
Scientific journal
SPORTSKI LOGOS

VOLUME 18 • ISSUE 32 • DECEMBER 2020.



ISSN 1512 – 875X (print)

ISSN 2233 – 0852 (online)

SPORTSKI LOGOS



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SCIENTIFIC JOURNAL

vol.18, issue 32, 2020.

Published by: Dzemal Bijedic University of Mostar, Faculty of Education Mostar , Department of Sport and Health

EDITORIAL OFFICE

Web: www.nf.unmo.ba

E-mail: sportski.logos@unmo.ba

Phone/ fax: +387 36 571-216

Address: Nastavnički fakultet, Sjeverni logor bb, 88104 Mostar, Bosnia and Herzegovina

For Publisher: dr. sci. Ekrem Čolakhodžić

Editor in chief: dr. sci. Rijad Novaković

Responsible Editor: dr. sci. Ekrem Čolakhodžić

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Printed by: „IC štamparija“ Mostar

Printed in 200 copies

Indexed in: Index Copernicus; EBSCOHost; COBISS.BA; ISI; Sponet.

The authors of the papers bear all responsibility for the entire content of the manuscript.

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CONSUMPTION OF STIMULATING AGENTS IN SPORT

Amel Mekić, Elvira Nikšić, Erol Kovačević, Sanel Čičić, Edin Beganović and Erol Vrević

Abstract: Nutrition is an extremely important factor for every person, especially those who do sports. Food provides the energy needed for growth, physical activity and other bodily functions. The needs of modern sports are increasingly including various dietary supplements in the diet of athletes. They are indispensable so that athletes can be adequately and better prepared for competitions and sports care in general. The aim of this research is to examine and determine the level of knowledge and attitudes of people from different spheres of society about the consumption of stimulants in sports. The sample of respondents consists of N = 1050 people from different spheres of society. For the purposes of this research, a survey questionnaire was constructed, which was conducted online. All data collected by the survey were processed by descriptive statistics procedures. Frequencies and percentages were calculated from the space of descriptive statistics. Out of the total number of respondents, 49.8% of respondents were engaged in recreational sports, of which a large number exercised in the gym or used to do sports. There were 25.8% of active athletes, while there were a total of 24.4% of those who do not do sports. 56.2% of respondents believe that stimulants are necessary only in professional sports. 22.7% answered that stimulants are necessary in modern sports, while 21.1% said that stimulants are not necessary in modern sports. Most respondents consume 445 proteins (43.3%) and 327 minerals (32.6%). Vitamins are used by 288 (28.7%), amino acids by 286 (28.5%), and herbal preparations by 68 (6.8%) respondents. All offered supplements are consumed by 100 (10%) respondents, while 68 (6.8%) use some other dietary supplements. 36.9% of respondents do not consume supplements at all, while daily consumers of dietary supplements make up slightly more than a quarter of respondents, 25.2% of them. As a source of information on the use of stimulants, they cite nutritionists (27.3%) in the first place, pharmacists (25.5%), doctors (21.6%), trainers (21.3%), and the media (18.3%) and some other persons (10.7%). 28.9% of them think that illicit preparations and stimulants are often used, and 18.5% do not think they are used. A total of 45.4% believe that the use of stimulants is necessary in achieving the desired sports results, while 38.8% state that stimulants are not necessary in sports. According to the answers, 15.9% of respondents do not have enough information on this topic. Knowledge and attitudes about the consumption of illicit stimulants in sports by ordinary people are generally limited, while athletes are much more familiar with this issue. However, modern dietary supplements that more and more people use as dietary supplements have shown that even people who are not in the world of sports have certain knowledge about illicit substances present nowadays.

Keywords: Different spheres of society, stimulants, sports, attitudes, knowledge.

INTRODUCTION

The needs of modern sports are increasingly including various dietary supplements in the diet of athletes. They are indispensable so that athletes can be adequately and better prepared for competitions and sports careers in general. Many scientists and sports workers overlook attitudes related to supplements, and view them differently. Some of them are not allowed for consumption, while others are an urgent need of athletes. Incentives give athletes a certain advantage in strength and endurance. There are more and more people in the world of sports with the attitude that various stimuli are necessary in achieving better sports results, and that as such they are widely used, especially in top sports. The desire for success often overcomes reason, so athletes resort to consuming illicit drugs and this is called doping (Tahiraj, 2015). Training and nutrition play a key role in achieving optimal sports results. Based on that, very significant effects can be achieved in improving training and sports achievements. Inadequate nutrition reduces the overall performance of the athlete, and especially the optimal mobilization of his biological abilities. Nutrition,

hydration and recovery are part of the so-called invisible training that has a big impact on the sports result. Training and nutrition are closely related, because intensive training causes increased metabolic, physical and mental activity, and the energy needs of athletes are greater than the needs of people who are not actively involved in sports. The quality composition of food, the relationship between proteins, fats and carbohydrates, the need for vitamins and mineral salts largely depends on the specifics of various sports activities. Different types of effort and load in different sports require proper nutrition, each for itself. Optimal nutrition must take into account not only the specifics of a particular sport, but also the different stages of preparation and competition. These include the preparation period, the pre-competition period, the competition period itself and finally the recovery and regeneration period. It should be taken into account that an athlete who plays a sport in which endurance is the dominant factor requires a different diet than an athlete for whom strength is an important factor (Mikić and Ahmetović, 2006). The use of illicit substances in

sport falls under the category of doping, and sports regulators are taking steps to prevent it. Sports are regulated by rules, which include a ban on doping. The most famous of these is the World Anti-Doping Code, implemented by the World Anti-Doping Agency (WADA), which publishes a list of banned substances and methods, in order to "protect the fundamental right of athletes to compete in doping-free sports" and thus ensure "health, honesty and equality of athletes around the world" (WADA, 2019). The first name associated with the use of doping is Abraham Wood, who used opium in 1807 to stay awake for more than 24 hours, and managed to win by crossing 837 kilometers in 138 hours (Aleksić and Savić, 2015). The first proven sporting case of doping was recorded in 1864 at the Bordeaux-Paris bicycle race, using Trimetin. The first victim was cyclist Linton. The epidemic of modern doping today began just over two decades ago, in the 1950s, as a result of the unfortunate combination of the circumstances of the American hammer thrower Harold Connolly. He was later given paralysis, and due to stunted muscles, he was recommended to use the preparation dianabol as a young man. After taking the drug for a long time, the muscles began to develop rapidly, and Connolly won Olympic gold in Melbourne in 1956. That's how anabolics - through Connolly's Olympic gold - entered the sports field. They entered through a small door, and now they cannot be expelled in any way (Mikić and Ahmetović, 2006). The potential properties of stimulants in increasing athletic performance are based on their impact on the central nervous system and the ability to perceive fatigue. They increase alertness, boost self-confidence and stimulate the heart and blood flow to the trained muscles. They achieve this by increasing their secretion of neurotransmitters and activating their receptors. WADA lists over 60 substances with similar content in this category (Docherty, 2008). The Finnish weightlifter, Kangasnjemi, an Olympic ace and world champion by his own admission, was under emotional pressure for many years after he stopped taking anabolics, in serious psychological crises, in a severe depressive state, apathetic, anxious and irritable. Swedish wrestler Svenson felt similarly. These first dopings had great consequences, they also caused high blood pressure, headaches and urinary problems, and they also increased cholesterol levels. If these pills are taken in large quantities, instead of contraceptives, they become hormonal doping of unprecedented proportions that really improves sports results, but reduces most other things and causes negative and sometimes catastrophic consequences for the body (Mikić and Ahmetović, 2006). WADA highlights the results of 269,878 samples analyzed during 2013, of which 5,962 (2.21%) indicated "atypical findings". The relatively recent introduction of blood sample tests was made possible by a study conducted on 2737 athletes, mostly long-distance runners, who indicated that the

prevalence of doping in blood (any method that increases red blood cell mass and increases oxygen transport) is 14% (Sottas, 2011). Violations of doping rules were also observed in Paralympic sports, in less than 1% of cases. When test results were positive, they were usually anabolic agents, and sports were mostly strength disciplines (Bird et al., 2016). At lower levels of competition, the prevalence of illicit substances is as follows: 43% anabolic androgenic steroids (AAS) and 12% growth hormone (hGH) or insulin-like growth factor (IGF-1) in young male weightlifters. It is estimated that 4-6% of male and 1.5-3% of female athletes have taken AAS over a period of time (Harmer, 2010). Long-term adaptations, such as structural and physiological changes in the skeletal muscles and cardiovascular system, increase the body's ability to cope with the demands of subsequent training and activities, for example through increased oxygen delivery and utilization capacity or increased contractile muscle protein. which they can accomplish. Such adaptations, ie improvements, enable a person to potentially reach higher levels of performance in subsequent trainings or competitions (Bird et al., 2016). The prevalence of doping can be determined by surveys or doping tests of athletes, but both methods have drawbacks. Survey data are limited by different definitions of doping and taking certain banned substances due to social reasons rather than reasons for improving sports performance (say cannabinoids), as well as unreliability in terms of honestly reporting one's own illegal behavior (Harmer, 2010). On the other hand, data obtained from clinical tests of blood or urine samples may underestimate the degree of doping if the time of sampling does not correspond to the time window in which the substance or its metabolites are present in the sample. The use of doping agents is not limited to competitive sports. They are widely used for aesthetic reasons and "body styling" for both younger and adult men and women. Because it is primarily about increasing muscle mass and reducing the proportion of adipose tissue, AAS are the most common. Cases in which the U.S. Drug Enforcement Administration (DEA) has seized millions of doses of steroids and hGH indicate widespread use of doping agents (Bird et al., 2016).

WORKING METHODS

The sample consisted of people of different ages and genders. A total of 1,050 people from different spheres of society were surveyed. The largest number of respondents came from the field of sports. Some are active athletes, and some play sports recreationally or have done so. Also, there were a number of people who were not active in any sport. The research was conducted in accordance with the recommendations of the Declaration of Helsinki and participation was voluntary

Table 1. The structure of the sample of respondents with regard to gender

Gender	Percentage (%)
Male	60,4
Female	39,6
Total	100,00

Table 2. The structure of the sample of respondents with regard to age

Age	Percentage (%)
15-20	12,6
20-25	36,9
25-30	29,3
Over 30	21,2
Total	100,00

The questionnaire consisted of two parts. In the first part, the socio - demographic characteristics of the research participants were examined, and in the second part, the respondents were examined about the consumption of stimulants in sports. For the purposes of this research, an online anonymous questionnaire was purposely formulated, consisting of 20 multiple-

choice, closed-ended questions. All data collected by the survey were processed by descriptive statistics procedures. Frequencies and percentages were calculated from the space of descriptive statistics. The statistical program for personal computers SPSS for Windows-version 20.0 was used for data processing.

RESULTS

Table 3. Review of respondents' answers to the question: "Do you practice sports?"

Variables	Percentage (%)
Yes, actively	25,8
Recreationally	49,8
I don't practice sports	24,4
Total	100,00

Table 4. Review of respondents' answers to the question: "Are you familiar with the consumption of stimulants in sports?"

Variables	Percentage (%)
Yes	37,6
No	29,7
Partially	32,7
Total	100,00

Table 5. Review of respondents' answers to the question: "Do you think that stimulants are necessary in modern sports?"

Variables	Percentage (%)
Yes	22,7
Yes, but only in professional sports	56,2
No	21,1
Total	100,00

Table 6. Review of respondents' answers to the question: "Do you use different supplements?"

Variables	Percentage (%)
Yes	50,0
No	50,0
Total	100,00

Graph 1. A review of the most widely used dietary supplements

Koje dijetetske supleme najviše koristite?

1.004 odgovora

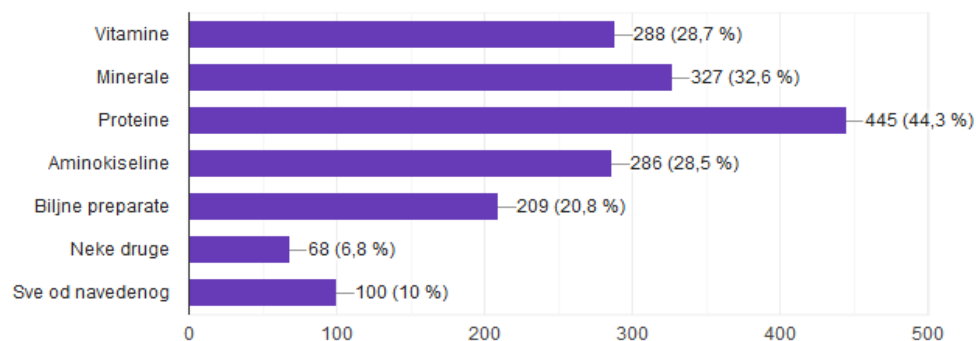


Table 7. Review of respondents' answers to the question: "How often do you use dietary supplements?"

Variables	Percentage (%)
Daily	25,2
2-3 times a week	37,9
Never	36,9
Total	100,00

Table 8. Review of respondents' answers to the question: "Have you had any side effects since using the supplements?"

Variables	Percentage (%)
Yes	31,5
No	68,5
Total	100,00

Table 9. Review of respondents' answers to the question: "Where do you get the supplements you use?"

Variables	Percentage (%)
Farmacy	25,4
I order online	32,8
At the gym	30,8
From my coach	11,0
Total	100,00

Table 10. Review of respondents' answers to the question: "What are the main reasons for using illicit stimulants in sports?"

Variables	Percentage(%)
Health promotion and dietary supplement	16,5
Energy boost	19,1
Weight loss or gain	21,2
Building muscle mass	15,0
Achieving better sports results	16,6
All of the above	11,5
Total	100,00

Graph 2. The most important sources of information on the use of stimulants in sports

Koji vam najznačajniji izvori informacija o korištenju stimulativnih sredstava u sportu?

1.022 odgovora

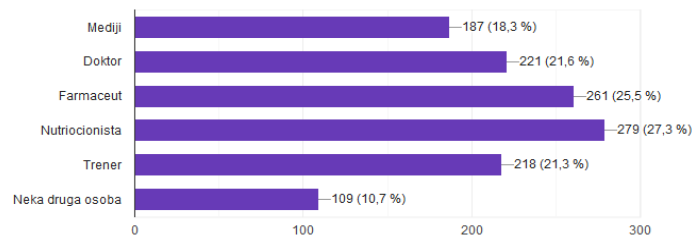


Table 11. Review of respondents' answers to the question: "Do you feel that you are sufficiently and adequately informed about the benefits and risks of using stimulants in sports?"

Variables	Percentage (%)
Yes	24,5
No	41,0
Partially	34,5
Total	100,00

Table 12. Review of respondents' answers to the question: "Are you familiar with the list of banned substances in sports?"

Variables	Percentage (%)
Yes	29,3
No	37,3
Not enough information	33,5
Total	100,00

Table 13. Review of respondents' answers to the question: "What is your opinion on penalties for those who have used doping or illicit stimulants in professional sports?"

Variables	Percentage(%)
Life ban	18,6
The first time a milder punishment, and the second time a life ban	34,4
Prohibition of participation in competitions for several seasons	33,0
Fines	9,9
It shouldn't be punished	4,1
Total	100,00

Table 14. Review of respondents' answers to the question: "Would you use illegal stimulants?"

Variables	Percentage (%)
If I knew they would be helpful	16,9
If I knew they would be helpful, and will not harm my health	47,7
I would not use it at any cost	35,5
Total	100,00

Table 15. Review of respondents' answers to the question: "Would you take an illicit substance or stimulant if you knew you couldn't be detected?"

Variables	Percentage (%)
Yes	34,7
No	65,3
Total	100,00

Table 16. Review of respondents' answers to the question: "How many times have you been tested for banned stimulants?"

Variables	Percentage (%)
Never	59,7
1-2 times	16,2
2-5 times	17,2
More than 5 times	6,9
Total	100,00

Table 17. Review of respondents' answers to the question: "Do you think that illicit preparations and stimulants are used in your sport in order to achieve the best possible result?"

Variables	Percentage (%)
I don't think they are used	18,5
I don't know if they are used	33,7
They are rarely used	28,9
They are widely used	19,0
Total	100,00

Table 18. Review of respondents' answers to the question: "Do you think that the use of stimulants is necessary in achieving the desired sports results?"

Variables	Percentage (%)
Yes	45,4
No	38,8
Lack of information	15,9
Total	100,00

DISCUSSION

Modern sport is demanding and conceived significantly differently from what it was twenty, thirty or fifty years ago. It requires a different training regime, but also a significantly improved diet with various stimulants and supplements that often exceed the allowable limit (Malacko and Rađo, 2004). The research, which was conducted among the respondents, provided answers to numerous questions about the understanding of

athletes, but also people who do not play sports about consumption and general knowledge of the use of illicit stimulants. A total of 61% of respondents are male and 39% female. It should be noted that a larger number of men is mainly related to the fact that the survey is divided into several gyms where the ratio of men to women is approximately as on the question asked. Women are certainly an equal participant in the discussion of this topic, and some of them are also active athletes, and therefore more than competent.

The age structure of the respondents ranged from 15 years onwards. From fifteen to twenty years of age, there were 12.6% of respondents. The largest number of people who completed the questionnaire is between the ages of twenty to twentyfive. Statistically, 36.9% of them belong to this age group. Slightly less than one third or 29.3% of them are between twenty-five and thirty years old. Over thirty years, the survey participants were a total of 12.6%. These figures support the fact that the participants in the research were mostly younger people, and most of them are between twenty and thirty years old. There were 49.8% of recreational athletes, a large number of whom exercised in the gym or once did sports. There were 25.8% of active athletes, while there were a total of 24.4% of those who do not do sports. This set of respondents significantly redirected the results to the fact that they will be different, and that unanimity will not prevail. About the importance and necessity of stimulant means in modern sports, the respondents answered with 56.2% of answers that they are necessary only in professional sports. 22.7% of them answered that stimulants are necessary in modern sports, while slightly less, 21.1% said that stimulants are not necessary in modern sports. The answers to these questions should be sought in the fact that a certain number of respondents are not so well versed in the subject or stimuli and their role in general about sports. A similar study was conducted on a sample of respondents from 187 top athletes. The survey was conducted in sports such as table tennis, tennis and badminton. This research is interesting because all respondents were professional athletes, so the results were quite expected and predictable. The only difference was in the sports and the needs they required. Between 10% and 24% of male athletes surveyed would take doping if such a practice would allow them to achieve better results and not endanger their health, while between 5 and 10% of respondents would take doping regardless of the possible health consequences. The female part of the respondents was generally less oriented towards taking substances, with no difference between sports, except for badminton. 20% of respondents practice going out where alcohol and cigarettes are consumed. It has been found that athletes do not trust doctors and their coaches much when it comes to taking illicit stimulants (Kondrič et al., 2011). When asked about the use of dietary supplements, respondents were able to give more answers or choose some others or all that were offered. According to the survey, most respondents consume proteins and minerals, ie 445 (43.3%) and 327 (32.6%) of them. Vitamins are used by 288 (28.7%), amino acids by 286 (28.5%), and herbal preparations by 68 (6.8%) respondents. All offered supplements are consumed by 100 (10%) respondents, while 68 (6.8%) use some other dietary supplements. This issue is related to all active and recreational athletes, as well as ordinary people. Diet

and the use of supplements are a very important factor in modern times when the pace of life is extremely fast and active. Regarding the use of dietary supplements, a larger number of respondents answered that they consume them two to three times a week. 36.9% of respondents do not take them at all, while daily consumers of dietary supplements make up slightly more than a quarter of respondents, 25.2% of them. About 31.5% of respondents had side effects from the use of supplements, while 68.5% of them used supplements without any side effects or problems. Adverse reactions could be reported by those who do sports, as well as recreational athletes, given that a significant number of them use various dietary supplements. About where they get supplements, respondents said that about 32.8% of them order from the Internet. Slightly less respondents take them in the gym, while 25.4% takes them in the pharmacy. The smallest number of respondents, 11% of them receive supplements from coaches. This is certainly about top and active athletes for whom the coach is a mentor and takes care of their diet. In his doctoral thesis, the author conducts research on the relationship of sociodemographic, health and sports predictors with doping factors in sports that require the application of high energy requirements, high technical requirements and high tactical requirements, was done in three studies. The sample of respondents consisted of a total of 293 athletes, who are older than 18 years. When the results were later compared, it was concluded that research shows that substance abuse in sports spreads beyond those that enhance sports performance such as high alcohol consumption. The research also showed that anti-doping tests are significantly advanced, and in the later period it will be much harder to remain negative in tests (Rodek, 2013). Respondents answered similarly and uniformly about the reasons for using stimulants in sports. 21.2% of them believe that the motive for using stimulants is related to the need to reduce or increase body weight. Here, in response, people who lose weight or go to the gym to gain weight can be seen. A total of 19.1% of respondents believe that stimulants are taken to increase energy, while 16.6% of them say that it is about achieving better sports results. The same statistic applies to the answer regarding health promotion and dietary supplementation. A similar study was conducted in London on a sample of a total of 346 athletes, of whom 28 were men and 138 women. The average age was 17 and most athletes were minors. They were respondents from different sports, and most of them played football. About 14% of athletes said they would take illicit stimulants to improve their success without being detected. 10% of them would use illicit stimulants in addition to control if it would bring them some success. This research proved that younger athletes are much more careless and ambitious, and their consumption of illicit drugs is more pronounced (Bloodworth & McNamee, 2010).

The use of drugs to improve physical performance and appearance has been observed for thousands of years. Today, individuals, including adolescents, continue to use a wide range of medications in hopes of improving their athletic performance and looking better. Unfortunately, other than evaluating the use of anabolic-androgenic steroids (AAS), very little is known about the use, safety, and efficiency of other performance-enhancing drugs and dietary supplements in adolescents. Most studies tell us that 3-12% of adolescent men admit to using AAS at some point in their lives. Among adolescent women, studies reveal that 1-2% state that they have used steroids. In order to change the current use of drugs to improve performance in adolescents, we as a society must confront our dependence on sport and the importance we attach to victory and performance (Yesalis & Bahrke, 2000). According to the respondents, the most important source on the use of stimulants in sports is a nutritionist (27.3%), pharmacist (25.5%), doctor (21.6%), coach (21.3%), media (18.3%) and another person (10.7%). This question also belongs to the "universal" because almost all respondents were able to give a valid answer. Also, it should be emphasized that the respondents had multiple choices in this matter, and that rightly the pharmacist, doctor and coach have the most information on such topics. Respondents gave different answers in the questionnaire about sufficient information about the benefits and risks of using stimulants. 41% of them think that they are not familiar enough, 34.5% answered partially, while 24.5% answered YES. This last answer is probably about professional athletes. 29.3% of respondents are familiar with the list of banned substances in sports. 33.5% of them do not have enough information, while 37.3% of people are not familiar with illicit substances in sports. Penalties for doping are a daily occurrence in sports, and respondents answered these questions quite harshly. They mostly demanded rigorous punishments. 34.4% of them believe that consumers of illicit drugs should be punished after one violation with a milder punishment, and the second time with a life ban. Slightly less, ie 33%, believe that the relevant punishment is a ban on participating in competitions for several seasons, and 18.6% are of the opinion that athletes should be punished with a life ban. A fine was somewhat less represented as an answer, while an almost imperceptible answer was that athletes should not be punished. The issue of taking illicit stimulants was more related to those who play professional sports. The response was quite dominant and negative (NO). As many as 65.3% of them answered like this, while 34.7% of respondents answered in the affirmative (YES). Here it can be noticed that the desire to succeed and achieve a top sports result is ahead of fair play. It should come as no surprise that at all major sports competitions, top athletes are punished for doping. On the other hand, a total of 59.7% of

respondents had never been tested for prohibited stimulants. 17.2% of them were tested 2 - 5 times, and 16.2% 1 - 2 times. A number of respondents have been tested more than five times and obviously these are top athletes. Sekulić et al. (2010) investigated the use of substances in 16 female and 9 male professional Croatian ballet dancers using an adequate survey questionnaire. All factors that include those activities outside of training were analyzed. The calculated frequency tables and rank correlation coefficients showed that one third of male dancers do not lead a healthy life and practice going out to places where alcohol and tobacco are consumed. In this survey, as many as 20% of women consume more than a pack of cigarettes a day. Almost 25% of dancers would use doping if it meant a successful ballet performance, regardless of the negative health consequences. In men, the risk of potential "doping" behavior increases with age, while in women the level of education is negatively associated with smoking, but positively with potential "doping" habits and behavior. The results indicate an evident need for more specific medical and/or psychological assistance in professional ballet. Similar research has been conducted by a number of authors. Former retired athletes took part in the research. They suggested that there were significantly fewer doping agents during their practice in sports, and those who took doping could hardly be detected unlike today. Current athletes who used a doping motive found it in the fact that they achieve the best possible result and that was the only reason (Erickson et al., 2016). Our research is significant because it offered a completely new approach in which the emphasis was placed on both active athletes and those who have completed their careers. 33.7% of respondents are not familiar with the use of preparations and stimulants in certain sports and think that they are not used. 28.9% of them think that illicit preparations and stimulants are often used, and 18.5% do not think they are used. The last question in the questionnaire referred to the use of stimulants, ie the necessity in achieving sports results. A total of 45.4% believe that the use of stimulants is necessary in achieving the desired sports results, while 38.8% state that stimulants are not necessary in sports. According to the answers, 15.9% of respondents do not have enough information on this topic. The research brought interesting results and is "universal" in that not only top athletes participated in this research, so at the beginning it should be noted that the answers were quite different. When it comes to understanding this topic, people have different views. They can often be attributed to the fact that many of them are not familiar with the consumption of illicit stimulants in sports.

CONCLUSION

Based on the conducted research, it is possible to make a clear conclusion about the knowledge and attitudes of people from different spheres of society about illicit

substances and their application in sports. Talking about this topic has long been marginalized, and those who have been victims of doping are usually stigmatized in society. However, lately, more and more people can read about this topic in the mass media, so that the respondents, some less, and some more are familiar with illicit substances and their application in sports. The answers we came to were expected given the concept of the questions asked and the different attitudes of the respondents. Among the respondents were active athletes and those who use some of the dubious stimulants for improved appearance and muscle mass development. The survey was also conducted in several gyms and sports clubs. In addition to athletes, people who did not have so much contact with illicit substances and some sports in general gave their views on this issue, so the quality of research is viewed from the angle of different attitudes and ideas that are explained in the discussion and results. That is why it is important to mention different data that were obtained because they represent a picture of thoughts and ideas of over a thousand respondents, so they can be used to accurately explain and see a clear attitude of people on this topic. Knowledge and attitudes about the consumption of illicit stimulants in sports by ordinary people are generally limited, while athletes are much more familiar with this issue. However, modern supplements, which more and more people use as dietary supplements, have shown that even people who are not in the world of sports have certain knowledge about illicit substances present nowadays.

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Corresponding author:

Dr. sci. Amel Mekić, associate professor
Faculty of Sports and Physical Education, University of Sarajevo
e-mail: amelmekic21@gmail.com

IMPACT OF CERTAIN ELEMENTS OF HANDBALL TECHNIQUE ON THE OCCURRENCE OF SCOLIOSIS IN FEMALE HANDBALL PLAYERS

Luka Posavac, Sanja Mišura, Stanislav Dragutinović and Ivana Čerkez Zovko

Abstract: Handball game is characterized by dynamism and mobility, with constant and fast changes in body position and technique elements. The asymmetric shape of burden in addition to high number of jumps and landings on hard surfaces effects adversely the loco motor system. Sudden growth in adolescent growth and inability of musculoskeletal system to support these sudden changes leads to improper body postures (scoliosis, kyphosis, lordosis). The aim of this research is to determine whether certain elements of handball play, basic passing from the shoulder, basic kicks from ground, kicks from jump of the same leg, kicks of the step next to body, kick with deflection, kick from the jump and running the ball, affect occurrence of scoliosis in female handball players of HŠRK Zrinjski. The results of this research on 20 respondents shows that six of them (30%) are with normal body posture (mostly respondents aged 2009. active in handball for one year). Left-side scoliotic posture is determined in three respondents (15%), of whom all respondents with dominant left hand. Right-hand scoliotic posture is determined in 11 respondents (55%) of whom all respondents are with dominant right hand.

Keywords: handball, scoliosis, improper posture

INTRODUCTION

Handball game is characterized by dynamism and mobility, with constant and fast changes in body position and technique elements. Handball is a sport of complex polystructural movements in which there is a whole range of different movements (step, cross step...), jumps (in smash, block, shout...), throws and falls (dive, roll...), sprints, static endurance in a pose, kicks (Janković, Marelić & Janković, 2003). Due to a certain characteristics of handball as a sport (parts of techniques asym-metric due to one hand play), there is a reasonable suspicion that handball players are exposed to fac-tors that can cause development of posture deformities.

The asymmetric shape of burden in addition to high number of jumps and landings on hard surfaces effects adversely the loco motor system. Sudden growth in adolescent growth and inability of muscu-loskeletal system to support these sudden changes leads to improper body postures (scoliosis, kyphosis, lordosis). Because improper body posture can take various forms which have been defined by various authors as body posture types (Aagaard& Jørgensen, 1996).

Scoliosis, as diagnosis, is very often used in chil-dren today even in situations where there is no medical basis for it. Namely, if a child has asymmetric position of shoulder, shoulder blades or pelvic denivelation, that is not necessarily a sign of scoliosis. More often that are signs of poor posture and they occur as a results of preferring one side of body (especially seen in children in handball, but other sports as well). In order to define poor posture as scoliosis there must be specific curvature of the spine. This can be visible in vertical position, and especially visible in inclination movements when specifically elevated rib arches (gibus) are visible on one side of the back and the spine itself has line of convexity in one (side of elevated rib arches) and concavity to the other side. Then the

degree of scoliosis can be accurately determined with scoliometer.

The subject of this work are certain elements of handball technique (basic passing from the shoul-der, basic kicks from the ground, kicks from step of the same leg, kicks from steps next to the body, kick with deflection, kick from a jump and running the ball).

The problem are certain elements of handball technique that can negatively affect body posture due to occurrence of muscle imbalance, because some muscle groups and topographic regions of body are not equally active and can affect the development of different types of poor posture.

The aim of this research is to determine whether certain elements of handball play, basic passing from the shoulder, basic kicks from ground, kicks from jump of the same leg, kicks of the step next to body, kick with deflection, kick from the jump and running the ball, affect occurrence of scoliosis in female handball players.

METHODS

The research is conducted on the sample of fe-male players training in the HŽRK Zrinjski (players who passed all selections in this club and are just starting from mini handball). Female handball play-ers aged 11-24 (20 in total) are tested by the Adam's forward bend test and morphological dimen-sions (arm length and dominant arm).

We used scoliometer to determine functional sco-liosis (lumbar and thoracic), and for morphological characteristics centimetre tape is used.

Adam's forward bend test: the subject comes in forward bend from standing position, chin is on the chest, palms folded, arms extended in elbows, scoliometer is placed on the top of vertebra (for

thoracic in thoracic part, for lumbar in lumbar part of the back), expressed in degrees.

Arm length: measured in standing position from the acromion point (processus acromialis) to the top of the longest finger (daktylion point), expressed in centimetres (cm).

RESULTS

This chapter presents results of the research work. Results are obtained based on research conducted

among female members of the HŽRK Zrinjski Mostar and data obtained by statistical processing.

Of the 20 respondents, six (30%) are with a normal body posture (mostly respondents aged 2009. active in handball for one year). Left-side scoliotic posture is determined in three respondents (15%), of whom all respondents with dominant left hand. Right-hand scoliotic posture is determined in 11 respondents (55%) of whom all respondents are with dominant right hand.

Table 1. Comparison of respondents' posture

RESPONDENTS	DOMINANT ARM	LEFT-SIDE POSTURE	RIGHT-SIDE POSTURE	NORMAL POSTURE
1996	Right		Yes	
1997	Right		Yes	
1997	Left	Yes		
2002	Right		Yes	
2002	Right		Yes	
2004	Right		Yes	
2004	Right		Yes	
2004	Right			Yes
2004	Right		Yes	
2005	Left	Yes		
2006	Right		Yes	
2006	Right		Yes	
2006	Right		Yes	
2006	Right			Yes
2006	Right		Yes	
2009	Right			Yes
2009	Left	Yes		
2009	Right			Yes
2009	Right			Yes
2009	Right			Yes

Of the 17 respondents with dominant right hand, 11 respondents have right-side scoliotic posture (64,7%) while the other six have normal scoliotic body posture

(35,2%). All 20 respondents does not have the same length of left and right arm.

Table 2. Comparison of respondents' arm length

RESPONDENTS	LEFT ARM LENGTH	RIGHT ARM LENGTH
1996	75	77
1997	77	78
1997	76	75,5
2002	75,5	77
2002	72,5	72,5
2004	68	70
2004	71	68
2004	75	78
2004	76,5	75
2005	72	71
2006	72	73
2006	70	70,5
2006	69	68,5
2006	70	72,5
2006	70,5	70,5
2009	64	65
2009	56	55
2009	58,5	59
2009	57	58,5
2009	70,5	70,5

The dominant arm affects occurrence of thoracic (-0,57) and lumbar scoliosis (0,56). This was proved by regression analysis which is Multiple R=0,71. Error is $p=0,002$ meaning result is statistically significant.

Regarding the correlation between number of respondents and year of their training with lumbar and thoracic scoliosis, the results are as follows:

- correlation between respondents and thoracic scoliosis is -0,32, meaning there is statistical correlation between variables ($p=0,5$)
- correlation between respondents and lumbar scoliosis is -0,47, meaning there is statistical correlation between variables ($p=0,5$)
- year of training are statistically correlated with thoracic scoliosis (0,21) and lumbar scoliosis (0,41). This confirms error of $p=0,5$.

Table 3. Correlation of respondents with type of scoliosis

	THORACIC SCOLIOSIS	LUMBAR SCOLIOSIS
RESPONDENTS	-0,32	-0,47
YEAR OF TRAINING	0,21	0,41

DISCUSSION

The research is conducted among all female handball players of the HŽRK Zrinjski aged 11-24. This condition is satisfied by 20 female players who participated in the assessment of body posture in the frontal plane. It is proved that right-side scoliotic posture prevails in 55% of players. 30% of players has normal posture and 15% left-side scoliotic posture. The obtained difference is statistically significant. Respondents with dominant right hand more often had right-side scoliotic posture in regard to respondents with dominant left hand (Multiple $R=0,71$; $p=0,002$). In the general population almost 90% of people are right-handed (Incel et al., 2002). Goldberg et al. (1990) found in right-handed correlation between use of a hand and prevalence of right-side thoracic curvature in adolescent idiopathic scoliosis. But, this correlation was not correlated in left-handed children. It is determined that the direction of spine curvature in this group is randomly distributed.

Hans-Gerd Pieper (1998) proved that sport specific by certain one-side exertion for upper extremity, during growth can lead to changes of soft tissues and bones. The research conducted on professional tennis players showed hypertrophy of upper arm bone on X-rays on the dominant arm i.e. the one that is more active in sport. The difference in cortical bone thickness of dominant and non-dominant arm is response on exercise and increased physical effort (Jones et al., 1977). The obtained difference is statistically significant.

A statistically significant difference in hand length regarding dominant arm was found in respondents with right-side scoliotic posture. Catching the ball with one hand in handball players certainly contributes to this result, which affects the difference in the length of hand, especially fingers. It is proved that athletes with dominant right arm have longer right arm, longer hand and larger upper arm circumference compared to the left. All differences are also confirmed as statistically significant for left-handed athletes. Results of other researches also confirm the obtained results. Milvi and Toivo (2007) found that in handball longer fingers are correlated with more precise shots and throws. Every shot and throw is finishing with the movement of wrist and fingers. Athletes with longer fingers and larger palm are likely to have greater grip.

CONCLUSION

The main goal of the research is to determine frequency of irregularity in body posture in young female handball players. It was necessary to assess which type of body posture prevail in female handball players to solve possible impact of hand-ball and

bilateral differences on disturbances in stato-dynamic connections in loco motor system.

In this research, scoliotic body posture was found in 70% players, 55% has right-side scoliotic posture, 15% left-side scoliotic posture, and 30% of them has normal body posture. Female players are 80% right-handed and 20% left-handed. Assessing bilateral differences between extremities, it was found that right-handed have longer right arm which is also true for female athletes with dominant left arm. A significant prevention of right-handed with right-side scoliotic posture was determined.

The obtained results assume that handball, in addition to positive effects on improper body posture, can have negative effect due to possible occurrence of muscle imbalance since certain muscle groups and topographic body regions are not equally active and may affect the development of different types of improper body posture. All this supports the fact that number of respondents with scoliotic posture increases with years of training ($p=0,5$). If we compare results of this research with results of some previous researches, it can be said that a similar contribution of certain measures and assessments of body posture was made. Results of this research on the sample of 20 female handball players show existence of certain improper body postures. It can be assumed that problem of improper body postures in handball players is correlated to regular sports.

In order to prevent on time occurrence of deformities of athletes' bodies, coaches are obliged to engage competent person for this and follow his/her instructions. Each training should have mobility exercises, muscle stretching, extensor and abdominal muscle strengthening and breathing exercises. Exercises can be performed in different positions: on the stomach, on the hip, on the back, in standing position, sitting position. To strengthen a muscle, exercises can be performed with own body load or with some aids that can help to strengthen muscle. If a body deformity occurred in athletes, then exercises should be adapted to an athlete. Exercises for scoliosis include different symmetrical exercises that establish proper posture reflex to strengthen abdominal and back muscles and increase spine stability, and asymmetrical exercises to mobilize spine, stretch shortened muscles of concave side and strengthen muscles of pulled convex side. Physical therapy also include general fitness exercises that indirectly affects the convection. Training should be adapted to the age of athlete with the emphasize on general physical preparation and not just specifics of the sport.

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Corresponding author:**Luka Posavac**

Faculty of Science and Education, University of Mostar
 e-mail: luka.posavac@fpmoz.sum.ba

THE CANONICAL CONNECTION BETWEEN MOTOR ABILITIES AND SITUATIONAL-MOTOR ELEMENTS OF THE WATER POLO GAME

Alma Dizdar , Edin Mirvić, Džan Lemeš and Amira Bazdarević - Rašidagić

Abstract: The main goal of this research is to determine the relations and the influence of motor abilities on the result in performing situational - motor elements of the water polo game in water polo players aged 13 to 15 years old. The variables measured in this sample are as follows: In the motor skills field, 12 tests were applied that represent the basis of motor skills in the water polo game. In the field of situational - motor tests, 6 tests were applied, which represent the basis for the application of elements of water polo technique in the situational conditions of the game. For a better quality analysis of the treated variables, as well as the magnitude of the mutual influences, canonical correlation analysis was applied. Based on the obtained re-sults of the canonical correlation analysis of motor abilities and situational - motor elements of the water polo game, significant connections between the treated areas were obtained. It can be concluded that water polo players, who have a higher (general) level of all applied basic motor skills, especially explosive and static strength, agility, speed endurance in swimming with water polo crawl, flexibility of the whole body have a greater opportunity to achieve better results in situational - motor elements of the water polo game which makes one team more successful.

Keywords: Water polo, canonical correlation analysis of motor abilities and situational-motor elements

INTRODUCION

Water polo, like any other sport, is a demonstration of various basic and specific motor skills through the application of technical elements of the game. Only well-developed basic motor skills can be a solid foundation for the development of specific motor skills. In the last few years, the game of water polo, given the system of competition at the top level that lasts for a long period of time, requires water polo players to have a high level of physical preparation that is carried out on land and in water. The game uses different movement tech-niques, without and with the ball (Trumbić, 2010). Research conducted by Polglaze et al. (2008) on the complexity of the water polo game for men, indicates the high intensity of repetitive technical elements of the players, due to the specificity in which the activities take place (water environment) as well as the fights with rival players. Coaches of younger age categories must pay more attention to the state of basic motor skills and pay special attention to the sensitive periods of their develop-ment and then the harmonization of these abilities, so that a certain movement can be reported in more complicated conditions, which is especially important for water polo. One of the important motor skills is coordination, which has a very important role for the best possible performance of all tech-nical and tactical elements of the game (Modrić et al., 2011), and ths indicates the need for even more intensive research of coordination in water polo. The research that has dealt with this problem so far is very scarce and does not provide too much information, so the importance of this paper is greater in theoretical and practical terms. The aim of this paper is to determine the connection between motor abilities and situational-motor abilities of the water polo game.

METHODS

Subjects

The sample consists of 70 male water polo players, aged 13-15, from the following water polo clubs of Sarajevo Canton, namely: Vaterpolo klub Akademija B, Vaterpolo klub Torpedo, Vaterpolo klub Mladost Sarajevo i Vaterpolo klub Dabar.

Procedures

A sample of predictor variables from the field of basic motor abilities of water polo players was per-formed using tests according to the tests of Kurelić et al., (1975) and tests of Eurofit battery (1988), as follows:

a) A movement structuring mechanism that represents the coordination and frequency of move-ments:

1. Agility in the air
2. Taping by hand
3. Taping by foot

b) The mechanism of synergistic regulation and regulation of tone, which represents the motor abil-ity of flexibility and balance:

1. A deep bow on the bench
2. Seat reach
3. Crossing on a low beam

c) The mechanism of regulation of the intensity of excitation, which represents the motor ability of speeds, explosive power:

1. Run 20m from a high start

2. Triple jump from place

3. Long jump from place

d) The mechanism of regulation of the duration of excitation, which represents the motor ability of repetitive power and static power.:

1. Hang in the joint

2. Torso lift in 30 seconds

3. Triceps dips

Sample of variables for assessment of situational - motor abilities

Determining the level of situational-motor abilities was performed using measuring instruments recommended by Volčanšek & Grčić-Zubčević (1984) and Bratuša (2010):

1. Swimming the 25m water polo crawl

2. Swimming the 50m water polo crawl

3. Swimming the 100m water polo crawl

4. Swimming 4x5m crawl-backstroke

5. Guide the ball 3x5m

6. Throwing a water polo ball out of the water

Description of the research

To ensure the regularity of this research process, approvals from relevant institutions and individuals were used in planning:

- all subjects were tested under the same conditions (air temperature ranged from 26 to 30 ° C, water temperature ranged from 24 to 26 degrees Celsius and the entire survey was conducted in the complex of Olympic pool Otoka Sarajevo);

- the research was conducted in such a manner that motor skills were measured first and then situational-motor skills;

- about all subjects prior to the measurement and testing process, explained in an acceptable way what was expected of them during the research period and what was required of them in this research, and the main motive was, curiosity and understanding of testing as an opportunity to test their own knowledge and knowledge about their motor skills;

- measurements were conducted in groups of 10 subjects each due to the limited space and time required for successful testing;

- one measurer and one scorer worked on each measurement

- during the measurement the subjects wore the proper testing equipment;

- after the test data were collected, the measurement lists were completed and the data were processed by appropriate methods for this research work.

Data processing methods

To determine the relations between motor skills and situational-motor elements of the water polo game, canonical correlation analysis was applied using the statistical package SPSS 12 for Windows.

RESULTS

Canonical correlation analysis was used to determine the relations between motor abilities and situational - motor abilities in water polo, which is an extremely suitable mathematical - statistical procedure in cases when it is necessary to determine the connection between two sets of variables.

The results of the canonical analysis for this research are presented in the tables from no. 1 to no. 3rd:

• In the column labeled (Canonical R), the coefficients of canonical correlation (function) are marked, which explains the connection between the two sets of variables.

• In the column labeled (Canonical R - sq) there is a% of common variability of the investigated fields.

• Under the label (Chi - sq) is marked the significance of the connections of the investigated areas.

• Under the designation (df) are freedom degrees.

• The level of significance of the pairs of canonical factors is presented in the column marked (p).

• In the column under the label (KF 1 and KF 2), the structure of isolated canonical factors is marked.

Canonical correlation analysis (Table 1), isolated two significant pairs of canonical factors (Canonical R) which explained the general connection between motor skills and success in performing situational - motor elements in water polo, at the degree of significance $p = .00$. The canonical function of the first canonical factor of these two sets of variables is quite high (Canonical R) = .94 which explains (Canonical R - sq) = 88% of the total variability of the set of motor abilities and situational - motor abilities. Significance of connections of investigated areas (Chi - sq) = 210.70. The canonical function of the second canonical factor is also high (Canonical R) = .82 and can explain (Canonical R - sq) = 67% of the common variability and the significance of the connections of the investigated spaces (Chi - sq) = 101.16.

First canonical factor in the space of variables for the assessment of motor abilities

The first canonical factor (Table 2) in the space of motor abilities, it is evident that a large number of variables have significant correlations with isolated canonical dimensions.

Correlated variables can be divided into three groups:

- The first group with the greatest correlation to which the following variables belong: Hang in the joint (-.59), Triple jump from the place (.59), Long jump from the place (-.54), A deep bow on the bench (.52).
- Another group with a weaker connection, which includes variables: Torso lift in 30 seconds (.34), Triceps dips (.30), Taping with the foot (.26) and Agility in the air (.21).
- The third group, which has zero connectivity, almost no connectivity, in this study have the following variables: Running 20 m from a high start (.03), Transverse standing on a low beam (-.02) and Seat reach (.01).

DISCUSSION

As tests from the field of power (static and explosive power) and flexibility have the most frequent projections on the first canonical factor in the space of motor abilities, this factor can be called the factor of explosive power. Precisely because of this fact, water polo coaches in the training process must pay more attention to the development of explosive power in water and on land. Of course, in all this, flexibility is very important, without which movements cannot be performed with maximum amplitude. Flexibility is also needed for the best and most efficient execution of all technical and tactical elements both in attack and defense.

First canonical factor in the field of variables for the assessment of situational - motor abilities

The first canonical factor (Table 3) in the space of variables for the assessment of situational - motor abilities, the largest number of variables has significant correlations with isolated canonical dimensions.

Correlated variables can be divided into three groups:

- The first group are the variables with the greatest correlation, which include: Swimming the 25m water polo crawl (.95) and Guide the ball 3x5m m (-.65);
- The second group are variables with little significant correlation, which include: Swimming the 50m water polo crawl (.17), Throwing a water polo ball out of the water (.31) and Swimming 4x5 m crawl-backstroke (.21);

- The third group includes a variable that has zero connection, almost no connection, and that is Swimming the 100m water polo crawl (.08).

Given that the first canonical factor in the field of variables for the assessment of situational - motor abilities have tests that are intended to assess the speed of swimming, this factor can be defined as a factor of the absolute speed of swimming with a water polo crawl. The water polo game consists of a lot of short-distance swimming, which requires a high speed of movement through the water in a vertical and horizontal position, large changes in the direction and pace of swimming, ie the transition from light swimming to sprint swimming.

From everything mentioned above, the general name for the first canonical factor in the area of motor and situational - motor abilities is the general speed endurance of swimming with a water polo crawl. Mirvić (2011) came to the conclusion that the flexibility of the complete body can not be derived from the correct crawl technique, and thus the maximum speed of swimming crawl technique in students of the Faculty of Sports and Physical Education, University of Sarajevo. In water polo matches, short sections with explosive and strong movements are mostly swum, so most work is done on the development of short section swimming. From this it can be concluded that water polo training in the future should be more dedicated to the development of absolute swimming speed on short sections (25 meters water polo crawl), as well as endurance in speed on short sections, and pay attention to the development of static and explosive power and flexibility without which movements cannot be reported at maximum amplitude.

Therefore, the explosive and static power from the space of basic motor abilities has a great influence on the result achievements in the absolute speed of swimming with a water polo crawl, which has conditioned the connection of the first pair of significant canonical dimensions.

Second canonical factor in the space of variables for assessing motor abilities

The second canonical factor (Table 2) in the field of variables for assessing motor abilities, the largest number of variables has significant correlations with isolated canonical dimensions.

Correlated variables can be divided into three groups:

- The first group are the variables with the highest correlation, which include: Agility in the air (-.67), Hang in the joint (.58), Taping by hand (-.55), Lifting the torso in 30 seconds (-.44) and Crossing on a low beam (-.43);

- The second group are variables with little significant correlation where they include: Seat reach (.40), Push-ups (-.39), Taping by foot (.30), Deep bow on the bench (.23), Running 20 m from a high start (.19) and Triple jump from place (.16);
- The third group includes a variable that has zero connection, almost no connection, in this study, and that is the variable Long jump from place (-.02).

On the second canonical factor in the space of variables for the assessment of motor abilities, tests of coordination, static and repetitive strength, speed of movement frequency and balance have significant projections, so this factor can be called the factor of general motor skills. The ability to quickly change the direction of movement depends on agility, ie the ability to slow down, accelerate and quickly change the direction of movement while maintaining control of movement without losing speed. Agility is characterized by rapid changes of direction and movement, abrupt stopping and then rapid start, therefore it is very complex and develops only in later development periods in children, when a high level of coordination has already been achieved, more precisely at the age of 10 to 13 conduct basic proactive exercises to develop agility, with an emphasis on performance technique, coordination, and balance. The strength of the upper body, ie the arm as well as the speed of the arms is very important when performing technical elements with the ball such as guiding the ball, catching the ball, passing the ball and finally shooting.

Second canonical factor in the field of variables for the assessment of situational - motor abilities

The second canonical factor (Table 3) in the space of variables for the assessment of situational - motor abilities, the largest number of variables has significant correlations with isolated canonical dimensions.

Correlated variables can be divided into two groups:

- The first group are the variables with the highest correlation, which include Swimming 4x5m crawl-backstroke (.90), Swimming 100m water polo crawl (.64) and Guiding the ball 3x5m (.47).
- The second group are variables with little significant correlation which include: Swimming 25m water polo crawl (.37), Throwing a water polo ball out of the water (.37) and Swimming 50m water polo crawl (.34).

On the second canonical factor in the field of variables for the assessment of situational - motor abilities, tests intended for the assessment of swimming speed and speed endurance have significant projections, this factor can be called the speed endurance of swimming water polo crawl factor. Dizdar and Mirvić (2014)

confirmed that different motor abilities that have a significant impact on swimming with the water polo crawl technique at 25 meters without the ball are abilities that condense agility, coordination, flexibility and static strength. Water polo game abounds in fast and short sprints with the crawl or backstroke water polo technique. Water polo player often changes swimming techniques during the game, moving from water polo crawl to water polo backstroke, which is dictated by the situation in the game, ie whether he is in the attack phase, in the defense phase, or even in the counterattack phase, where he needs to swim fast, move away from the opponent and at the same time follow the ball passed by a teammate.

From everything mentioned above, general name for second canonical factor in the field of motor and situational - motor abilities has the highest correlation with agility and speed endurance, this factor can be called the general factor of locomotor swimming speed with water polo technique. Since water polo rules dictate playing 4 X 8 minutes of play time which requires great endurance in swimming. It should also be emphasized that the water polo game is dynamic with a lot of variable intensities in swimming, which requires special planning for the training process in order to adapt everything to the real game and solve tactical tasks. Mirvić et al. (2016) based on the set goal of the research and based on the obtained results, it can be concluded that there is a connection between the researched fields, ie between motor skills and situational-motor skills in water polo. In his research, Ubović (2019) dealt with the basic motor characteristics of team sports athletes: football players, basketball players and water polo players aged 16 to 17, and a one-factor analysis of variance showed a significant impact of sports only on the STIF variable. In the modern water polo game, the performance of situational - motor elements and their success cannot be imagined without good knowledge, ie learning the basic swimming crawl, with perfecting the water polo crawl and handling the ball in the water. The greatest attention should be paid to the speed of swimming and those clubs that have good swimmers can expect success in the water polo game. Every coach or professional in water polo clubs should pay great attention to the development of motor skills such as: agility, speed, strength and flexibility.

CONCLUSION

Based on the basic goal of the research and based on the obtained results, it can be concluded that water polo players, who have a higher (general) level of all applied basic motor skills, especially explosive and static strength, agility, speed endurance in water polo crawl and whole body flexibility have greater opportunity to achieve a better result in performing situational - motor elements of the water polo game, which makes one team more successful. Also, it allows

to a certain extent, in certain situations to compensate for the lack of some other motor skills. the first canonical factor in the space of motor abilities is most often projected by tests from the field of strenght (static and explo-sive power) and flexibility, this factor can be called the factor of explosive power. First canonical factor in the field of variables for the assessment of situational-motor abilities are tests intended for the assessment of swimming speed, this factor can be defined as a factor of absolute swimming speed with water polo crawl. From everithyng mentioned above, the general name for the first canonical factor in the area of motor and situational - motor abilities is the general speed endurance of swimming with a water polo crawl. The second canonical factor in the space of variables for assessing motor abilities has significant projections of tests of coordination, static and repetitive power, speed of movement frequency and balance, so this factor can be called the factor of general motor skills. Second canonical factor in the space of variables for the assessment of situational - motor abilities has significant projections tests intended for the assessment of swimming speed and speed endur-ance, this factor can be called the factor of speed endurance of swimming water polo crawl. From everything mentioned above, the general name for the second canonical factor in the space of motor and situational - motor abilities has the highest correlation with agility and speed endurance, this factor can be called the general factor of locomotor swimming speed with water polo technique. If we talk about the dynamics of the water polo game, there are changes in the direction and direction of movement with certain loads, which makes it much more difficult and tiring for the players of the op-posing team. It should be emphasized that the player wants to reach the opponent's goal in the shortest possible time and score a goal so that they often change their body position, eg from a chest position to a back position. The research results can be used when constructing a set of measuring instruments that can provide quality information when planning and programming training, selection, guidance and training to determine the position in the game, as well as to create training periodization in both annual and semiannual training cycles. making a plan and program for each individual training.

Table 1. Canonical correlation analysis of motor abilities and success in performing situational-motor elements in water polo

	Canonical R	Canonical R-sqr.	Chi-sqr.	df	p	Lambda Prime
0	,94	,88	210,70	72	,00	,02
1	,82	,67	101,16	55	,00	,14
2	,55	,30	43,34	40	,33	,43
3	,48	,23	24,69	27	,59	,62
4	,38	,14	10,97	16	,81	,81
5	,24	,06	3,00	7	,89	,94

Table 2. Canonical factors in field of motor abilities

	KF 1	KF 2
Agility in the air	,21	-,67
Taping by hand	-,42	-,55
Taping by foot	,26	,30
Deep bow on the bench	,52	,23
Seat reach	,01	,40
Crossing on a low beam	-,02	-,43
Run 20m from a high start	,03	,19
Triple jump from place	,59	,16
Long jump from place	-,54	-,02
Hang in the joint	-,59	,58
Torso lift in 30 seconds	,34	-,44
Triceps dips	,30	-,39

Table 3. Canonical factors in space situational - motor abilities

	KF 1	KF 2
Swimming 25m water polo crawl	,95	,37
Swimming 50m water polo crawl	,17	,34
Swimming 100m water polo crawl	,08	,64
Swimming 4x5m crawl-backstroke	,21	,90
Guide the ball 3x5m	-,65	,47
Throwing a water polo ball out of the water	,31	,37

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Corresponding author:**Alma Dizdar**

Olimpic swimming pool Sarajevo, Bosnia and Her-zegovina
e-mail: asportt@hotmail.com

SPORTS AND VIOLENCE

Jasmin Peco and Jasmina Gerin

Abstract: Violence in sports can be observed within competitions (for example in boxing, wrestling, martial arts, rugby, etc.), or as violence outside competition, but most often, as a social problem, violence of spectators. Michael Smith distinguishes „relatively legitimate“ violence from „relatively illegitimate“, including in the first group, violence within the limits of sports rules, and violence that goes beyond the limits, but is generally accepted, and in the second group, „quasi-criminal“, which violates law and official rules, and „criminal“, which, among other things, violates informal rules, and is, therefore, absolutely unacceptable. The boundaries between these phenomena, however, are not as strict as is generally thought: observers identify with athletes, and athletes often become a role model for young people. Identification in the game (i.e. with the play, the role model) is one of the key catalysts of aggression: fake aggression on the sports field turns empathetically into real aggression in the stands. And it is precisely this transferred aggression from the field to stands that is one of the focuses of this paper, which aims to analyze and explain the social context of the conflict both on the field and in the stands. The phenomenon of hooliganism is something that in today`s modern sport is closely related to sports events, especially in team sports and among teams where there is a history of rivalry and long term „struggle“.

Keywords: sport, violence, hooliganism, sports fans

INTRODUCION

Some authors believe that the root of sport is in violence, in ancient rituals or wars as turning points in the life of society. Television still devotes a lot of time to conversations and programs with topics such as "Sports? It's a war!" Or "Sport as a substitute for war". Suffice is to say that violence and what will become a "sport" have been long linked, although sport arose last as a series of certain physical activities. The ancient Games (Corinthian, Isthmian, Nemean, and Olympic) offered a respite from conflict to some extent. They did indeed represent a substitute, or alternative form of warfare, a form of affirmation of the supremacy of the city-state over rivals. Physical activities such as *pancratium* (Greco-Roman style wrestling) were extremely violent and they resulted in the death of the fighters. Doping was also used, although it was more related to religious and folk beliefs than to a product (mostly synthetic, but also biological) which are in use today. Beliefs, as today, have played a major role in achieving the effect of various substances that have been rubbed, swallowed or inhaled both by individuals and collectively.

One of the problems with aggressive and violent behavior in sports is that some athletes and coaches believe that a certain level of aggression in sports is necessary to achieve athletic success. However, in this context, it is necessary to distinguish aggressive behaviors from the so-called assertive behaviors related to proactive, firm and decisive play in which the athlete uses all permitted means to achieve the set goal. Namely, although it can result in injury due to the rougher physical contact that occurs in the heat of the game, the basic feature of assertive behavior is that it does not contain the intention to injure the opponent's player. In contrast, verbal injury or physical injury is

an integral part of aggressive behavior in the true sense of the word. Researchers in the field of sociology of sports emphasize the importance of distinguishing instrumental and reactive aggression. As its name suggests, instrumental aggression is a form of inappropriate behavior that is considered an instrument to achieve a certain goal (for example, hard injury when taking the ball or intentional injury to the best opponent in order to increase the chances of winning), causing harm to the victim, although it doesn't have to be accidental. Reactive aggression is a form of inappropriate behavior that is an end in itself. This form of aggression is motivated by the desire to injure or damage someone, or to jeopardize the physical (for example, physical confrontation with the opposing team's athletes after a match) or the other person's mental integrity (for example, insulting an opponent on national or racial grounds).

CAUSES OF VIOLENCE IN SPORTS

Other authors, again, systematize theories of the causes of violence into "apocalyptic" (socio-political causes, cultural causes and mass behavior, criminal patterns, guilt of club administrations, players and sports media) and "fatalistic" (cause in psychopathology and instincts). The third attribute to football a significant role as "social exhaust valve" for violence, and believe that if there were no football, the society will witness the growing presence of hooliganism. According to some, sport is a trace of an "ancient predatory instinct", "an indicator of the fall of the human race into barbarism", and the elimination of violence from it would deprive it of its "fundamental psychological functions". This view, which, in a way, thinks of violence as a characteristic immanent to sport, is largely maintained at the level of psychology or even popular psychology. Authors who consider

violence to be immanent to sport perceive sport as "war by friendly means", "intraspecific aggression", a form of struggle that seeks to establish dominance, etc. Srđan Vrcan, for example, is not inclined to interpret fan violence by human nature and instincts, or any theory that does not take into account the historical moment, emphasizing the specificity of the social situation that leads to the eruption of violence in sports. Using the term "eruption", Vrcan is just showing that violence in and around sports is an all-time phenomenon that only oscillates. It is clear, of course, that violence in sports is strongly connected with culture and class, as well as that it is encouraged by external, ie. collective, social "triggers": the fact that the biggest fan riots on the territory of the former Yugoslavia erupted just at the time of rising pre-war tensions in the 1990s speaks volumes about such a thesis. (Of course, it would be completely wrong to claim that fan violence is a kind of "vent" of totalitarian regimes, since it is equally present in democracies.) But what really underlies a man's willingness to attack to inflict physical pain on fans of the opposing team, peaceful passers-by, or police officers? Konrad Lorenz interprets aggression as a natural phenomenon directed exclusively towards food, that is, if it is about members of the same species, towards the resolution of competition for territory, female and other property. In addition to his instinctual nature, Lorenz tends to attribute human cruelty to the fact that man, by inventing various types of weapons, introduced the possibility of remote violence and therefore "exceeded" the natural limit of inflicting pain with his own hands. Lorenz's observations (according to which sport could be interpreted as a catharsis suitable for channeling instinctive aggression), however, as Hannah Arendt rightly pointed out, as well as the observations of many other ethnologists and psychologists, reveal nothing but the old truth that man is only an animal with an additional attribute of reason.

Sport offers directed artificial competition, and some sports - mostly the most popular, such as football - also have a gradation of tension, ie. expectations. Everyone knows from their own experience that we are able to formulate quite complex expectations from the events we observe, from our actions and the actions of others. Fulfilling our expectations makes us satisfied, and their failure tense. In the background of shaping expectations is a constant comparison of our experiences (stored in long-term memory) with our current observations. In short, the realized expectation resolves individual tension (frustration), and the failed (unrealized) one emphasizes it and eventually transforms it into aggression. This aggression, organized under the protection and anonymity of the masses, is also a surrogate of interaction with society, and the emotional attachment of fans to the club is a substitute for the alienation of everyday life. There is also the idea that sport should be used as a significant

re-source for systematic and individual education of a person in the direction of aggressive and assertive, but not violent behavior, ie, a person who discovers his potential but does not abuse it but learns to control it. It is possible and understandable to ask whether sport is not just a socially agreed / agreed game, therefore, a social street play that everyone tolerates as a remedy, a collective discharge of individual frustrations? But, apart from the fact that in the game we just "play together" and in sports we always oppose each other. As Eco rightly observes, "how is it that football evokes such powerful forms of expression of emotion if it's just a game?" The truth is that sport can be somewhat compared to carnival: according to the psychology of the masses, which overcomes the fears and considerations of the individual, emphasizing the experience with alcohol consumption, often emphasizing resistance to politics, etc. The carnival, however, is not characterized by the development of tension and the collision of two collectives (teams), nor by the participation (more precisely, the protagonism) of the audience in violence. In addition, unlike carnivals and similar social phenomena, in sports, envy followed by anger (anger), both defeat and victory (euphoria), appears as a significant trigger of aggression, since, as Gore Vidal says, "it is not enough for me to win, it is important that others lose".

FOOTBALL STADIUM VS VIOLENCE

If there is one particular form of violence that is usually associated with sports or at least fans, it is hooliganism. It could be said that in everyday discourse, hooliganism is the only recognizable form of violence, if we ignore violence among athletes themselves either on the playgrounds or due to excessive effort. This focus on hooliganism is probably a reflection of the media's exaggeration of certain violent events or perhaps the attitude of most people that hooliganism is impossible to reconcile with the traditional, celebratory aspect of the sport. However, in order for hooliganism to be understood, it is necessary to look beyond the usual definitions and collective perceptions of the problem and the prevailing stereotypes and prejudices. It is a common image of a hooligan as a young man who finds it difficult to fit into society, a delinquent in everyday life and gets drunk and uses football matches as an excuse to go wild in the stadium. But events have shown that the social reality of the phenomenon is much more complex than we imagine based on such a simplified picture.

Records of hooliganism

Three factors distinguish hooliganism from the forms of crowd violence that have existed in sporting events since ancient times: the frequency of violent incidents, their specific connection to football, and the fact that hooliganism was initially linked to one country - the UK. The question is how and why this sport and that

country were exposed to hooliganism earlier and more intensely than others.

It should be noted that deviant and violent behavior is not some new phenomenon that has occurred on sports fields and competitions. Throughout history, sports crowd competitions have largely resembled modern-day hooliganism and have even required special social measures, such as maintaining law and order or banning entry to the stadium. So it will be enough to cite a few examples from different historical epochs to illustrate.

The first record can be found in the works of Tacitus, which describe the skirmishes in Pompeii in 59, when during the gladiatorial games organized in Pompeii by Livenius Regulus, spectators from the colonies of Nuceria and Pompeii began an argument of insults, which continued by throwing stones and then developed into an armed conflict. A large number of people were killed and wounded in the clashes, and Pompeii was given a ten year ban from holding sports competitions, and the associations were abolished. In the Grand Circus of Rome, which could accommodate up to 150,000 spectators, on several occasions a large number of people were killed by being run over by a crowd. In the Middle Ages, the Church banned the play of the soul, which was characterized by riots and fights among spectators. In Brittany, during the playing of the soul, special surveillance of law and order was carried out so that "officials" were equipped with pikes as an aid in separating opponents. Forms of violence, verbal or physical, have been recorded from the very beginning of sports and sports competition, which is understandable given the expression of belonging to a particular team, squad or commitment to a particular party. As the "struggle" for something that belongs to each of us is implanted in human bodies, the very choice of side defines a certain struggle for something or someone. The difference is that sport no longer has the same purpose. While the ancient games in their practice were a preparation or substitute for war, sport in the 20th century began to reflect different values and goals, such as education, hedonism, fitness and strength, hunger for competitions and spectacles, social or professional integration, sense of belonging and social cohesion. In addition, it should be noted the development of football, as the most popular game in the world, with which violent incidents and hooliganism have built their foundations for further development.

STAGES OF DEVELOPMENT OF HOOLIGANISM IN EUROPE

The first phase of the emergence of hooliganism covers the period from the late fifties and early sixties of the 20th century, when journalists and scientists, primarily sociologists, began to record an increase in organized violence, outside and inside the stadium. At first glance, this violence was clearly different from what

was previously known and represented a transition from ritualized and Dionysian violence, associated with the logic of the game and the antagonism it evokes, to premeditated violence. Until then, there was mostly sporadic violence whose causes and meaning stem from the ambivalent nature of the sport itself.

The second period of development of hooliganism corresponds to a change in the attitude of the audience. A number of changes have taken place in British football since the 1950s. British society is changing and modernizing, living standards are rising, people have more free time, and these changes allow individuals to seek out new forms of entertainment (e.g. going out, going to the cinema, etc.). This is a period in which fans are going through many changes. The first reason is the expansion and encouragement of football in schools. Furthermore, changes in society have brought new features to stadiums where there is a growing presence of younger audiences, motivated by new forms of entertainment. The third reason is economic, which is reflected in cheaper tickets for new stands, the so-called ends where the younger fans were housed. Young people are looking for independence, they have different worldviews from their families and the elderly, they are looking for peers with whom they make new friends, which creates the basis for the emergence of new fan groups. Instead of a celebratory atmosphere, sports rivalries appear at matches. A new and more active form of support for football teams led to the emergence of hooliganism by creating a culture of confrontation that was no longer closely tied to sports.

The third phase of hooliganism took place in the 1970s and 1980s, a period followed by the economic downturn of Great Britain. With the coming to power of Margaret Thatcher and the introduction of the so-called "Restriction and austerity" policies, new decisions are introduced, primarily economic recovery at all costs. Football is becoming a means of expression for young people who are excluded from society, and fan groups bring comfort to society before it disintegrates, providing it with support and solidarity. For them, hooliganism is a way of life, expressing and nurturing diversity, while fan groups offer an alternative to the pale everyday life.

The role of the media in the spread of hooliganism - Anglo-Saxon studies have spawned a number of interpretations whose theses coincide or differ depending on the choice of field and scientific approaches, while the drama in Heysel encouraged the spread of the phenomenon to Europe and the creation of collective notions of hooliganism.

Heysel case - Research has shown that tickets were sold to everyone and basic safety precautions were not followed. The media in the heat of the report kept repeating the interpretation of British hooliganism and

thus greatly contributed to the creation of a collective image of hooliganism, thus presenting the hooligan as a young Englishman, poorly integrated into society, delinquent in everyday life and under the influence of alcohol. Hooliganism began to be viewed differently, with huge media publicity, thus beginning the last phase of the development of hooliganism - spreading to Europe.

Hooliganism is spreading in Europe - With the spread of hooliganism throughout Europe, European studies on the problem have become more diverse, although some scientists who have dealt with this topic have taught at British universities. "Fan training" program - the goal of the program is to educate fans, and in a way communication between fans and club management and reduce violence. It also includes the presence of guards and supervision of fans in stadiums to prevent violent behavior, while on the other hand organizing activities for young fans (sports meetings, travel). However, social oversight leads to the emergence of a new type of hooligan (the casual) "modern hooligan" characterized by informal, everyday dress.

The new type of hooligan becomes unrecognizable to most, blends in more easily with other fans, and imperceptibly passes controls in stadiums. Controls at the entrance to the stadiums are mostly carried out by the wardens, and this takes place quickly without a thorough inspection of the fans, where the hooligans imperceptibly pass the controls at the stadiums.

HOOIGANS VERSUS SPORTS FANS

It is impossible to focus only on physical violence and to exclude psychological and symbolic forms of violence, because this denies the existence of the phenomenon "aggro", a ritual imitation of violent behavior that serves to intimidate the opponent. Seeming strong and dangerous and trying to instill fear in the opponent's bones was often more important than the physical action itself, the latter being resorted to only when the unwritten rules of "aggra" were violated (by attacking a girl), or when the police were involved. The ability to intimidate an opponent to the point that he escapes without confrontation was perceived among hooligans as a major indicator of fighting spirit. Yet the boundaries between physical, psychological, and symbolic violence can be almost invisible. Violent acts simply represent certain moments or stages in the social processes of that food or encourage other forms of violence to the extent that they sometimes get out of control. Psychological and symbolic violence "aggro", in many cases, is, therefore, the basis for a pattern of extreme violent conflicts or antagonisms between fan groups that can last for years. The results of the researchers, based on data obtained from the participants in the violence themselves, differ significantly from British studies, which, it

should be borne in mind, are based on police data. So far, the description of hooliganism has reflected sociodemographic factors that usually explain the classic forms of delinquency: it is the work of young people organized into groups. Of all sports, football attracts the youngest audience, which is attracted by the atmosphere created by the multitude of people and the common interests and sense of fun within the fan groups. Given that fans participate in hooliganism, this form of violence is present in football to a greater extent than in other sports. People under the age of 17, and this is the age at which individuals usually become part of the fan culture by imitating gradually accept antagonistic and violent forms of behavior. Thanks to such behavior, the older ones accept the younger ones and include them in the fan group. By behaving aggressively and violently, a young individual can gain both a more important role and a better status within the core of the group. An additional explanation for the violent behavior of these young people lies in the fact that they do not treat social norms the way adults do. Although age is a discriminatory factor, it is unrealistic to talk about a dangerous age group. It is a simple fact that outbursts of violence of this kind are characteristic of a transitional period in human lives, when an individual's identity is formed, a period of "psychosocial latency" in which young football fans, just like young people in general, have not yet taken on adult roles. suggests, less sensitive to norms and rules. As they get older, they gradually accept the roles and social position of adults. Most criminological studies show, in fact, that young people are more tolerant of physical violence and are reluctant to condemn it, or do so to a lesser extent than adults, provided that it does not involve the use of weapons.

On the other hand, sports fans are people who love sports and through their attitudes, emotions and behaviors show a special attachment to a particular sports organization. Such persons are characterized by various behaviors such as: going to matches, watching matches on television, frequent conversations about matches, having fan props, attachment to the team and when he loses, some are prone to betting, etc. Fans should be distinguished from ordinary spectators of football matches because their emotional involvement is at a lower level. He becomes a fiery fan for various reasons. Some become it because of friends and peers, and some under the influence of older family members. Sometimes cheering is mediated by a sense of belonging to a city or a particular neighborhood where one lives. Certainly the beauty of the game, the tradition of success of a certain team and their stars influences that he has a larger number of fans. There are various explanations for why someone becomes a fan and what attracts them to it. Scientists cite eight motives for cheering:

Group affiliation - Group affiliation reflects the desire and motive to be part of a group. Individuals with a

high motive of group affiliation become fans because it gives them the opportunity to spend time with others.

Aesthetic impression of sport - Some fans are attracted by the beauty and energy of the sport itself and that motivates them to become fans.

Excitement - Many people feel that they do not have enough stimulation or excitement in their own life, and try to find it further through sports cheering.

Self-esteem - It is known from psychology that if the group we belong to is successful, the opinion about ourselves also improves. So, when we cheer for the winning team, our self-esteem also grows, and that is indirectly one of the motives for cheering.

Economic motives - For some sports fans, the biggest motivation is the potential economic benefit of betting at sports bookmakers.

An escape from boredom - People who are dissatisfied or bored in life can temporarily forget about adversity and misfortune through sports using it as a way to take a break from work and activities of daily living.

Family - Cheering is often part of the family tradition and a way to spend time with your family members. Fan affiliation is often passed from one generation to another.

Self-presentation - This motive is associated with value orientations. Through cheering, some people strive to express themselves in a unique and special way, both in the community and because of the personal inner experience that makes their life meaningful.

Through cheering, fans create social connections but also a sense of belonging to the reference fan group and the city in which they live. Matches are a place to gather old friends and meet new ones. Fan groups bring together fans from different social strata, encourage solidarity and cohesion between them. For many, cheering is the most important thing in life, so even without a game, life without other fans is unthinkable. Other fans come to them as a family, which often "understands" them better than the biological family. Fans are perceived as part of an important, strong and respectable club collective that makes them proud. This identification is also transferred to the identification with the local community, especially if the club is playing with someone from another city. Fans are often then perceived and seen as protectors and true representatives of their city. The characteristic of the fans is also great loyalty to the club, for better or for worse. Real fans are those who are ready for both great joy during victories and emotional suffering during defeats. That is why it is said that the "marriage" between the fans and the club breaks down much less often than the marriage of a man and a

woman! Real fans are not observers but active participants. They believe that they can influence the outcome of the game and act accordingly. Fans are therefore often seen as an additional player of the team, e.g. as the twelfth player in football. There are many examples in practice that show that this is real and so. This active role of the fans contributes to the fact that they and the players perceive each other as one team and a one unity.

This, of course, is valid as long as the fans have confidence in the players and are satisfied, above all, with their commitment on the field. One of the main features is regular attendance at matches. This refers to matches "at home", but also to away matches. This implies active participation in cheering through songs, choreography, etc. Some fans, because of their dedication, often travel several hundred kilometers just to support their club.

Passive football audience makes up the majority of today's direct football audience of developed countries, with a low share of active, ie. organized members of the audience. Trade and service activities, as well as numerous other benefits related to the commercialization of sports/football, enable the passive spectator to experience the spectacle with maximum comfort. Therefore, for the description of an individual who has the characteristics of passive participant in football events, the syntagm of theatrical audience often appears in the literature: the interests of its members are often not related to a specific football club or national team, but are attracted by the idea of the grandeur of the event accompanied by the quality of the goods and services offered.

SOCIO-PSYCHOLOGICAL CHARACTERISTICS OF FAN GROUPS

While some encourage their clubs in an appropriate manner in accordance with the norms of good behavior, others encourage their athletes in a violent manner, endangering both their own and other people's safety. Since in most cases fans act in a group (rarely as individuals), fans are increasingly the subject of scientific research, especially in the field of psychology and sociology. Such research has revealed some common traits of all fans, such as that fans are prone to euphoria when a team wins and sadness when a team loses, and the reactions of one fan encourage the reactions of most other fans. Since fans are classified as a group, ie a mass of people, they take on the characteristics of a group and not an individual, because the individual in such groups is lost, and feelings, thoughts and actions are thought of. Belonging to a group brings anonymity and a sense of power and a departure from personal responsibility, all of which lead to the creation of instincts and instincts that individuals do not have and also to the phenomenon of suggestibility, which is more

pronounced in groups. Given the development of society and the development of the youth subculture, it was not enough to observe football fans from a classical (Le Bon) perspective, but it was necessary to use the terms sociology of the youth subculture. This is best seen in the first domestic survey of fan hooliganism conducted by Buzov et al. In 1989.

Fan groups are formed groups in which there is a certain set of values and affiliations and each member of such a group has a role to play. They are characterized by a certain established hierarchy, and based on the fan experience and intensity of participation in group activities between members of such a group are not formal, on the contrary, they are informal or the rules of their behavior are unwritten.

Cheering for a club is often associated with belonging to a place of residence or a nation. Through their commitment to the club, the fans also express their commitment to the city from which the club comes. If ethnic relations are unstable, it usually contributes to the cheering being colored by glorifying the ethnic or regional identity to which most fans of that group belong. Stadiums are becoming a testing ground for the expression of ethnic attitudes, pride and identification. Thus, e.g. the Barcelona club is a symbol of the Spanish region of Catalonia and with that the Catalans identify very strongly; it is, perhaps, perhaps the chief symbol of the power of Catalonia. In divided Belgium, there is also a strong identification with Walloon or Flemish clubs. Unfortunately, the connection between cheering and ethnicity often ends in provocations or open conflicts on or outside the stadium. A good example is Bosnia and Herzegovina, but also the entire Balkans, where most fan conflicts are based on belonging to different nations. The strong identification of the club with the territory is especially pronounced in smaller places where the club and matches are the main weekly attraction. It should also be noted that sometimes the identification with the club is higher than with the national team. This is especially pronounced if the ties with the central state are shaken. As for the representation of women among football fans, it is mostly negligible in number. There are, but are rare cases, fan groups that also have a female subgroup. It is interesting that the participation of women in sports has increased in the last few decades, but it is still to a much lesser extent when it comes to football in particular. Even in the Scandinavian countries, known for gender equality, cheering is one of the last islands that is predominantly reserved for men. There are different reasons for this. Men are, for the most part, more interested in this sport than women, and there is a stereotype that women simply do not understand football, so they have no place in the stadium. In addition, it is certain that going to the stadium is also a way for men to socialize more with each other and escape from the routine of family life for a moment. In most countries, there is an

untried rule that football matches are a time to hang out with male friends. In such a society, for most fans, beer is a more desirable associate member of such an interaction than any woman. They practically become "surplus" in those few hours. The only exceptions may be the matches of the national team at the continental or world championships, when the higher participation of women, mostly younger ones, is noticeable. At such competitions, the most cheerleaders are usually chosen in the media

Hooliganism is associated with both individual and collective reputation management. Participating in football hooliganism allows fans to raise their status and prestige. Reputation and strength are also built through conflicts with opposing groups. The need for sovereignty and autonomy can also encourage fan hooliganism. This social need, inherent in all people, can be manifested in fans through overemphasized arbitrariness, disobedience and the desire to make decisions independently and freely. This can lead to violations of certain rules that often lead to conflicts with the police, etc.

Cheering in Bosnia and Herzegovina is more burdened than in other countries by political and ethnic relations and conflicts. The stadium is often reminiscent of the mirror in which the whole society is located. Thus, e.g. the attitude towards the state of BiH also transfers to the attitude towards the national BH team. The BiH national team is mostly supported by Bosniaks, while Serbs and Croats are more interested in the success of Serbia and Croatia. Most fan conflicts have their own political and ethnic background.

CONCLUSION

Sport has been an integral part of human life since time immemorial. It is so ingrained in today's society that, for example, football is said to be "the most important sideline in the world." Apart from physical activity and competition, sport becomes a hobby, pastime, type of socializing and the like. Therefore, sports are accompanied by other groups composed of different individuals that are not directly related to the sport itself, such as athletes and coaches. Such a group of people, which is related to sports, athletes or sports club is called fans. But it often happens that the behavior of fans is not in accordance with the norms of good behavior, but on the contrary, such groups cause violent behavior with many harms and victims. Hooliganism, ie violent behavior of fans, has existed since ancient times, and culminated in England in the last centuries after a bad economic situation, where young people tried to find their identity, try to move away from the difficult everyday life and be part of something bigger. They spend their free time at matches (mostly football) and they expressed their dissatisfaction with society, rules, laws and the generally bad economic situation at such matches

through riots and violent behavior. Such behavior has persisted to this day. It is believed that the reasons for such behavior have not changed too much. Young people are still dissatisfied with their roles in society, dissatisfied with the general situation in society and also with politics and crime that are increasingly interfering in sports nowadays, so it is not uncommon to see political banners and express dissatisfaction with politics and government at football matches.

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Corresponding author:

Jasmin Peco

Faculty of Education, University of Džemal Bijedić, Mostar
e-mail: jasmin.peco@unmo.ba

DIFFERENCES BETWEEN WINNING AND DEFEATED TEAMS AT THE CADET STATE CHAMPIONSHIP OF BOSNIA AND HERZEGOVINA IN WATER POLO

Džan Lemeš, Edin Mirvić, Alma Dizdar and Amira Baždarević - Rašidagić

Abstract: The aim of this paper is to determine the differences between certain segments of the water polo game of the winning and defeated teams at the state championship of Bosnia and Herzegovina for cadets. By analyzing the results of the research on a sample of 7 teams in 21 games from the state championship of Bosnia and Herzegovina in water polo for the cadet category, we came to the conclusion that there is a statistically significant difference between winning and losing teams. 19 variables were tested on this sample, and they are: Goals scored, goal attempts, goals from the action, 6 on 5, goal from 6 on 5, shot from 6 on 5, goals from the anchor, penalty, penalty goal, defended penalty, counter foul, counterattack, goal from counterattack, ball sprint, shot from foul, goal from foul, Intercepted balls, corners and goal frame. It can be concluded that the results, even if they are quite similar, there was a small statistically significant difference, which shows that all teams are of approximate qualities when it comes to motor skills, techniques and tactics. It is recommended that a more efficient plan and program be developed to improve these capabilities as well as coach training for this Olympic sport.

Keywords: water polo players, winning teams and defeated teams

INTRODUCCION

Water polo is a team water sport. The game consists of four quarters in which two teams try to score goals by throwing the ball into the opponent's team's goal. The team with the most goals is the winner of the match in the end. The water polo team consists of one goalkeeper and six players on the field in the pool at any one time. In addition to these seven players, teams can have substitutes on the bench as well as a reserve goalkeeper. Water polo consists of players who swim, with and without a ball, a eggbeater (a form of maintaining head above water), throwing and catching a ball. All these actions with the ball must be performed with one hand except the goalkeeper. In every team, every player, except the goalkeeper, has an offensive and defensive role, which requires the player to be able to play and attack and defence. Water polo is a contact sport, so minor offenses and exclusions are very common in the game. This sport is known as a very rough sport, the reason for that is that the referees at matches are quite limited by the surface of the water, below which they cannot see. The players know how to use it in every possible way to stop the opponent's intentions without committing foul. As all players, except the goalkeeper, are expected to stay afloat throughout the match, players either swim or do a water polo eggbeater. Players can often and easily cover up punches to their opponents as an act of keeping afloat on the water by doing eggbeater. The water polo team consists of 7 players with assigned roles: center, winger, defender, outside striker and goalkeeper. Depending on the development, any player can take over from the given role, but usually players play the given role (Lozovina, M., Pavičić, L. and Lozovina, V., 2012). Each player has a specific place on the court, and an umbrella formation is the most common. The position of players remains mostly the same throughout the game, and the players rarely move far

from their positions. Wing players and defenders are often referred to as players on the edge. The typical numbering system for these positions starts with the attacking wing on the right side of the opponent's goalkeeper. An outside striker that is counter-clockwise from position one is called two. Moving in the same direction, the center back is three, the next outside striker is four, the second wing five, and the anchor six. The most basic and popular offensive lineup is known as 3-3. That name was created because there are two lines of three players in front of the opponent's goal. Another offensive setting more often used by professional teams is called umbrella, where players on the rim form an umbrella around the goal, with a hole placed in the middle. An additional offensive setup is a 4-2 or double set. That is when there are two anchors in front of the goal. The positions of the defense are often the same as the offensive positions, only transferred to the other side. Like most team sports, defence can be played either in zones or man to man, all depending on the tactics chosen by the coach, by tactics we mean the coordinated activity of the whole team, whose ultimate goal is to score if in possession of the ball and in the attack phase, or prevent a goal when it is in the defensive phase and is not in possession of the ball (Lozovina, V., Gusić, Ž. and Lozovina, M., 2006). Defense can also be played as a combination of zone and man to man in what is known as the "M" zone, in which the main defensive player deploys his teammates in the zone to better defend the anchor position. Trumbić (2010) divides the tactics of water polo into 3 parts: attack system, defense system, attack and defense systems with a player more and a player less. The aim of this paper is to determine the differences between certain segments of the water polo game of the winning and defeated teams at the state championship of Bosnia and Herzegovina for cadets.

METHODS

Subjects

The sample consists of 7 teams at the state championship of Bosnia and Herzegovina in water polo for cadets. The sample consists of an analysis of winning and losing teams from 21 games in 2019. The research was realized in the championship matches with the appropriate conditions necessary for testing in this research.

Procedures

The sample of variables consists of 19 tests to assess situational efficiency in water polo at different stages of the game in attack and defense. The following tests were used for evaluation:

Goals scored This variable shows the total number of goals scored in matches. This data was collected using the official scoreboard on which the result was shown, and it only recorded goals recognized by the referee, ie. goals scored in accordance with the rules. Attempts to score this variable means the total number of shots on goal taken in accordance with the rules and in a correct manner, including shots that were blocked by a defensive player or goalkeeper, ended behind or next to the goal, bounced off the goal frame and of course those shots which ended in a goal. Goals from the action this variable indicates the number of goals scored from the game in accordance with the rules, ie. goals scored after elaborate and organized action, including goals scored from 6 on 5. 6 on 5 this variable indicates the number of "6 on 5" actions, played by one or the other team during the match. The data was collected using the official scoreboard, which states the number of excluded players. Goal from 6 on 5 this variable means the number of goals scored from 6 on 5, where the opposing team had the player excluded. Goals were taken into account only if the team in defense had at least one player less in the field. Goals from the anchor this variable indicates the number of goals scored from the anchor position, ie as in modern water polo this position is called position 6. Penalty this variable indicates the number of penalties awarded per game. Goal from penalty this variable means goals scored from penalty. Goals are taken into account only if the referee awarded a penalty and the player scored. Penalty saves This variable indicates the number of successful penalty defenses by the goalkeeper. The shots that ended next to or over the goal were not taken into account, but only the successful interventions of the goalkeeper. Counter foul or foul in attack, this variable refers to offenses committed by players of the team that was in attack, ie in possession of the ball. Counterattack, this variable indicates the number of attacks in which players have successfully made the transition from defense to attack, while making the so-called. excess players in attack.

Counter-attacking goal this variable indicates the number of goals scored from a counterattack. Only the goals scored by the team after the successful transition in which they made the so-called excess players in attack. Ball sprint each quarter begins with a ball floating on the water, where players of both teams swim for the ball to the center of the court. This variable indicates the number of successful sprints for the ball by one or the other team. Shot from foul this variable indicates the number of shots on goal taken after a defensive player has committed an offense against an attacking player, provided that that offense is not an exclusion or brutality offense. Goal from foul this variable indicates the number of goals scored directly from the offense, and after the defensive player has committed an offense against the attacking player, provided that the offense is not an offense for exclusion or brutality. Intercepted balls this variable indicates the number of intercepted balls without offense. Poorly executed shots on goal that ended behind or next to the goal or that were saved by the goalkeeper were not taken into account. Corners A corner in water polo is awarded by the referee only if the goalkeeper has touched the ball before it goes out of bounds. This variable indicates the number of corners per game. Goal frame This variable indicates the number of shots on goal that hit the goal frame and did not end in a goal.

Description of the research

The research was conducted in person at the matches of the BiH State Championship as a spectator, accordingly there was no need for any permission to conduct this research. The conditions for conducting this research were the same for all participants in the tournament (air temperature was from 26 to 30 °, water temperature was from 24 to 26 degrees Celsius, swimming pool dimensions 30 x 20 meters and pool depth 2.20 meters). During the measurement, the subjects wore equipment prescribed by water polo rules. After collecting the test data, the measurement lists were completed, and the data were processed by appropriate methods for this research work.

Data processing methods

Data processing methods were chosen in accordance with the characteristics and size of the sample of respondents, hypotheses in the explanation of this research, as well as the subject and problems, and the goal of the research. Microsoft Office Excel 2007 software was used for data entry. The IBM SPSS Statistics statistical package (version 20.0, SPSS Inc, USA) was used for statistical data processing. First, descriptive statistical methods were used, then intercorrelation, and finally, to determine the differences between the frequencies from the national championship, the Chi-Square test at the level of

statistical significance of 5% was used. The results are presented in tables and graphs.

RESULTS

In Table 1 we can see the results of the differences between the frequencies of variables among the winners and defeated teams at the BiH national championship for cadets. By reviewing the Chi square test we can clearly see that there are statistically significant differences of 0.000 in the variables tested. By analyzing the individual variables, we can notice that a total of 141 (11.46%) goals were scored, of which the winners scored 89 (13.57%) goals, while the defeated teams scored 52 (9.06%). Winning teams tried to score 148 (22.56%) times, and defeated 146 (25.44%) times out of a total of 294 (23.90%) attempts on the opponent's goal. Out of 67 (5.45%) goals from the game, the winners scored 38 (5.79%) goals, and the defeated teams 29 (5.05%) goals. The winning teams had 52 (7.39%) times 6 on 5 in the field, while the winning teams had 46 (8.01%) 6 on 5. The goal from the 6 on 5 defeated team managed to score 19 (3.31%) times, while the winners managed to score 25 (3.81%) goals out of a total of 44 (3.58%). The winning teams shot 41 (6.25%) times from the 6 on 5, while the winning teams did so 43 (7.49%) times out of a total of 84 (6.83%) attempts to score from the 6 on 5. The anchors of the winning teams scored 9 (1.37%) goals, and the anchors of the defeated teams scored 6 (1.05%) goals out of a total of 15 (1.22%) goals scored from the anchor position. A total of 33 (2.68%) penalties were awarded at the championship, of which 22 (3.35%) were awarded to the winning teams, and 11 (1.92%) to the defeated teams. The winning teams scored 20 (3.05%) goals from penalty, while the defeated teams scored 8 (1.39%) out of 28 (2.28%) of the total goals scored from the penalty. The goalkeepers of the winning teams defended 1 (0.17%) penalty, while the goalkeepers of the defeated teams managed to stop 2 (0.30%) out of a total of 3 (0.24%). Out of a total of 21 (1.71%) counter-fouls committed in the championship, the winning teams made 11 (1.68%), while the defeated teams made 10 (1.74%) counter-fouls. Winning teams surfaced 30 (4.57%) counter-attacks, and defeated 13 (2.26%) out of a total of 43 (3.50%) counterattacks. A total of 20 (1.63%) goals were scored from the counterattack, of which the winning teams scored 15 (2.29%) goals, and the defeated teams 5 (0.87%) goals. The winning teams were 11 (1.68%) faster in the sprint for the ball, while the defeated teams were 25 (4.36%) times better in the sprint for the ball than a total of 36 (2.93%). Defeated teams shot from the foul 32 (5.57%) times, and the winners did so 17 (2.59%) times out of a total of 49 (3.98%) attempts to score from the foul. Teams at the national championship of

BiH scored a total of 10 (0.81%) goals from fouls, of which the winning teams scored 4 (0.61%) and defeated teams scored 6 (1.05%) goals. The players of the winning teams took 88 (13.41%) balls from the opponents, while the players of the defeated teams did the same 82 (14.29%) times out of a total of 170 (13.82%) balls taken in the championship. Out of a total of 20 (1.63%) corners, the winning teams took 9 (1.37%) and the defeated teams 11 (1.92%) corners. The winning teams hit the goal frame 25 (3.81%) times, while the defeated teams hit the goal frame 29 (5.05%) times out of a total of 54 (4.39%) times.

Table 1. Results of winning and losing teams in water polo at the cadet state championship of Bosnia and Herzegovina in water polo.

Variables	Winners	Defeated	Total
Goals scored	89 13.57%	52 9.06%	141 11.46%
Attempts to score	148 22.56%	146 25.44%	294 23.90%
Goals from the action	38 5.79%	29 5.05%	67 5.45%
6 on 5	52 7.93%	46 8.01%	98 7.97%
Goal from 6 on 5	25 3.81%	19 3.31%	44 3.58%
Shot from 6 on 5	41 6.25%	43 7.49%	84 6.83%
Goals from the anchor	9 1.37%	6 1.05%	15 1.22%
Penalty	22 3.35%	11 1.92%	33 2.68%
Goal from penalty	20 3.05%	8 1.39%	28 2.28%
Penalty saves	2 0.30%	1 0.17%	3 0.24%
Counter-foul or foul in attack	11 1.68%	10 1.74%	21 1.71%
Counterattack	30 4.57%	13 2.26%	43 3.50%
Counter-attacking goal	15 2.29%	5 0.87%	20 1.63%
Ball sprint	11 1.68%	25 4.36%	36 2.93%
Shot from foul	17 2.59%	32 5.57%	49 3.98%
Goal from foul	4 0.61%	6 1.05%	10 0.81%
Intercepted balls	88 13.41%	82 14.29%	170 13.82%
Corners	9 1.37%	11 1.92%	20 1.63%
Goal frame	25 3.81%	29 5.05%	54 4.39%
Total:	656 53.33%	574 46.67%	1230 100%
Chi-square = 205; Degrees of freedom = 19; Probability = 0.000			

DISCUSSION

From the table shown for the variable "Goals scored" we can conclude that the winning teams were much more efficient in the tournament, scoring a total of 89 goals, while the defeated teams scored 52 goals. The reason for that is the much more efficient transition from defense to attack, and the placement of players in attack, as well as the realization of a larger number of 6 on 5. According to Ademović et al. (2020) faster game was realized at the tournament in Sisak because the difference between the number of attempts to score a goal is higher than the tournament held in Sarajevo by 309 attempts, while the table shows the variable "Attempts to score" we can see that both sides had approximately the same number of goal attempts, ie. winners 148 and defeated teams 146, so from this variable we can conclude that the defeated teams lacked the realization of shots on goal, and that the players in the tournaments in Sisak and Sarajevo played much faster. The variable "Goals from the game" indicates that the players of the winning teams scored more goals from the action, ie. active play, the reason for this may be that the winning teams based their game more on scoring goals from an elaborate attack, than scoring goals from fouls, etc. The players of the winning teams scored 38, and the players of the defeated teams scored 29 goals from the action. Trivun et al (2019). The authors in their re-search came to the conclusion that the teams that finished the game as the winner were more dominant in almost all variables related to shot efficiency, had a more efficient goalkeeper, more efficient shot blocking performance, better player utilization and more efficient swimmers. swimming for the ball. The study did not identify statistically significant differences in the variables; lost balls, won balls, percentage of shots from 5 meters and the total number of fouls in the game. From the table of the variable "6 on 5" we can see that the defeated teams played a little rougher, ie. more aggressive in defense unlike the winning teams, making 52 exclusions, while the winning teams made 46 exclusions in the state championship. With the table and graphical display of the variable "Goal from 6 on 5" we can conclude that the players of the winning teams took more opportunities from 6 on 5 situations 25, while the players of the defeated teams were less efficient from these situations converting 19 situations, the reason is more efficient transition of winning teams from the "umbrella" to the setting for the 6 on 5, as well as faster and better flow of the ball. From the table of variables "Shot from 6 on 5" we can conclude that the players of both teams shot from 6 on 5 same number of times, which indicates that both sides managed to develop the action with the 6 on 5, which means that defence was not at the highest level on either side. The variable "Goals from the anchor" shows us that the teams had better players in the anchor position, we can also conclude that the winning

teams have repeatedly created a situation from which the anchor can score. The variable "Peterac" confirms the claim that the players of the defeated teams played a bit rougher, more aggressive. The table and graph of the variable "Goal from penalty" indicate that the players who performed penalties on both sides were calm and concentrated enough to use most of the awarded penalties. From the table and graph of the variable "Penalty saves" we can conclude that the goalkeepers on both sides were not at the highest level when it comes to defending penalty. The variable "Contra-foul" shows equally rough play on both sides in the attack. The big difference between the winning and losing teams in the results of the table and the chart of the variable "Counterattack" indicates that the players of the winning teams came to the tournament significantly more physically ready.

The variable "Goal from the counterattack" shows us that the players of both teams were not concentrated in the end of the counterattack, because the players of the winning teams from 30 counterattacks used 15, while their opponents from 13 used only 5. Similar results were obtained by Mirvić et al. (2011) where they came to the conclusion that the winning teams have a more effective counter-attack, because they had better swimmers and better swimming, so the defensive team committed offenses which lead the winning team to achieve better success and the game was based on the central player because the central player is the playmaker. Variables "Sprint for the ball" we can conclude that the players of the defeated teams had faster individuals in the team. The variable "Foul shot" shows us that the players of the defeated teams shot much more from the foul, which indicates the lack of coordination and the inability of the team to organize the attack, and to shoot from the action. From the tables of the variable "Goals from fouls" we can conclude that the defense of the shot from foul (block) on both sides was good, because neither side was effective from the offense. Variables "Intercepted balls" we can conclude that the players of both sides managed to take the ball to the opponent several times without a foul, which indicates that the individual placement of players in defense was at a satisfactory level. Variables "Corners" we can conclude that the goalkeepers of the defeated teams had a little more work. The table and graph of the "Goal Frame" variable show us that players on both sides were almost inaccurate a total of 54 times. Mirvić et al. (2019) The outcomes of the women's water polo Olympic unbalanced games are determined by unusual player events. Therefore, top women's water polo coaches and physical coaches can plan sound training according to the specific match data reported for the Olympics. As can be seen from this study, it can be seen that the results show a balanced game which is not the same case in the previous study. All this proves to us that coaches still need to be educated when it comes to

specific motor skills, technical and tactical segment in water polo. Hraste et al. (2016). We came to knowledge that the results of this research can be applied in the selection of teams and players, in selecting the appropriate concept of the game and for organizing a suitable training concept. Mirvić et al. (2014). The teams that prevailed were more prepared in motor skills and had faster swimmers, due to the large number of goals scored from the counterattack. The authors also concluded that there were more fouls (rougher play) in the game compared to earlier water polo matches. The defeated teams committed several fouls during the counter-attack of the opponents, which caused a larger number of penalty kicks and the success of the winning teams in taking them over. In general, it can be concluded in the dynamics of the game, that the dynamics was on the side of the winning team that won the final and showed better results.

CONCLUSION

Based on the basic goal of this research and based on the obtained results, it can be concluded that there are statistically significant differences of 0.000 in the variables that were tested. The weakest difference is in the performance of penalties and counterattacks, which leads to the conclusion that the competitors are weaker in the accuracy of the shot and the approximate swimming speed. All this says that attention must be paid to the development of precision and swimming speed, all of which can confirm the weaker difference between the variables sprint for the ball and goal from a foul. It is obvious that the players did not use the 6 on 5 situations, which leads us to the conclusion that they did not work enough on perfecting this tactic. So more has to be dedicated to perfecting the tactics of the 6 on 5, this can be confirmed with the variable goals from the anchor. It can be concluded that the results, even if they are quite similar, there was a small statistically significant difference, which shows that all teams are of approximate qualities when it comes to motor skills, techniques and tactics. It is recommended to make a more efficient plan and program to improve these skills as well as to train coaches for this Olympic sport.

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Corresponding author:

Džan Lemeš
Faculty of Sports and Physical Education, University of Sarajevo, Bosnia and Herzegovina
e-mail: dzan.lemes@gmail.com

MEASURES FOR INJURY PREVENTION IN PHYSICAL AND HEALTH EDUCATION CLASSES

Faris Rašidagić, Anida Kapo and Amira Baždarević-Rašidagić

Abstract: Exercise can have different effects on the human body and on the human organism. Influence such as physical activity can sometimes cause more or less pathological changes in the organism. The changes can adversely affect the humoral status due to e.g. excessive fatigue, or the harmful impact may occur in the form of mechanical injury – caused by excessive stress and the action of internal muscular force or otherwise external mechanical force. Sports professor who implement the contents of sport and physical education, as well as coaches and doctors, should be aware of these dangers in order to prevent possible injuries. A large number of authors believe that injuries caused during sports and physical education can be called sport injuries, and in order to reduce them and for the purpose of the most successful implementation of the teaching process, it is necessary to pay attention to injury prevention measures. The teaching staff on this issue must be warned and trained, that is to have appropriate knowledge. "Appropriate knowledge" in this case is not only related to the medical health segment, but also to professional scientific knowledge in the field of sports and physical education, then knowledge in the field of classroom work, with special emphasis on the existence of appropriate desire and motivation of teachers to work with students. By adhering to and undertaking empirically elaborated rules and procedures with students, devices, aids, and appropriate orientation in time and space, the exercise process will be ensured in such a way that injuries to students in the teaching process of physical education are minimized.

Keywords: Physical and Health Education teaching, Kinesiological education, Injury prevention

INTRODUCTION

Physical efforts during physical education classes should be planned and programmed to achieve positive effects on the anthropological status of the student population (Hadžikadunić and Mađarević, 2004). However, physical activity, due to the complexity and realization of movements in different situations, can sometimes cause negative changes (Najšteter, 1991). It is possible that in certain cases, with extremely high physical effort, negative side effects occur (muscle pain, sleep disorders, hormonal imbalance and other). Sports professors, coaches, doctors and others working in physical education and health education should be aware of these dangers in order to possibly prevent them (Rašidagić and Mekić, 2011). In addition to such negative side effects, there is another danger in the teaching process of physical and health education, which is reflected in purely physical injury (Gjurić, 1989). During the movement in class, carelessness of students, improper organization of work, poor arrangement of teaching aids, poor assessment of the time component as well as other factors can cause mechanical - physical injury. Sports injuries, i.e. damage caused in sports halls, are mainly caused by mechanical force (Pavlović et al., 2015). Sport injuries are caused by the impact of an object, an opponent's player, a fall or even after an excessive contraction of one's own muscles (Medved, 1987). Injuries that occur during physical education and health education or sports or physical education classes are caused by some of the above causes, so we can call them sports injuries (Milanović, 1993). In order to be able to adequately protect themselves in the teaching process, the teaching staff, but also children and youth who

implement the teaching content, should be familiar with prevention measures, which are still the most effective protection measures. If they already occur, injuries would need to be adequately treated (first aid) immediately after they occur, as this prevents an increase in damage to the locomotor system. In this case, the teaching staff should - must be fully trained to provide first aid, which is not present in practice, so that prevention measures are still the most effective means of implementation.

DISCUSSION

In order for the teaching process to be as successful as possible, care should also be taken to prevent student's injuries. Sometimes, regardless of the preventive action, injuries can occur during the teaching process. If all necessary measures are taken before, during and after the completion of the process of working with students (Najšteter, 1997), such cases will be significantly less, and even if injuries occur, injuries will be significantly less severe. Then it is possible that their consequences disappear during the class or the teaching day (smaller and lighter blow, more clumsy landing, less stretching). If the teacher / professor takes appropriate measures, he/she will be able - in case of injury, to justifiably appear before the parents, the school management, as well as other relevant bodies that can analyze the cause of the injury. The prevention measures that we can take, which are aimed at increasing occupational safety (Rašidagić et al., 2016), the safety of students and the

preservation and improvement of their health can be divided according to the following:

Health and hygiene prevention measures,

Preventive measures regarding the control of the correctness of devices and teaching aids,

Preventive measures to protect students, help students and assist students,

Order and discipline in class as a measure of preventive activity,

Motivation and stimulation at work as a measure of preventive activities,

Prevention by applying the sign for increased attention and

Injury prevention or self-preservation of teachers/professors when working with students

Practical application of prevention measures

Health and hygiene prevention measures

The implementation of health measures implies that the teacher, in order to start the process of realization of the program contents at all, must receive appropriate information about the health of students. At the beginning of the school year, the teacher, with the help of a survey conducted among students and parents, gets basic information about whether students are healthy (Čokorilo and Mikalčki, 2014). Parents need to be interviewed because children can sometimes consciously, and sometimes out of ignorance, conceal their own health condition (parents of students can deny this information due to possessive or non-specific behavior towards the child). The teacher can also be provided with an appropriate medical document on the basis of which it is clear what the health status of the student is. All information the teacher/professor receives about the health of his/hers students, accepts with caution and if he/she can check them from different sources (if the knowledge of the student checks it with parents, if the knowledge is from parents, checks it with the school doctor, etc.) "Student personal development card". In the process of collecting information about the health of students, the teacher must take into account the secrecy of the obtained data as well as keep all possible information "for himself". Based on the determined health condition, the teacher can assume for the realization of which teaching contents the children are capable of. It is clear that regardless of the possible presence of a disease, it will not be used to completely free the student from the realization of the content of physical education and health education (this attitude is supported by modern processes of inclusion in teaching where it is considered that there is no student who cannot participate in physical education and

sports). Furthermore, the teacher adapts the teaching contents from the school curriculum for the generation to which the student belongs, to the remaining abilities of the students. The teacher, even during the realization of activities during classes, controls the ability of students to realize the planned tasks and brings adequate solutions in order to change them. Student health is a variable category, so a student who was completely healthy at the beginning of the school year may become ill or, in the case of a chronic illness, the same may worsen.

Preventive measures regarding the control of correctness devices and teaching aids

Preventive measures regarding the control of the correctness of devices and teaching aids include all activities of teachers that will be aimed at the safety of students in school and extracurricular activities. Preventive measures include the following activities:

Checking the available spaces within which the teaching contents will be realized, depends on whether it is a closed or open space. The closed space is usually a hall for physical and health education in which teaching contents are realized every day. The temperature, lighting, dust and ventilation are checked in the hall. At the beginning of each school day, it is necessary to check that there is no damage to the surface for teaching activities (damage to the parquet, dents in the rubber surfaces, etc.). The walls of the hall are also subject to inspection since it is possible to determine e.g. radiators move or introduce new ones while the teacher was not present. Such places should be provided by the teacher with additional protection or at least by introducing students to the new situation. In the case of open spaces provided for the implementation of teaching content (school sports fields), the teacher can check them in the above manner. In jumping pits, it is mandatory to inspect the sand level and its structure. If there are unarranged spaces for the realization of teaching contents (excursion), it is obligatory to perform additional checks. It should be checked whether there are foreign bodies on the specified area, different hazards, different biological, mechanical or chemical waste, and above all the adequacy of the position of the specified area should be determined, which should not be near highways, water surfaces, watercourses or steep surfaces. Special preventive measures are required by the realization of teaching contents on snow, water, on the mountain, on camping, wintering, excursions.

Checking the devices necessary for the realization of program contents is obligatory in terms of controlling the strength of hanging, jumping devices and devices for climbing, resistance and/or gymnastic exercise. Then the function of the springboard, the stability of the Swedish benches and beams, as well as the correctness of the Swedish ladder should be checked.

The correctness of teaching aids (balls, cones, hoops, etc.) is also subject to control. Mats and sponges that are used as a base on which landings are made or which provide jobs should be inspected for structure and elasticity. The teacher checks all aids before each addition to use. If there is a doubt in the correctness of any of the teaching aids, it is removed and not put into function.

After the end of the school day, it is necessary to return all teaching aids and devices to their original positions. On that occasion, the teacher can determine whether certain damages have occurred and prepare for their elimination.

Preventive measures to protect students, help students and assist students

Before proceeding to consider the basic theoretical assumptions relating to storage, it is necessary to clarify the basis for the definitions of this term. In practice, different terms such as the term guarding and the term assisting, which are usually applied as if they have the same meaning. All previous experiences (Najšteter 1997) from practice show that these are essentially three different concepts with completely different actions of teachers with students. The concept of preservation implies a series of complex procedures, part of which is applied in preparation for the teaching process and part is realized directly during the class.

Precautionary Measures

Analyzing the "notion of precaution", it can be stated that today in theory a complex of measures would be determined that includes this notion according to the following:

Taking precaution of students with appropriate methodical work with students,

Taking precaution of students by educational work with students,

Taking precaution of by applying organizational measures in classes,

Taking precaution by regular control of students' motor abilities,

Keeping good knowledge of students by teachers,

Direct care for student and

Self-awareness of students.

Taking precaution of students with appropriate methodical work with students

The teacher/professor as a good expert in the development of the curriculum should meet the parameters required in the diagnostic, analytical,

prognostic and valorization verification phase of programming (Findak and Neljak, 2006; Neljak, 2013). If the development of the curriculum is carried out through these four phases, the teaching units will be placed in appropriate methodological sequences between techniques of different elements and methodological sequences within one technical element (Bergoč and Zagorc, 2000). In practice, this will mean that the techniques of the elements are learned by applying the principles of gradualness and systematicity, in other words the approach of educating techniques on complexity from simpler to more complex, from easier to more difficult, from known to unknown and from closer to further. This approach prevents injuring students. Also, within the technique of one element, the various movements belonging to that technique (if the complexity of the technique requires it) should be decomposed into learning less complex and less demanding to more complex and demanding (of course if this technique requires an analytical approach at all). The student will then gradually upgrade the simple or less dangerous movements and thus the injury of the student will be prevented.

Taking precaution of students by educational work with students

During the class, but also during the realization of other forms of work in the system of physical and health education, the teacher/professor must continuously and directly influence the education of students (Findak, 2001). Regarding the undertaking of activities within this area, it is important to apply the following preventive measures:

Students are asked to adjust their behavior towards teaching aids, which should be with due care, so that they would not be damaged, since they were used by generations before, but will also be used by generations who will be educated later,

The teacher also has an educational effect if he notices inappropriate behavior of one student or group of students towards other students,

The teacher/professor also has an educational effect if he notices inappropriate behavior of the student towards him personally (inappropriate behavior that is not for taking disciplinary measures but needs to be corrected),

Letting and going to the toilet should not be done without the teacher's/professor's consent,

Group changes by students should be done with the teacher's approval,

Making micro pauses for e.g. student refreshment should also be under the strict supervision of the teacher and with his permission,

Special educational work should be applied to students who, during the lesson or "continuously" with their behavior, overemphasize themselves among other students.

Taking precaution of by applying organizational measures in classes

The organizational measures that the teacher takes in class are a very important means of preventing student injuries. The more experienced the teacher is (has a longer work experience), the easier it is for him to manage the students, the space of devices and aids, as well as the time allotted for teaching. It is considered that after 3 to 5 years of practical experience, the teacher can fully apply quality organizational measures. An example of appropriate injury prevention in this regard is:

Joint enactment and delivery of equipment and teaching aids with students, arrangement of equipment at the place of work and cleaning up after the work is completed, without endangering the safety of students. Students thus get to know the layout of devices and aids in the field. Devices and props should be placed at the optimal distance from each other in accordance with the tasks for students. It is necessary for the teacher to know which devices and aids will be used in which part of the lesson, on which the arrangement of devices or miseenscène in general depends. If the use of certain technical aids (video projectors, computers, etc.) is planned during the class, the same rule applies to them.

Professors/teachers should educate as many students as possible on how to properly handle all teaching aids used during classes, because by doing that the loss of active time in class is significantly shortened, but also the safety of work is increased so that students can notice possible irregularities which may have occurred on previously used aids.

It is important to choose the appropriate methodological and organizational form of work, especially in sports which require tasks with skipping, jumping, etc., where a moment of deconcentration and less attention can lead to injury to students or teachers. As an example, we can cite the organization of work where the teaching content in which there are elements of throwing, should be realized so that throwing is performed only on one side of the training ground and that all students go for thrown objects at the same time while providing optimal discipline.

In order for the realization of teaching contents, the teacher must check the temperature, lighting, the presence of dust and the like.

Special preventive measures are required by the realization of extracurricular teaching contents (excursions, tours, camps, visits)

Direct care for student

Direct care for students implies the presence with the student in the specific realization of a task which requires certain movement. These are usually more complex tasks that belong to more complex forms of movement. Immediate care can be performed by a teacher or other student who must be trained to perform immediate care. Otherwise, direct guarding achieves a counter-effect in the sense that both the student who realizes the moving task and the student who is in the role of guarding can be injured. Keeping students does not tolerate improvisation. Regardless of who is in the role of guardian, it is necessary to behave as follows:

Be as close as possible to the student during the exercise, the landing place or the place where there is the greatest possibility that the student will be injured by a fall during a failed task. If necessary, create a special place that is adapted to the role of storage and that allows for effective intervention.

Know well the moving task and the parts of the task in which a fall can occur. Often, the first signal of a possible fall is a wrong execution of the movement task technique, so that signal enables timely intervention.

The attitude of the teacher must be self-confident so that the student is not suggested the probability of a fall, because in that way the student would be discouraged in advance and lose self-confidence.

The role taken by the teacher must be such as to enable maximum mobility, so in practice the posture similar to the so called "Basketball defensive attitude" or an attitude similar to "boxing guard". But a big mistake is made when a guard kneels, sits, or takes a position that prevents him from reacting quickly in all different directions.

Note: In addition to knowing the measures of direct care of students, it is necessary to have some teacher experience in the implementation of care, which is gained through the passage of a certain amount of time spent in the teaching process.

Taking precaution by regular control of students' motor abilities

During the school year, the teacher must check the anthropological status of students (Rađo, 2000). The same is done at the beginning of the year by applying initial testing of students (morphology, motor skills, and functional status). Based on these indicators, a work plan and program is made, which is as close as possible to the students' abilities. In that way, the teacher will not ask the student to realize teaching

contents that are impossible or dangerous for him to realize (Belloc, 1972). In addition to the initial, a periodic check is applied, which can give the teacher a cross section of students' abilities and on the basis of which data he can change the plan and program made after the initial check. The change of the plan is done "if the abilities are lower - by applying simpler motor knowledge in the teaching process and vice versa. The final check in terms of increasing the safety of the teaching process does not play a significant role, nor does the ongoing check, since it checks the degree of acquisition of motor knowledge.

Keeping good knowledge of students by teachers

During the realization of physical education and health education classes, the teaching staff should not set motor tasks for the students that they suspect that the student can realize them. After a long work with students, the teacher gets to know the students well and can accurately determine whether the student is at the same level as in the previous classes (able to master a certain task for that class or not). The teacher has knowledge about all students based on exact data from the process of measurement and test-ing (Nikolić, 2003). However, there are other practical indicators that the teacher can observe on the student by observing. A student may come to class with fever, upset stomach, or other health problems that occurred just before class. By observing the student (changes on the skin, facial expressions, posture, behavior, etc.), the teacher can assume that certain disturbances have occurred, and by additional examination-conversation with the student (Brajša, 1994) can determine whether there is a need to take preventive measures to facilitate the student realization of the set tasks or completely prevent the participation of students in the class. Sometimes, even though the students insist on realizing the set tasks, the teacher is obliged to prevent them preventively.

Self-awareness of students

It implies that the student is trained to be aware of their own motor skills and what they can do and cannot do. This measure is very important for the "private life" of students, who should not engage in the implementation of various motor endeavors, if he realistically believes that he can successfully implement them. However, it can also find its place of application, self-preservation, in the teaching process. At the same time, the teaching staff must find a way for the student to have enough confidence in his knowledge, so that he undoubtedly approaches the realization of the set tasks.

The concept of helping

It allows for the first attempts to perform an exercise to overcome a number of problems that need to be addressed appropriately. The main problem is

reflected in the fact that, after the demonstration and explanation, it seems to the student that the movement is very simple and a total failure during the first attempt to perform, can be a serious shock and hindrance in further adoption of that and other movements. To avoid this, there is a valuable opportunity in the teach-ing process to assist in trying to accomplish mov-ing tasks. When we talk about the application of help, then it is understood that the pedagogue, or more experienced trainer, includes his own strength as an additional external force that will facilitate the performance of the task. It is important that the help is provided by a pedagogue or a more experienced trainer, because it is not just about involving additional external force, but the application of that force must be controlled and adjusted to the effort (force) produced by the trainee himself. The teacher supports the process of movement by directing the move-ments of the trainees, orienting the student in time and space and thus successfully "together" realize the movement task. Helping should be effective, but the student should notice and feel it as little as possible. The student should be convinced that he performed the movement almost independently and that the help provided was almost insignificant. In that case, he does not lose the necessary self-confidence and the training process continues normally. The most unfavorable situation is when, despite the help applied, the task is not successfully completed. Basically, the reason for failure lies in the inexperience of the helper or when trying to realize a task that is beyond the student's ability. In addition for providing personal contact assistance, various technical aids can be used. No matter how valuable help is in the training process, it must be applied carefully and only to the extent if necessary. Excessive help does not develop students' self confidence, which can cause negative consequences and jeopardize the learning process.

The concept of assistance

Assistance is one of the special measures in which there is practically no contact between teachers and students while teaching content is being implemented. We apply assistance in the phase when the student has already completely mastered the element he is realizing and the role of the teacher is reduced to the presence in the immediate vicinity of the device or place of realization of the motor task. Knowing the exercise well, the teacher pays attention to the critical moments or parts of the exercise, when it is possible, that due to the complexity of the movement task, the student's contact with the device is lost. Only in the case of a student falling off the aids, the teacher intervenes and prevents a more severe form of injury because it is enough for an experienced student-trainee to get only the appropriate impulse to overcome the problem in which he found himself. Certain au-thors also call this measure psychological

help in the realization of the most complex teaching contents.

Order and discipline in class as a measure of preventive activity

It is implied that learning and exercising in all organizational forms of work in physical education and sports is realized in optimal working conditions. Then, the necessary work atmosphere and disciplined attitude of students towards work was established. When educating students, the teacher guides, warns and stimulates students by developing students' independence. However, if the educational work of teachers does not have an appropriate effect, disciplinary measures can be applied by imposing penalties and establishing prohibitions that should be appropriate to the situation. Accustoming students to work and discipline is an integral part of the process of learning and practicing, it must not be understood in any case as a restriction of freedoms and satisfaction of students. Disciplinary measures applied in school should lead to the suppression of undesirable behaviors in school, while being age appropriate and respecting the principle of ethical treatment of children. In teaching practice, there are so many possible "non-working" and "undisciplined" actions of students that it is not possible to overlook them all (Mirić, 2011), but with a good general organization of the teaching process, this number can be reduced. Students can e.g. come to class but not work / sit on the bench. The problems in imposing disciplinary measures in school are as follows:

The procedure for determining responsibility usually takes a long time.

There is a different treatment between teachers, who often selectively and differently apply the imposition of measures that are available to them.

A student is often punished, which is wrong because "behavior" should be punished, not the student.

The school has complex procedures for imposing disciplinary measures.

Note: The school evaluates the behavior of students in accordance with the Law on Primary Education.

Motivation and stimulation at work as a measure of preventive activities

Motivation and stimulation measures are based on stimulating students' natural biological need for research. The teaching of physical and health education satisfies the need and desire for movement, which also explores certain areas. The interest of students at a younger age shows variability, and the desire for the same can be stimulated by the word of the teacher who addresses the student. Motivational words addressed by the teacher to the student should

be appropriate to the student's current abilities. Verbal motivation can be used at the moment when it is most needed in terms of approval, praise, recognition for the task performed, corrections and the like. In order to develop the positive qualities of students, students who excel in learning and behavior and activities in school and outside, can be awarded praise and awards for the purpose of motivation. Praise can be given directly in class by the teacher but part of the praise and awards are given by certain school bodies. Official praise or reward of students is done in accordance with the "rules of the school" which represent the general act of the school. The rules of the school are adopted by the school board with the consent of the Ministry of Education. Commendations and diplomas, in addition to being awarded to individual students, can also be awarded to a group of students or a class for the results achieved in teaching and educational activities. Commendations, diplomas and awards are given publicly and are announced on important dates such as: school day, at the end of the semester, at the end of the school year and the like. Awards are given by: a class teacher for a student from I-IV grade, a class teacher for a student from V-IX grades, a class council, a teachers' council, a school principal and a school board. The reasons for awarding prizes to students can be the following:

Special results in the affirmation of the school in the implementation of the curriculum, municipal and cantonal competition,

Outstanding results in the competition at the federal and state level,

Commitment and outstanding success in various forms of leisure activities, in the social and cultural life of the school,

Exceptional contribution to the development of social relations and providing assistance to other students in mastering the curriculum, and other rewards.

The preventive purpose of all praise or rewarding of students is that the school has an additional member of the team who shows behavior in which responsibility is observed, and behavior that is an example for other students. In this way, the overall behavior of students in the school is stimulated and raised to a higher level (towards other students, teachers, school property, teaching process).

Prevention by applying the sign for increased attention

The pedagogue who implements the teaching process must acquaint all students with the sign for increased attention. The purpose of this sign is to be used for the purpose of general interruption of all activities. The same can be realized with e.g. a whistle that sounds in a specific way (a long and penetrating whistle). After this sign, which is usually not used more than two or

three times during the class, it is necessary that all participants in the teaching process stop activities (play, movement, conversation) and turn to the pedagogue. After this, the educator can proceed to a detailed explanation of his expectations. The sign can also be used in cases when students have lost control and started behaving outside all the rules, or in case of certain dangers for the student or students (e.g. in case a certain student finds himself in danger during outdoor classes) where after the use of the sign immediately suspends activities and thus eliminates the dangers.

Injury prevention or self-preservation of teachers /professors when working with students

A very important segment of prevention that is little or not talked about is the self-preservation of teachers/professors during the implementation of teaching content. For the teaching of physical education and sports, this segment is far more important than for other subjects. First of all, the realization of helping, guarding or assisting can lead to poor assessment or self-sacrifice and injury to teachers, all with the aim of preventive action to injure students. Also, poor organization of work in e.g. throwing athletic disciplines, or a moment of deconcentration and poor attention, or poor working conditions such as poor visibility can lead to injury. A very important segment of injury prevention is the well-developed awareness of the teacher about his current abilities, where in the implementation of demonstration methods, a moment of inattention or muscle weakness can lead to injury. Certain teaching contents are sometimes realized in field or other difficult conditions, so the recommendation for the teacher is to always perform quality preliminary preparation. Given that research has shown that a large number of sports educators are injured during competitions with students (especially high school), it is recommended not to engage in activities for which personal readiness has not been previously checked, playing basketball with students, taking students on hiking, school organization skiing on difficult trails, demonstration of motorically demanding sports techniques). It is important to note that teachers are expected to help students in moments of weakness, and not to let opposite situations happen, which can cause certain traumas for students, as well as be an interfering factor for further organization of teaching.

CONCLUSION

Sports injuries are usually characterized by numerous functional outbursts of the locomotor system. There may be minimal disability, but also the complete impossibility of realizing the content of physical education and health education. Such a situation is completely contrary to the immediate goals of teaching where it is necessary for as many students as possible

to participate in physical activity, in order to acquire exercise habits but also the necessary knowledge of sports techniques that could be applied in the so-called "free time" (Buntić, 2006). Due to the above, the prevention of injuries in the teaching process is one of the primary tasks, of course not to the extent that the entire teaching activity is reduced to the formal application "just so that students are not injured." A large number of injuries can be avoided by appropriate dosing of the load, but also by taking preventive measures in class. In theory, one can only assume how many injuries have been prevented (the number is imaginary and impossible to assume or investigate) by proper preventive action - by taking measures to prevent injuries in physical education classes. Since injuries do not have to be caused by extremely high mechanical external force, the application of proper technique is one of the most important measures in protecting students. Well self-awareness of knowledge reduces the chances of injury. It is recommended that all persons involved in physical education processes (professors, trainers, teachers) adhere to the rules developed in this paper, so that the exercise process is ensured and injury prevention is raised to a higher level.

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Corresponding author:**Faris Rašidagić**

faris.rasidagic@gmail.com

University in Sarajevo

Faculty of Sports and Physical Education

Phone: +38761109435

ANALYSIS OF REPRESENTATION OF SCIENTIFIC PAPERS WITH TOPIC OF WINTER SPORTS IN SPORT MAGAZINES

Rasim Lakota and Berina Turković

ABSTRACT: Winter sports are sports considered as most attractive sports all around the world. Visiting mountains gives people feeling of: relaxation, pleasure and it influences on their health and cardio vascular and respirator system. This study included sample subjects of 6 magazines, which are available on the web pages. Magazines from the period of 2009-2019 are taken into consideration i.e. magazines in the last 10 years. **METHODS:** Method of analysis is used for data processing. That is procedure of scientific research by breakdown of complex terms and conclusions on the simplest parts and elements. All magazines are analyzed by years and each paper is analyzed, in detail. Analysis of 6 magazines from different cities of Bosnia and Herzegovina (Sarajevo, Mostar, Travnik, Tuzla and Banja Luka) and one magazine from Croatia (Zagreb), showed that there is small number of papers on winter sports in sport scientific magazines. Most papers on winter sports, was founded in magazine Kinesiology Zagreb and magazine Sport Logia Banja Luka. **CONCLUSION:** Sport presents every aspect of entertainment, fun and play and physical exercise and through contest and competition asks for measurable effect of work i.e. sport result.

Keywords: skiing, sports, nordic skiing, biathlon, health.

INTRODUCTION

Winter sports are sports considered as most attractive sports all around the world. Visiting mountains gives people feeling of: relaxation, pleasure and it influences on their health and cardio vascular and respirator system. Apart from winter sports, which are practiced on mountains, there are also winter sports that are performed in sport halls. Winter sports are known for attractive movements, excitement, dynamics and unpredictable situations. Winter sports include: Alpine skiing, Nordic skiing, biathlon, fast skating, carting, ski jumps, ice hockey, curling, bobsleigh, snowboard etc. Alpine skiing is the most common winter sport. Skiing is a unique activity, which demands high level of preparation, skills and abilities. Every winter sport has its own story, demands, rules, ways of performance, it features etc. This paper will be based on analysis of representation of scientific papers in sport scientific magazines in the area of winter sports. Each winter sport has its history of its creation, its founders, originators etc. People usually practice winter sports as recreational activities, which they perform with pleasure and without any pressure. In order to practice any winter sport, one needs to have adequate equipment, which will prevent any

potential injury. During the years, equipment changed, it is improved, it became more modern, it gives more possibilities, looks better etc. In terms of winter sports, Bosnia and Herzegovina is marked by Winter Olympic Games in 1984. Olympic Games in Sarajevo brought many positive things for winter sport such as: popularity, money, marketing, sport promotion, business collaborations etc. Practicing any sport demands a lot of time and effort, hard work, motivation and will.

METHODS

This study included sample subjects of 6 magazines, which are available on the web pages. Magazines from the period of 2009 -2019 are taken into consideration i.e. magazines in the last 10 years. Those magazines are: Homosporticus Sarajevo, Sport Logia Banja Luka, Sport Logos Mostar, Sport science Educational faculty of symposium sport and health – proceeding books Tuzla, Kinesiology Zagreb. Method of analysis is used for data processing. That is procedure of scientific research by breakdown of complex terms and conclusions on the simplest parts and elements. All magazines are analyzed by years and each paper is analyzed, in detail.

Graph 1. Diagram of selection of studies

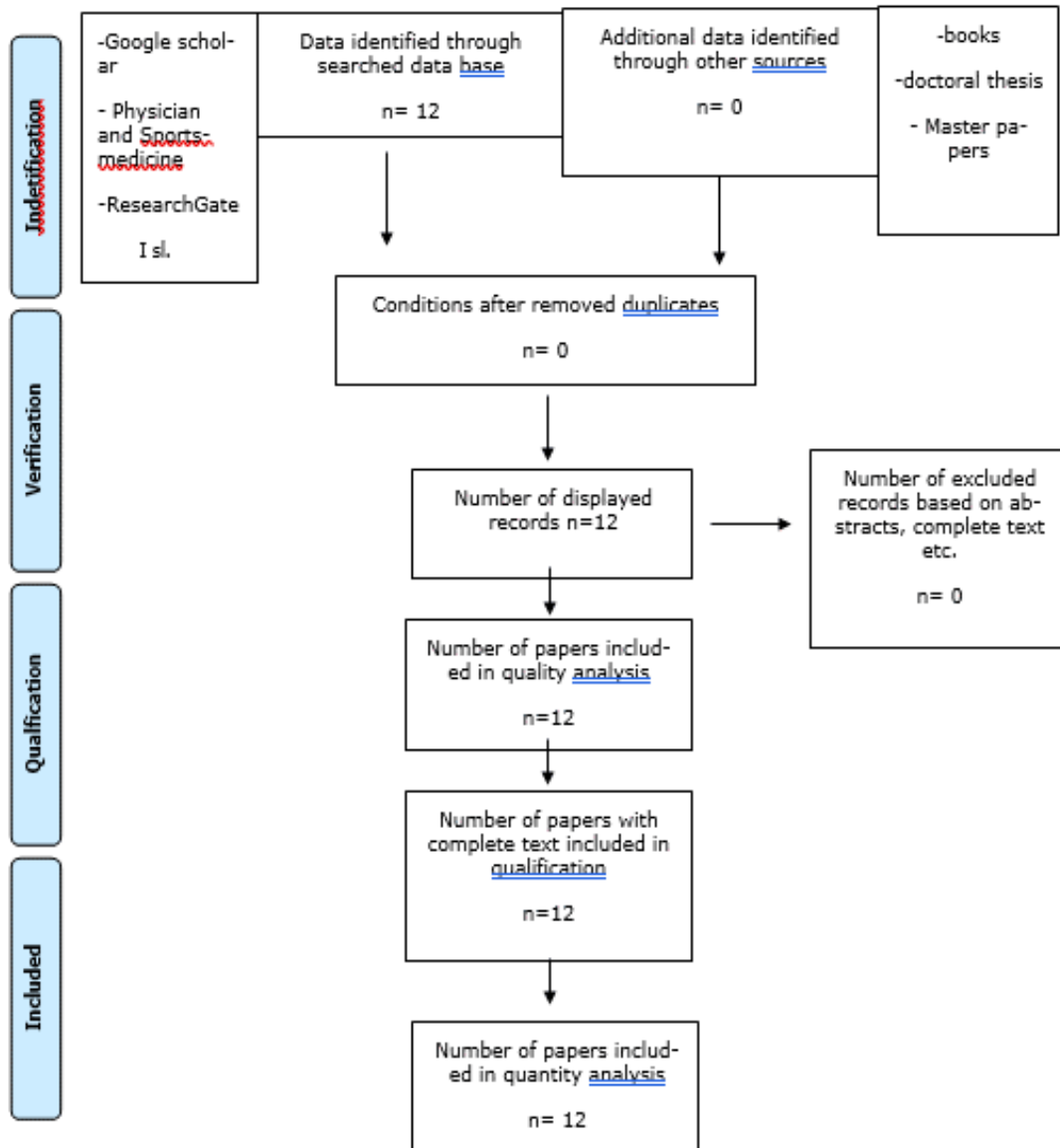


Table 1. Results

Name of the author	Paper	Sample subjects	Description of the study	Results
Stojanović, N., Savić, Z., Stijerović, V., Lilić, Lj	From telemark to curving	n=2	Study presents historic presentation of recent techniques and practice in skiing, and predictions of future trends in development of Alpine skiing	First skis came from the period of the ice age, 45000 BC, and they had different length, weight and width. Only one stick was used. Telemark and Christiania were basic ski techniques of turning and stopping, which are still developing and improving today. New challenges of technology of ski industry are related to narrower, lighter and faster ski and for combination of shorter and longer skis in training of beginners.

Name of the author	Paper	Sample subjects	Description of the study	Results
Čigrovski, V., Božić, I., Prizmić, N.	Contribution of development of motor skills in acquiring skiing techniques.	n=86	This study determined influence of motor skills on the process of learning of Alpine skiing.	Analysis of results showed how agility has positive effect on learning all examined elements of skiing technique. Results of subjects in test endurance in squats, which is used to assess static strength of legs, has a positive influence on learning curves to the slope, basic curve, and parallel curve. Body height of skiers, beginners, has negative effect on learning skiing.

Name of the author	Paper	Sample subjects	Description of the study	Results
Mijanović, M., Matković, B.	Prediction of the final time in slalom, based on time of the first and the second race	n=27	Measurement of time of the first and the second race.	Rules say that the right of participation in the second race have the first 30 competitors from the first race. Therefore it can be concluded that the first race i.e. race without calculation, all or nothing. Tactics of the second race is significantly different from the first race.

Name of the author	Paper	Sample subjects	Description of the study	Results
Cigrovski, V., Matković, B., Matković, B.	Is the way of teaching of Alpine skiing without plough skiing technique, more efficient?	n=126	Skiing knowledge is determined by testing five skiing techniques, which were evaluated by five independent judges.	In conclusion, according to our observations, in process of teaching of beginners of Alpine skiing, parallel and plough technique of skiing are used for more efficient skiing.

Name of the author	Paper	Sample subjects	Description of the study	Results
Lakota, R., Hranjčić, D.	Influence of motor skills on basic elements of Alpine skiing of students of Faculty of Sport and Physical Education	n =40	The main goal of this study is to determine influence of motor skills on the success in performance basic elements of Alpine skiing. Sample of variables were groups of 18 tests, which cover explosive and repetitive strength, speed, coordination, balance and flexibility. There were 9 criteria variables.	Results of this study indicate that in process of physical preparation, before getting to the snow, i.e. in skiing training, an important role takes the process of transformation of motor skills.

Name of the author	Paper	Sample subjects	Description of the study	Results
Mujanović, E., Alihodžić, Dž., Mujanović, A., Nožinić, A., Atiković, A., Mebinović, J.	Correlation of body composition with success in performance certain elements of technique of skiing.	n =20	Data processing for this study, is conducted with adequate statistical program. Correlation between variables of examined areas, will be determined by Spearman's coefficient of correlation.	Determination of correlation of examined areas (body compositions, success in performance of basic elements of skiing techniques) by Spearman's correlation analysis of variables for assessment body composition of and variables for assessment performances of basic elements of skiing techniques.

Name of the author	Paper	Sample subjects	Description of the study	Results
Lolić, D., Lolić, N., Basara, S., Čoković, S.	Canonic relations of motor skills and explosive strength in young skiers	n =26	The aim of is determining statistically significant canonic relations between group of motor variables for assessment of repetitive strength and coordination and group of variables for assessment explosive strength in young skiers.	Results of study indicate (tables 1-6) that between motor skills, as predictor system, and results of explosive strength, as criterion, there is statistically significant relation (P-Level=.000), which indicates high projections of motor dimensions and tests of explosive strength on canonic factor.

Name of the author	Paper	Sample subjects	Description of the study	Results
Kunzell, S., Lukas, S.	Transfer of learned in preparation training of skateboarding on learning snowboarding	n =24	In this study we analyzed possibility and theory base for effects of transfer in field conditions. Students of experimental group participated in 5 trainings of skateboarding. After that they joined the control group of subjects, on 6-day school trip of learning snowboarding	There were no statistically significant differences between groups in initial testing conducted on the second day of, while in the second measurement, conducted on sixth day of the trip, there were statistically significant differences between groups, on behalf of experimental group ($M_{kont}=4,80$, $SD_{kont}=2,10$; $M_{eksperim}=6,56$, $SD_{eksperim}=2,10$; $T=1,78$, $df=16$, $p=0,045$, $d=-0,83$).

Name of the author	Paper	Sample subjects	Description of the study	Results
Vodičar, J., Jošt, B.	Correlation between selected kinematic parameters and length of jumps on competition ski flying.	n=40	The aim of this study was to analyze selected kinematic parameters (time of flight, speed on ski jump, speed of reflection, speed of flight, height of flight on 17m of flight, height of flight on 75m, height of flight on 120m, aerodynamic index on 17m of flight, aerodynamic index on 75m, aerodynamic index on 120m of flight.) The best world skiers fliers, who participated on two final competitions of the World cup in skiing flights (Friday and Sunday) on Planika (height if ski jump 215m), Slovenia 2009.	Correlation analysis and univariant analysis of variance were used to determine statistical significance of lower number of correlation among defined kinematic variables and length of jump.

Name of the author	Paper	Sample subjects	Description of the study	Results
Ušaj, A., Burnik, S.	Level of saturation of blood with oxygen and frequency of heart during exercise, measured a month after Alpine expedition on high altitude	n =4	The aim of this study was to determine whether three specific features of adaptation on altitude – changes in body weight, saturation of arterial blood with oxygen and frequency of heart – indicate that process of adaptation ended one month after winning Gasherbrum II peak.	Results showed that body weight was reduced for about 8kg ($p<,05$). A month after winning the peak. A heart frequency remained the same during the testing at absolute intensity in conditions of hypoxia (153±19 o/min. Before in relation to 154±15 o/min after expedition) and hypoxia (155±21 o/min before in relation to 158±20 o/min after expedition), but me must forget reduced body weight after expedition.

Name of the author	Paper	Sample subjects	Description of the study	Results
Radman I., Matković B., Gurmet S., Podnar H.	Effects of program of Alpine skiing on attitude toward Alpine skiing	n =136	The aim of this study was to determine difference in attitude toward Alpine skiing between men and women immediately before (initial testing) and after school of skiing (final testing)	Based on results of final testing, it can be concluded that there is no statistically significant difference in attitude between men and women, which is determined by initial testing.

Name of the author	Paper	Sample subjects	Description of the study	Results
Oyvind Sandbakk (2018)	Practical performance of training of strength for improvement of performances of the world class skiers	n =1	Presented examples give short-term support to the scientific evidence, where training with great strength in preparation period, once a week, is included, in order to keep the strength during the competing period.	Individualized programs for strength, specified for movement with the aim of improvement of technique of skiing, efficient exercise, and delaying of weariness, are used in this study

RESULTS

This scientific magazine included sample of papers from the period of 2009 - 2019 godine, in magazines from 2011-te i 2013, two papers, related to winter sports, are found. Nurković, N., Siniša K., Idrizović, A. (2011). THE EFFICACY OF CLASSIC AND DIRECT METHODOLOGICAL PRACTICE PARTIAL DIFFERENCES ANALYSIS IN ALPINE SKIING LEARNING. and Kovač, S., Lakota, R., Kapetanović, M. (2013). KINEMATIC RESEARCH OF IMPROVEMENT THE FACT THAT SHORTER AND DIRECT SKIING LINE ACHIEVED HIGHER SPEED WHILE PASSING THROUGH SLALOM GATES

Sport Logia - Banja Luka

Sport Logia included sample of papers from the period from 2009-2019. 4 papers, related to winter sports, are found. Stojanović, N., Savić, Z., Stijepović, V., Lilić, Lj. (2017). FROM TELEMAR TO CURVING Cigrovski. V., Božić, I., Prlenda, N. 2012). Contribution of development of motor skills in learning skiing technique Mijanović, M., Matković, B. (2011). Prediction of final time in slalom, based on the first and the second race. Cigrovski, V., Matković Bojan., Matković, B. (2010). Is the way of teaching of Alpine skiing, without application of the plough skiing technique, more efficient?

Sportski Logos - Mostar

Analyzing, collecting and processing data of found papers of scientific magazine „Sport Logos“ in period from 2009-2019, only 1 paper, which was related to winter sports, was analyzed Lakota, R., Hrnjić, D. (2015). INFLUENCE OF MOTOR SKILLS ON BASIC ELEMENTS OF ALPINE SKIING IN STUDENTS OF FACULTY OF SPORT AND PHYSICAL EDUCATION. 7.4 Faculty- Symposium Sport and Health-Proceeding Books Tuzla VI and X International Symposium sport and health, Proceeding Books, Tuzla, are analyzed in this paper. These papers were the only ones available on Internet. On VI International symposium sport and health, 65 papers is published but none of them was related to winter sports. On X International symposium sport and health, 35 papers was published and one paper was related to winter sports. Mujanović, E., Alihodžić, Dž., Nožinović Mujanović, A., Atiković A., Mehinović, J. (2017). Correlation of the body composition with the success in performance of certain elements of skiing technique Sport Science-Travnik

One magazine (2017) and one proceeding book (2016) was analyzed. In 2017 magazine no paper or proceeding book related to winter sports, was found. Lolić, D., Lolić, N., Basara, S., Čoković, S. (2016).

Canonical Relations of Motor Skills and Explosive Strength in Young Skiers.

Kinesiology- Zagreb

Papers from the period between 2009 and 2019 are analyzed in this paper. Five papers included topics related to winter sports. Ušaj, A., Burnik, S. (2009). Level of Saturation of Blood with Oxygen and Frequency of Heart During the Exercise, Measured a Month After Alpine Expedition on High Altitude Kunzell, S., Lukas, S. (2011). Transfer of Learned in Preparation Training of Skateboarding on Learning Snowboarding Scientific Vodičar, J., Jošt, B. (2011). Correlation of Selected Kinematic Parameters and Length of Jumps in Competition in Skiing Flights Radman, I., Matković, B., Gurmet, S., Podnar, H. (2014). Effects of Program of Alpine Skiing on Attitudes Toward Alpine Skiing Øyvind Sandbakk (2018). Practical Implementation of Strength Training to Improve the Performance of World Class Cross Country Skiers

DISCUSSION

Analysis of 6 magazines from different cities of Bosnia and Herzegovina (Sarajevo, Mostar, Travnik, Tuzla and Banja Luka) and one magazine from Croatia (Zagreb), showed that there is small number of papers on winter sports in sport scientific magazines. Most papers on winter sports, was founded in magazine Kinesiology Zagreb and magazine Sport Logia Banja Luka. Searching the Internet most magazines were from Kinesiology Faculty of Zagreb and their magazine is called Kinesiology (23 magazines in period from 2009-2019), where 5 magazines on winter sport was found. Faculty of Sport and Physical Education of University of Sarajevo (Homospartacus), also has great number of published magazines (18 papers in period from 2009-2019). However only two papers related to winter sports, were found in these magazines. The least available references related to magazine „Sport Science Travnik“ and „Symposium Sport and Health, Proceeding Books, Tuzla“. Two papers were found in web pages in each of these two magazines from the period from 2009 to 2019., and only two papers were related to winter sports. (one paper from 2016 Travnik and one from the 10th International Symposium of Sport and Health, Tuzla). Analysis of papers showed that all papers were related to skiing. Skiing is one of the most representative winter sports and attracts most authors. In order to write about winter sports, they need to be more promoted in all countries and not only in countries, that are known for top results on competitions, such as: skiing, snowboarding, ski jumps... According to results of this study, magazine Kinesiology-Zagreb has most different papers on topic of winter sports. Some of the topic are: snowboarding, cross-country, ski jumps, Alpine skiing, but most

attention gets Alpine skiing. Main hypothesis is discarded, because there is no great number of papers on topic of winter sports in sport scientific magazines. H1 is confirmed because it is proved that Croatian sport magazine Kinesiology has more papers on topic of winter sports than 5 magazines in Bosnia and Herzegovina. Reason for this can be that Croatia is known for winter sports, it even has the most popular and most successful skiers Ivica and Janica Kostelic. Further research recommends including great number of magazines from other cities of Bosnia and Herzegovina and from Croatia, in order for results to be more realistic. Also, it is recommended inclusion of other countries, in order to analyze representation of papers on topic of winter sports in sport scientific magazines.

CONCLUSION

Sport presents every aspect of entertainment, fun and play and physical exercise and through contest and competition asks for measurable effect of work i.e. sport result. Winter sports are sports which are practiced in winter conditions, on low temperatures, with presence of snow or ice. There is great number of winter sports and the most popular ones are: skiing, snowboarding, ski jumps, biathlon Nordic skiing etc. This study included sample subjects of 6 magazines, which are available on web pages. Magazines in period from 2009 to 2019 i.e. magazines in the last 10 years, are taken into consideration. Those are: Homosporticus Sarajevo, Sport Logia Banja Luka, Sport Logos Mostar, Sport science-Educational Faculty Travnik, Faculty-Symposium Sport and Health-proceeding books Tuzla, Kinesiology Zagreb. General hypothesis H-presents that there is great representation of scientific papers in sport scientific magazines in the area of winter sports is not confirmed.

H1 – shows that higher percentage of representation of scientific papers in sport magazines outside Bosnia and Herzegovina is confirmed. Primary aim of this study is to determine and analyze representation of scientific papers in the area of winter sports, in sport magazines. Magazines from Bosnia and Herzegovina and one magazine from Croatia are analyzed in this paper. All magazines are available on web pages. Results of this study showed proved that there isn't a lot of papers on topic of winter magazines in sport scientific magazines. In six sport scientific magazines there were 14 papers on topic of winter sports, found. Most papers on this topic are found in magazine Kinesiology – Croatia, followed by papers in Sport Logia - Banja Luka. Least references are found related to symposium of sport and health Tuzla. In almost all papers, which were related to skiing, only magazine from Croatia had diverse papers. It is recommended to include more papers in the future studies, in order to get more realistic results.

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Corresponding author

Rasim Lakota

Faculty of Sport and Physical Education, University of Sarajevo
 rasim.lakota@fasto.unsa.ba

THE FREQUENCY OF FOOT DEFORMITIES OF PRIMARY SCHOOL PUPILS IN THE „PRIMARY SCHOOL BIJELO POLJE“

Džafer Alić

Abstract: Deformities of the locomotor system are a growing problem today. Unhealthy lifestyle, reduced physical activity, insufficient exercise, wrong diet are some of the reasons for the growing number of deformities, especially deformities of the feet and spine. It is very important to determine the overall postural status of the child, especially the feet and spine. In the theory above, we can identify three factors that we can act on to slow down the development of deformation, if it cannot be prevented, due to hereditary predisposition. These are weakness of the foot muscles, being overweight and a lowered arch of foot. The research objective is to determine the frequency of foot deformities in children of primary school age in the Primary School "Bijelo polje" on the basis of the determined condition.

The research was conducted in the 2015/2016 school year on a sample of 454 pupils of both sexes. The method of plantography and clinical examination of the feet was used as a method of determining foot deformities. The results of the research obtained by the plantography method show that 38% of the children included in this research have some kind of foot deformity. 157 or 34.5% of children have a lowered foot (pedes plani), 4 or 0.8% of them have an inverted foot (pedes valgi), 6 students or 1.3% of students included in this study have an inverted lowered foot (pedes planivalgi), while 1 or 0.2% have a lowered transverse arch of the foot (pedes transversplani), and 11 or 2.4% of students have a recessed foot (pedes excavati). Based on the obtained results, we can conclude that greater involvement in the education system is needed in the detection and prevention of this type of deformity.

Keywords: foot deformities, pupil, plantography

INTRODUCION

Proper growth and development is crucial for every person, and especially for preschool and elementary school age. Physical and health education with all its organizational forms of work through specific kinesiological activities can significantly affect the qualitative transformation processes of the overall anthropological status. One of the basic tasks of physical and health education is to monitor the overall development of the school population, and especially the postural status of pupils. It is of great importance to detect on time any form of deformity, as well as the correct approach in correcting them. Also, the contents of physical education and health education should have a preventive and therapeutic effect through their contents, and especially through corrective gymnastics in homogeneous groups. These are therapeutic exercises that aim to restore the disturbed balance between the musculoskeletal system and the muscles. If this is not entirely possible, further progression of the deformity should be prevented. Today, there are specialized clinics for determining the status of the feet as well as for making special orthopedic insoles in large clinical centers. Diagnosis is performed according to high scientific standards and constant supervision of experts (Skender, 2000; Stefanovic, 1985; Džafić, Čolakhodžić, 2016). Based on the imprint, an individual orthopedic insole is made of natural materials, modern design and effective corrective effect, adapted to ready-made footwear. In school practice, the method of plantography is most often used to take a footprint.

RESEARCH METHODOLOGY

The research objective and tasks.

The research objective is to determine the frequency of foot deformities in children of primary school age in the area of primary school Bijelo Polje, Potoci, Municipality Sjever, City of Mostar. In this paper, we will explain and present foot deformity, as one of the increasingly common deformities in the school population.

The research tasks are:

1. Explain the function of the human foot,
2. Demonstrate exercises to foot deformities correction,
3. Examine and determine whether deformity of the lowered foot occurs in primary school children - pedes plani, pedes planovalgi, transversoplani and transversoplanovalgi, and to what extent,
4. Determine whether deformity of a recessed foot (excavate) occurs in primary school children and to what extent,
5. Determine if the foot condition is good in primary school children.

RESEARCH METHOD

In this research paper, we used the method of plantography and clinical examination of the feet.

Research subjects

The research was conducted on 454 primary school pupils of 'Primary School Bijelo Polje'.

Research results

On the first task of this research, we were supposed to study the scientific literature and show the types of foot deformities. The type of foot deformity in all persons, and especially in primary school students, is influenced by pathology factors, so we can divide them into internal and external:

Internal factors of foot deformity are:

- weakness of the muscles, ligaments and tendons of the feet
- nerve disease
- joint disease
- poor blood circulation

External factors of foot deformity are:

- bad shoes
- adiposity
- insufficient physical activity
- traumas of the locomotor apparatus in development
- workplace

The surface of the footrest can be displayed and determined in a classical way. It is a footprint with full reliance on indigo paper or canvas. Today, a podoscope is used, which consists of solid transparent glass, obliquely placed mirrors and electric lighting. Static and dynamic foot function can be examined on a podoscope. In developed countries, there are modern software methods that are based on the same principle but the results are faster, clearer and more accurate.

Based on the footprint, the following characteristics

(types) of feet can be obtained:

- PEDES RECTI (proper foot), the print contains all five toes, the front part connected to the back of the foot. The load is directed to the heel axis, to the head of the first bone of the foot,
- PEDES PLANI - the foot is lowered,
- PEDES PLANUS (flat foot), a widely printed foot-print, which results from the failure of short plantar muscle function due to ligament strain. There is a pronation of the talus which is placed medially towards the calcaneus. With a flat foot, we have pain in both the foot and the lower leg.

- PEDES CAVUS (High foot), occurs when the heel bone is supinated with the pronation of other tarsus bones.
- PEDES VALGI (Inverted foot), has a medially con-vex imprint and a flat foot is twisted towards the medial.
- PEDES VALGUS, calcaneus is in the position of pronation. The direction of the load passes through the talus and calcaneus, forming an angle open to the outside, and the foot in the position of pronation.
- PES VARUS, a shrunken foot creates the opposite image of a pes valgus. The longitudinal axis that passes through the talus and calcaneus forms an angle open medially with the transverse axis, resulting from stiffness of the pronator muscles.
- PES EQUINUS, occurs when the flexor muscles of the lower leg are stiff, when the perineal muscles and m.tibialis anterior are stiff, the pes equivarus occurs.
- PEDES EXCEVATI - there is a depression of the foot,
- PEDES PLANOVALGI - is an inverted lowered foot,
- PREDES TRANSVERSPLANI - the transverse arch of the foot is lowered.

The results of examinations conducted in the 2015/2016 school year show that out of 454 students included in this research, 38% of children have some kind of foot deformity. 157 or 34.5% of children have a lowered foot (pedes plani), 4 or 0.8% of them have an inverted foot (pedes valgi), 6 students or 1.3% of students included in this study have an inverted lowered foot (pedes plani-valgi), while 1 or 0.2% have a lowered transverse arch of the foot (pedes transversplani), and 11 or 2.4% of students have a recessed foot (pedes ex-cavati).

Table 1. Results of the examination of foot deformity in the 2015/2016 school year

Foot diagnosis	Research subjects included	%
Pedes recti (proper foot)	275	61%
Pedes plani (lowered foot)	157	35%
Pedes excavati (recessed foot)	11	2%
Pedes valgi (inverted foot)	4	1%
Pedes planovalgi (inverted lowered foot)	6	1%
Pedes transversplani (lowered transverse arch of the foot)	1	0,2%

After analyzing the conducted examinations in the 2015/2016 school year, we can conclude that about 61% of the examined students have a normal foot finding, while about 40% of them have different types of foot deformities, which can be seen from table No 1.

CONCLUSION

The degree of deformity and age of the child determines the method of correction. It is necessary to choose one of the methods of correction in cooperation with physiotherapists and teachers, and in cooperation with parents in order to permanently correct the deformity. It is of great importance to detect any form of deformity on time because that is crucial for the future health of the child. And in such situations, cooperation, information and persistence are very important, which aims to reduce or eliminate deformities.

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Corresponding author:

Džafer Alić, doctoral study

Nastavnički fakultet Univerziteta „Džemal Bijedić“
e-mail: dzafer_a@hotmail.com

THE INFLUENCE OF THE SPECIFIC 3-MONTH FOOTBALL PROGRAM ON THE STRENGTH AND FUNCTIONAL ABILITY OF FOOTBALL PLAYERS AGED 16 – 18

Jasmin Pandur

Abstract: The main goal of this research is to determine the level of quantitative changes in motor and functional abilities in the three-month football program of football players aged 16-18. Based on the aim of the research, the basic tasks were determined, i.e. to perform the initial measurement of motor and functional abilities for each respondent individually at the beginning of the program, to conduct a training program lasting 3 months, to perform the final measurement of motor and functional abilities of each respondent individually at the end of the program, choose an adequate procedure for data processing, draw conclusions based on the obtained data. The respondents were members of the football club FK Blagaj from Blagaj. The longitudinal research included 30 respondents of FK Blagaj aged 16-18 years. The work program lasted 90 days, with a total of 38 training units. Training was conducted three times a week. The duration of the training ranged from 50 to 60 minutes, depending on the training task, period, weekly and daily work schedule, weather conditions and ambience.

Keywords: football, experimental program, functional abilities, strength

INTRODUCCION

The main goal of this research is to determine the level of quantitative changes in motor and functional abilities in the three-month football program of football players aged 16-18. Based on the aim of the research, the basic tasks were determined, i.e. to perform the initial measurement of motor and functional abilities for each respondent individually at the beginning of the program, to conduct a training program lasting 3 months, to perform the final measurement of motor and functional abilities of each respondent individually at the end of the program, choose an adequate procedure for data processing, draw conclusions based on the obtained data. The respondents were members of the football club FK Blagaj from Blagaj. The longitudinal research included 30 respondents of FK Blagaj aged 16-18 years. The work program lasted 90 days, with a total of 38 training units. Training was conducted three times a week. The duration of the training ranged from 50 to 60 minutes, depending on the training task, period, weekly and daily work schedule, weather conditions and ambience. Methods, content and intensity of work are harmonized with the developmental characteristics of the respondents. These results give us the right to claim that the work program with the entire application of the situational model of work, based on exercises of strength and functional abilities, and adapted to the age characteristics of the youngest football players, leads to positive changes in most situational-motor and functional abilities. All this confirms that the skillful manipulation of volume, intensity and rest between repetitions and series of exercises, which can be very well controlled by appropriate selection of exercises and specific assignments in the game, depending on the period of preparation, it is possible to make a high-quality training that will be integrated and at the same time different fitness and technical-tactical requirements.

METHODS

This study is a longitudinal character (which means that we researched out between the two time points, finding the first initial state subjects, then conducted the program and ultimately determine their final status), and aims to determine the level of quantitative-qualitative changes in motor and functional abilities in a three-month football program.

Sample of respondents

The respondents were members of the football club FK Blagaj from Blagaj. The longitudinal research included 30 FK Blagaj respondents aged 16-18.

Sample variables

The project defined the following variables that will cover motor characteristics that influence the success in the football game (Šoš, Mekić i Rađo, 1998; Čolakhodžić, 2010; Čolakhodžić, Rađo, 2011):

Variables for estimating motor ability:

1. High jump (explosive power) (MFESVM)
2. Bench press (static power) (MRABPT)
3. Lifting the torso from lying down (repetitive power) (MRSDTŠ)
4. Long jump from place (explosive power) (MFESDM)

Variables for estimating functional ability:

1. Cooper test (FAE12)
2. Harvard step test (HST)

Research description

Spatial, temporal and organizational conditions are provided in accordance with the standards for such research. Measurements were carried out in the forenoon at the stadium of the FK Blagaj in Blagaj, whose space met the standards for measurement (world temperature, temperature, etc.), under equal measurement conditions for all respondents, which is why each measurement test is the same on true respondents. The weigher first read the result, the scorer would repeat it and write it in the personal card of the respondent as measured, i.e. in the original units of measurement for each motor measuring instrument. Respondents came for measurement in groups of 10 respondents. Re-pondents came for measurement in groups of 10 respondents. They performed each test in appropriate clothing and footwear (T-shirt, shorts and sneakers). When programming the experiment, the order of the measuring instruments was taken into account, in order to avoid the influence of the application of one test on the results of another. According to the experimental scheme, the order of measurements was the same for all subjects. Measurements to assess motor ability of power were performed in sequence:

- 1.High jump,
- 2.Long jump,
- 3.Lifting the torso from lying to sitting,
- 4.Bench press,

After measuring the motor ability of strength, the measurement of functional abilities was started, namely the Cooper test.

Chronologically, all subjects completed the measurement on the same measuring instrument. Respondents were explained what awaits them during testing, and are reasonably motivated to commit to each test and measurement. For the regularity and uninterrupted execution of this program, all respondents participating in the examination were subjected to measurements under the same conditions, and the work was approached with maximum seriousness and commitment.

Data processing methods

In relation to the subject, problem, objectives and hypothesis of the study as well as the characteristics of the collected data, and the possibility of their statistical analysis, methods for processing data were selected and applied. The basic methods for processing the results are determined by the characteristics and size of the sample and the research hypothesis. We used appropriate mathematical-statistical methods and procedures for data entry, data processing and

analysis. Processing of the results was performed in the program SPSS 19.0 for Windows.

For each applied variable, the central and dispersion parameters were calculated:

- Arithmetic mean (mean)
- Standard deviation (Std.Dev.)
- Minimum value (Minimum)
- Maximum value (Maximum)

The normality of the distribution of test results is based on these measures:

- Coefficient of curvature (Skewness)
- Coefficient of association (Kurtosis)

Using a univariate t-test for dependent samples, the difference of the applied variables before and after the football program was tested.

RESULTS AND DISCUSSION

Based on the results obtained from the program for 90 days, it led to statistically significant changes in all of the treated variables for the evaluation of functional abilities and strength. The program really showed slight changes in the stated duration of the program, in all segments of playing potential, which gives us practical applicability, and a suggestion to all coaches to apply a similar way of working, especially in this system where weight and strength of youth development is slightly neglected. The basis of the training was to increase all the performances by which the young man achieves the path to completing the entire playing potential, accompanied by technical and tactical work.

Besides a lot of research on this subject, it did not stop us from introducing a novelty in terms of the diversity of the training program being researched, because in modern football, more and more, the basic factor is the enhance of these performances.

Habul, Čolakhodžić, Ademović (2012) found that the boys, who are in the system football training, have higher values of the variables that define the pulmonary ventilation and have more continuous trend of growth and development up to 15 years, after which we can claim with certainty that this training program can be extremely complex in the transition period between the two generations, which is a key problem in all clubs when taking over generations from different coaches, of course with certain corrections and tracking of professional staff.

Based on the results, where the form of players and their general progress was observed in all characteristics, we can conclude that this increase took place due to the change of generation and a sudden change of training program, i.e., the transition from cadet to junior generation.

Under the influence of a stronger training program, adequately dosed, and the first encounter with adequate nutrition causes sudden changes in a short period of work. After that with adequate work the general development of these generations can be monitored, which is the current problem in most clubs, except for a few most developed clubs that have an additional academy and an entire professional team that monitors the entire development after selecting the most promising players.

From Table 1 we can't determine major changes, however, taking into account the fact that currently in practice the most difficult thing is to increase the body weight of players, with delay and improvement of motor and functional abilities, and taking into account the maximum weight of these respondents, we can determine that the program has shown successful in accordance with the stated tasks.

We can also conclude that the minimum weight before the program was 55.9, while after the program it increased to 58.1, and the maximum 92.9, which after the program decreased to 87.2. This means that the program showed exactly the basic goal in which we satisfied both groups, increasing the mass for those who need it, and reducing it for those who need it.

Table 1.- Descriptive indicators of measurement results for body weight

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
Weight initial (kg)	30	37.0	55.9	92.9	73.220	8.2349	67.813	.392	.936
Weight final (kg)	25	29.1	58.1	87.2	74.684	6.6664	44.441	-.180	.453

A jump, or reflection, is one of the more important elements of the manifestation of strength in a football game. Development requires a longer period with retention of all other components. From Table 2, we conclude that the average increase in high jump is 3,260 cm, which is not an extreme increase.

Nevertheless, as part of the program, we can determine that it is important to choose specific training units with which we can improve each segment of the football game.

Table 2. - Measurement results for estimating the MFESVM variable

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
High jump from a place initial (cm)	30	23.0	25.0	48.0	37.100	5.5792	31.128	-.038	-.496
High jump from a place final (cm)	25	20.0	29.0	49.0	40.360	4.8380	23.407	-.484	.039

Long jump and high jump are related variables for rating the motor ability of strength, from which we can conclude in which segment and phase is the development of sports potential. The results show us an increase of 26.971% from the initial state, which is impressive. With probability we claim that the sudden increase occurred after the transition between the two generations and the change of coach and training program.

Table 3. Measurement results for estimating variable MFESDM

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
Long jump from a place initial (cm)	30	45.1	225.4	270.5	244.450	10.4095	108.35	.322	.166
Long jump from a place final (cm)	25	34.5	240.0	274.5	252.352	9.1597	83.90	.527	-.370

Cooper test, one of the basic tests for rating functional abilities, which is less and less used, but which does not mean that it is not relevant, and we are witnessing that more and more football staff do not meet the

stated conditions. From the results we conclude that none of the young people reached the grade 5, i.e. to cross 3200 m in 12 minutes, which is not surprising,

due to the current passivity of the training staff in the development of functional abilities.

The increase after the program does not have to be directly related to the impact of the program, but the

possible decline in form before the program, caused a slight increase in arithmetic means of 81.1, which in any context we can't take into account.

Table 4. - Cooper test result

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
Cooper test initial	30	1150.0	1950.0	3100.0	2444.500	258.9113	67035.086	.032	.754
Cooper test final	25	980.0	2110.0	3090.0	2525.600	209.1467	43742.333	.674	1.328

The bench press is one of the most popular exercises for young people, which they use for the wrong purposes. The development of strength in the upper torso is one of the key elements for the development of complete strength during sprints, duels and deflections.

The increase of 14.754% after the program from the initial measurement and the difference of 9 kg, may represent the initial development, when not encountering this exercise, which is in any case a great progress and a very significant difference, in a complete overview of changes in all variables, taking in consideration and development of functional abilities.

Table 5. - A variable for estimating motor ability of power MRABP

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
Bench press initial (kg)	30	47.5	42.5	90.0	61.083	10.5390	111.070	.817	.924
Bench press final(kg)	25	42.5	50.0	92.5	70.088	12.3763	153.173	.213	-.733

From Table 5 we conclude that the minimum number of lifting the torso in the first measurement was 8 repetitions, which can be related to the weight of the subjects, which decreased over time, to increase the minimum number of repetitions of lifting the torso in the seat. The minimum number of repetitions doubled, while the maximum number of repetitions increased slightly by 3 repetitions to 51, which we associate with one of the trained youths.

Lifting the torso from a supine position is one of the exercises through which the force of the ball's impact, jump and partial acceleration are manifested.

Table 6. - Measurement results for the variable MRSDTŠ

	N	Extent	Min.	Max.	A.S.	Std. Dev.	Var.	Ske.	Kur.
Lifting the torso from a supine position initial (repetition)	30	40	8	48	24.800	10.0499	111.070	.322	.166
Lifting the torso from a supine position final (repetition)	25	36	16	51	30.640	8.5337	153.173	.527	-.370

The results of research into the effects of specially programmed exercise on the development of functional abilities and strength will primarily contribute to better methodological design of teaching and training work, which will provide more efficient monitoring and evaluation of quantitative changes in anthropological characteristics of morphological characteristics, motor, functional and situational motor abilities.

Table 7. -Descriptive indicators of paired samples

		Mean	N	Std. Dev.	Std. Error Mean
Pair 1	Weight of respondents before the program	74.548	25	7.8918	1.5784
	Weight of respondents after the program	74.684	25	6.6664	1.3333
Pair 2	High jump from a place before the program	37.760	25	5.5474	1.1095
	High jump from a place after the program	40.360	25	4.8380	.9676
Pair 3	Long jump from the place before the program	246.144	25	9.3113	1.8623
	Long jump from the place after the program	252.352	25	9.1597	1.8319
Pair 4	Cooper test before the program	2480.400	25	253.1877	50.6375
	Cooper test after the program	2525.600	25	209.1467	41.8293
Pair 5	Bench press before the program	61.800	25	10.7897	2.1579
	Bench press after the program	70.088	25	12.3763	2.4753
Pair 6	Lifting the torso from a supine position to sitting before the program	24.800	25	10.0499	2.0100
	Lifting the torso from a supine position to sitting after the program	30.640	25	8.5337	1.7067

Table 7. -Analysis of differences in arithmetic means of variables for evaluating some anthropological features

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	(Sig. 2-tailed)
				Lower	Upper			
Weight of respondents before and after the program	-.1360	2.2368	.4474	-1.0593	.7873	-.304	24	.764
High jump before and after the program	-2.6000	3.3417	.6683	-3.9794	-1.2206	-3.890	24	.001
Long jump before and after the program	-6.2080	6.3055	1.2611	-8.8108	-3.6052	-4.923	24	.000
Cooper test before and after the program	-45.2000	98.4937	19.6987	-85.8562	-4.5438	-2.295	24	.031
Bench press before and after the program	-8.2880	5.7737	1.1547	-10.6713	-5.9047	-7.177	24	.000
Lifting the torso from a supine position to sitting before and after the program	-5.8400	3.6819	.7364	-7.3598	-4.3202	-7.931	24	.000

It is a known fact that athletes of different age categories differ in personal, abilities and knowledge. These are indicators of training in general, but in particular the differences between groups of athletes in the indicators of individual anthropological characteristics can be determined. A particularly important part of the research so far relates to the obtained data on the morphological characteristics of top footballers, but in this re-search, we showed how to make a general program with a general goal and complete impact on the entire playing staff, which we were able to show. These results tell us about the program that showed one of the adequate training systems between the two generations, which in this period of development of the football in Bosnia and Herzegovina, is very necessary. We have already established the problem of transition from one generation to another, with the change of coaches, differences in work methodology, lack of adequate

strength training and development of functional abilities.

CONCLUSION

Football game is a complex sports activity characterized by a high variability of motor activities with or without the ball by which the game is realized and by which players achieve the basic goals of the game in defense, transition and attack: taking the ball away from the opponent, organizing and implementing tactical action, scoring a goal and achieving the final victory in the match. The activity in the football game also has its specifics with consideration to the intensity and duration of work. According to Bangsbo 1991, very high development of physical abilities is required: optimal physique, development of aerobic and anaerobic system, high degree of muscle strength, highly developed speed and agility, optimal flexibility and balance.

These results give us the right to claim that the work program with the exclusive application of the situational model of work, based on exercises of strength and functional abilities, and adapted to the age characteristics of the youngest football players, leads to positive changes in most situational-motor and functional abilities. All this confirms that by skillful manipulation of the volume, intensity and pause between repetitions and series of exercises, which can be very well controlled by adequate selection of exercises and certain tasks in the game depending on the period of preparation. It is possible to make an extremely high-quality training in which different fitness conditions (depending on the preparation period and the goal of the training) and technical-tactical requirements will be integrated at the same time.

Considering all the issues and results of this research, we are of the opinion that the applied program can be used in practical training work. With slight corrections of the program, i.e., paying more attention to precision as a motor skill, where young footballers will be brought into situational conditions to solve various specific tasks of precision, with an appropriate relationship with the technique and tactics of football game, we assume that it is possible to raise the motor ability of precision to a higher level.

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Corresponding author:

Jasmin Pandur

Nastavnički fakultet Univerziteta „Džemal Bijedić“
e-mail: jasmin.pandur@gmail.com

INVESTMENTS OF LOCAL COMMUNITIES IN SPACES FOR PLAY AND SPORTS

Admir Hadžikadunić, Rijad Novaković, Jasmin Budimlić, Almir Popo and Estela Hadžikadunić

Abstract: The subject of this paper is the analysis of strategic investments of municipalities in the Sarajevo Canton, in areas for play and sports. Municipalities have a major role to play in creating adequately equipped sports facilities, in order to properly manage children's and sports playgrounds, and to contribute to and ensure safety in this area. The analysis will provide insight into the number of safe spaces for play and sports in individual municipalities in Sarajevo Canton and their qualitative condition. We will focus on investment data for the construction of new and maintenance of existing spaces. The aim of this paper is to examine the significance of investments of municipalities in Sarajevo Canton, in safe areas for sports and children's play, because due to the diversity of arrangements in the field of sports, at different levels of administrative organization in Bosnia and Herzegovina, for a long time there is an unfavorable environment. The responsibility for creating and developing safe play areas for children and young people belongs to public institutions, which have clearly defined goals for the development of safe play areas, and poor maintenance of playgrounds causes more severe injuries to children and young people. The methodological tools used are adapted to the nature of the data and the hypothetical research framework, with content analysis methods and descriptive statistics methods being used as basic.

Keywords: Local community, investment, safe space for play and sports

INTRODUCTION

„Safe play areas are children's playgrounds, parks, landscaped green areas adapted to the needs of both children and youth. These are spaces for play and entertainment. Premises should primarily be safe, spaces that should be adapted for safe play and carefree children, spaces that would include green areas without waste and dangerous objects, which are often located on the same. We know that in parks, as well as playgrounds, inappropriate objects are often found, such as broken bottles of alcoholic beverages, syringes, needles, cigarette butts and other objects that pose a danger to children, who through play in such areas come into direct danger of succumb to many injuries and illnesses.“

Children have guaranteed rights to play and leisure, without compromising their safety. Threats to their safety are numerous and require a systematic approach in order to respond to them adequately and act preventively, and the most important to note is the danger of defective devices, waste and mutual injury. In taking responsibility for the safety of children's playgrounds, it is necessary to distinguish between persons (natural and/or legal) who are responsible for maintaining safety standards on playgrounds, and in accordance with this criterion we recognize three groups: Responsibility of local governments; Responsibility of educational institutions; Responsibility of legal and natural persons who implement pre-school education programs at primary schools and as playrooms in libraries, health, social, cultural and sports institutions and associations. For all children's playgrounds built on public areas of the local government unit, the responsibility for the safety of the playground lies with the persons responsible for the

functioning of the local government unit. It should be noted here that local governments should have organized monitoring of the safety of playgrounds owned by them and remove and repair play equipment to prevent potential injuries to children.“ Places for play and sports as part of educational institutions are the responsibility of the director of that institution, and since a large number of children use these spaces almost every day, the safety aspect should be primary. Local communities should take certain measures in order to achieve the highest possible level of security, and some of the necessary measures are: monitoring the safety of the area, repair or replacement of play and sports equipment, high-lighting the rules of conduct, as well as creating toll-free telephone number for reporting possible faults and irregularities in those areas. When we talk about the quality of space for play and sports, then we do not mean only the different types of devices that will complement the activities of children and youth, but we primarily mean the quality of the devices, surfaces, and adequate installation and maintenance. The quality of playgrounds in Bosnia and Herzegovina has not been systematically examined for a long time, and the last time in 2014 was a visual inspection of children's playgrounds and laboratory tests. According to the results of that supervision, out of 115 inspected playgrounds, 103 of them are defective or noncompliant, and the fact that all 66 inspected children's playgrounds in the Sarajevo Canton are incorrect is especially significant. This alarming fact should result in measures and activities, primarily of local communities, both in investments in the reconstruction of old and construction of new playgrounds, and in their maintenance. Investing in new spaces for play and sports and their maintenance is as important as investing in neglected spaces, because "unsafe space for play and sports" will cause

the opposite effect than desired, by causing more or less serious injuries to children, or to make that space a place where people prone to alcohol or narcotics will stay. The responsibility for creating and developing safe play areas for children and young people belongs to public institutions, which have clearly defined goals for the development of safe play areas and sports. The subject of this paper, as already mentioned, is the analysis of strategic investments of municipalities in the Sarajevo Canton in safe spaces for sports and play. Municipalities have the largest role in creating adequately equipped areas for sports and play, in the proper management of children's and sports playgrounds, and to ensure safety in these areas. The analysis will provide insight into the number of safe spaces for sports and play in individual municipalities in Sarajevo Canton and their qualitative condition, and special focus will be placed on data on investments in the previous three years in this area. We will also analyze data on the population and the age structure of the population. The aim of this paper is to examine the significance of investments of municipalities in Sarajevo Canton, in safe areas for sports and play, because due to the diversity of arrangements in the field of sports, at different levels of administrative organization in Bosnia and Herzegovina, for a long time there is an unfavorable environment.

METHODS AND RESEARCH

The hypothetical framework of this research relies on the thesis that greater investment of local communities in safe spaces for play and sports, significantly contributes to safety in this area. In addition to the safety of children and youth, greater investment by local communities in safe areas will positively affect the age structure of the population, and it will have a positive effect on both birth rates and the area will be

"attractive" for couples who change their place of residence. The methodological tools used for the purposes of this research are adapted to the nature of the data, the goal and the hypothetical framework of the research, using the methods of content analysis and the methods of descriptive statistics as the basic ones. Content analysis methods and description methods will be used in the theoretical part, while in the research part we will use the method of statistical analysis and the comparative method. In addition to the above, we will use the method of compilation, which is taking over other people's research results, or analysis of works by other authors who have dealt with this or similar issues. The biggest problem that arose during the data analysis is that each of the municipalities documents these investments in different ways, furthermore, the classifications in the budgets are not the same, and in many cases the data are grouped with other types of investments. Given the above problem, apart from this source of data, we conducted interviews with almost all persons in charge of sports and children's playgrounds in the municipalities of Sarajevo Canton, but some local authorities are clearly not transparent enough when it comes to spending public funds.

RESULT AND DISCUSSION

There are nine municipalities in the area of Sarajevo Canton, but only five of them we managed to collect adequate data, as can be seen in Table 1. However, it is significant that we get valid data from all four city municipalities.

First of all, we will compare the situation regarding the "load" of playgrounds by municipalities, in order to determine in which areas in Sarajevo Canton playgrounds are most accessible for children and youth. (Table 2).

Table No. 1: Availability of data in municipalities in Sarajevo Canton

MUNICIPALITY	Data on the number of playgrounds	Population data	Maintenance investment data	Data on investments in reconstruction and construction
Stari Grad	Available	Available	Available	Available
Novi Grad	Available	Available	Available	Available
Centar	Available	Available	Available	Available
Novo Sarajevo	Available	Available	Available	Available
Ilidža	Unavailable	Available	Unavailable	Unavailable
Hadžići	Unavailable	Available	Unavailable	Unavailable
Vogošća	Available	Available	Available	Available
Ilijaš	Unavailable	Available	Unavailable	Unavailable
Trnovo	Unavailable	Available	Unavailable	Unavailable

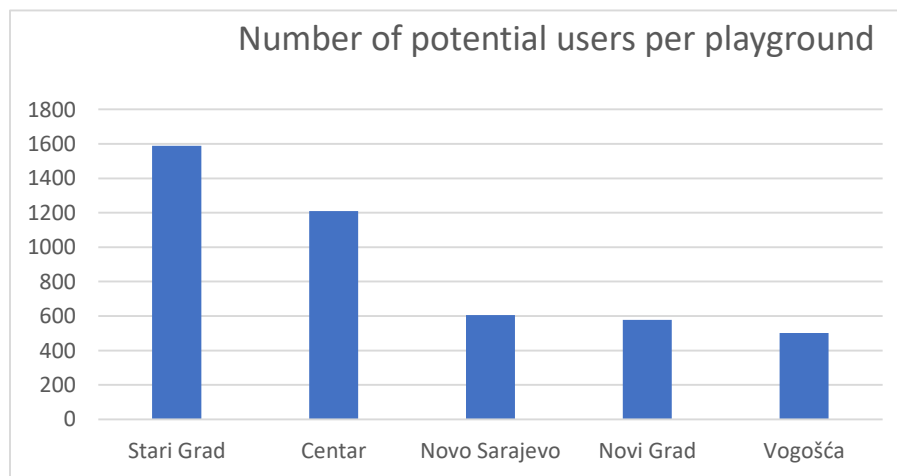
As we can see in Table No. 2, the Municipality of Vogošća has the most comfortable playgrounds, while according to these indicators the worst situation is in the Municipality of Stari grad. For a better perception

of the differences between these municipalities, we will graphically present this Table in Graph 1.

Table No. 2: Number of potential users per playground

MUNICIPALITY	Number of potential users per playground
Stari Grad	1589
Centar	1210
Novo Sarajevo	605
Novi Grad	577
Vogošća	502

Graph 1: Number of potential users per playground



This situation in some municipalities should alert the competent services to work systematically on this problem, which in the long run can cause a number of negative effects on the health and satisfaction of the population, as well as on the demographic picture. The age structure of the population is slowly becoming a

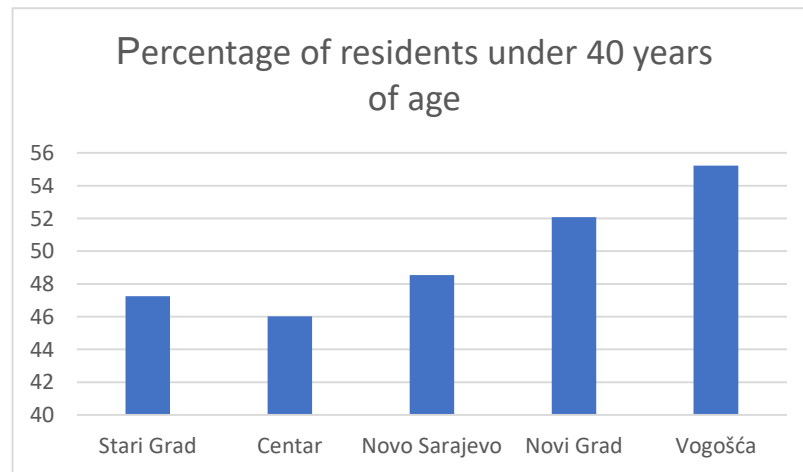
problem in Bos-nia and Herzegovina, with a high rate of emigration of young people and falling birth rates faced only by the fact that we are becoming a state of "old", and many demographic predictions show that we could disappear as a society. (Table 2.)

Table No. 3: Percentage of residents under 40 years of age

MUNICIPALITY	Percentage of residents under 40 years of age
Stari Grad	47,26
Centar	46,03
Novo Sarajevo	48,55
Novi Grad	52,08
Vogošća	55,23

We will also graphically present this table for the purpose of visual comparison of the age of the population by municipalities, ie the population younger than 40 years expressed in estimates. (Graph 2)

Graph No. 2: Percentage of residents under 40 years of age



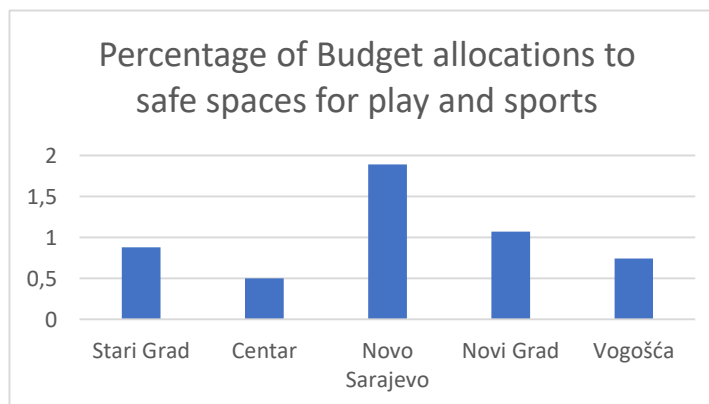
Safe spaces for play and sports are certainly not a determining factor in this phenomena, but we can certainly encourage positive changes by creating an adequate environment for children and young people. By allocating more public revenues for the construction of new and maintenance of old playgrounds, municipalities can directly or indirectly influence the

trends related to health, birth rates, micro-migration, crime, etc. In Table No. 3, we can see how much the individual municipalities have allocated on average in the last three years to safe areas for play and sports. The Municipality of Novo Sarajevo and the Municipality of Novi Grad allocate the most funds for this purpose, with more than 1% of collected public funds each.

Table No. 3: Percentage of Budget allocations to safe spaces for play and sports

MUNICIPALITY	Percentage of Budget allocations to safe spaces for play and sports
Stari Grad	0,88
Centar	0,50
Novo Sarajevo	1,89
Novi Grad	1,07
Vogošća	0,74

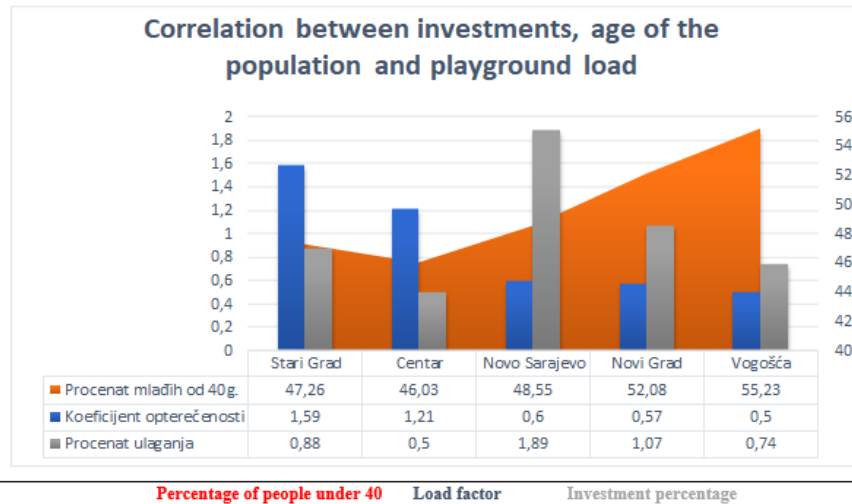
Graph No. 3: Percentage of budget allocations to safe spaces for play and sports



Graph No. 4 shows the correlation of the percentage of persons under the age of 40, the percentage of lying in safe areas for play and sports, and the load on the playgrounds. In order to have an easier and clearer

relationship between the above, we will divide the number of potential users per playground by 1000, and we will observe the obtained indicator as a load factor of the playground.

Graph 4: Correlation between investments, age of the population and playground load



From this graphic presentation, the connection between the load factor of the playground and the percentage of persons younger than 40 years is

evident, the higher the load on the play-grounds, the smaller the number of younger people.

CONCLUSION

This paper established the importance of sports and play for children and youth, ie safe spaces for these activities. We saw how much this was recognized by the local communities in the part in which we analyzed the investments of the municipalities in safe spaces for play and sports. The hypothetical framework of this paper relied on the thesis that greater investment contributes to safety on playgrounds, and that investing in this area contributes to positive demographic trends. We can conclude that the hypothesis was confirmed, because in our opinion there was an evident improvement compared to the situation in 2014, when the Bosnia and Herzegovina Market Surveillance Agency determined that all inspected playgrounds in Sarajevo were defective. Municipal investments in safe spaces for play and sports have resulted in the construction of new and reconstruction of old playgrounds, so it would be necessary for Bosnia and Herzegovina Market Surveillance Agency to conduct a new control of children's and sports playgrounds in order to establish the real quality situation.

The research also led to the conclusion that there is an inversely proportional relationship between the number of people under the age of 40 and the load on

the playgrounds, ie the higher the load per playground, the smaller the number of people under the age of 40. Although it was to be expected that there was a higher work load in municipalities where more young people live, this research showed that on the contrary, spaces with less loaded playgrounds are more attractive for younger people, mostly due to accessibility. Investments in safe spaces for play and sports, in addition to the safety of children and young people, have other positive effects, such as increased population activity, health, sports success, reduction of deviant behavior, demographic picture, etc.

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Corresponding author**Admir Hadžikadunić**

Faculty of Criminology, Criminology and Security Studies, University of Sarajevo
ahadzikadunic@fkn.unsa.ba

INJURIES, CAUSES OF INJURIES AND REHABILITATION OF ALPINE SKIERS – SYSTEMATIC REVIEW

Berina Turković, Rasim Lakota, Ivor Doder, Eldin Jelešković, Amila Hodžić and Merima Merdan

Abstract: One of the ways to prevent injury and to rehabilitate after an injury in alpine skiing is to psychophysically prepare the athlete to safely go through the ski season. The aim of this research was to collect, analyze and critically review data from relevant research studies that are closely related to the prevention, causes and rehabilitation of alpine skiers. Data selection, analyzing and critical review was done according to "PRISMA" methodology. The systematic search for relevant articles (Google Scholar, PubMed, MEDLINE, etc.) related to the prevention, causes and rehabilitation of alpine skiers will create comprehensiveness in knowing the basic principles of self-management (self-control) on a mountain trail. The results indicated that the most common injuries among alpine skiers are ACL injuries. However, good physical preparation, a very stable mental health, appropriate ski behavior on the track and compliance with the "International Ski Federation" rules and obligations are the main aspects of injury prevention. This review study has collected and classified data taken from relevant databases that were based on injuries, causes of injury and rehabilitation of alpine skiers. The most common injuries classified in this study are ACL injuries, as the ACL injury patterns and post-injury rehabilitation.

Keywords: Measurement, biomechanics, turn, learning model, beginners, activity, challenge, moving stereotype, program, exercises, judges, mistakes.

INTRODUCTION

When we talk about skiing, we are talking about development of skiing in our region. Skiing in Bosnia and Herzegovina was developed during the Austro-Hungarian occupation, in 1978. Austro-Hungarian soldiers and citizens brought skiing in our areas. Before that they performed this sport in the Alps. During that time local population didn't practice this sport and saw it as something new. Significant development of skiing in our area among local population occurred in April, 4 1905, when tourist association "Nature friend" was established, in Sarajevo. With the establishment of this association skiing became the most attractive entertainment and recreation among local population. Ministry of physical education, in period between 13-16 February, organized first jamboree skiers of Yugoslavia on Jahorina, Bosnian mountain. Opening ceremony of this event was performed in City Hall on February, 13 in 8:00 p.m., where skiers from all over ex Republic of Yugoslavia were present. Participants of this event came from Ljubljana, Sarajevo, Zagreb, Maribor, Skopje, and other cities of ex Yugoslavia. "XVI Winter Olympic games", which were opened in 1984, in Sarajevo, the capital of B&H, a member of ex Yugoslavia, were significant factor for development of skiing in Bosnia and Herzegovina. Olympics brought expansion of development of skiing in Bosnia and Herzegovina and it is considered to be one of the most beautifully developed sports in Bosnia and Herzegovina, today. The one thing that is specific not only for skiing but for any type of professional or recreational sport are injuries. Injuries are part of any sport and skiing as well. Bad technique, tactic or general preparation for going on the snow, leads to many injuries of many people and athletes in terms of knee injuries, head injuries, neck injuries etc. which luckily do not demand long and demanding treatment. Going to ski tracks increases number of injuries, today, which usually involves long and demanding treatment. It includes injuries of tibia in the past, but development of technology and improvement of equipment reduced appearance of injuries. However, today the most common injuries are knee injuries and injuries of upper extremities such as thumb and shoulder injuries. Injuries of knee, shoulder and thumb and other body parts are reduced due to better standards and conditions on ski tracks and the equipment which is improved to perfection. The most common causes of injuries on ski tracks are weariness, bad visibility, speed, and bad weather conditions. The most common injuries are injuries of beginners, due to lack of knowledge and injuries of professionals whose aggressive ride leads to serious injuries, which include long recovery which can last over a year. This paper analyzes studies which dealt with injuries of alpine skiers, their rehabilitation and cause of those injuries.

METHODS

Sample of subjects

Paper presents common paper review. Primary source of research and reference reviews were: Google scholar, ResearchGate, Cambridge Journals, Emerald Library, Journal The Physician and Sportsmedicine by entering the key words: isokinetic, muscle, rehabilitation, skier, knee, rotation, angle speed, biodex. Search of literature identified 100 reference units. After analyzing headlines, abstracts, key words, and unmatched of complete text, 70 papers were excluded. Other papers that fulfilled criteria are analyzed, in detail, by reading and analyzing content. Criterion of inclusion, included studies that treated mechanisms of prevention, cause and rehabilitation of alpine skiers. Criterion of exclusion were directly valorized data opposite to set hypothesis.

Graph 1. Diagram of selection of studies

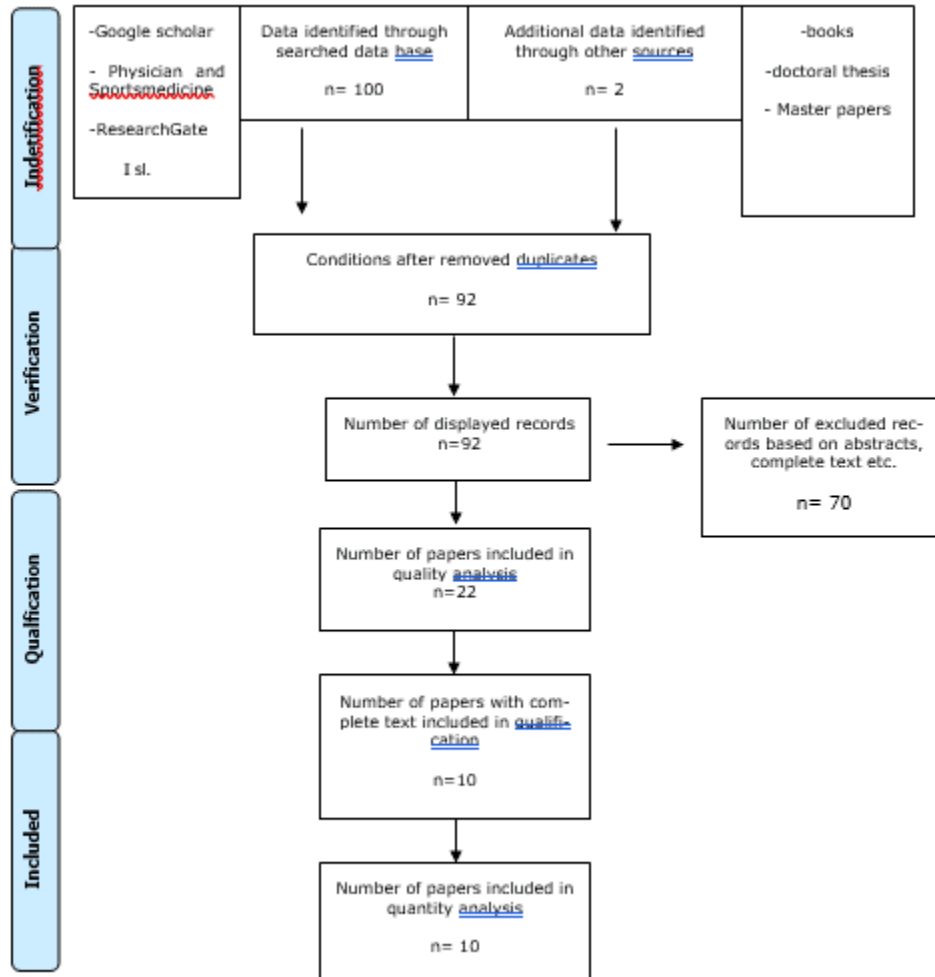


Table 2. Results

Author name and surname	Sample subjects	Description of study procedure	Results
Edoardo Monaco, Andrea Redler, Mattia Fabbri, Lorenzo Proietti, Edoardo Gaj, Matthew Dagget (2018)	A=22 B= 22	Research was conducted on sample of 44 subjects. All samples had injury of ACL. Group A is subjected to reconstruction of ACL which is performed by ALL technique-inside graft, and group B is subjected to reconstruction of ACL OUT-IN technique and DGST graft.	Subjects of A group , median difference at maximal flexion of turning moment from one side to another between operated and helathy extremities is -3%, and median moving moment at 30° was -7,5 % at high angular speed of 180 ° / s. Median peak angular flexion was 7,2% median moving moment at 30° was 3,1 % at low angular speed. Subject of group B In Group B means of maximal turning moment at bending was -3,5%. Median movement moment at 30° was -7,6 % at high angular speed of 180°/s; Median peak moment of bending was 7,2%, and median turning moment at 30 ° was 3,1% at low angular speed (60 ° / s). statistically significant difference is determined between two groups at lower angular speed and at median peak turning moment at 30 ° (p = 0,009), with better results in subject group.
M.V.Narici & sar; (2011)	n= 22	22 subjects were subjected to testing, whether they can regularly practice skiing, reduce sarcopenia and muscle weakness of men and women of average age 67±2.	Dynamometria is measured by maximal isokinetic stretching of knees at angular speed of 60° Results showed that Alpen skiing and usage of isokinetic procedure in rehabilitation, efficient intervention in emergence of sarcopenia and muscle weakness in elderly men and women.
Matthew J. Jordan, Per Aagaard, Walter Herzog (2014)	n= 13 M / un n= 8 Ž / un n= 3 M / ACL n= 5 Ž / ACL	This study included sample subjects of control group which included 13 male Alpen skiers, who haven't had any injuries and 8 female Alpen skiers, who also haven't had injuries of any kind. Experimental group of this study included sample subjects of 3 male Alpen skiers and 5 female Alpen skiers with ACL injury.	Analyzing and processing data of 5 tests, which were conducted on these samples of data, showed that although these are only examples of several cases, ACL injuries are great problem in strength recovery and strengthening muscles of quadriceps. Therefore it presents great percentage of failure when returning to the track.
Josef Kroll & sar ; (2015)	n= 7 n= 13 n= 15	This study included sample subjects of three subjects. The first group included sample subjects of 7 athletes, which performed Alpen skiing dicipline technique on three prototypes and on Pref. The second group included sample subjects of 15 students of sport evaluated several video clips in order to evaluate external	Analysis and data processing authors got to the result of this study, which showed that kinematic variables are set in the paper and that qualified agressivness of skiing, showed reduce of means for P35 and P40 in u comparison to Prefo an+ <d P30.

		attractiveness of G slalom performance.	
Csapo R¹ , Hoser C² , Gföller P² , Raschner C³ , Fink C² (2018)	n=541	This paper is based on search of data base of professional Alpen skiers with ACL injuries and its reconstruction. Questionnaire, which reflects subjective perception of pain, function in everyday life and various physical activities which are performed after the injury, is conducted. Web page of „International Skiing Federation“ is used for getting FIS points, which showed results of these skiers before the injury, after recovery, and a year after the reconstruction of ACL.	Questionnaire results of subjective assessment of pain, function in everyday life and various physical activities after injuries, showed patient's satisfaction. Measurement conducted 161,5 ±24,2 days after operation showed existence of muscle strength and its deficit. FIS points were increased weight after return among competitors 364,3 ± 142,5 days after operation procedure, but the final results showed significant decrease of personal results on ranking list, a year after the procedure and a year before the injury.
S Ravi (2016)	n= 176 M n= 163 Ž	This research was conducted on sample subject of 339 Alpen skiers, where 176 of them are men and 163 are women from Swedish high schools.	Authors came to results, through collecting, analysing and data processing, that 11 male subjects and 14 female subjects had 25 ACL injuries, in total, during the first testing. Most injuries occurred on left knees. Skiers, who participated in Alpen skiing about 13 years, had low risk of ACL injury. 16 ACL injuries happened during training, 12 in great slalom and 8 in slalom. 14 female subjects said that they didn't feel tired before injury occurred and 8 of them said they were a bit tired.
Kevin. G. Shea & sar;	n= 541	This research included sample of 514 subjects of both gender of Alpen skiers and it lasted for 6 years. Patients chose one of six classifications of injuries.	Results of this 6 year study showed the following: causes of injuries were valgus rotation and it was 32,9%, phantom foot 22,5%, hiperextension 19, 0%, inadequate footwear 7,8%, collision and other 15,6 %. Adult and young skiers that were identified as „advanced“ skiers, had bigger prevalence valgus external rotation than less experienced skiers (51,5% of total valgus injuries P <.01). Correlations appeared in 19.3% in adults and 53.7% in young (P <.01) during the injury. Female skiers were 60,0% of total number of subjects, but only 39,7% of injuries occurred in female children.
S Ravi (2016)	n= 1	This research was conducted on one of the skiers in Yoga center of Academy of sport education in Latvia. An athlete was subjected to 30-minute Yoga , as additional intervention, three times a week with 90-minute physical therapy,	Results of this program showed that IKDC was improved from 49,4 to 63,2. Volume of movement of injured knee is improved from -3 to normal. Flexion of knee is increased for 20 degrees. Enhanced external rotation active 20 degrees, passive 10 degrees.) Passive hip flexion is increased for 10 degrees. Muscle test for

		by designed programe for rehabilitation after the injury.	flexion and extension gave the following results: flexion of the knee from 3 to 4 and extension from 3 to 5.
T W Florenes & sar (2009)	n= 521	Reserach was conducted on sample of 521 subjects of World Cup in Alpen skiing.	Results showed 191 acute injury among 521 Alpen skiers of the World Cup. Number of injuries is increased with the increase of speed (slalom 4,9 injuries on 1000 running, 95% CI 2,5 do 7,4 – giant slalom 9,2, 5,1 to 13,3 - super-G 11,0, 5,2 to 16,8 - downhill 17,2, 11,6 to 22,7). Most commonly injured body part is knee, with 68 injuries (36%), and 37 of them are serious. Total rate of injuries was higher in men than in women but that's not the case with knee injuries.
Toni Bere & sar (2011)	n= 20	Reserch was conducted on sample of 20 subjects, Alpen skiers registered through System of monitoring of injuries „International skiing federation“, who were participantd of the World Cup of three seasons in a row. Methods of data prpcessing were analyzed through video clips. Members of commision for visaulization and opinion, were experts from the field of biomechanics of skiing and doctors of spor medicine, who did separate analysis of each video and explained mechanisms of injuries, in detail (skiing situation, behaviour of skiers and biomechanic features).	Results of analysis of video clips, showed that mechanism of skating of skaters was the biggest cause of injuries during the rotation, before the fall.(n=10). Three subjects were injured by demonstration of dynamic snow plough. Category of the fall backwards was n= 4.where skier was out of balance, and during which he fell backwards and at the tail of skies with knees completely straighten knees. Suggested mechanism for recovery was combination of tibiofemoral compression, test of stability of knees and active test of quadriceps.

DISCUSSION

Table 1 shows 10 papers of different studies closely related to injuries, causes of injuries and rehabilitation of injuries during performance of skiing elements, in Alpen skiing.

Edoardo M, Andrea R, Mattia Fabbri, Lorenzo Proietti, Edoardo Gaj, Matthew Dagget (2018) researched isokinetic diagnostics in recovery of strength of flexion after reconstruction of ACL. Their research included 2 groups, control and experimental group. Control group, A group included 22 patients and experimental group also included 22 subjects. Isokinetic procedure determined statistically significant difference between these two groups and those are: speed of performing flexion, where experimental group had better speed, median peak angle and median rotation movement at 30°, where p was 0,009. Sacral ligaments, ACL (knee) had main role in stabilization of knee and ensuring

partial „sliding and rolling“ of joints, which is one of the most important segments for Alpen skier. This study can affect recovery of ACL after the injury and due to many tests, in very short amount of time we can recover and improve our condition, after the reconstruction of ACL. M.V Navici et al, (2011) examined whether and to the what amount skiing can switch the condition of sarcopenia and muscle weakness in elderly people (22 of sample subjects of average age 67 ±2). Model of this study included 12 weeks of recreative skiing, for 3 weeks of training, which lasted 3,5 hours, in average. Control group included inactive group of subjects (n=20) aged 67±4. Two subjects were selected as a sample subjects of experimental group. Before and after training thickness of muscle extensors penation angle and angle of muscle fibers consist vastus lateralis muscle, measured by ultrasound. Ultrasound analysis showed significantly different condition where thickness was

increased for $T_m = 7,1\%$, $L_f = 4\%$, $i\theta = 3.4\%$. inactive group of subjects did not show any significant changes except for angle of length of muscle fibre θ ($2,1\%$, $P < 0,02$). Subject of the second group, training group, showed significant connection in the increase of kinase focal adhesion, indicating primary role of this mechanic-sensitive protein in remodeling sarcomer with hypertrophy of muscles. Final results showed that Alpen skiing has a positive influence in defeating sarcopenia and muscle weakness in elderly individuals. Third age of life is considered as special period in life of every individual. Recreation in this period of life is important because it enables maintenance of body weight, helps in development of flexibility and increases serotonin production also called „hormone of happiness“. Some studies say that elderly people who practice sport and lead healthy way of life, can influence on biological aging of a human, even 25 years less. Therefore, skiing is one of the good ways of recreation, because it improves motor abilities of a human and also affects those biological ones. Matthew J et al. (2014) conducted research which included 21 subjects, members of ski representation, where some of the members won medals on World skiing cup, where skiers on training, before going on a track, were tested. 3 groups were taken from this sample and those are: first group included sample subjects $n = 3$ men, $n = 5$ women; of 8 skiers with ACL injury, 5 of which were operated, with knee transplant. Also, 5 out of 8 skiers were injured in non-dominant part of lower extremity, while one subject had external or isolated fracture of ACL. All subjects before training, were subjected to medical exam, in order for them to be prepared for the competition. Subjects, who had injury in lumbal area and injuries i.e. fractures of lower extremities, are excluded from this study. Subjects who took medical exam were subjected to scanning by DXA scanner of double energy of absorption of X-ray, according to instructions of manufacturers (Discovery A QDR, verzija softvera 12.6.2., Hologic, Inc.; Waltham, MA). Technician who was in charge of this testing and responsible for collecting, analyzing and data processing was an expert-technician for all DXA scanning. Testing and determining the relation of bilateral limbs of injured and non injured skiers, showed no significant difference, despite of set hypothesis of this study. Skiers of ACL didn't show significant difference in muscle mass of lower limbs. ACL skiers showed significant deficits in sinew of knee and maximal strength of quadriceps and injury of thumb bone. As assumed in hypothesis of this study, female subjects, who weren't injured didn't show statistically significant differences in bilateral extremities in relation to sinews of knee and injury of thumb bone. Results of this study showed significant deficits in volume of maximal strength of quadriceps of injured sinew and metatarsal bones of feet. Final results of this study, strength recovery QUAD, after ACL injury, showed unsuccessful for recovery and return to the

track. Josef Kroll et al. (2009) based their study on aggressiveness on skis, which is categorized by direct force of transmission on the edge of the ski, which leads skiers to disbalance, which is, very often, cause of injuries on the track. Sample subject included 3 groups of subjects. First group included sample of 7 Alpen skiers, who skied on prototype giant slalom skis (GS skis), which were compared to standard skis for giant slalom race. In comparison to standard giant slalom skis, prototype of new ski for giant slalom is changed and was a bit longer than standard ski Radius of PREF ski was $\geq 27m$, and radius of new giant slalom ski was 35 m, 40 m and 45 m, which is increased for 74,07%. Sample subjects included 7 Alpen skiers, who skied on each of these prototypes and on standard giant slalom skis, as well. Sample subjects of second group, 13 of them, based on subjective assessment, they evaluated their behaviour and aggressiveness on skis, by standard questionnaire. Samples of third group included 15 subjects, students of sport, who evaluated rides on these three prototypes, by looking at videos, and positive external conditions, which include ride in natural tracks. Bigger side radius had positive effect on subjects, and influenced on reduce of aggressiveness when giant slalom race. Kinetic variables, who are set in the papered which qualified aggressiveness during the ride, showed reduced values for radius of 35m and radius of 40m in relation to standard giant slalom skis and new prototype GS skis, with radius of 30m. these prototypes are made as a prevention of injuries, where prototype of radius GS skis 40m, showed significant preventive measure and the least attraction of the subject. Csapo et al (2018) in their study included sample of 541 subjects, where they wanted to examine subjective assessment of the pain, function in everyday life and level of physical activity after the injury. Collecting, analyzing and processing data was conducted by questionnaire, where questions about subjective assessment of the subjects resulted with satisfaction. Questions related to the level of activities after the injury showed that it was statistically good, however a year after the operation, patients (subjects) responded physical activity was significantly smaller than the one before the injury. With this study, authors wanted to show how injury can affect physical activity after the ACL injury and other injuries. S Ravi (2016) conducted a study which took 6 years and which included 176 male subjects, and 163 female subjects. Subjects were selected through questionnaire, where they were classified according to their injuries, when skiing. Authors got the results where 11 subjects of male population and 14 female population had 25 ACL injuries, in total, during the first testing. Skiers, who performed in Alpen skiing for 13 years, had reduced risk of ACL injury. 18 ACL injury occurred during the training, 12 in giant slalom and 8 in slalom. 14 female subjects stated that they weren't tired when injury occurred and 8 stated that they were. This paper is intended to show how often

tiredness or weariness causes ACL injuries in Alpen skiing. This study proved that tiredness or weariness isn't statistically significant indicators of ACL injuries, during the ski season and preparation of the race.

Kevin G Shea et al. (2014) did the research which lasted for 6 years, which included 541 subjects patients, Alpen skiers, who had knee injuries, caused by Alpen skiing. Subjects were selected by gender, age, weight, height, level of capabilities, and loosening ski bindings. Study was conducted through survey, which gave final results. Study of six seasons, was finished with the survey filled by 541 subjects (patients), who during this 6 years, gained acute injuries when skiing. 459 of adults and 79 young skiers were sample subjects. Measurements taken from the survey, included the following injuries with the percentage of replies: 1) valgus external rotation 32,9 %, 2) phantom foot 22,5 %, 3) hyper-extension 19,0 %, 4) unfitted footwear 7,8 %, 5) collision 2,2%, 6) other 15,6 %. This study showed that injury „phantom foot“ is common injury in individuals aged from 30-40, in comparison to other injuries. The highest percentage i.e. the most common injury is valgus external rotation (35,4 %). Phantom foot, according to the survey was 25,3 % , unfit footwear 3,8% , and other 16,8 %. There were no statistically significant differences in relation to the injuries in younger and older skiers. S Ravi (2016) worked in his study to program model of rehabilitation after the injury and reconstruction of ACL of front sacral ligament. Subject was a skier who, by adjusted program designed for rehabilitation after reconstruction, performed 12 week program for improvement and return to physical activities. Program was performed 3 times a week, 30 minutes each and 90 minutes of physical therapy. IKDC result was improved from 49,4 to 63,2 which is statistically significant improvement. This study proved that yoga is one of the best ways of recovery after the reconstruction of ACL, of front sacral ligament. This study should be guidance to the future studies, in order to present yoga as rehabilitation program after the injury and operation caused by skiing and other sports. T W Florenes et al. (2009) included 521 subjects, participants of World Cup in skiing, in their study. They conducted retrospective interviews on 191 subjects. When there were no coaches and athletes in interviews, they interviewed medical staff. Results of this study showed that, during one season, there was 191 acute injury in 521 subjects of World Cup in Alpen skiing. 86 injuries occurred during the World cup which is about 45% of total number of subjects. The most common injury is knee injury, 68, 63% precisely, and 37 of them were serious. Total rate of injuries was bigger in men than in women. These injuries are caused by tiredness, unfortunately, non standardized equipment, lack of concentration and aggressive ride.

Toni Bere et al. (2011) conducted their study because of limited insight into mechanisms of injuries of front

sacral ligament in Alpen skiing, which is very common in professional Alpen skiers. This paper included sample of 20 subjects, skiers of the World cup in skiing. Access to the injuries was gained by „International Ski Federation Injury Surveillance System“ which deals with the reduction and analysis of injuries on World championships in Alpen skiing. Processed videos in this paper are videos from three ski seasons of World cup in Alpen skiing, where seven international experts from the field of kinematics, biomechanics, ski and sport medicine, conducted visual analysis of each registered case on International Ski Federation Injury Surveillance System, in order for each one of them to describe mechanisms of injury, and variables, which were analyzed and processed were skiing situation in which injury occurred, skiers actions during rotation on skies, with or without fall. Main cause of injuries is identified during the rotation, because skier in that moment uses full strength of right or left leg, and makes rotation during the twist, and all weight is transferred to the leg which makes the twist. During the breaking skiers often make so called snow plough, therefore in this analysis, is shown as cause of injury of skiers and identified in 3 subjects. Suggested mechanisms of recovery are mechanisms of combination of tibiofemoral compression and combination of isokinetic tests for strengthening quadriceps.

CONCLUSION

This paper included research review, which was based on prevention, causes, and rehabilitation after injury in Alpen skiing. Analyzing papers which were selected for this paper, we came to a conclusion that apart from good preparation, preventive aspects of causes of injury is, to the great extent, psychological capacity of an Alpen skiing athlete. Skiing is a sport which demands strength, endurance, flexibility, and well preparedness before going to snow. The most common injuries of athletes are knee injuries, shoulder injuries, phantom foot, and thumb injuries. This study shows the way of analyzing of papers, which were based on preventive aspects of injuries, and it gives useful pieces of advice in terms of prevention of cause of injury and rehabilitation after the injury.

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Corresponding author:

Berina Turković

Faculty of Sport and Physical Education, University of Sarajevo
berina.turkovic@fasto.unsa.ba

ASSESSMENT OF MOTOR SKILLS IN THE SELECTION OF POLICE OFFICERS

Bakir Alispahić and Admir Hadžikadunić

Abstract: The methods used in the selection of human resources potential for the police needs had been recognized in the remote past, however, those selection proceedings were founded on practical experience. The first selection proceedings founded on scientific facts are implemented in modern era, and they primarily relate to the motor, functional abilities, anthropological and cognitive characteristics, as well as specific police skills and knowledge. The elements that are currently utilized in practice for the personnel selection in police, but also for an initial classification of police officers, imply a degree of motor and functional abilities, health status (determined by the results of previous general health check up), as well as a certain educational level. The functional and motor abilities ensure an elementary safety in the candidate selection for certain duties, primarily relating to the description of their tasks. The goal of this work is to obtain scientific and empirical findings that will help to understand the specificities of development of the anthropological characteristics of the human resources in police, which will contribute towards introducing the new criteria, methods and techniques in the process of development i.e. education, training, planning and developing career in the police, thereby ultimately contributing towards increasing the efficacy and effectiveness of performing police jobs.

Key words: police officer; motor skills; classification procedure.

INTRODUCTION

Testing for police jobs encompasses the development and maintenance of general readiness programs, knowledge of martial arts, firearms handling skills, training in driving of official police vehicles, and other needed programs. The high degree of skills and knowledge that are developed and maintained through police testing are necessary for safe and successful work of police officer (Anderson, 2001; Beck, 2012; Bawah, 2013; Strating, 2010). General physical preparation implies the process of harmonized and versatile development of all functional, motor and morphologic characteristics. According to Milanović (2010), it is aimed at the improvement of physical abilities, preparedness of all topological body regions, increase of efficacy of all organs and organ systems, improvement of all functional and motor abilities, taking into consideration delicate development stages, and strengthening weak links of the locomotor system.

Diagnostics of general physical preparedness is one of the most important activities aimed at improvement of physical abilities of police officers. Physical preparedness of police officers is the basis for further developing of specific police skills and knowledge aimed at creating a quality individual (Jukić, Vučetić, Aračić, Bok, Dizdar, Sporiš and Križanić, 2008:8). Motor diagnostics produces the data on the basic and specific fitness abilities (strength, speed, agility, coordination, flexibility, precision and balance). The motor diagnostics through the degree of motor abilities determines motor capacity of a police officer, so we can argue that the police officers with a higher degree of general physical abilities will produce better, high-quality results i.e. that they will unconditionally display situational efficacy of higher quality when performing

all types of police jobs. Those abilities are developed through a variety of training methods and modalities in various conditions. General physical abilities are the condition for quality execution of tasks placed before police officers. During the implementation of general and specific physical preparations, it is necessary to carry out constant observation of the subject for the purpose of timely detection of any negative or positive developments relative to the desired model state. Model characteristics are the examples to follow and, if possible, achieve by planning and programming of a training for the police officers depending on their jobs. Taking into consideration the goals and training procedures, everything should be directed towards reducing the current differences of the present status of entity and degree of abilities defines in the desired model state. These indicators of the police and other success can be registered by evidencing the test results of the police officers from the field. The police exercise the legal authority, which includes the right to use the means of coercion. The interventions carried out by the police members of both sexes are performed in rather complex circumstances and can be within low value range, such as verbal warning, up to high and very high (the use of different levels of physical force), all the way to deadly force (Dopsay et al., 2012:172). The ability to solve such tasks in a legal and efficient way depends on educational and professional profile. Preparation and application of special security tasks can be presented as an equilateral triangle whose sides represent the equipment, engagement tactics, and general and specific physical abilities of the police officers (Vučković et al., 2011:390). On the basis of continued measuring of basic and specific motor skills of the police officers, we get the data about average values of the results of selected tests which show to the leaders of training process the current state of fitness of every individual. Having said that, it is

difficult to assemble and select a group of tests which could be deemed ideal considering different characteristics and abilities of the police officers. It would be worthwhile to draw a parallel with the sports where members of the same sports team may show different results of some variables (Milanović, 1997:50). During their professional career the policemen are expected to maintain adequate levels of physical abilities, either with expert assistance or on their own. Development level is determined through periodical testing, and results are evaluated relative to defined norms. In addition to determining police officer's work abilities, the results are also used as an information about the quality of educational process (Boyce et al., 2008; Strating et al., 2010; Dopsaj et al., 2012; Janković & Dimitrijević, 2012).

ANALYSIS OF MOTOR MOVEMENT

Motor movements during regular daily tasks that the police members carry out, can be included in the category of complex polistructural activities, depending on the situation in which police officers take part. These activities can contain a big part of monostructural and acyclical activities. Complex activities constitute a complex of simple or more complex movement, in the conditions of cooperation among team members. In sports, this group of activities includes winter sports (soccer, handball, basketball, volleyball). Polistructural activities are movement structures performed in variable or changeable conditions. In sports, this activity group includes martial arts. Monostructural activities consist of successively repeated movement structures which can be of cyclical or acyclical character. In sports, those include running, swimming as cyclical activities, and athletic jumping and throwing, as well as weight lifting as acyclical activities (Milanović & Gabelica-Šupljak, 1997). If we compare the jobs of police members to these terms, we will realize that their work is mainly team work whereas every team member has his own task that contributes towards the main goal – successfully accomplished task, with necessary cooperation among team members. The movements of the entire team are of complex nature, requiring good coordination and cooperation, which can be achieved through tactical training. The activities of police members include monostructural cyclical and acyclical activities. Those include cyclical activities such as walking and running, with the possibility of prevalence of some activity, e.g. running during a chase, saving a drowning person when swimming is necessary, or the use of alpine equipment as a monostructural acyclical activity, which can also be only one part of an action, but perhaps also the main and only means in situations when it is required to climb or descend with such equipment in order to successfully accomplish the task (Šopar, 2004).

RECRUITMENT

Many requirements that make the work of police members more complex, are forcing the police organizations to reexamine the procedures of member selection. It is common to say that an organization functions as good as its personnel. Therefore, it is very important that police recruits for their needs the most capable and best qualified personnel that are not only good in task execution but also whose behavior will not discredit police service as a whole. The attention of police management is therefore directed to attracting and hiring talented and quality personnel members. Badly implemented recruitment can produce long term consequences for police organization considering that the majority police officers spend their entire career in one organization. Recruitment process is a direct way to influence both the quality and reliability of the police, and the social, ethnic and gender structure of the police members, and consequently the quality of relations between police and social community. It is generally considered that recruitment policy mustn't be discriminatory towards members of some classes, ethnic, religious, racial and other social groups. The recruitment proceeding has to be correct, and cannot be founded on any form of differentiating the candidates without legal and justified basis. Timely recruitment and hiring of quality personnel is considered one of the biggest challenges of modern organizations, as without such approach it is difficult to become competitive. It is a well known fact that many employers chronically lack talented and ambitious people. Therefore, it should come as no surprise that organizations remain interested in the ways to attract, hire and keep such personnel. For successful organizations that also have a good recruitment policy, such goals are not unachievable. However, for the others – they are practically unattainable (Kulić & Talijan, 2010). The recruitment process begins with making a decision about filling the vacancies and reviewing the requirements. Once the requirements are set, a search for potential candidates for the vacancies begins. It is necessary to secure fairly more candidates than required in order to end up with the candidates that entirely fulfill the requirements for the police jobs in question. Some researchers suggest that only one sixth of the applicants deserve to be called for an interview (Amidžić, 2009). The recruitment program should include the number of missing people, as well as the qualifications, knowledge, abilities and other criteria the candidates should meet. In addition, it should be clarified if the candidates will come from the internal or the external sources. The more important is the vacant position, the bigger is the need for quality candidates for it. Their qualities should be assessed responsibly and comprehensively, to reduce the possibility of mistakes to the minimum (Kulić & Talijan, 2010). Recruitment is a two-way process as two sides

participate in it. On one side is the organization with the need to fill the vacant position, and on the other side is a candidate interested in working for the organization. Both sides have a right to choose. As the organization has to be mindful of the candidate's qualities, so does the candidate has to ensure that the offered conditions are acceptable to him. Recruitment is the process in which the cooperation between the line staff and the HQ staff is of crucial importance. The HR experts, i.e. recruitment experts, have to have a clear vision about the vacant position for which the candidates are sought. Inter alia, it includes the need for their close cooperation with the line managers. The recruitment is an act of creating a large enough group of candidates from which the best will be selected in accordance with the previously set criteria, and a staffing plan (Ristović, 2006).

SELECTION

In the context of police organization, the personnel selection represents a set of designed criteria, methods and procedures which have for their purpose to provide the police management with the best possible selection of candidates interested in working for the police. The success of training and probation period, as well as the prospect for further development of abilities of the personnel members during their career, depend to a large extent on the quality of the selection, while the success of organization in executing its tasks depends on those exact abilities. Any oversights during the selection process may have serious, long term consequences given that most of policemen spend their entire career in one organization. Hence a faulty personnel selection usually means a certainty that police echelons will have weak employees for the next twenty years to come (or more). Also, the initial selection (the first reception of new personnel members) will determine the quality of additional selection for higher, managerial positions. An organization that does not care enough about timely and quality personnel regeneration, can almost certainly expect a decline and is likely to come across more hurdles to achieving its goals (Šarenac, 2020). Having said that, the selection is not merely a set of specific criteria, methods and procedures in function of regeneration of the police personnel, but also an issue of indisputable social consequences. Namely, the personnel selection directly impacts the quality and reliability of the police, as well as the social, ethnic and gender structure of the police personnel, and thereby the quality of relations between the police and social community. It is this other dimension of the personnel selection for the police that attracts a great deal of attention in every society. In principle, it is expected that the police structure will adequately represent the social structure, i.e. that police members should originate from all social layers. It is quite common that wider public shows special interest in certain social and political aspects of personnel selection for the police,

which is based on the belief that through this selection politically influential layers of the society can manifest their stance towards members of certain social groups whereas they make it easy for some, while for the others they make it difficult to enter the police service. In other words, it is believed that the selection politics can be discriminatory towards members of some classes, ethnic, racial, religious and other social groups, and that the basis for such discrimination is in a lack of confidence in the members of these groups by those social layers which have decisive influence on the personnel selection politics. Similarly, there is also the issue of discrimination of the candidates for police based on gender, age, education, political affiliation, physical and mental abilities, sexual orientation etc. The issue of personnel selection for police emerges as a question which has its inevitable sociopolitical context i.e. significance. The context and significance are partly expressed in the law which prescribes certain rules relevant to this area, primarily the rules against any kind of discrimination relating to the employment process. In this regard, we should remember the fact that the international documents about human rights, as well as the constitutions of most of the countries, contain a basic rule stating that the employment in public services is accessible to the members of all social layers and groups under the same conditions. As police is also a public service, it has the same obligation regarding the personnel selection process that is to ensure an equal treatment for all candidates who applied for the jobs, and to eliminate any kind of discrimination on the basis of their personal characteristics or affiliation to certain social and ethnic groups, as well as other proceedings that are likely to violate their equality regarding the access to the job for which they meet legal requirements. The selection proceedings have to be correct and, therefore, cannot be based on any form of differentiating between candidates without legal and justified basis. Certain countries have a special legislation which provides precise guarantees of an equal treatment for all candidates during the employment process, and which can prescribe instruments of control over police in that regard (Bahtijarević-Šiber, 1999).

ANALYSIS OF MOTOR ACTIVITY

The selection of human resources and potential, by application of motor tests as a selection instrument, is a procedure of selection of certain candidates for a certain police activity, whereby an assessment of possibility for realization of candidates' achievements in executing their duties for a certain police activity in the future is done based on four equal factors: the familiarity with the ultimate goal of the selection i.e. the model of police activities, the assessment of familiarity with motor skills and the candidates' skills, the assessment of familiarity with the procedure of transforming motor skills and the skills of future candidate, and the assessment of characteristics of the

candidates who take part in the selection process (Hadžikadunić et al., 2013:111). Speaking of applicability of the motor tests in the personnel selection for police, we have to point out that their applicability is insignificant, unless the police activity model is known. Without that model it is not possible to make an adequate selection of the potential candidates as it is now known what kind of 'material' should be taken into account in order to expect the police strategies to be implemented. For a personnel selection for the police needs, we have to perform a structural analysis of motor activity of the police members, and on that basis create a model of some organizational structures of the police. The structural analysis enables insight into the structure of activity performed by the members of certain police organizational units, as well as the movements performed during the process. On that basis alone we can create a quality battery of tests for assessing motor skills of the police members.

ASSESSING MOTOR SKILLS IN THE PERSONNEL SELECTION

The selection of human resources for police should be dominated by the tests which assess the motor abilities, motor habits (skills) i.e. the motor behavior of the potential candidates. Test-ing of the motor skills implies a systematic use of suitable tests in order to quantify motor behavior, abilities and skills (habits, motor stereo-type, motor knowledge) aimed at predicting motor performance of the examinees. Motor testing is utilized to assess very complex human characteristics. Measuring of motor skills manifestation includes a variety of procedures aimed at obtaining some quantitative data (Hadžikadunić & Turković, 2013). It should be noticed that this is an assessment of motor skills on the basis of appropriate manifestation indicators (motor tasks in suitable motor tests), as the motor abilities have latent nature which is why they cannot be measured. Such procedures imply indirect measuring, therefore, it is necessary to have more indicators (motor instruments, tests) about some motor ability (Malacko & Rađo, 2004). The motor measuring refers to various procedures of real measuring on the basis of motor tests. It is common to use the terms 'motor testing', 'motor test', or just 'test'. The term 'test' is equated with the term 'measuring instrument'. It relates to any means or way employed to provoke responses (reactions) which serve as the basis to link human behavior with anything that may create some relations (Hadžikadunić et al., 2013:112). Division of motor tests in relation to so-called basic and specific motor abilities, is in a more frequent use. Basic motor abilities imply the presence of the motor abilities that every person has, while the specific ones are the result of doing certain kinesiological activities for relatively long period. Consequently, the tests for assessment of motor abilities for the candidates meant to enter the

police structure, can be generally divided into two groups: the tests for assessing basic motor abilities and the tests for assessing specific motor abilities.

Upon completion of the general police training (which is, given its content, equally important for all candidates), follows the stage of classification or sorting the candidates into specific police specialities. The classification is nothing other than kinesiological orientation, and it is quite possible that it is the moment when kinesiology as a scientific discipline can take on (almost) the most important role. In the process of classification or sorting, specific, targeted batteries of tests are created which, through clearly defined normatives, ensure that the candidates are pointed towards those police duties in which their anthropological potential can be used and realized to the highest degree. In such delicate intervention, kinesiology can't and mustn't act in isolation as that procedure is interdisciplinary and as such requires involvement of other scientific disciplines.

CONCLUSION

Specific abilities are exceptionally important for the function of quality execution of a part of police work, and hence they are one of the basic criteria for the personnel selection. During education, SFO provides the conditions for increasing of BMS based on reliable scientific methods, measuring procedures, as well as normative parameters, during professional career. It is legally prescribed that the policemen maintain an appropriate level of those abilities, either with expert assistance or on their own. The level of development is determined through periodical testing, and results are evaluated relative to the defined norms. In addition to determining the police officer work ability, the achieved results are used as an information which reveals the quality of the educational process. Most important is to predict which abilities, characteristics and knowledge contribute most to performing police duties. Also, the importance of human capital increases, resulting in people possessing more information, thus making it more difficult to manage human resources. The cadet selection is very important in the process for the reason of future professional work of the service they are to enter. In the new ambiance of social changes characterized by new and/or significantly altered security challenges, risks and threats, the police training and professional development are facing new challenges. The guarantee such as formal education does not suffice any longer; what has become necessary are professional training and narrow specialization for specific police jobs and tasks. At the same time, one should be aware of the transformation of the police function, accompanied by appropriate legal, organizational and other changes. In that sense, changes to the training concept and professional

development are also necessary. Upon completion of formal education, the cadets accepted to the police agencies are additionally pointed towards acquiring the basic police and additional skills, knowledge and abilities, as well as developing competences for the purpose of their better work performance. This implies one continued process during the entire career which serves to direct and develop it (the career), while it enables the individual to progress in accord with the acquired knowledge and competences. At the same time, it allows for new challenges to be set, which are primarily reflected in the need for more dynamic approach to the training and development, as well as a more efficient transfer of required skills and knowledge, which will provide the police officers with the opportunity to have a suitable, continuous training throughout their career, which would in parallel serve as the basis for their further progression in the service. The use of motor tests as the instrument meant for the personnel selection for police, can help with determining degree of required skills and abilities in the personnel selection, and analysis of the tests that the cadets have to pass in order to be accepted. The selection of human resources and potential, by use of motor tests as the selection instrument, represents one of the ways to select certain candidates for certain police activity. The motor abilities assessments are exceptionally important for the selection of certain candidates for certain police activity - if the candidates do not meet the required minimum, then they mustn't be considered as they would only endanger lives of others as well as their own. Everyone can perform some moves (e.g. lift something, run a certain distance etc.). They have a series of qualitative and quantitative characteristics. It is common to consider the motor abilities as special forms of movement related human possibilities. The motor abilities defined as such differ from the motor habits and skills, although, of course, the manifestation of motor abilities is possible only through some concrete motor act. The motor movements that the police officers carry out daily during their regular tasks, can be categorized as complex polistructural activities, depending on the situation in which the police members take part. These activities can contain a large part of monostructural cyclical and acyclical activities. Complex activities constitute a complex of simple or more complex movements, in the conditions of cooperation among team members. The application of motor tests as an instrument in the process of personnel selection for police, enables us to determine a degree of required skills and abilities for the selection of human resources and potential. Similarly, the instruments utilized for the assessment of level of motor abilities can serve as starting point for creating procedures for improvement of the existing human resources and potential in police.

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Corresponding author:

Bakir Alalispahić

Fakultet za kriminalistiku, kriminologiju i sigurn-osne studije Univerziteta u Sarajevu
balispahic@fkn.unsa.ba

COORDINATION ABILITIES IN DANCE SPORT: SYSTEMATIC DEVELOPMENT IN THE TRAINING PROCESS

Adriana Ljubojević, Snežana Bijelić, Saša Jovanović and Lejla Šebić

Abstract: Coordination as a qualitative motor skill summarizes a wide range of manifestations, integrates the manifestations of other motor skills, and plays a significant role in the development and overall performance of dancers' coordinative skills through the coordinative skills. The space for motor learning ability, direction and control of movement, and adaptation and transformation of movement are the main focus here. Coordination in dance activities manifests itself through the ability to harmonize the parameters of dance technique in terms of time, space, and muscle tension. The level of coordination is directly proportional to the quality of esthetic presentation on the podium, but also to the speed of adoption of new dance patterns and improvisation of stylized movement in specific dance presentations. Esthetically coordinated movement is composed of segments that are enhanced and complemented. The importance of timely and purposeful development and improvement of the dancer's coordination skills is carried out through several phases that are interdependent and linked in a controlled training process with the aim of showing the dance performance with minimal energetic and motor load under the guidance of the dancer's motor intelligence. This sets the stage for a higher segment of dance movement that shapes the esthetic component to dance mastery.

Keywords: motor intelligence, aesthetics movement, dancers

INTRODUCTION

Dancing movements are an important part of the competitive presentation of many sports (gymnastics, rhythmic gymnastics, synchronized swimming, figure skating, etc.). In the context of this text, sports dance refers to several types of dance for which there is an organized system of competition prescribed by world governing bodies: World Dance Sport Federation, International Dance Organization, World Rock 'n' Roll Confederation, International Federation of Cheerleading, etc. The most popular competitive dances are Latin American dances, Ballroom dances (Standard dances), Spectacle dances, Street and Pop dances, Special couple dances, Acrobatic rock 'n' roll, Disco dances, etc. In general, sport dances can be described as a specific combination of art and sport, which in a certain way, independently or in interaction with other dancers, allows a unique expression of sincere emotions provoked by different music and transformed into harmony and fusion of the most beautiful movements and movements. (Lukić, 2006). Dance steps are present in the choreographies of all aesthetic sports. In dance sports, coordination manifests itself in the connection and realization of various characters of movement technique. The efficiency of its manifestation depends on the motor experience in the application of stylized movement, i.e. on the richness of the repertoire of dance techniques of different performance, complexity, dynamics and spatial transition. Coordination as a qualitative motor skill summarizes a wide range of manifestations, integrates the manifestations of other motor skills, and plays a significant role in the development and overall performance of dancers' coordinative skills through the coordinative skills. The space for motor learning ability, direction and control of movement, and adaptation and transformation of movement are the main focus here.

The importance of the musical component, rhythm and dynamics through coordination in rhythm, based on the ability to perceive kinesthetic, tactile, vestibular, visual and sound information, is highly positioned, considering that the dancer harmonizes with his own rhythm, the rhythm of the partner (or several at the same time) and the rhythm music.

Coordination in dance activities manifests itself through the ability to harmonize the parameters of dance technique in terms of time, space, and muscle tension. The level of coordination is directly proportional to the quality of esthetic presentation on the podium, but also to the speed of adoption of new dance patterns and improvisation of stylized movement in specific dance presentations. Esthetically coordinated movement is composed of segments that are enhanced and complemented. The importance of timely and purposeful development and improvement of the dancer's coordination skills is carried out through several phases that are interdependent and linked in a controlled training process with the aim of showing the dance performance with minimal energetic and motor load under the guidance of the dancer's motor intelligence. This sets the stage for a higher segment of dance movement that shapes the esthetic component to dance mastery. What all dance disciplines have in common is that the foundation of quality movement technique lies in the application of ballet exercises. Ballet exercises in the training of dancers, in fact, teach and improve all manifestations of coordination for the purposes of esthetic presentation (nuance of dynamics, isolation - asymmetric movement, speed of manifestation of each movement, interpretation of music through movement or movement, etc.).

COORDINATION ABILITIES IN DANCE SPORT

Coordination in sport dance manifests itself through the ability to harmonize the parameters of dance technique in time and space. The speed component also relates to the musical interpretation of syncopated dance movements. In sport dance, there is a very important component of harmonization and coordination of movements in relation to the movement of the dance partner and in relation to the movement of other dance couples or dancers on the dance floor. In an adjudicator's evaluation of the quality of a dance presentation, this component is referred to as "partnership". Coordination in dance training also implies the speed of adopting new movement patterns. The harmonization of new complex dance tasks also depends on the so-called motor experience, i.e. the wealth of motor knowledge realized through dance movements and sequences of movements. Certainly, it is one of the most important motor skills for dancers in the context of choreographic and technical preparation of dancers. Dancers develop it by enriching movements and sequences of movements with other dance styles and forms. In this way, a large number of learned movement stereotypes enables faster and easier adoption of new or similar dance forms (Ljubojević & Bijelić, 2014). Any aesthetically formed movement is conditioned by the level of coordination of all motor potentials of dancers. From the need to show the aesthetic component in the movement of dancers, the ability of stylized movement, which arises as a product of control of the nuance of the dynamics of execution or timely dosage of muscle tension in the execution of the movement or movement, certainly should not be neglected. This control is conditioned by the sense of the position of the body or parts of the body in space and muscle tension. It is known in dancers as kinaesthesia or muscle sensation and is developed through proprioceptive training. Proprioception is a very current topic of dance trainers and has taken a significant role in the conditioning of dancers in recent years. Numerous studies (Jola & Angharad, 2011; Srdić & Bajrić, 2015; Ljubojević, Bijelić, Šebić, & Gerdijan, 2017; Chatzopoulos, Doganis & Iraklis, 2018) indicate that proprioceptive training improves intermuscular and intramuscular coordination, which in turn leads to better control. Movement (establishing and maintaining movement), control over sudden changes in the direction of movement (by shifting the body's center of gravity from one leg to the other more precisely and quickly), but also more subtle nuances in muscle contractions and relaxations for stylized movements or sequences of movements.

In analysing the factors that influence specific sport skills, the constitutional, coordination, and control factors are mentioned. Coordination skills imply that movement is based on the functioning of the nervous system. Movement coordination is a skill that

integrates the manifestation of other motor skills, it is the organizer of their cooperation in various motor activities (Starosta, 2002). This is particularly evident in dance activities. Dance implies harmony, temporal and spatial precision and combines simple but also very complex movement structures. The senses of sight, hearing, touch, as well as balance and kinaesthesia play an important role in adequately ensuring harmony and precision in movement execution. The coordination skills, which play a significant role in the development and achievement of coordination skills, assign three spaces that make up the actual structure of coordination. These are the space of ability for motor learning, the space of ability for direction and control of movement, and the space of ability for adaptation and transformation of movement (Jevtić, 2011).

In sport dance, all three coordination capacities are of great importance, without exception, because the possibility of learning and the speed of learning movements and sequences of movements from the simplest to very complex biomechanical structures depend on them. The last, but perhaps the most dominant form of coordination in dance, without which it is impossible to achieve unity of movement and harmony with the music, is coordination in rhythm. Rhythm is based on the ability to perceive kinaesthetic, tactile, vestibular, visual and auditory information. The body has its own rhythm, which must be harmonized with the rhythm of the music, the rhythm of the partners or several partners in the group. Also, the harmony of muscular contraction and relaxation, which is determined by the efficiency of the CNS in each dance, is constantly expressed throughout the execution of the dance. The alternation of contraction and relaxation creates a plasticity that the spectator perceives as an incredible elegance and lightness of performance.

COORDINATION DEVELOPMENT

The development of coordination is considered to be based on five fundamental principles (Drabnik, 1996):

1. Coordination is improved by learning new movement patterns.
2. Coordination is developed first by learning the spatial components of movement, then temporal (at a certain speed, rhythm), and then by applying tasks in situational (variable practice conditions).
3. Motor tasks for the development of coordination must gradually become more complex.
4. Motor tasks should be alternated after the previous movements have been automated.
5. Automated motor tasks can further modify coordination provided they are performed under variable conditions by increasing the speed of

execution, adding movements, changing the start and/or end positions of execution, changing directions, changing loads, making sensory control more difficult, etc. (according to Neljak, 2013).

It can be said that the coordination of the "team-work" are the muscles involved in the movement and the conscious thoughts of the individual, whether the movement is known or not. Some movement patterns that are repeatedly used and learned become habits that become automated. They are stored as complete units in the motor cortex of the CNS and are controlled by the individual's conscious intent. This "interaction" develops in successive stages, each new level building on all previous levels. Weakness at one level can lead to weakness throughout the system. In the development of coordination, all phases overlap. It is an extremely complex process that is inherently programmed into every human being. When a new phase of development begins, all previous phases must be strengthened while at the same time stressing the new phase. These laws are especially true in the training of aesthetic sports. As already mentioned, coordination is conditioned by the development of all motor skills. The level of motor knowledge is the result of purposeful experience through movement. Purposeful movement cannot be random or arbitrary, but manifests itself as a "conscious" activity, i.e., the intention to perform a movement or sequence of movements. The development of motor skills and coordination are natural processes in human development. It takes place when appropriate experiences of natural movement are sufficiently present in all years of growth and development. It is assumed that the better the basic movement experiences are learned, the easier it is to improve coordination. The richer the movement experiences, i.e., the higher the total motor information, the easier and faster new motor patterns are adopted. Although sensitive periods for their development are associated with preschool and younger school ages, insufficient development of coordination can be "compensated" by enrichment of motor knowledge through movement at a later age. Unfortunately, modern lifestyles and reduced exercise at an early age also negatively impact the natural potential for coordination development in children. Hidden within each person is a visible and complex progression in the development of coordination. Coaches in sport dance must have an understanding and respect for each stage of development. The specific experiences gained on the path of aesthetic movement training make dance one of the best activities for the development of coordination in children.

The "Pyramid of Coordination Development" presented is taken from the book *Coordination for Ballet* by Ruth Brinkerhof (2018) and provides insight into each segment of coordination maturation and how they overlap and complement each other.

1. Conscious movement (2 months - 2 years).

It begins soon after birth. As a special phase of development, it lasts until the second year of life, but continues to build and strengthen throughout life. It manifests itself primarily as a movement that arises from the thinking process. This is the basis of all coordination. As skills and abilities increase, motor planning becomes an increasingly important part of coordination. This is where self-awareness begins: size, shape, ability to move, ability to control and manipulate objects and connect with people in the immediate environment.

2. Symmetry (2 - 7 years)

As an observed phase, symmetry implies a period from the second to the seventh year of life. During this stage, symmetrical coordination occurs. Both sides of the body move in the same way, either simultaneously or alternately, as in walking. Balance under gravity is achieved and maintained, and some aspects of building correct posture begin. Awareness of the body's position in space is increased. With the strengthening of self-awareness comes the emergence of self-esteem and self-confidence.

3. Unit (3 - 6 years)

This phase lasts from the third to the sixth year of life. The unilateral coordination model develops and adds to the symmetry already present. This refers to the situation

4. Contrast (5 years – 7 years)

Usually begins to show up around age five to age seven; in some movements it may appear much sooner.

COORDINATION DEVELOPMENT IN DANCE SPORT

Without a detailed understanding of the regularity of the development of coordination, it is difficult to promote its development in the training process of sport dance. Coordination is fundamental to the development of movement technique, and the more understandable its naturalness, the easier it is to promote and guide its proper development at all ages. The level of coordination directly affects the quality of aesthetic presentation. Aesthetically coordinated movement mobilizes all the potentials of the performer. It consists of a series of segments that are enhanced and complemented. The motor segment appears first in the form of coordination skills. It represents a purposeful movement directed by the performer's intelligence, which is repeated until it becomes automated. At this level, the movement is performed without much energy or motor effort, and a prerequisite is created for the next segment, which adds an aesthetic touch to the movement. The

aesthetics of the movement depend, among other things, on the emotional experience of the performer and the ability to en-rich the choreography with it.

Understanding and paying attention to the regularity of the development of coordination will be very helpful in planning and organizing training work in sports dance. The use of stylized movement forms can improve the natural development of coordination in children. The need to establish and maintain correct posture in the training process of aesthetic sport certainly contributes to maintaining and improving natural movement patterns at all stages of development (Jovanovic & Ljubojević, 2020). Targeted development of coordinative skills is possible only with attention to these develop-mental stages. It takes place in several stages:

- Derivation of the standard technical struc-tures of the sport branch;
- Execution of all exercises in the reverse direction (left to right and vice versa);
- Changes in the speed and rhythm of the exercises
- Modifications of elements of known techniques;
- Addition of new movements to known techniques;
- Increasing the load in situational exercis-es;
- Learning technical skills of other sports (according to Šimić & Šimek, 2006).

In the training process of aesthetic sports, ad-vanced coordination skills depend on a strong foundation of learned basic skills. In the training of stylized movement, the aforementioned foundations are never neglected, but are systematically and continuously developed and improved throughout the sports career. Attention to the phases of coordination development in aesthetic sports is the key to mastering the most complex aesthetic manifestations, which later mature into true movement mastery. The formation of the aesthetically designed movement is a process that requires knowledge of the nature and lawfulness of the development of coordination, attention to and improvement of all the stages that precede the construction of an easy and supple movement, and on this path the coaches, leaders, teachers have the most responsible role. Training planning in the aesthetic sports should be based on the knowledge of the lawfulness of the development of all motor skills and, in particular, the development of awareness of the timely dosage of muscle tension for the purpose of nuanced dynamics of movement.

CONCLUSION

It is known that in the aesthetic sports (rhythmic gymnastics, sports gymnastics, sports dance) the achievement of top athletic performance begins very early and with it the developmental path to reach the necessary physical potentials. In the esthetic sports, very complex motor tasks are performed by athletes of different ages at a very early age. With good training design and organization, top sporting performances are possible, as the adaptability of the child's body to specific training stimuli is very high. This requires knowledge and application of methodical principles in the development of motor skills, especially coordination, as well as an understanding of the physiological characteristics of the different developmental phases. For this reason, individualization in the training process of esthetic sports begins very early.

The fact is that the manifestation of coordination abilities directly depends on the intellectual and physical potential of the performer. In the training of dancers, the richness of movement experiences contributes to better dance coordination. Movement training, as mentioned earlier, is based on the use of ballet exercises in most esthetic sports. Through different ballet positions, the movements of the arms and legs are made conscious, and through symmetrical-asymmetrical activity, one learns, among other things, the dosage of tension in the muscles for the needs of optimizing energy consumption. The optimization of the movement and the sequence of movements naturally leads to a light and fused dance performance, which is very important from the point of view of the evaluation of the esthetic criteria. Although it is necessary to know the general laws of coordination develop-ment, the specificity of coordination in sports dance is reflected in the individual assessment of intellectual and motor maturity and, accordingly, in the setting and adjustment of coordination requirements and tasks in the choreography. For this reason, it is extremely important for coaches to adjust the motor, intellectual and energetic load to the athlete's mental and physical maturity.

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Corresponding author:

Adriana Ljubojević

Faculty of Physical Education and Sport, University of Banja Luka, Bosnia and Herzegovina
E mail: adriana.ljubojevic@ffvs.unibl.org

THE COMPARISON OF ATTACKING EFFICIENCY INDEX (AEI) DERIVED FROM YOUNGER MALE AND FEMALE SENIORS (U-23) PARTICIPATED AT THE NATIONAL JUDO CHAMPIONSHIP OF BOSNIA AND HERZEGOVINA

Jasmin Drljević, Haris Čutuk, Safet Kapo, Admir Vražalica, Anida Kapo and Husnija Kajmović

Abstract: The main objective of this research is about to compare the attacking efficiency index (AEI) derived from younger male and female U-23 seniors, participated at The National Judo Championship of Bosnia and Herzegovina held in 2015 at Ilidza-Sarajevo. The sample of respondents consists (n=60) combats of younger male seniors and (n = 22) combats of younger female ones in all seven weight categories. The sample of variables consists of throwing techniques, parterre techniques and scored technical points as result of the quality of the throwing techniques and the techniques in the parterre being performed. The data were collected by video analysis of the combats from younger male and female seniors that participated at The National Judo Championship of Bosnia and Herzegovina. The results shown that there were not any differences in the points scored between the younger male and female seniors of U23. The results of the T-test for independent samples shown the existence of statistically significant differences in the cumulative attacking efficiency index, which was AEI = 10.9 at younger male seniors and AEI = 11.77 at younger female ones. The AEI results of the individual techniques shown that the most effective ones were at the younger male seniors named Kesa gatame, Tani otoshi and Uchi mata, and at the younger female seniors named O Soto Gari, Ouchi gari and Kesa gatame. The results suggested the need to re-analyze the performances from competitions of younger male and female seniors, as well as the recommendation for coaches to adjust their plans and programs of technical-tactical and fitness preparation of athletes, especially younger female seniors.

Key words: Combat sport, gender, performance, analysis

INTRODUCTION

The diversity of approaches in the analysis of the performances of male and female competitors in judo at younger age categories in both genders is essential for further progress in achieving the success of judo competitors based on relevant information, and above all from the competitions.

Judo was commonly described as a martial art, a spiritual discipline, a system of physical education and recreational activity. Judo literally means "the way of gentleness", precisely a dynamic combat sport that demands both physical prowess and great mental discipline (Peset et al., 2013).

The competitive Judo is a highly explosive, dynamic, intense physical and mental activity with highly developed aerobic and anaerobic energy systems (Callister et al., 1991; Pulkkinen, 2001).

The role of aerobic processes in Judo is to prepare the working capacity of heart and the ability of one to deliver oxygen to the muscles, that will improve oxygen delivery through continuous training.

On the other hand, interval training will more effectively influence at increase of oxygen utilization during the combat (Sterkowicz et al., 1999).

The application in Judo's practice entails a major recovery from aerobic work (via lactate metabolism), faster phosphate resynthesis and where is needed to increase individual maximal oxygen uptake VO_{2max} (Astrand and Rodahl, 1986; NCCP, 1990; Taylor et al.,

1981; Thomas et al., 1989; Little, 1991; Mickiewicz et al., 1987; Callister et al., 1991; Horswill et al., 1992; Matsumoto et al., 1978; Kaneko et al., 1978).

The role of anaerobic processes in Judo is reflected through the efficiency of muscle work, which is determined by lactate anaerobic or aerobic glycolytic abilities. This energy system contains both systems; ATP - CP (Alactic) and Lactate (Anaerobic glycolytic) systems (Verhošanski et al., 1992; Pulkkinen, 2001). As mentioned earlier, Judo primarily contains an anaerobic system, and therefore exercise is applied that is characteristic in the adaptation of these systems.

Lactate and non-lactate energy systems will be focused on two details as follows: the general, one that is useful in sport's science for assessing the effectiveness of training programs and specific one, as a presentation of profiles of what individual world champions may exhibit in their performance. Judo's scientist and trainers need to understand which of these components are essential for the success in Judo and how to harmonize the training regime, thus ensuring that Judo's training is even more effective (Capriano, 1993; Astrand and Rodahl, 1986; Cipriano, 1993; Astrand and Rodahl, 1986; Astrand and Rodahl, 1996).

Related to the structure of movement, Judo belongs to the poly structural acyclic sports that take place in variable conditions. The combat between two rivals takes place in "tachi waza" - a combat in a standing position and "ne waza" - a combat in a parterre position, and both ways of combating require different

approaches in training and competition (Seisenbacher and Kerr, 1997; Murayama et al., 2005).

In Judo, men and women do not combat with each other, but this does not prevent Judo re-searchers from exploring the similarities as well as differences between the different genders. Thus, the research conducted by Callister et al., (1991) stated the existence of differences in morphological and physiological characteristics between men and women at the world level of Judo's competition.

The anaerobic role in Judo is determined by a research of Callister et al., (1991) on the sample of vastus lateralis muscles at male and female competitors of U.S.A. National Team. They found that female competitors had a higher value of type I muscle fiber content (48.9%) compared to male competitors (35.7%). Female competitors had type II B muscle fibers, average value (10.5%), and male competitors (26.8%). Type II A muscle fibers had the same ratio between male (37.1%) and female competitors (38.5%).

The research of technical-tactical characteristics of Judo's combats were objective of many researchers, so Calmet, Trezel and Ahmaidi (2006) by analysis of Judo's combat concluded that to succeed you need to improve several throwing techniques in three or four different directions of attack and to have a firm grip that will allow them to be performed. Due to the great complexity of throwing techniques in terms of better and faster progress, they recommended learning throwing techniques in a coordinated throwing system.

Heinisch and Oswald (2007) were trying to analyze the dominant tactical-technical combating styles that get the best results in today's Judo. In Judo, the main aspects of high performance used during training can only be derived from the behavior of top judokas during combat. Therefore, competition analysis, as a complex method of performance analysis aimed at collecting, processing, analyzing and interpreting information become more and more the dominant diagnostic method.

Basically, the winning performance is almost always higher activity in Judo's combats of your opponent as well as high technical-tactical perfection (higher efficiency in attack and defense). Despite the growing specialization in top sports, athletes who attack their opponents with greater technical diversity still predominate.

Sterkowicz, Lech, and Almansba (2007) were analyzing the different ways of combat shown by medalists at the Polish championship in relation to lower ranking competitors. They analyzed 518 Judo's combats that took place during Judo's championships in Poland in 1999 and 1998. The main indicator of the differences was the activity index in Judo's combats (number of

actions divided by the number of combats). That index was almost twice as high among the competitors who won a medal at the analyzed competitions.

The authors consider that this result has related to better physical preparation of higher-ranking judokas. It has also shown that in lower judokas the activity index does not change significantly during the combat, while in higher judokas the activity index has a variable character. During the combat, the index decreases in the second and fourth minutes, and increases in the fifth minute. Such results were associated with greater tactical preparation of higher-ranking judokas. These results have served the authors to create a tactical scheme of Judo's combat characterized by a gradual progression of activity from the first to the third minute, a decline in the fourth, and an increase again in the fifth minute.

Franchini and Sterkowicz (2000) were analyzing the techniques used during the Olympic Games and at the World Championships between 1995 and 1999. They also determined the time in combat during which these techniques were used, taking into account the weight (lighter and heavier). The main findings of the statistical analysis of 4,813 actions were: (1) the dominance of foot techniques in both lighter and heavier categories; (2) the highest points by throwing were obtained in the first three minutes of the combat; (3) penalties earned almost half of the points scored in judo; (4) there was a trend in scoring points, that was more stressed in higher weight categories. The percent-age of Ippon, Wazari and Yuko decreased, while the number of penalties increased during the 1995-1999 tournament; (5) In 1997, new techniques emerged that did not exist in previous classifications. This knowledge can be useful in the organization and management of major sporting events, as well as for coaches who can better prepare their competitors based on them.

Boguszewski and Boguszewska (2006) were analyzing the dynamics of Judo's combat shown by the finalists of the 2005 European Championships in Rotterdam at men and women. They assumed that the finalists of the European Championship were top athletes with extraordinary abilities. The analysis included 14 final Judo's combats, and the following parameters were determined: offensive/defensive activity, efficiency in attack, efficiency in counterattack, efficiency of defense without counterattack and general dynamics of the combat. The results indicated that the winners in Judo's combat had higher indexes of efficiency parameters: efficiency in attack, efficiency in counterattack, and general dynamics of the combat.

There was no significant difference between male and female judokas and weight categories. The authors concluded that the rules of Judo's combat should increase the dynamics of combat. In addition, tactical

training should be based on achieving a result advantage as well as on effective defense and exploiting the opponent's mistakes.

Inakamura et al., (2006) were doing analysis of the World Judo Championships from 1995 to 2005 to stress out how the performance of the competition changed during that period. The research was prompted by the activities and rules of the IJF (World Judo Federation) that made Judo a more dynamic and aggressive sport in recent years. New rules such as the emphasis on punishing passive combat in the late 1990s and the introduction of the golden point in 2003 has required from judokas to be more physically prepared and to have continuous attacks.

Also, in 2003 at the women's competition for female seniors, the combat was extended by one minute, thus raising the demands in women's Judo. The research included results from 4,500 Judo's combats from six world championships. The percentage of ippons in the competition increased from 51.4% in 1995 to 59.6% in 2003, but also decreased to 57.1% in 2005. The highest percentage of ippons was recorded in 2001 when it was 65.0%. Winnings on the koka or gold point decreased from 5.7% in 2001 to 2.9% in 2003 and 2.1% in 2005. The percentage of ippon at women increased significantly from 50.2% in 2001 to 58.1% in 2003. The results indicated that Judo has become a more dynamic sport if one looks at the ratio between wins on ippons and wins on the koka. In 2003 it can also be noted that according to these indicators, the significant difference between male and female's Judo disappeared.

Sertić, Szeged and Sterkowicz (2008) were identifying differences between the use of throwing techniques by juniors by analyzing the combats at the 2005 European Junior Championships. By analyzing 409 Judo's combats, they noticed the grouping of weight categories into two groups depending on the techniques used in them. The -48 kg and -52 kg categories had an equal distribution of throwing technique groups. They dominated by manual throwing techniques, followed by pedal foot, sacrificial and side throws.

This group can be joined by the category -57 kg, that is not completely identical to the first two categories, but it is also dominated by manual techniques. The second group included categories from -63 kg to +78 kg in which pedal foot and sacrificial techniques have dominated. In the junior categories -60 kg, -66 kg, -73 kg were dominant the use of manual techniques and within them the most dominant the throwing of Kata Gurum. At the second place were foot techniques. The second group of categories from -81 kg to +100 kg connected only by the dominant use of foot techniques. The technical efficiency of female judokas and male judokas from the European Championship

was compared with the technical efficiency of female judokas and male judokas of lower rank at the Zagreb Open 2005 tournament. The authors concluded that judokas of lower rank had not as large a range of techniques as those of European ones. They also noticed that the number of techniques in Judo's combat were smaller, and they were being performed in a more sparse choice of combinations with too many direct and unconnected attacks.

Sertić, Szeged and Vučak (2009) were analyzing the European Judo Championship for younger male seniors and in a sample of 174 combats at men's competition they indicated that the use of different groups of throws distributed very similarly in all weight categories, that is, there was no significant difference between light, medium and heavy-weight. During the analyzed Judo's combats, a total of 24 different throwing techniques were successfully performed. In 174 combats, a total of 214 throwing techniques (1.22 per combat) were successfully performed, of which 75 throwing techniques (35%) qualified as ippon.

If we associate to this number the techniques by which the ippon scored in the non-waza position (21 techniques), it was concluded that 52% of the combats ended before the end of regular time with an attractive technique in the tachi waza or non-waza position. The most commonly used throwing techniques, in the men's part of the championship, were: 1. Manual throwing techniques with a total of 102 successfully applied techniques during the championship. Within this group of throws, the most used techniques are: Kata Guruma (26), Te Guruma (19) and Seoinage (17). 2. Sacrificial throwing techniques with a total of 58 successfully applied techniques during the championship. Within this group of throws the most used techniques were: Tani Otoshi (21), Soto Makikomi (14), Sumi Gaeshi (9). 3. Foot throwing techniques with a total of 43 successfully applied techniques during the championship. Within this throwing group the most used techniques were: Uchi Mata (16), Ouchi Gari and Kouchi Gari (8). 4. Side throwing techniques with a total of 11 successfully applied techniques during the championship. Within this throwing group the most used techniques were: Harai Goshi and Sode Tsurikomi Goshi (4) and Koshi Guruma (3).

Calmet et al., (2010) were comparing the total length of the match, the frequency of points (ippon, wazari, yuko) and penalties (shido) between the Rio 2016 and London 2012 Olympics (before and after the rule change), taking into account the weight categories and stages of the competition. Data from 307 female and 470 male athletes analyzed, each of them had 1.022 and 698 matches in both competitions. The results (Rio 2016 vs. London 2012) suggested that there was no change in the results of ippon and wazari, by reducing the number of yukos and increasing the number of penalties. Women scored more yukos and had fewer

penalties than men. The women's matches in Rio were shorter than the matches for all other groups. There was no difference in the results and penalties for the different weight categories, but in the light heavyweight category the matches were shorter than those in the lightweight category.

Miller et al., (2015) were evaluating the use of throwing techniques based on The British Championships dated 2013. The data shown that British judokas used foot techniques (ashi-waza) most effectively, and Uchi-mata proved to be the most effective technique. Men and women, juniors and seniors, used different techniques, however only young male competitors provided data that had not matched the overall trend, with manual techniques (te-waza) where Seoi-nage was the most effective throwing technique.

Kajmović and Rađo (2014) were investigating the comparison in the efficiency index of throwing techniques between male and female seniors from the same and opposite guards. Based on the notation's analysis of 280 guard configurations and the same number of male seniors throwing techniques and 166 guard configurations and the same number of female seniors throwing techniques from The National Championship of Bosnia and Herzegovina dated 2013 and 2014. The existence of differences between frequencies from the same and opposite guard were determined. Male seniors dominate throws from the same (Ai yotsu), while female seniors dominate throws from the opposite guard (Kenka yotsu).

The most effective throwing techniques from the same guard for male seniors were Ippon seoi nage (0.68) and for female seniors Harai goshi (0.73). The technique that had the highest efficiency index in male seniors from the opposite guard was Uchi mata (0.66), and in female seniors Uchi mata (1.21). The information from this research can be useful to coaches and competitors, so they can treat the guard to a new approach, but also to researchers of Judo to develop new ways to research the guard at different levels of competition and apply these research results in training practice. Based on all the above, the goal of this research is to compare the attacking efficiency index of younger U-23 male and female seniors from the National Judo Championship of Bosnia and Herzegovina.

METHODS

Sample of respondents

The sample of respondents consists of (n=60) combats of younger male seniors and (n=22) combats of younger female seniors in all seven weight categories.

Sample of variables

The sample of variables consists of throwing techniques, parterre techniques, scored technical points (Ippon, Waza-ari and Yuko) as a result of successfully performed throwing techniques and techniques in the parterre.

Method of data collection

Two analysts were collecting data by using notarial analysis of video recordings of the fights of U23 younger male and female seniors from The National Judo Championship of Bosnia and Herzegovina held in 2015 in Ilidza - Sarajevo. Analysts were longtime competitors, coaches and judges in Judo with respectable sports results. Each arena was filmed with a Sony video camera and analysts could see the fighters, the judges and their gestures and the scoreboard next to the arena. The data were entered into specially prepared protocols of Judo fighting.

Ethical approval

The research was approved by the Scientific Council of the Faculty of Sport and Physical Education University of Sarajevo (02-1967/20).

Reliability

The results of Cohen's kappa test for estimating the agreement of two judges for female and male competitors is .880, which represents a very good agreement between two judges in the process of awarding techniques and points during the competition U-23.

Data processing methods

All results were calculated in frequencies and percentages. The Chi-square test was used to determine the differences between younger male seniors and younger female seniors in the scored technical points. The index of situational efficiency of Judo techniques by younger male and female seniors was calculated based on the formula (Adam, Klimowicz, Pujso, 2016)

$$AEI = (5p \cdot YN + 7p \cdot WN + 10p \cdot IN)/CN \quad (1)$$

Where is (YN the number of yuko, WN the number of waza-ari, IN the number of ippon, CN contest number). A t-test for independent samples was used to determine differences in the situational efficiency index between younger male and female seniors. The statistical significance level was set at $p < 0.05$ for all analyzes. Statistical Package for Social Science (SPSS) base 22.0 for Windows (IBM, USA) was used to compute the statistics.

RESULTS

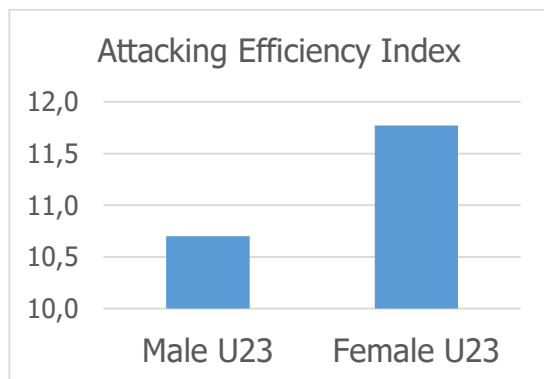
The results of the Chi-square test (Table 1) at the level of statistical significance of 0.05% show that there is no statistical significance (Chi-square test = .712; df = 2; Phi = .080; p = .701) in the comparison of the scored points (Ippon, Waza-ari and Yuko) as a result of the quality of the throwing technique performed and the technique in the ground floor between the younger male and female seniors.

Table 1. Comparison of scored technical points between younger male and female U-23 seniors.

		U23		Total	
		Female	Male		
POINTS	Ippon	Count	16	34	50
		% Points	32.0%	68.0%	100.0%
		% U23	50.0%	42.5%	44.6%
		% of Total	14.3%	30.4%	44.6%
		Std. Residual	.5	-.3	
	Wazari	Count	8	20	28
		% Points	28.6%	71.4%	100.0%
		% U23	25.0%	25.0%	25.0%
		% of Total	7.1%	17.9%	25.0%
		Std. Residual	.0	.0	
	Yuko	Count	8	26	34
		% Points	23.5%	76.5%	100.0%
		% U23	25.0%	32.5%	30.4%
		% of Total	7.1%	23.2%	30.4%
		Std. Residual	-.6	.3	
Total	Count	32	80	112	
	% Points	28.6%	71.4%	100.0%	
	% Group	100.0%	100.0%	100.0%	
	% of Total	28.6%	71.4%	100.0%	

Figure 1 shows that younger female seniors have statistically significant ($t(36) = -3.161$; $p = .003$) values of total AEI relative to total AEI values scored by younger male seniors.

Graph 1. Comparison of the overall Attacking Efficiency Index (AEI) between younger male and female seniors U-23.



The data from Table 2 show the individual indexes of situational efficiency of the realized Judo's techniques from The National Championship of Bosnia and Herzegovina between younger male and female seniors held in 2015. In younger male seniors, the most successful parterre technique was Kesa Gatama, followed by Tani Otoshi throw-ing techniques and Uchi Mata foot technique. However, for younger female seniors, the situation was completely different and the most successful throwing technique was the foot techniques O Soto Gari and O Uchi Gari and the parterre technique Kesa Gatame. It is interesting that younger male seniors used a larger number of throwing techniques and parterre techniques compared to younger female seniors.

Table 2. Comparison of the index of situational efficiency of individual Judo's techniques between younger U-23 male and female seniors.

MALE SENIORS U-23		FEMALE SENIORS U-23	
Judo techniques	AEI	Judo techniques	AEI
Kesa gatame	1.72	O Soto Gari	2.68
Tani Otoshi	1.63	O Uchi Gari	2.36
Uchi Mata	1.28	Kesa gatame	1.82
O Soto Gari	0.77	Harai Goshi	1.00
Ippon Seoi Nage	0.75	Koshi Jime	0.91
O Uchi Gari	0.57	Ippon Seoi Nage	0.86
De Ashi Barai	0.45	Uchi Mata	0.68
Ura Nage	0.42	Tani Otoshi	0.55
Kami Shiho Gatame	0.33	Yoko Shiho Gatame	0.45
Ko Uchi Gari	0.28	Seoi Otoshi	0.23
Yoko Shiho Gatame	0.28	Koshi Guruma	0.23
Sumi Gaeshi	0.25		
Koshi Guruma	0.25		
Tate Shiho Gatame	0.17		
Koshi Jime	0.17		
Juji Gatame	0.17		
Hadaka Jime	0.17		
Tai Otoshi	0.17		
Yoko Tomoe	0.17		
Tomoe Nage	0.17		
Uki Goshi	0.17		
Harai Goshi	0.12		
Sumi Otoshi	0.12		
Ko Uchi Makikomi	0.08		
Soto Makikomi	0.08		
Seoi Nage	0.08		
Kata Guruma	0.08		

DISCUSSION

The objective of this work is about to compare the index of situational efficiency of younger U-23 male and female seniors from the National Judo Championship of Bosnia and Herzegovina. It was noticed that younger male seniors had a larger technical repertoire (27 throwing techniques and parterre technique) compared to younger female seniors (11 throwing techniques and parterre technique). A higher index of efficiency of certain techniques in younger female seniors compared to younger male seniors does not mean that they were of better quality. On the contrary, it may indicate that for the younger female seniors were much easier to score throwing and winning techniques compared to the younger male seniors, who had to put in much more effort to overcome their opponent and come to victory. It is important that the number of female competitors

was lower than male competitors, which may also be one of the factors of a higher efficiency index compared to men. It is necessary to mention the fitness aspects of the respondents, which are certainly in favor of men compared to women.

The analysis of differences between men and women were the objective of research by many authors from different segments of Judo. A survey (Sterkowicz, 1999) of actions during Judo's combats from the 1996 Olympic Games provided key information on Judo, on gender differences from the highest level of competition. Women have used control interventions more, while men have used risky throwing more. The throwing techniques that men have used the most were: Seoi nage, Uchi mata, O uchi gari, Ko uchi gari, Ko soto gake, Kata guruma, O soto gari, while women have used the throwing techniques the most: Seoi nage, O uchi gari, Uchi mata, Harai goshi, Ko soto gake, Ko uchi gari.

Courel et al., (2014) were exploring the side of the guard and the throwing side on the success of attacks in elite judokas of both genders, in the final and semifinal combats at 12 IJF tournaments in all seven weight categories, found that the opposite guard (Kenka yotsu) guard was used mostly in both genders and all weight categories. However, from the aspect of efficiency, the technique of throwing from the same guard (Ai yotsu) was the most efficient guard. Also, the configuration of the guards of the same side from which the attack was placed increases the chance of winning the combat, especially in men, the closer they were getting to the end of the combat. Our opinion is that the reason for this constellation is the better physical readiness of men and that they tried to use their fitness capacities at the end of a match in the function of victory.

Ito et al., (2014) were analyzing the guard and efficiency of techniques after the change of rules in 2013, that resulted in higher efficiency compared to 2012. The efficiency index of certain throwing techniques was for: Ippon seoi nage 0.20, Seoi nage 0.21, Uchi mata 0.51, Ko uchi gari 0.03, O soto gari 0.15, De ashi barai 0.02, O uchi gari 0.21, Koshi guruma 0.03, Sumi gaeshi 0.21, Tani otoshi 0.09, Ura nage 0.04, Soto maki komi 0.09. Comparing the efficiency index of throwing techniques from The National Judo Championship of Bosnia and Herzegovina for younger male and female seniors with the efficiency index scored at the World Championship in 2013, it was noticed that the efficiency index was significantly higher compared to the World Championship. These indicators are logical because the difference in quality and quantity is large, the selected sample of competitors and therefore it is much more difficult to place throwing techniques at the World Cup, and the efficiency index was lower compared to the BiH National Championship.

Sertić and Segedi (2012) were analyzing the structure of significance of individual throwing techniques at juniors and seniors conducted by different experts in Judo from five different countries, and who juniors and seniors rated from 1 to 5. Juniors considered the most important techniques for them were: Ippon seoi nage, Seoi nage, O uchi gari, Uchi mata, Ko uchi gari, Harai goshi, O soto gari, while seniors consider that the most important techniques for them were: Ippon seoi nage, Seoi nage, Uchi mata, Ko uchi gari, Tai otoshi, O uchi gari, O soto gari, etc. It is obvious that both of these groups have a similar view on the techniques they applied in competitions as their special throwing techniques.

Tirp et al., (2014) were investigating the influence of throwing side preferences, in which the left side was dominated over the right side of the throwing from different levels of competition, found a relative influence of the left in relation to the right combating position between and within the competition. It is interesting to note that the competitors who were dominant in the left combating position in all three competitions took from 1 to 5 places, and most of the competitors from the left position were from the Olympic Games, and then at the German University Championship. We are of the opinion that competitors who are at the top level or strive to become so must have the ability to perform throwings to the left and right side more evenly in real conditions in competitions, and that competitors who are one-sided, ie. they perform throwing techniques only in one direction, handicapped in relation to competitors who are not.

This statement was confirmed by a study (Adam, Smaruj, and Laskowski, 2014) in which the technical-tactical profile of the vice Olympic champion was analyzed, and it was found that he performed throwing techniques to the left (50.55%) and right (49.45%). %) throwing side. The throwing techniques with which he won world titles were: Seoi nage, Uchi mata, O soto gari, Ko uchi gari, Morote gari, Tani otoshi. All these techniques are also used by seniors, however, for their successful application at higher levels of competition, it is necessary to develop other segments that can be of great help in the implementation of these techniques. The results of the analysis of the Italian national team championship for cadets in 2009 (Dalponte, Pierantozzi and Lubisco, 2011), in order to determine the differences between men and women, came to the data that most throwing techniques were performed on the right side, which indicated that the right guard had a dominant role at this level of competition. The most dominant throwing techniques in both groups were techniques from the group of sacrificed (Sutemi) throws, while foot (Ashi) are second in efficiency (M = 22.5%; F = 16.1%).

Kajmović, Rađo and Kapo (2005) when they were analyzing the differences at the regional, Balkan championship found out the differences between men and women in the parameters of situational efficiency and found that men dominated in techniques: Kata guruma, Uchi mata, Sukui nage, Ippon seoi nage, O soto gari, while in women the most effective throwing techniques were: Uchi mata, Seoi nage, Harai goshi, O uchi gari, Ippon seoi nage.

Witkowski, Maslinski and Kotwica (2012) by analyzing throwing techniques from the 2008 Beijing Olympics, found that the most effective throwing techniques for men are: Seoi nage, Kata guruma, Kutchiki taoshi, Uchi mata, Sumi gaeshi, Morote gari, Ko soto gake, O uchi gari. It is clear that despite the change in the rules, some throwing techniques have remained in use by competitors and it can be a guide to further improve the techniques in their application, but also to enable competitors to effectively cope with these techniques to defend. It was noticed that very little research in the field of guards and throwing techniques was conducted on women, and that is why we are of the opinion that special attention should be paid to this segment. Another important fact is that at the beginning of 2014 there was a new change in the rules by The International Judo Federation (IJF, 2014) and that the biggest changes occurred in the guard segment, which opens new spaces for research in this segment for both genders of different ages. and at all levels of competition. The results of research from different levels of competition in the segment of the most efficient throwing techniques and from The National Championship of Bosnia and Herzegovina show similarities, i.e. using almost the same throwing techniques.

CONCLUSION

In order to determine the efficiency index of certain throwing techniques that male and female seniors of U23 applied at The National Judo championship, different behaviors were observed between these two groups of respondents. What attracts special attention is that in younger male seniors the most successful technique was Kesa Gatame, and in younger female seniors the foot technique was O Soro Gari. What is important to emphasize is that this research was conducted at the competition from 2015, and that the rules of Judo have changed several times. Therefore, this kind of research in Judo can be done again with the same sample of respondents, but under the new rules of conducting combat with the scored points and the index of situational efficiency.

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Corresponding author:

Jasmin Drljević

High school of electrical engineering, Mostar, Bosnia and Herzegovina
e-mail: pachak1977@gmail.com

IMPACT OF THE SCHOOL BAG ON THE POSTURE OF PRIMARY SCHOOL CHILDREN

Luka Posavac, Ana Krajina, Vedrana Grbavac and Martina Rezić

ABSTRACT: An indispensable part of equipment of any pupil is a school bag. Many consider that school bags are too heavy and they contribute to bad posture, that is increasingly common problem in younger children. The most timely health problem correlated with the adverse impact of school bags is lower back pain. The question is how much school bag affects imbalanced spine function and occurrence of improper body posture in children of developmental age. In order to find satisfying answer extensive research was conducted to determine correlation between improper carrying of heavy bag and paramorphic changes in posture, address preventive measures and procedures to combat this mass phenomenon in young people, as well as to examine type of posture in children from the first to ninth grade. The research was conducted on 358 pupils of primary school and based on the obtained result we can conclude that as many as 43,3% of pupils from the first to the ninth grade have some kind of posture deformity. Results of the research show that there is statistically significant difference between all grades in the weight of the school bag ($F=38,65$; $p=0,00$). By analysing HI-square test, it was determined the occurrence of statistically significant ($p<0,05$) difference by type of posture except in the first, second and ninth grade where results showed no statistically significant differences by type of posture ($p>0,05$).

Keywords: posture, posture disturbances, heavy bag, growth and development

INTRODUCTION

An indispensable part of pupil's equipment is a school bag. Many, especially parents consider school bags too heavy, but still we have no answers regarding dangers of school bags for child's health. The problem of school bag becomes even more problem of family, school and society. This problem has to be solved as systematic, preventive and protective measures that obliged the joint activities of parents, educators and teachers in the school. Poor posture is increasing problem in young children. Collecting data on children's growth and development and on impact of different endogenous and exogenous factors on their body at different ages is very important to understand growth and development and especially for proper and timely selection of preventive measures in order to ensure proper child's growth and development.

The most timely health problem correlated with adverse affect of school bags is lower back pain. Pain can occur throughout musculoskeletal system. Furthermore, poor posture, fatigue, exhaustion and consequently poorer concentration in school and poorer school achievement. Most of the available literature recommends weights of school bags up to 15% of child's weight because this weight is not related with health problems in children. School bag is often considered as a big culprit responsible for imbalanced spine function and occurrence of improper body posture in children of developmental age.

It is worrying that when enrolling in the first grade around 20% of children already have poor posture problems and this percentage is increasing so after completing the primary school it is 40%.

To find satisfying answer and scientifically based explanation, extensive research was conducted to determine correlation between improper carrying of (too) heavy bag and paramorphic changes of posture. Also, the aim of this work is to address preventive measures and procedures in order to combat this mass phenomenon in young people. Also, we wanted to examine how many children from the first to the ninth grade have a postural deformity i.e. their type of posture.

METHODS

The research was conducted on the sample of 358 pupils of the primary school Osnovna škola Bijakovići, Međugorje.

The research included pupils from the first to the ninth grade. Testing was approved by parents, principle of the school and ministry of education, culture and sport via written confirmation.

Pupils were tested by the clinical Adam's forward bend test, and in addition to physical examination and evaluation instruments for measurements are used as scoliometer, scale and central tape.

During the research we used anthropological measurement methods and all obtained results were processed in Statistica programme and by calculating:

- Descriptive statistics: mean, minimal score, maximal score
- Parametric methods: ANOVA
- Non-parametric methods: HI-square test

RESULTS

Table 1. Number and percentage of respondents with the bag 15% heavier than body weight

PUPILS WITH THE BAG 15% HEAVIER		
GRADE	F	%
FIRST	3	3,4
SECOND	2	2,2
THIRD	10	11,2
FOURTH	17	19,1
FIFTH	14	15,7
SIXTH	16	18,0
SEVENTH	16	18,0
EIGHTH	11	12,4
NINTH	0	0,00
NOTE: F – number of respondents ; % - percentage		

Table 2. Difference between grades in bag weight

BAG WEIGHT					
GRADE	F	MEAN	MIN	MAX	ANOVA
1	49	2,9	2,5	4	F=38,65 p=0,00
2	39	2,8	2	3,5	
3	44	3,9	3,5	4,5	
4	37	5,0	4,0	7,0	
5	44	5,4	4,0	6,0	
6	34	6,7	5,0	8,0	
7	42	6,9	5,0	8,0	
8	36	6,8	5,0	7,5	
9	33	6,6	4,0	8,0	
NOTE: F – number of respondents ; MEAN – average value ; MIN – minimal score ; MAX – maximal score ; ANOVA – analysis of variance ; F – value of ANOVA test ; p – level of significance of error					

Table shows results of descriptive statistics and difference between grades in bag weight from the first to the ninth grade tested by the parametric

independent ANOVA test. Results show that there is statistically significant difference between all grades in school bag weight ($F=38,65$; $p=0,00$).

Table 3. Difference of respondents by type of posture

GRADE	NORMAL POSTURE	POSTURAL DEFORMITY	SCOLIOSIS	KYPHOSIS	FLAT BACK	COMBINATION KYPHOSIS/SCOLIOSIS	χ^2 (p)
FIRST	1	2	0	0	2	0	5,82 (0,32)
SECOND	2	0	0	0	0	0	8,08 (0,15)
THIRD	4	6	4	2	0	0	11,29 (0,04)
FOURTH	4	13	6	2	5	0	20,00 (0,00)
FIFTH	9	5	1	1	1	1	18,67 (0,00)
SIXTH	9	7	5	0	2	0	18,64 (0,00)
SEVENTH	10	6	4	2	0	0	20,93 (0,00)
EIGHTH	8	3	1	2	0	0	19,71 (0,00)
NINTH	0	0	0	0	0	0	
NOTE: χ^2 - HI-square test; p – level of significance of error							

The difference of respondents by type of body posture for each grade is calculated by HI-square test. Calculated χ^2 value and corresponding minimal error of statistical conclusion indicates that in each grade there are statistically significant ($p < 0,05$) differences by type of posture except in the first, second and ninth grade where results show no statistically significant differences by type of posture ($p > 0,05$).

DISCUSSION

The research conducted on 358 pupils of primary school from the first to the ninth grade indicates that each group of pupils i.e. each grade has pupils with improper posture (poor posture). Based on the research it can be concluded that as many as 43,3% of pupils from the first to the ninth grade has some form of posture deformity (kyphosis, scoliosis, lordosis, normal, chest deformity, flat back, flat back, chest deformity, normal, funnel-shaped chest, kyphosis etc).

Namely, according to the Croatian Health Statistics Yearbook for 2010, at the physical check-up for pupils for the year 2009/10, improper body posture was recorded in 20% of pupils of primary and 27% of pupils

of secondary school. More serious health problems and deformities as brachial plexus damage with clenched arm and breathing problems also can occur but still rarely. There is no scientific evidence on correlation between structural spine curvatures (scoliosis, kyphosis) with school bags.

But a recent study of American and New Zealand authors (Kistner and et.; Mackie HW and Legg) showed that bag weight should be limited to as much as 10% of child's weight because a weight of 15% or 20% compared to 10% increases chances of tilting head forward, subjective health disturbances of a child like fatigue, exhaustion and back pain and difficulties in walking and balance.

In some European countries, the law stipulates that weight of school bag must not exceed 10% of child's body weight (Fošnarič, 2007; Gent et al., 2006). Many researchers conducted worldwide indicate that school bag weights exceed allowed value and range from 10 to 14% (Whittfiel, 2001; Fošnarič, 2007). A recent studies in some Dalmatian primary schools in pupils of all grades showed that the average school bag weight

in relation to pupils' weight range from 12,5% to 13,8% (Paušić i Kujundžić, 2008).

According to children body weight curves in Croatia, children weight aged 6,5 years is on average 24 kilograms or 95% of pupils start the first grade of primary school with the body weight of 18 to 37 kilograms. If we take recommendation of 15% of a child's body weight than school bag of the pupil in the first grade on average should not be heavier than 3,6 kilograms (for 95% of pupils between 2,7 to 5,6 kilograms). More strict criteria (10%) that limits an average bag weight to 2,4 kilograms (for 95% of pupils between 1,8 and 3,7 kilograms). Question is whether is this criteria feasible since school bags are much heavier in reality (according to some measurements over 7 kilograms). Problem of heavy bags is noticed not just in our countries but also in other 115 countries. Interestingly, in Italy an average weight of school bags is measured at 8 kilograms a maximum of even more than 12 kilograms (Šimetin, I.P., 2012)

Problem of heavy bags is global problem recognised in many European and world countries. This is evidenced in many scientific researches conducted and published in this area. Furthermore, many countries have taken concrete actions within national strategic documents, for example: Ministry of Education of Malta adopted in 2000 document of strategic importance on fight against heavy school bags (Handling of Heavy school bags Report 2000) where they recommend the weight of school bag to be up to 10% of pupils' body weight and not more than 20% and they give recommendation to achieve this goal. In Hong Kong national guidelines are given to reduce school bags weight. The Central Bureau of Education in India adopted guidelines to reduce school bag weight. Although these countries are culturally and geographically very different, it is surprising how much problems are similar and some solutions and recommendations have universal value. Kosinac many times has examined school bag weights of the pupils in primary school in Split (1976,1989,1996). In 1976 author has determined on the sample of 24 pupils of the first, second, third and fourth grade of the primary schools in Split the following: an average school bag weight in the first grade was 2,4 kg, in the second grade 2,8kg, in the third grade 3,5kg and in the fourth grade 3,9kg. Ten years after (in 1986) an average school bag weight increased for the first grade to 2,7kg, for the second grade to 3,2kg, for the third grade to 4,1kg and for the fourth grade to 4,9 kg. Comparative analysis of the school bag content and official weekly schedule on the date of inspection the author has determined: pupils of the first grade had in the bag 32% of didactic material (textbooks, notebooks, maps, drawing supplies etc) that were not predicted by the schedule for that day. In the second grade there were 37% of unnecessary didactic material, 39% in the third and 35% in the fourth grade.

The obtained indicators in this preliminary research were a justified determinant for one comprehensive research conducted in 1996 in Split in the primary school Dobri (Kosinac, 2004).

Researches on human posture has led us to conclusion that there is no universal model of good posture. However, we can make effort to give the best definition of good posture where the good posture is the one where the body makes least effort to maintain stable balance. In younger children poor posture is becoming more pronounced. Collecting data on children growth and development and on impacts of different endogenous and exogenous factors on their body at different ages is important to understand growth and development and especially for proper and timely selection of preventive measures to ensure proper growth and development of a child.

In this research it was found that an average school bag weight in pupils of primary school from the first to the ninth grade is 12,3% of the average pupil's body weight.

To find satisfying answer and scientifically based explanation of the problem, we conducted extensive research to determine correlation between improper carrying of (too) heavy school bag and paramorphic posture changes. The most of available literature recommends school bag weight up to 10%-15% of a child's body weight because this weight is not related to health disturbances in child.

Problem of heavy school bags is a global problem recognized in many European and world countries. This is evidenced by large number of scientific researches conducted and published in this area. Heavy school bag creates health problems in proper development (mostly posture problems that lead to spinal deformities). Throughout this research it can be concluded that as many as 43,3% of pupils from the first to the ninth grade have some kind of posture deformities, and school bag weight in primary school pupils from the first to the ninth grade is 12,3% of the average pupils' body weight.

With special proposals and measures school can contribute to reducing pupils' bags in terms of adjusting schedules, setting up lockers for unnecessary things etc. In addition to this, additional education of teachers, pupils and parents about harmfulness of school bag to health is necessary. Producers of school bags should take care of this and contribute to the solution through propaganda and educational activities. Short instructions and demos on proper carrying of the school bag would be useful for children, parents and teachers and very concrete and instructive contribution in protection of child's spine.

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Corresponding author:

Luka Posavac
 The Faculty of Science and Education, University of Mostar
 e-mail: luka.posavac@fpmoz.sum.ba

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