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COLLEGE STUDENTS' AND GRADUATES' ADHERENCE TO REGULAR EXERCISE - PRELIMINARY DATA

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ABSTRACT. Sport participation is a main pursuit for health prevention programs and research. As such, it is imperative to understand how and under what conditions youth engagement in physical exercise promotes or interferes with development and ageing. A common theme emerging from a variety of theoretical approaches to the problem of exercise adherence concerns the role of individuals' reasons for exercising (participation motives) and the value of social support for athletes in individual sports or in team sports. This research compared social support and motivation of persons who regularly engage in various forms of physical exercise and sport with those of a group of martial arts practitioners. Participants were college students or graduates. We examined the types of social support that may act as predictors for exercise adherence and the motivation in the domains of exercise and sport. In general, the results did not differ significantly between martial arts and other sports participants. The highest rated motives for sport/exercise participation were strength and endurance, enjoyment, challenge, appearance and health-related motives (positive health). Women rated weight management and appearance higher than did men, and men reported higher levels of motivation than did women for strength, endurance and enjoyment. The most important resources of support were peer (friends and colleagues) support and parental support (father's role was more important). In combination, the perspectives and findings provided in these articles can help guide future research and the development of programs and interventions.

Keywords: Physical activity; Martial arts; Youth; Social support; Motivation.

REZUMAT. Aderarea studenților și absolvenților la practica exercițiilor fizice regulate - date preelminare. Practicarea și cercetarea sportului este o preocuparea majoră în vederea păstrării sănătății. De aceea este absolut necesar să înțelegem, cum și în ce condiții sunt implicați tinerii în promovarea exercițiului fizic și cum interferează exercițiul fizic cu dezvoltarea și îmbătrânirea. Există o varietate de abordări teoretice cu privire la motivele unei persoane de a efectua exerciții fizice și suportul social pentru practicarea sporturilor individuale sau de echipă. Această cercetare a comparat suportul social și motivațiile personale ale unui grup angajat în mod regulat în practicarea diferitelor forme de exercițiu fizic, cu cele ale unui grup de practicanți de arte marțiale. Participanții au fost studenți și absolvenți de instituții superioare. Am examinat tipurile de suport social care acționează ca predictorii pentru

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practicarea sportului și motivațiile în domeniul exercițiului și sportului. În general rezultatele nu diferă semnificativ între participanții la artele marțiale și cei ai altor sporturi. Cele mai multe motive pentru a practica sportul au fost date de dorința de dezvoltare a forței și rezistenței, provocările, bucuria de a face mișcare, aspectul fizic și sănătatea. Sexul feminin a motivat practicarea exercițiului fizic ca mijloc de a controla greutatea, în timp ce cel masculin este mai interesat de dezvoltarea forței, rezistenței și a stării de bine. Cele mai importante resurse de suport în practicarea exercițiului fizic sunt date de sprijinul reciproc (prietenii și colegii), precum și suportul familie (în special rolul tatălui fiind cel mai important). În asociere, rezultatele și perspectivele prezentate în acest articol pot fi un ghid pentru viitoarele cercetări în vederea dezvoltării de programe și intervenții.

Cuvinte cheie: activitate fizică; arte marțiale; tineret; suport social; motivație.

Introduction

Sport is a cultural part in the majority of nations, nowadays. Sport is considered as a social suitable and desirable pursuit. In spite of its benefits, the successful implementation of sports programs aimed at gender equity still encounters challenges and obstacles. Although sport promotes gender equity, in all countries, girls and women are less likely than boys and men to participate in sport (Larkin, Razack & Moole, 2007). Sport, physical activity, has important health benefits, improves quality of life, lowers risk of disease and involves numerous psychological and social benefits (WHO, 1995). Physical activity is one of the three primary factors that influence individual and population risks of chronic disease (WHO, 2005).

Evidence indicates that the level of physical activity decreases from school to college. About 65% of high school students involve in regular vigorous activity and only 38% of college students participate in regular moderate activity (Douglas et. al., 1997; Grunbaum et al., 2002). More than that, almost half of college students report a decrease in exercising following graduation (Calfas et. al, 1994).

Thus, for an efficient development and implementation of physical activity interventions, programs, we need to understand the underlying variables. Most interventions, unfortunately, focus excessively on exercise and fail to appraise the aspects as motivation, self efficacy, factors of personality etc.

Motivation is a controversial point in research. One explanation is that many studies have limits in measuring motivation; usual scales are rather narrow in their coverage of possible motives for physical activity (Kilpatrick et al., 2005).

One measurement tool that proves to be more efficient is Exercise Motivation Inventory -2 (EMI-2). It includes 51 items and 14 factors that represent a wide range of motivations for engaging in physical activity, such as: stress management, revitalization, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, nimbleness (Kilpatrick et al., 2005; Markland & Ingledew, 1997).

An important part of the scientific sport literature examines children's participation in sport (less the adults') because children participate more frequently and persevering in regular physical activity.

Regarding adults participation in regular physical activity, Crone-Grant and Smith (1999) suggest that adults exercise for a sense of achievement, skill development and to spend enjoyable time on themselves away from daily responsibilities. Other benefits may be social support network created and general health benefits of being active.

Allender, Cowburn and Foster (2006) show that the enjoyment and social network created are important motivators for people aged between 18 and 50 years.

Brasile and Hedrick (1991) also mention the group interactions, affiliation and mutual respect, as primary factors for regular activity.

Smith (1998) shows differences in exercisers groups, for intense physical activity, motivation is often associated to competition and winning and for moderate physical activity people are more motivated by health benefits.

Another factor associated with sport participation is social support. Social support may take a variety of forms: informational (e.g. discussing physical activity), emotional (e.g. encouragements) and instrumental (e.g. practicing together, equipment, transportation) (Taylor et al., 1994; Sallis et al., 1992).

The main sources of social support are family, friends, colleagues, coach.

Family support. Most research examined parent modeling of physical activity, which seems to be related to adolescent physical activity participation (Anderssen & Wold, 1992). In general, more active parents tend to have more active children (pre-adolescents and adolescents) (Moore et al., 1991; Sallis et al., 1988).

Parental support is defined as parents' behaviors perceived by their children as facilitating athletic participation and performance (Leff & Hoyle, 1995). Parents tend to assume roles of motivators, facilitator, even coach in the life of the young athlete (Hoyle & Leff, 1997).

Parental involvement begins with socializing a child to play sports and entails time, energy and money parents invest in child's sport participation (Weiss & Hayashi, 1995; Enyon, Kitchen & Semotiuk, 1980; Spreitzer & Snyder, 1976; Snyder & Spreitzer, 1973).

Evidence suggests that parental support is associated with greater enjoyment of sport, more positive appraisal of performance outcomes and more positive appraisals of self-worth (Leff & Hoyle, 1995; Scanlan & Lewthwaite, 1986; Smith, Zingale & Coleman, 1978; Felker, 1968; Coopersmith, 1967).

Peers and coach support. Peers are likely to be an important source of social support for practicing sport activities, serving a number of functions: social integration or companionship, emotional support, informational support, instrumental support. Peers also provide esteem support, which may influence performance of desired behavior and help to overcome perceived barriers (Duncan et. al, 2002; Duncan & McAuley, 1993; Zakarian et al., 1994).

Martin and Mushett (1996) demonstrate that the support received from others reduces the negative effects of stress.

Friends' and colleagues' support tends to be associated with emotional aspects of practicing sport, such as enjoyment, self-worth enhancement and achievement recognition (Duncan, 1993; Scalan et al., 1989).

Data from the investigations suggest an important tie between friendship and physical activity involvement (Smith, 1999; Weiss, Smith & Theeboom, 1996; Duncan, 1993; Zarbatany, Ghesquiere & Mohr, 1992; Bigelow, Lewko & Salhani, 1989).

In college group, considerateness and helping were most preferred to be received from the others (Smith, 1999).

Regarding coach's support, one study demonstrates that if the coach instills the belief that ability can improve, this is associated with an increase in intrinsic motivation. This could result in better performance from the trainee (Moreno et al., 2010).

Smoll & Smith (1989) suggest that coaching effectiveness is mediated by athletes' perception and recall. Athletes, who feel compatible with their coach, tend to feel more support by him/her and evaluate him/her communication ability more favorably. If the athletes' psychological features (personality, goals, beliefs etc.) are consistent with those of their coach, the interaction of the individuals will likely be satisfactory to both parties, producing positive results (Kenow & Williams, 1999).

Given the positive outcomes social support can exert, it should serve as a mean for responding to the psychological needs of injured athletes and for reducing consequences of other stressors (Gould, Udry, Bridges & Beck, 1997; Hardy & Grace, 1993; Hardy, Richman & Rosenfeld, 1991; Ganster & Victor, 1988; Wiese & Weiss, 1987).

In this study, our primary purpose was to investigate motivational factors and social support sources associated with young college people's adherence for exercise; the secondary purpose was to identify the impact of gender on motivation for exercise and sport participation. The third purpose was to see how motivation differed between martial arts and other sports practitioners.

We believe that data from this kind of projects is useful to individuals who design, implement and evaluate physical activity programs to improve the health of college students and graduates populations.

The current study, as said before, aimed to investigate two major factors: motivation and social support. We chose young population, college students or graduates, because many studies had focused on children and scholars (as a group, they have a greater adherence to regular exercise programs), and after examining existing data, we wanted to see whether motivational and social patterns are similar in young college population.

We chose people who practice regularly, because we were interested in the factors that facilitate exercise and sport participation and not barriers that prevent young people from becoming involved in sport and physical activity.

We achieved to collect only the first part of the data, the results will be completely processed by the end of the year.

We used terms as “physical activity”, “sport”, “exercise” meaning “a broad category of bodily movement produced by skeletal muscle that results in energy and expenditure, involving extension of sufficient intensity, duration and frequency to maintain fitness or other athletic objectives, governed by formal and informal rules that involve competition against an opponent or oneself” (Kilpatrick et al., 2005; Lumpkin, 1998).

Method

Participants

The participants in this study were adult college students or graduates (N=51), aged from 19 to 37 years (M = 23.71), 37.3 % women and 62.7 % men.

92% had urban residence and 8% rural residence. 47.1% practice martial arts regularly and 52.9% other sports (running, stretching, swimming, soccer, volley ball, basket ball, tennis etc.).

Procedure

We collected data during one (class or training) meeting, with the permission of college or sport club administration (having a written agreement). We informed the respondents that participation was voluntary and that responses would be confidential. We instructed them to respond honestly and one of the authors was always available to answer questions associated with the questionnaire during its administration. We conducted data analyses using the Statistical Package for the Social Sciences.

Measurement

Participants completed a *General Sport Questionnaire*, which provided descriptive information's regarding their physical activity behavior, including indicators measuring frequency, duration, intensity and adherence.

The questionnaire also included items focused on sport motivation, adapted by *The Exercise Motivations Inventory - 2*, (Markland & Ingledew, 1997) and items regarding the relation with colleagues and coach, adapted by *Individual and Team Character in Sport Questionnaire* (Davidson, Khmelkov & Moran-Miller, 2006) and items assessing social support adapted by *Social Support and Exercise Survey* (Sallis et al., 1987).

Measurements of internal consistency indicated that our approach of the items did not affect factorial validity. We found that alpha values for the motivation scale ($\alpha = 0.93$) and for the team items ($\alpha = 0.79$) met accepted criteria.

Results and Discussion

Data regarding *motivation for physical activity* revealed that the most prevalent motives for all participants were: strength and endurance, enjoyment, challenge, appearance, positive health.

Descriptive data of physical activity participation revealed gender differences. Men reported higher levels of motivation than did woman for strength and endurance and enjoyment, while women rated appearance and weight management higher than did men (fig. 1, fig. 2).

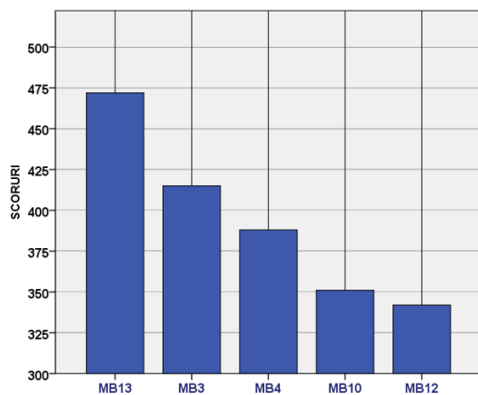


Fig. 1. Men’s motives for sport/ physical activity

MB 13 = strength and endurance
 MB 3 = enjoyment
 MB 4 = challenge
 MB 10 = positive health
 MB 12 = appearance

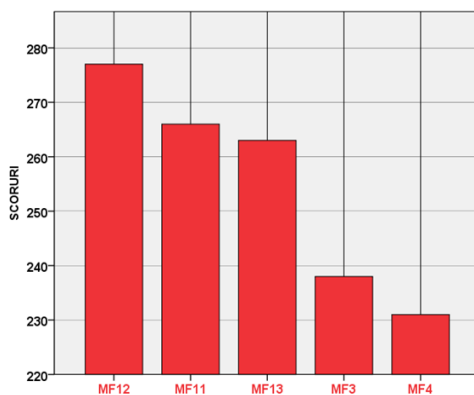


Fig. 2. Women’s motive for sport/ physical activity

MF 12 = appearance
 MF 11 = weight management
 MF 13 = strength and endurance
 MF 3 = enjoyment
 MF 4 = challenge

The differences between martial arts and other sports practitioners were insignificant, both types of athletes were motivated to exercise and participate in sport for gaining and keeping strength and endurance.

The results are similar with other studies, Kilpatrick, Herbert & Bartholomew (2005) assessed the motivation for physical activity and sport in a sample of active college students, and concluded that men rated higher challenge, competition, social recognition and strength and endurance, and women were most concerned by weight management.

Another study, that explored college student’s possible motivation for engaging in physical activity, identified five main motivations: health benefit, body image, self-efficacy, social interaction and enjoyment (Yu, 2007).

The current study revealed multiple sources of **social support** including: parents, siblings, friends, colleagues and coach.

To the item “Exercised with me”, the participants reported: *colleagues* (27,5 %), *friends* (23,5%) and *siblings* (21,6%), “Reminded me to exercise” - the higher scores were *father* (21, 6%), *friends* (15,7%), *siblings* (11,8%) and *colleagues* (9,8%)

The item "(Encouraged me/Gave me encouragement to stick with my exercise program)" was answered: *father* (17,6%), *friends* (19, 6%), *coach* (11,8%) and *mother* (9,8%).

Friends (41,2%), *siblings* (11,8%), *colleagues* (9,8%) and *father* (9,8%) had also a role in informational support ("Discussed with me about exercise").

Lack of social support was associated in a small range with *mother*, *friend/lover* and *brother*.

Data suggest that the source of support most highly related to physical activity was the peer group (friends and colleagues), but family (especially father) still plays an important role at this age. Colleagues and father are more frequently associated with support, while mother and friends sometimes support the young athlete, other times do not.

Sallis et al. (2002) also found that peer support influenced youth vigorous physical activity.

Father seems to play a more important role in comparison to mothers, but other studies showed that mothers play an equal, if not more important, role in the psychological and behavioral development of young athletes, in sports as soccer, wrestling and figure skating. On the other hand, fathers are more likely to initiate their child's involvement in sport and they provide evaluative feedback regarding exercise (Cumming & Ewing, 2002). Also, in all cultures sport is often associated with masculinity, and men are more likely to participate in sport than women.

The participants' answers regarding social support were similar for both martial arts and other sports practitioners.

The items about sports coach and team support, revealed youths perceived direct support for physical activity from sports colleagues and coach. The items that explored the coach and training colleagues attitudes and behaviors were rated higher for positive aspects and lower for negative aspects; meaning that items as "Colleagues work together for developing new skills", "Colleagues encourage each other, even to those who have a lower performance", "Colleagues trust each other" reported higher scores and items as "Colleagues use fights, insults or threats to resolve conflicts among them", "Colleagues get mad at those who make mistakes during training sessions or games", "Colleagues gossip about one another" reported the lower scores.

The items about sports coach's behavior showed a positive perception about the relation with the coach. "The coach encouraged me for giving my best effort (during training and competition)", "The coach talked to us about moral values (respect, responsibility and fair play)", "The coach explained the reason for a training rule or for an individual/team punishment" were given the highest scores.

These preliminary findings suggest that for young college and graduates athletes, the level of aggressiveness is very low among training mates; and coach and colleagues are a very important source of social support.

We found no significant differences between sports practitioners; perhaps higher level of education and precisely settled exercise goals are important variables that impact on the relation between practitioners/ team mates.

Conclusion

The value of various forms of social support and motivation for the promotion and accomplishment of regular physical activity training has been emphasized in research and intervention programs. The present research was conducted to investigate the relation between different types of regular exercise and these variables.

Data revealed that main sources for social support are: peer group, family and sports coach. Colleagues and father are more frequently associated with support, while mother and friends sometimes support the young athlete, other times do not. Mothers are more often associated with emotional support (Cumming & Ewing, 2002).

Regular exercisers attached more importance to strength and endurance, enjoyment, challenge, appearance and positive health, as main motives for physical activity. Men reported higher levels of motivation for strength and endurance and enjoyment, while women were more concerned about maintaining an appropriate body shape.

Comparisons between martial art and other sports practitioners did not reveal significant differences.

These findings support the importance of relationship between social or team factors and regular exercise. Participation in sport is mostly motivated by strength and endurance, enjoyment, appearance and weight management.

This study highlights the importance of proximal social networks on youth activity and the main motives for regular exercise which should be considered when developing policies and programs looking to promote physical activity among young adult people.

This study has several limitations, including the size sample and the fact that participants were college student or graduate regular exercisers, so the conclusions are most applicable to them. Some of the reported elements would be closely related to this specific population, so generalization is left to the reader. In addition, information about motivation and social support that appear to affect sport participation cannot provide us with cause-effect relationships.

To determine the true effect of each source of social support and of every type of motivation, further research is required - that utilizes more in-depth and specific items and Romanian versions of reliable tools to assess physical activity influencing factors.

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THE INFLUENCE OF HEMP OIL DIETARY SUPPLEMENTATION ON AEROBIC CAPACITY IN RATS

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ABSTRACT. Background. Hemp seed oil obtained by cold pressing is a source of polyunsaturated fatty acids omega 3 and omega 6 required for a normal diet. **Aims.** The study investigated the effects of dietary supplementation with hemp seed oil on aerobic effort capacity in experimental conditions. **Materials and methods.** The research was conducted in six groups (n = 10 animals / group) of male Wistar adult rats. The groups I-III comprised rats trained to exercise with different intensity, IV-VI groups included rats trained with different intensity of effort and supplemented with hemp oil. In all groups aerobic exercise capacity was determined daily for 27 days using the swimming test. **Results.** Compared with control groups (I,II and III) we found significant increases of the aerobic capacity in groups supplemented with oil (IV,V and VI) throughout the study. The maximum increase of aerobic capacity was in the group with 10% loading and oil supplementation compared with the groups with 15% and 20% loading with or without oil supplementation. **Conclusions.** Our study shows a favorable effect of polyunsaturated fatty acids on aerobic capacity.

Key words: rats, polyunsaturated fatty acids, exercise, aerobic capacity.

REZUMAT. Influența acizilor grași polinesaturați asupra capacității aerobe de efort la șobolani. Premize. Uleiul din semințe de cânepă obținut prin presare la rece constituie o sursă de acizi grași polinesaturați omega 3 și omega 6, necesari unei diete normale. **Obiective.** S-a urmărit experimental efectul suplimentării cu ulei din semințe de cânepă, bogat în acizi grași polinesaturați, asupra capacității aerobe de efort. **Material și metode.** Cercetările s-au efectuat pe șase loturi (n=10 animale/lot) de șobolani masculi, adulți, rasa Wistar. Loturile I-III au cuprins șobolani martori antrenați la efort cu intensitate diferită, loturile IV-VI au cuprins șobolani antrenați la efort cu intensitate diferită și suplimentați cu ulei de cânepă. La toate loturile s-a determinat capacitatea aerobă de efort zilnic, pe baza probei de înot, timp de 27 de zile. **Rezultate.** Comparativ cu loturile martor (I, II și III), la loturile suplimentate cu ulei (IV, V și VI) se constată creșteri semnificative ale capacității aerobe de efort pe toată durata studiată. Creșterea capacității aerobe de efort este maximă în cazul efortului cu încărcare de 10 % și suplimentare cu ulei, față de loturile cu încărcare de 15 % și 20 % cu și fără suplimentare. **Concluzii.** Studiul nostru demonstrează efectul favorabil al acizilor grași polinesaturați asupra capacității aerobe de efort.

Cuvinte cheie: șobolani, acizi grași polinesaturați, efort fizic, capacitate aerobă.

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Background

Adequate diet in terms of quantity and quality and exercise are part of a healthy lifestyle. A bad diet often contains large amounts of unsaturated fatty acids, animal fat, cholesterol and insufficient quantities of essential polyunsaturated fatty acids (PUFA) omega 3 and omega 6. Omega 3 family includes α linoleic acid (LNA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). In some plants omega 3 fatty acids (FA) exist as α linolenic acid. Omega-6 family includes linolenic acid, cis-linoleic acid and gamma- linoleic acid (GLA).

Today it is known that PUFA are formed from saturated precursors in fruits and seeds and marine animals. The oxidative degradation of fatty acid β -oxidation produces a large amount of energy (Neamțu 1997).

PUFA can be specifically enzymatic oxidized resulting prostaglandins and related derivatives and nonspecific oxidized (lipid peroxidation) resulting degradation products that determine damaging effect - lipid peroxides, which disrupt metabolic processes. In the somatic muscles at rest 20% of energy is provided by FA. During effort, according to the intensity, consumption reaches 25% in moderate effort, 50% in long-term effort and 80-90% in intense effort, when glycogen stores are exhausted (Weineck 1995).

A study on the antioxidant action of vegetable oils obtained by cold pressing notes that hemp oil and pumpkin seed oil have a high antioxidant capacity and anti-radical power (Siger A. et al. 2008).

Aims

The study investigates the effect of dietary supplementation with PUFA on aerobic exercise capacity in trained rats during exercise.

Materials and methods

The study is a prospective longitudinal study of experimental type, performed on animals. The research was conducted at the Department of Physiology and Pharmacy "Iuliu Hațieganu", Cluj-Napoca, in the Laboratory of Experimental Physiology, on six groups (n = 10 animals / group) of male rats, adult Wistar with the average weight of 200 - 300 g.

PUFA supplementation was made by oropharyngeal gavage using hemp seed oil in amounts of 0.1 ml per rat, dose calculated in relation to oil ratio recommended to human daily intake. The hemp oil product used, called Canah Hemp Oil, is manufactured by SC Canah International LLC and has the following characteristics of 14 g per serving: energy value: 126 Kcal/14g and chemical composition: 1.4 g saturated AG, PUFA 12.5 g of which 1.7 g oleic acid, linoleic acid 7.7 g, acid gamma-linolenic acid a, 5 g, α linoleic acid 2.5 g, 0.1 g stearidonic acid, vitamin E 1.35 mg (13.5% RDA).

a) Groups

The six groups were divided as follows: groups I – III were control groups and comprised rats trained with different loading and no supplementation and groups IV – VI comprised rats trained with different loading and supplementation with hemp seed oil.

b) Aerobic exercise capacity

Aerobic exercise capacity was determined by the swimming test in thermostatic water at 20-22 ° C, daily for 27 days. Indicator of aerobic capacity was the elapsed time in seconds since the introduction of animals into the pool until exhausted. The animals were trained daily for 27 days. The intensity of effort was modified by loading animals as follows: group I and IV by 10% by weight, group II and V by 15% by weight, group III and VI with 20% weight.

c) Statistical analysis

Statistical calculations were performed with Microsoft Excel and SPSS 13.0 (demo versions). Moments chosen for analysis were day1 (Z1), day 9 (Z9), day 18 (Z18) and day 27 (Z27). The statistical study developed in this article is based on analysis of variance ANOVA namely the analysis post hoc multiple comparison test (Scheffe) aiming at bilateral p value threshold of significance alpha set at 0.05.

Results

Comparative statistical analysis of aerobic capacity values in studied groups is presented in Tables 1-4.

Table 1. Comparison of swimming time on day 1 of study between groups I – VI

Group A-Group B DAY 1	GROUP A		GROUP B		P
	Mean	Standard Deviation	Mean	Standard Deviation	
Group I-Group II	324.78	49.48	294.06	36.001	0.8
Group I-Group III	324.78	49.48	231.72	28.86	0.001
Group I-Group IV	324.78	49.48	346.32	36.82	0.9
Group I-Group V	324.78	49.48	291.42	53.47	0.7
Group I-Group VI	324.78	49.48	329.88	44.54	1
Group II-Group III	294.06	36.001	231.72	28.86	0.07
Group II-Group IV	294.06	36.001	346.32	36.82	0.2
Group II-Group V	294.06	36.001	291.42	53.47	1
Group II-Group VI	294.06	36.001	329.88	44.54	0.6
Group III-Group IV	231.72	28.86	346.32	36.82	0.000
Group III-Group V	231.72	28.86	291.42	53.47	0.09
Group III-Group VI	231.72	28.86	329.88	44.54	0.000
Group IV-Group V	346.32	36.82	291.42	53.47	0.2
Group IV-Group VI	346.32	36.82	329.88	44.54	0.98
Group V-Group VI	291.42	53.47	329.88	44.54	0.5

On the first day of analysis, the difference between group I and group IV ($p = 0.9$) is not statistically significant. Statistically significant differences are obtained between: group I and group III (lower exercise capacity in rats with higher loads), group III and group IV (greater aerobic capacity in the group loaded with 10% than at 20% load), group III and group VI (greater aerobic capacity in the group loaded with 20% and supplemented with oil than loaded with 20% and not supplemented) (Table 1).

Table 2. Comparison of swimming time on day 9 of study between groups I – VI

Group A-Group B DAY 9	GROUP A		GROUP B		P
	Mean	Standard Deviation	Mean	Standard Deviation	
Group I-Group II	405.18	44.60	396.24	22.71	0.997
Group I-Group III	405.18	44.60	316.44	9.2	0.000
Group I-Group IV	405.18	44.60	459.54	37.7	0.04
Group I-Group V	405.18	44.60	388.2	40.41	0.94
Group I-Group VI	405.18	44.60	435.54	37.25	0.6
Group II-Group III	396.24	22.71	316.44	9.2	0.000
Group II-Group IV	396.24	22.71	459.54	37.7	0.009
Group II-Group V	396.24	22.71	388.2	40.41	0.998
Group II-Group VI	396.24	22.71	435.54	37.25	0.27
Group III-Group IV	316.44	9.2	459.54	37.7	0.000
Group III-Group V	316.44	9.2	388.2	40.41	0.002
Group III-Group VI	316.44	9.2	435.54	37.25	0.000
Group IV-Group V	459.54	37.7	388.2	40.41	0.002
Group IV-Group VI	459.54	37.7	435.54	37.25	0.781
Group V-Group VI	388.2	40.41	435.54	37.25	0.107

On day 9 analysis shows that oil administration increases exercise capacity in group IV to group I. Among group III and all groups who receive oil is a significant increase in exercise capacity. Between group IV and group V exercise capacity is higher in group IV (Table 2)

On day 18 analysis shows that oil administration increases exercise capacity in group IV compared to group I. In group II exercise capacity is higher than in group III. In group II exercise capacity is lower than group IV. Between group II and group V there is no statistically significant differences. In group III exercise capacity is lower compared to group VI. Between group III and all groups who receive oil is a significant increase in exercise capacity. Between group IV and Group V exercise capacity is higher in group IV (Table 3).

Table 3. Comparison of swimming time on day 18 of study between groups I - VI

Group A-Group B DAY 18	GROUP A		GROUP B		P
	Mean	Standard Deviation	Mean	Standard Deviation	
Group I-Group II	451.38	48.86	493.68	35.92	0.36
Group I-Group III	451.38	48.86	424.32	21.91	0.806
Group I-Group IV	451.38	48.86	620.52	29.59	0.000
Group I- Group V	451.38	48.86	534.66	53.28	0.002
Group I-Group VI	451.38	48.86	574.02	41.58	0.000
Group II-Group III	493.68	35.92	424.32	21.91	0.018
Group II-Group IV	493.68	35.92	620.52	29.59	0.000
Group II-Group V	493.68	35.92	534.66	53.28	0.399
Group II-Group VI	493.68	35.92	574.02	41.58	0.003
Group III-Group IV	424.32	21.91	620.52	29.59	0.000
Group III-Group V	424.32	21.91	534.66	53.28	0.000
Group III-Group VI	424.32	21.91	574.02	41.58	0.000
Group IV-Group V	620.52	29.59	534.66	53.28	0.001
Group IV-Group VI	620.52	29.59	574.02	41.58	0.257
Group V-Group VI	534.66	53.28	574.02	41.58	0.446

Table 4. Comparison of swimming time on day 27 of study between groups I - VI

Group A-Group B DAY 27	GROUP A		GROUP B		P
	Mean	Standard Deviation	Mean	Standard Deviation	
Group I-Group II	530.93	52.80	540.3	29.17	0.988
Group I-Group III	530.93	52.80	515.4	50.43	0.981
Group I-Group IV	530.93	52.80	835.86	40.85	0.000
Group I- Group V	530.93	52.80	770.34	41.77	0.000
Group I-Group VI	530.93	52.80	747.78	22.90	0.000
Group II-Group III	515.4	50.43	515.4	50.43	0.869
Group II-Group IV	515.4	50.43	835.86	40.85	0.000
Group II-Group V	515.4	50.43	770.34	41.77	0.000
Group II-Group VI	515.4	50.43	747.78	22.90	0.000
Group III-Group IV	515.4	50.43	835.86	40.85	0.000
Group III-Group V	515.4	50.43	770.34	41.77	0.000
Group III-Group VI	515.4	50.43	747.78	22.90	0.000
Group IV-Group V	835.86	40.85	835.86	40.85	0.039
Group IV-Group VI	835.86	40.85	770.34	41.77	0.001
Group V-Group VI	835.86	40.85	770.34	41.77	0.910

On day 27 analysis shows that oil administration increased exercise capacity in group IV compared to group I. In group II exercise capacity is lower compared to group IV. In group II exercise capacity is lower than group V. Group II exercise capacity is lower than in group VI. In group III exercise capacity is lower compared to group VI. Between group III and all groups who receive oil is a significant increase in exercise capacity. In group IV exercise capacity is higher than in group V. In group IV exercise capacity is higher than in group VI (Table 4).

Discussion

Hemp seed oil, less used in food consumption is high in unsaturated fats such as essential fatty acids. Essential fatty acids linoleic (omega 6) and linolenic (omega 3) are PUFA that can not be synthesized by the body but are found in most plants, vegetable and fish oils. The two classes of PUFA are widespread in nature: the animal bodies predominate class $n = 6$, instead $n = 3$ class of PUFA is found mainly in plants and in phospholipids of marine origin. Fatty acids occur in the body as precursors in the synthesis of prostaglandins, prostacyclin, thromboxane, lipoxinelor, leukotrienes and related compounds - substances eicosanoids (Barrett et al. 2010). PUFA have many functions: they are components of the structure of membranes which act as cellular messengers (Olinescu 1994), they have role in regulating cardiovascular, reproductive, immune, nervous system activity and behavior. The importance attributed to PUFA led them to be included on the list of vitamins (vitamin F).

The ratio of essential fatty acids omega 3/omega 6 is estimated at around 30/1 (Lieberman and Brüning 2005). Current diet does not provide the necessary essential fatty acids at ratio of 2/1 or 1/1, which requires supplementation for prevention of chronic diseases: cardiovascular, diabetes, arthritis, cancer, allergies, skin diseases, immunological disorders, nerve disorders. Although essential, fatty acids have no determined daily doses and symptoms of deficiency. Lieberman and Brüning (2005) recommended daily dose of 3 g of omega 3 and 0.24 g omega 6.

Supplements of fatty acids include vitamin E to prevent their oxidation in the body. The presence of vitamin E in hemp seed oil is important for it has antioxidant capacity: it is the main non-enzymatic lipid-soluble antioxidant in cell membranes that: converts O_2^- , OH and lipoperoxide radicals in forms less reactive; interrupts lipid peroxidation, is a regenerator for vitamin C, reduces the synthesis of xanthine oxidase (generator of O_2^- radicals), is protective for Se and it is used as SeGSH-Px, is effective in stabilizing against PUFA autooxidation.

Vitamin E is a universal stabilizer of cell membranes, which are subject to oxidative attack. It is located in the hydrophobic layer of membranes as a complex of phospholipids with PUFA (Tache 2001). Depending on the concentration and the environment, vitamin E can act as antioxidant or prooxidant (Tache 2006).

Our results show a favorable effect on aerobic capacity obtained by dietary supplementation with hemp oil, and effect might be due to: the presence of vitamin E in its composition and its antioxidant role, the use of PUFA energy production, the increased content of omega-6 and the optimal ratio omega 3/omega6 of 3/1 in the preparation use.

Compared with control groups (I, II and III), in groups supplemented with oil (IV, V and VI) we found significant increases in aerobic capacity throughout the study. In literature we found few studies in the field. Our results are in disagreement with data of other authors (Ayre, Huffman) who studied the effect of PUFA supplementation and compared omega 3 and omega 6. The negative effect was assigned to omega 3 fatty acid.

Conclusions

1. Training with or without hemp oil increases aerobic capacity.
2. The increase of aerobic capacity produced by exercise is influenced by the intensity of effort as follows: increasing the intensity of effort reduces the aerobic capacity.
3. The increase of aerobic capacity is maximum when the loading was 10% and oil supplementation compared to groups with load of 15% and 20% with or without oil supplementation.

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AUTOMATED SUPERVISION METHOD OF THE TRAINING LOAD

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ABSTRACT. Introduction: The automated supervision of the training load implies the use of software in taking decisions regarding the optimum training load for each step of the training cycle. Coaches and athletes could equally benefit from using this type of method in their preparation process. **Materials and methods:** A model based on Petri Nets was developed in order to supervise training. The model corresponds to a one week training cycle (six training sessions, one training session per day). After the first session, the athletes are evaluated with the Rating of Perceived Exertion (RPE) method. Next morning, they assess themselves for overtraining with the Anderson questionnaire. Based on these two parameters and on the performed training session's level, a decision is made regarding the next workout. **Results:** The developed model was implemented and the resulting application was called SUPERTRAIN. Coaches and athletes can use it by introducing the number of points resulted after the overtraining evaluation, the number of arbitrary units resulted after the session-RPE evaluation, and the previous training load level. The output of the application is the level of the training load for the next workout. **Conclusions:** In the future, the training process could be improved by the use of automated tools such as SUPERTRAIN. The result is expected to be an enhancement in the athletic performance.

Keywords: *training load, automated supervision, Petri Nets, model.*

REZUMAT. Metodă automată de supervizare a încărcăturii în antrenamentul sportiv. Introducere: Supervizarea automată a încărcăturii în antrenamentul sportiv implică utilizarea de software în luarea deciziilor referitoare la încărcătura optimă corespunzătoare fiecărui pas al unui ciclul de antrenament. Antrenorii și sportivii ar putea beneficia în mod egal de pe urma folosirii acestei metode în procesul lor de pregătire sportivă. **Materiale și metode:** A fost dezvoltat un model bazat pe rețele Petri pentru supervizarea antrenamentului sportiv. Modelul corespunde unui ciclu de antrenament cu durata de o săptămână (șase ședințe de antrenament, un antrenament pe zi). După primul antrenament, sportivii sunt evaluați cu metoda RPE (Rating of Perceived Exertion). A doua zi, ei se autoevaluează pentru supra-antrenament folosind chestionarul lui Anderson. Pe baza acestor doi parametri și a nivelului încărcăturii în antrenamentul deja efectuat, se ia o decizie referitoare la nivelul încărcăturii antrenamentului viitor. **Rezultate:** Modelul dezvoltat a fost implementat și aplicația rezultată a fost numită SUPERTRAIN. Antrenorii și sportivii o pot folosi introducând numărul de puncte rezultate în urma evaluării pentru supra-antrenament, numărul de unități arbitrare rezultate în urma evaluării cu metoda RPE și nivelul încărcăturii în antrenamentului precedent. Rezultatul dat de aplicație este nivelul încărcăturii pentru

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antrenamentul următor. **Concluzii:** În viitor, procesul de pregătire sportivă va putea fi îmbunătățit cu ajutorul unor unelte automate de tipul aplicației SUPERTRAIN. Rezultatul așteptat este îmbunătățirea performanței sportive.

Cuvinte cheie: încărcătură de antrenament, supervizare automată, rețele Petri, model.

Introduction

Athletic preparation has become a highly demanding process over the last decades for both athletes and coaches. Finding the right balance between training and recovery is the key to a successful preparation process, which leads, most of the times, to an enhancement in performance.

Avoiding overtraining, while increasing the training load, is one of the biggest challenges that coaches face today. Overtraining is a condition which occurs in athletes when they are subject to training volumes higher than the optimum (Kentta & Hassmen, 1998). Once the athlete's exercise tolerance is exceeded, the risk of injury increases. In order to lower the occurrence of injuries and maximize performance, coaches have to find the perfect equilibrium between training loads, competition stress and recovery (Barnett, 2006).

Monitoring training load has been proved to be beneficial for coaches and athletes (Coutts, Wallace & Slattery, 2004). The recorded training load data can provide useful information regarding the effectiveness of different training methods. It can also be used to implement the appropriate training loads in future workouts. The final purpose of monitoring training is to give coaches the knowledge which will allow them to determine the best training methods for each athlete (Coutts, Wallace & Slattery, 2004).

The supervision of training enables coaches to intervene and operate changes throughout the development of the training process. Acting immediately instead of waiting the end of a training cycle to do so is expected to affect in a positive way the athletic performance.

Objectives

The purpose of this study is to develop, implement and test a new automated method for the supervision of training loads. Both coaches and athletes could benefit from using this tool by making the right decisions regarding the load of each training session, thus helping to prevent injuries and illness.

Materials and methods

Rating of Perceived Exertion (RPE) evaluation method

One of the methods widely used to determine exercise intensity is Rating of Perceived Exertion (RPE). Originally, the RPE scale was developed by Borg (Borg, 1998) to reflect the level of strain experienced during physical effort. Nowadays, a modified

version of the Borg RPE scale (Figure 1) is being used as a standard method to evaluate perceived exertion in training and rehabilitation (Day, McGuigan, Brice & Foster, 2004).

The session-RPE method is a simple to implement, easy to understand and non-invasive method of monitoring training (Coutts, 2001). Scientific evidence proves that the session-RPE method can be compared favorably with more complex methods of quantifying training loads in the case of team sports (Impellizzeri et al., 2004), resistance training (Sweet, Foster, McGuigan & Brice, 2004) and endurance sports (Foster et al., 2001). Based on this evidence, it can be concluded that session-RPE is, in most sports, a valid and reliable method for monitoring training.

Rating	Descriptor
0	Rest
1	Very, Very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
8	-
9	-
10	Maximal

Fig. 1. Modified Rating of Perceived Exertion (RPE) Scale (Foster et al., 2001)

To calculate the intensity of a training session using the session-RPE method, athletes are required to answer a simple question like “How was your workout?” in a 30-minutes time interval after finishing their workout. The magnitude of training load for each session is determined by the following equation:

$$\text{Training load} = \text{session RPE} \times \text{session duration (minutes)} \quad (1)$$

where the session RPE is a number from 0 to 10 according to the Modified Rating of Perceived Exertion Scale described in Figure 1. Training load is measured in arbitrary units (AU).

Overtraining evaluation method

Overtraining is a condition caused by several factors like inappropriate use of training methods, bad lifestyle habits, stressful environment and health status. The assessment of overtraining is usually done by questionnaires ever since the Profile of

Mood States (POMS) method was popularized in the area of sport and exercise by Morgan and Pollock (Morgan & Pollock, 1977). POMS contains 65 questions and uses six mood states: tension, depression, anger, vigor, fatigue and confusion.

A shorter questionnaire is used by Anderson (Anderson, 2002) to monitor the status of his athletes. They assess themselves each morning by rating the following six statements:

- I slept well last night.
- I am looking forward to today's workout.
- I am optimistic about my future performance.
- I feel vigorous and energetic.
- My appetite is great.
- I have little muscle soreness.

The scale used to rate each statement is:

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly agree

If the score is equal to 20 or above then athletes may continue their training program. If the score is lower than 20 then they should consider rest or an easy workout until they recover enough.

Petri Nets based model

A model based on Petri Nets was developed in order to supervise training. Petri Nets combine the representation based on a bipartite graph with a well defined mathematical theory, being a powerful tool suitable to describe the behavior of asynchronous, distributed, concurrent, possible undeterministic systems.

The model presented in Figure 2 corresponds to a one week training cycle (six training sessions, one training session per day). After the first session, the athletes are evaluated with the session-RPE method. Next morning, they assess themselves with the Anderson questionnaire. Based on these two parameters and on the performed training session's level, a decision is made regarding the next workout. There are 8 training levels defined by distinct intervals of arbitrary units (AU). Level 1 corresponds to Rest and Level 8 corresponds to the most intense workout level (> 900 AU). Four overtraining evaluation intervals were defined based on the Anderson questionnaire's score as follows: Interval I (< 15 points), Interval II (15-19 points), Interval III (20-24 points) and Interval IV (≥ 25 points).

AUTOMATED SUPERVISION METHOD OF THE TRAINING LOAD

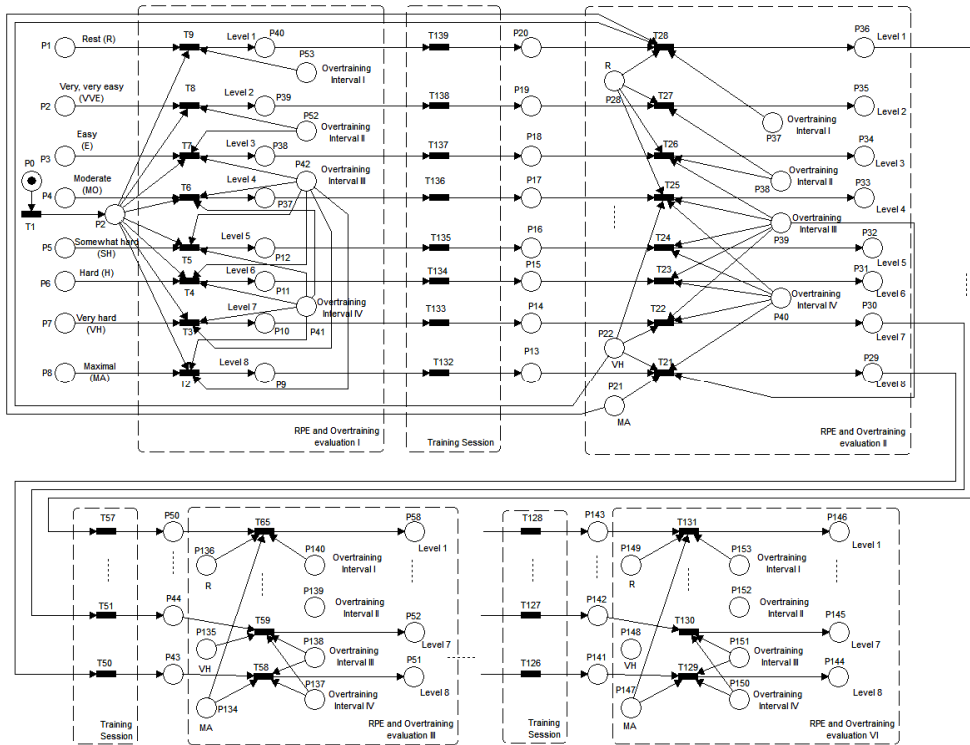


Fig. 2. The Petri Nets based model for the supervision of the training load



Fig. 3. The Graphical User Interface of the implemented supervision system

The developed Petri Net consists of places (i.e. conditions, represented by circles), transitions (i.e. events that may occur, represented by bars) and arcs. Places $P_1 \dots P_8, P_{21} \dots P_{28}, P_{43} \dots P_{50}$ and $P_{147} \dots P_{150}$ correspond to the ratings of the session-RPE evaluation performed immediately after the training sessions. $P_9 \dots P_{12}, P_{37} \dots P_{40}, P_{29} \dots P_{36}, P_{51} \dots P_{58}$ and $P_{144} \dots P_{146}$ correspond to the different levels of training. $P_{41}, P_{42}, P_{52}, P_{53}, P_{37} \dots P_{40}, P_{137} \dots P_{140}$ and $P_{150} \dots P_{153}$ represent the four intervals of the overtraining evaluation. $T_2 \dots T_9, T_{21} \dots T_{28}, T_{58} \dots T_{65}$ and $T_{129} \dots T_{131}$ represent the evaluation actions performed after each training session. $T_1, T_{132} \dots T_{139}, T_{150} \dots T_{157}$ and $T_{126} \dots T_{128}$ represent the training sessions corresponding to each training level.

Results

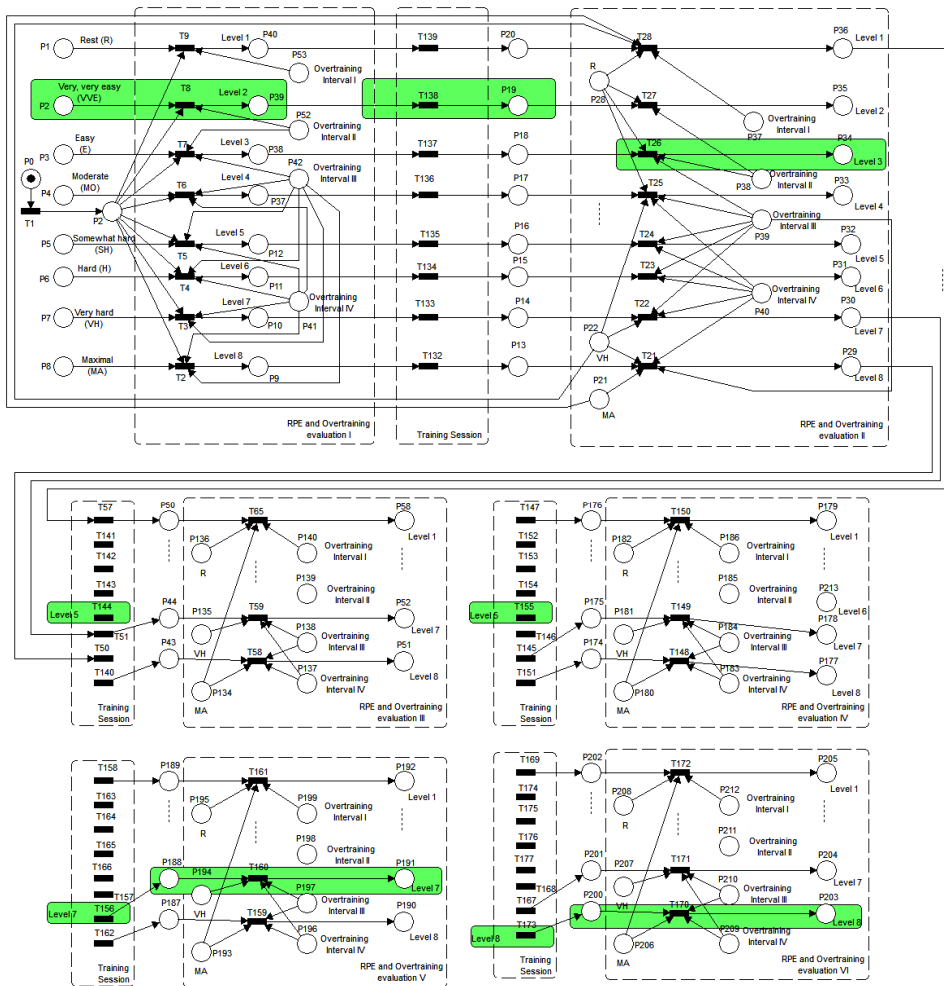


Fig. 4. Example of a training path followed by a body fitness athlete over a training cycle

The developed model was implemented and the resulting application was called SUPERTRAIN. The Graphical User Interface of SUPERTRAIN is depicted in Figure 3. Coaches and athletes can use it by introducing the number of points resulted after the overtraining evaluation, the number of arbitrary units resulted after the session-RPE evaluation, and the previous training load level. Pressing the "Calculate" button will generate the level of training load at which athletes should perform the next workout.

An example of a training path followed over a one week training cycle by a body fitness athlete is presented in Figure 4. After the first evaluation session, the result is Level 2. The next workouts are performed at Level 3, Level 5, Level 5, Level 7 and Level 8, respectively.

Conclusions

Monitoring training helps prevent injuries and illness in athletes. Training supervision is the next logical step in improving athletic preparation.

Automated tools such as SUPERTRAIN could represent the future of the training process. In a world where reaching peak performances is the ultimate goal, the help of an automated system which takes objective decisions on a daily basis regarding the optimal workout load might make all the difference.

Acknowledgments

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ASPECTS ON TRAUMA INCIDENCE IN COMPETITIVE SPORTSMEN – TRAUMA DISTRIBUTION BY AGE, TIME SPENT IN SPORTS PRACTISING, HEIGHT, WEIGHT, B.M.I

MIRCIOAGĂ ELENA DOINA¹

ABSTRACT. The starting point of the present study is the premise that the high trauma incidence among the studied competitive sportsmen is caused by factors that can be controlled at least partially through primary prevention methods. **Objective:** The objective of this study is to reduce the number of traumas in the studied sportsmen through the identification of risk factors and the introduction of prevention exercises and stretching techniques exercises in the training programme, both during warm-up and in post-effort rehabilitation, in order to prevent injuries and increase performance. **Material and methods:** The study was performed on a batch of 155 sportsmen. The sportsmen were between 13 and 42 years old and had been practising sports for 4-20 years. The incidence, frequency and location of specific traumas, the causes favouring traumas and the prevention and rehabilitation methods were determined. The sportsmen were closely monitored during the study that covered three years of competitions: August 2006 – July 2009. **Results and discussions:** **The average weight** of the basketball players is much higher than that of the others sportsmen. The difference in weight is given by the particularities of basketball (basketball players are tall and heavy). **BMI**, has optimal values and there are no major differences among the sportsmen. **The maximum number** of traumas per sportsman on the same body segment is **significantly higher in handball players** than in other sportsmen. **The total number** of traumas per sportsman on all body segments is significantly higher in **handball players** than in athletes, basketball, football and volleyball players.

Key words: sportsmen, traumas, numerical parameters (age, time spent in sports practising, height, weight, BMI).

REZUMAT. Aspecte privind incidența traumatismelor în sportul de performanță, rapoarte la: vârstă, vechime în sport, talie, greutate, IMC. Studiul pleacă de la premisa că, incidența crescută a traumatismelor în rândul sportivilor de performanță investigați, se datorează unor factori ce pot fi măcar în parte contracarați prin intermediul profilaxiei primare. **Scop.** Reducerea numărului de traumatisme la sportivii cuprinși în studiu, prin identificarea factorilor de risc și introducerea în procesul de pregătire, a unor programe de exerciții profilactice și a tehnicilor de stretching, atât în încălzire cât și în refacerea postefort, în scopul prevenirii și a creșterii performanței sportive. **Material și metodă:** Studiul a cuprins un lot de 155 sportivi cu vârste cuprinse între 13-42 de ani și o vechime în sport cuprinsă în intervalul 4-20 ani. S-a urmărit incidența, frecvența și localizarea traumatismelor specifice, cauzele ce favorizează producerea de traumatisme și intervenția noastră cu metode de prevenție și recuperare. Studiul s-a derulat pe o

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perioadă de 3 ani competiționali când s-a reușit urmărirea îndeaproape a sportivilor respectiv: august 2006 – iulie 2009. **Rezultate: Media greutateii** sportivilor baschetbaliști este semnificativ crescută, față de media greutateii celorlalți sportivi. Această diferență este dată de particularitățile sportului respectiv (în baschet sportivii au talie înaltă și greutate mare). **I.M.C.**, se încadrează în condiții optime și nu sunt diferențe semnificative între ramurile sportive. **Numărul maxim** de traumatisme înregistrate de un sportiv pe același segment este **semnificativ crescut la handbaliști** față de celelalte ramuri sportive. **Numărul total** de traumatisme înregistrate de un sportiv la toate segmente este semnificativ crescut **la handbaliști** față de celelalte ramuri sportive.

***Cuvinte cheie:** sportivi, traumatisme, parametrii numerici (vârsta, vechime în sport, talie, greutatea, IMC).*

Introduction

The overtraining imposed by competitiveness and the imbalance between the mechanic overstress and the functional resistance of the tissues are the causes of the high incidence of joint trauma in the studied sports.

Material and methods

Research methods: scientific documentation, observation, experiments, conversations, questionnaires, MRI, CT, statistic and graphic methods. (Baciu C.; Iconia Borza, Faur Cosmin, Niculescu Bogdan, Mitrulescu Catalin, 2009; Pasztai Zoltan, 2001; Poenaru D, Petru L. Matusz, 1994; Rinderu ET, Ilinca I, Rusu L, Kesse AM., 2004).

The study was performed on a batch of 155 sportsmen (52 (33.5%) female and 103 (66.5%) male) who practised athletics, basketball, handball, football and volleyball in Leagues A1 and A2, in Timisoara and Lugoj. The sportsmen were between 13 and 42 years old and had been practising sports for 4-20 years. The incidence, frequency and location of specific traumas, the causes favouring traumas and the prevention and rehabilitation methods were determined.

The sportsmen were closely monitored during the study that covered three years of competitions: August 2006 – July 2009.

❖ The mean, the standard deviation and the standard error of the mean were calculated for all numerical parameters (age, time spent in sport practising, height, weight, BMI), the maximum number of traumas per body segment and total number of traumas per sportsman in the studied period.

❖ All injured segments (N = 11) were compared against the total number of traumas per sportsmen, age groups and time spent in sport practising, in order to reveal the age groups and longevity groups with the highest trauma incidence and the most frequently affected segments in the two periods (before and after starting the prevention exercises programme).

The statistical processing included

The comparison of the average values: the “t” (Student) test was used for pairs of independent batches and a significance (risk) level of 0.05 (5%); the “F” test was used to compare more than two batches (the ANOVA model); - regression and statistic correlation: linear regression and the Pearson coefficient; - the Z test. (Baron T., Anghelache C-tin, Titan E., 1995; Gagea, A., 1996; Gagea, A. 1999).

Results

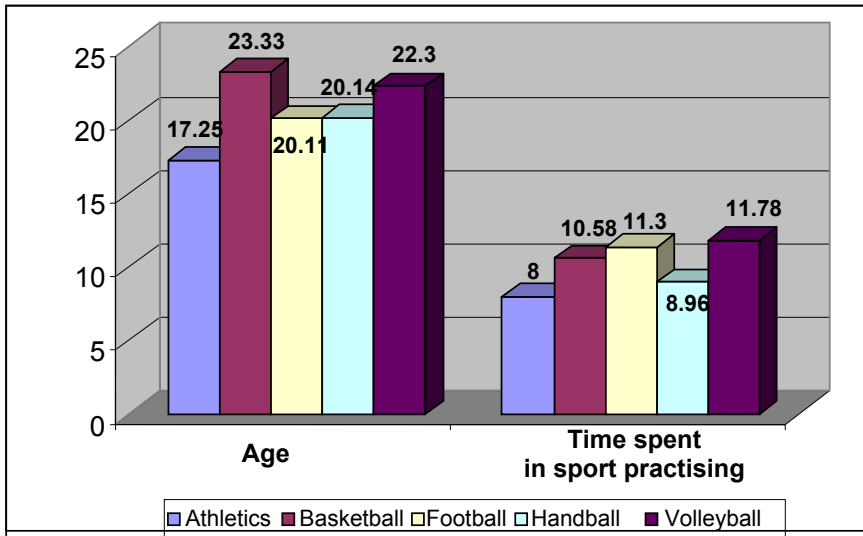
The mean, the standard deviation and the standard error of the mean were calculated for all numerical parameters (age, time spent in sport practising, height, weight, BMI, maximum number of traumas per body segment and total number of traumas per sportsman in the studied period.

Table 1. The mean, the standard deviation and the standard error of the mean were calculated for all numerical parameters (age, time spent in sport practising, height, weight, BMI, maximum number of traumas per body segment and total number of traumas per sportsman in the studied period.

Studied parameter	Sport	N	Mean	Standard deviation	Standard error	95% mean confidence interval		Min.	Max.
						Lower limit	Upper limit		
AGE	Athletics	12	17.25	1.49	0.43	16.31	18.19	16	21
	Basketball	48	23.33	3.19	0.46	22.41	24.26	19	32
	Football	27	20.11	3.55	0.68	18.71	21.51	13	26
	Handball	28	20.14	4.19	0.79	18.52	21.77	15	29
	Volleyball	40	22.30	4.72	0.75	20.79	23.81	18	42
TIME SPENT IN SPORTS PRACTISING	Athletics	12	8.00	2.52	0.73	6.40	9.60	4	11
	Basketball	48	10.58	2.66	0.38	9.81	11.35	6	16
	Football	27	11.30	3.54	0.68	9.90	12.70	4	17
	Handball	28	8.96	2.93	0.55	7.83	10.10	4	16
	Volleyball	40	11.78	3.98	0.63	10.50	13.05	6	28
HEIGHT	Athletics	12	179.42	4.21	1.22	176.74	182.09	174	187
	Basketball	48	189.64	12.94	1.87	185.88	193.39	163	211
	Football	27	182.15	8.52	1.64	178.78	185.52	165	196
	Handball	28	182.43	7.25	1.37	179.62	185.24	171	201
	Volleyball	40	180.73	8.82	1.39	177.91	183.54	162	198
WEIGHT	Athletics	12	71.75	5.19	1.50	68.45	75.05	65	80
	Basketball	48	83.28	17.03	2.46	78.34	88.23	55	122
	Football	27	74.81	7.88	1.52	71.70	77.93	60	87
	Handball	28	78.07	8.04	1.52	74.95	81.19	65	97
	Volleyball	40	73.70	13.28	2.10	69.45	77.95	55	105

Studied parameter	Sport	N	Mean	Standard deviation	Standard error	95% mean confidence interval		Min.	Max.
						Lower limit	Upper limit		
BMI	Athletics	12	22.26	0.69	0.20	21.82	22.70	21.22	23.29
	Basketball	48	22.92	2.47	0.36	22.20	23.64	17.80	28.75
	Football	27	22.48	0.74	0.14	22.19	22.78	20.62	23.94
	Handball	28	23.39	0.91	0.17	23.04	23.74	21.31	25.25
	Volleyball	40	22.38	2.25	0.36	21.66	23.11	18.71	27.06
Maximum number of traumas of the same body segment/sports man	Athletics	12	1.42	0.52	0.15	1.09	1.74	1	2
	Basketball	48	1.42	0.54	0.08	1.26	1.57	1	3
	Football	27	1.15	0.36	0.07	1.00	1.29	1	2
	Handball	28	2.11	1.32	0.25	1.60	2.62	1	5
	Volleyball	40	1.63	0.71	0.11	1.40	1.85	1	4
Total number of traumas of all body segments/sport sman	Athletics	12	4.33	1.07	0.31	3.65	5.02	3	6
	Basketball	48	2.73	1.11	0.16	2.41	3.05	1	6
	Football	27	2.07	0.39	0.07	1.92	2.23	1	3
	Handball	28	4.07	2.29	0.43	3.18	4.96	1	9
	Volleyball	40	3.28	1.24	0.20	2.88	3.67	1	7

Distribution of average values by age, time spent in sports practising, height, weight, traumas of the same body segment and total number of traumas; comparative view per sports



Graphic 1. Distribution of average values by age and time spent in sports practising; comparative view per sports

Discussions

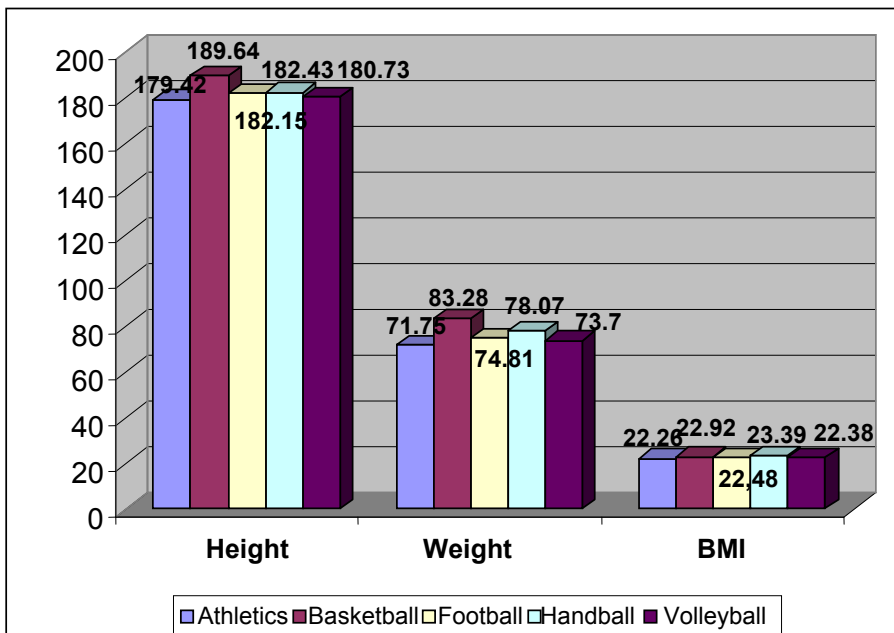
The following conclusions have been drawn:

The average age of athletes is significantly lower than that of basketball ($p = 0.006$; $\alpha = 0.01$) players.

The average age of handball players is significantly lower than that of basketball and football players ($p = 0.006$; $\alpha = 0.01$).

The time spent in sport practising is much shorter for athletes than for football players ($p = 0.039$; $\alpha = 0$).

The time spent in sport practising is much shorter for handball players than for volleyball ($p = 0.006$; $\alpha = 0.01$) and basketball players.



Graphic 2. Distribution of average values by height, weight and BMI; comparative view per sports

Height: on average, basketball players are significantly taller than handball and football players ($p = 0.024$; $\alpha = 0.05$).

Height: on average, basketball players are significantly taller than volleyball players ($p < 0.001$; $\alpha = 0.001$).

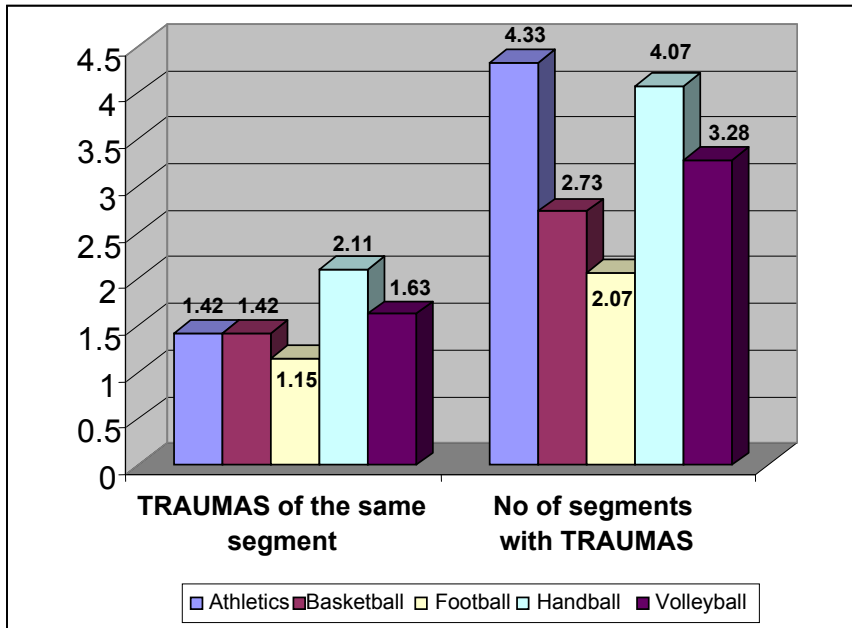
Height: on average, basketball players are significantly taller than athletes ($p < 0,001$; $\alpha = 0.001$).

The average weight of the basketball players is much higher than that of volleyball players ($p = 0.006$; $\alpha = 0.01$).

The average weight of the basketball players is much higher than that of athletes ($p = 0.006$; $\alpha = 0.01$)

The average weight of the basketball players is much higher than that of football players ($p = 0.006$; $\alpha = 0.01$)

The Body Mass Index, BMI, has optimal values (table 58, graphic 61) and there are no major differences among sportsmen.



Graphic 3. Distribution of average values by the maximum number of traumas per sportsman per the same segment and the total number of traumas per sportsman per all segments – comparative view per sport

The following conclusions have been drawn:

The maximum number of traumas per sportsman **on the same body segment** is significantly higher in handball players than in athletes, basketball, football and volleyball players ($p = 0.002$; $\alpha = 0.01$).

The total number of traumas per sportsman **on all body segments** is significantly higher in athletes than in football players ($p < 0.001$; $\alpha = 0.001$).

The total number of traumas per sportsman **on all body segments** is significantly higher in handball players than in basketball players ($p = 0.001$; $\alpha = 0.01$).

The total number of traumas per sportsman **on all body segments** is significantly higher in handball players than in football players ($p = 0.001$; $\alpha = 0.01$).

The total number of traumas per sportsman on all body segments is higher, though not significantly higher, in handball players than in volleyball ($p = 0.184$; $\alpha = 0.01$).

Table 2. The ANOVA test was applied to determine the differences among the five sports.

		Sum of Squares	df	Mean Square	F	Sig.
AGE	Between Groups	507.066	4	126.766	8.757	<0.001 ^s
	Within Groups	2171.412	150	14.476		
	Total	2678.477	154			
TIME SPENT IN SPORT PRACTISING	Between Groups	223.435	4	55.859	5.312	<0.001 ^s
	Within Groups	1577.236	150	10.515		
	Total	1800.671	154			
HEIGHT	Between Groups	2366.642	4	591.660	6.161	<0.001 ^s
	Within Groups	14404.026	150	96.027		
	Total	16770.668	154			
WEIGHT	Between Groups	2782.466	4	695.616	4.317	0.002 ^s
	Within Groups	24171.034	150	161.140		
	Total	26953.500	154			
BMI	Between Groups	23.102	4	5.775	1.643	0.166 ^{ns}
	Within Groups	527.396	150	3.516		
	Total	550.498	154			
Maximum number of traumas of the same segment per sportsman	Between Groups	14.343	4	3.586	6.251	<0.001 ^s
	Within Groups	86.044	150	.574		
	Total	100.387	154			
Total number of traumas of all segments per sportsman	Between Groups	80.841	4	20.210	10.991	<0.001 ^s
	Within Groups	275.830	150	1.839		
	Total	356.671	154			

Table 3.

Variable to compare	Compared sports		p value and significance
AGE	Athletics	Football	0.318 ^{ns}
	Basketball	Handball	0.006 ^s
		Volleyball	1.000 ^{ns}
	Handball	Volleyball	0.228 ^{ns}
TIME SPENT IN SPORT PRACTISING	Athletics	Football	0.039 ^s
	Basketball	Handball	0.374 ^{ns}
		Volleyball	0.881 ^{ns}
	Handball	Volleyball	0.006 ^s
HEIGHT	Athletics	Football	1.000 ^{ns}
	Basketball	Handball	0.024 ^s
		Volleyball	<0.001 ^s
	Handball	Volleyball	1.000 ^{ns}

Variable to compare	Compared sports		p value and significance
WEIGHT	Athletics	Football	1.000 ^{ns}
	Basketball	Handball	0.864 ^{ns}
		Volleyball	0.006^s
	Handball	Volleyball	1.000 ^{ns}
BMI	Athletics	Football	1.000 ^{ns}
	Basketball	Handball	1.000 ^{ns}
		Volleyball	1.000 ^{ns}
	Handball	Volleyball	0.308 ^{ns}
Maximum number of traumas of the same segment per sportsman	Athletics	Football	1.000 ^{ns}
	Basketball	Handball	0.002^s
		Volleyball	1.000 ^{ns}
	Handball	Volleyball	0.107 ^{ns}
Total number of traumas of all segments per sportsman	Athletics	Football	<0.001^s
	Basketball	Handball	0.001^s
		Volleyball	0.620 ^{ns}
	Handball	Volleyball	0.184 ^{ns}

Discussions

The following conclusions have been drawn:

The average age of handball players is significantly lower than that of basketball players ($p = 0.006$; $\alpha = 0.01$).

The time spent in sport practising is much shorter for athletes than for football players ($p = 0.039$; $\alpha = 0.05$).

The time spent in sport practising is much shorter for handball players than for volleyball players ($p = 0.006$; $\alpha = 0.01$).

Height: on average, basketball players are significantly taller than handball players ($p = 0.024$; $\alpha = 0.05$).

Height: on average, basketball players are significantly taller than volleyball players ($p < 0.001$; $\alpha = 0.001$).

The average weight of the basketball players is much higher than that of volleyball players ($p = 0.006$; $\alpha = 0.01$).

The maximum number of traumas per sportsman **on the same body segment** is significantly higher in handball players than in athletes, basketball, football and volleyball players ($p = 0.002$; $\alpha = 0.01$).

The total number of traumas per sportsman **on all body segments** is significantly higher in athletes than in football players ($p < 0.001$; $\alpha = 0.001$).

The total number of traumas per sportsman on all body segments is significantly higher in **handball players than in basketball players** ($p = 0.001$; $\alpha = 0.01$).

The total number of traumas per sportsman on all body segments is significantly higher in **handball players than in football players** ($p = 0.001$; $\alpha = 0.01$).

Conclusions

The utility, necessity and beneficial effects of the prevention exercises included in the training programme have been proved.

The early use of MRI, CT and ultrasound have helped us choose the best prevention and fast rehabilitation methods.

In order to avoid accidents and meet the requirements of daily training, the following factors must be taken into consideration: prevention exercises, diet, rest and proper warm-up.

In sports, accidents have multiple causes. Their analysis should be performed in relation to the specific psychomotric features of each sport.

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THE NEW MUTATIONS OF THE FOOTBALL GAME AFTER THE WORLD CUP 2010

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ABSTRACT. The „Professional most important mutation of the Football Game, at the 2010 World Cup, has been the practical demonstration of Spain, winning the 2010 World Cup (after winning in the same manner, the Europe Cup 2008), is that: 1. „There is not anymore, a playing system (4-4-2, 4-3-3, etc.). There are formations of a new dynamics movement of the players, in three combinations: 1. Individual; 2. Small groups 2-3-4-5 players and 3. big groups (lines, sides, parts) of the team’s players”; 2. The Winner is the master of Management of Mental & Physical Concentration & Relaxation, called „the art of playing in three zones of the field: (1. Activ zone; 2. Intermediary zone and 3. Far away-zone); 3. The new playing concept is a composition of the following factors: 1. The Football is international in content of performance; 2. Football is national in its form of manifestation, a national style and 3. Football is individual, in his practical implementation.

Key words: *3-dimensional system, playing in 3 zones; FIFA-Changing the Laws of the Game*

Introduction

The World Cup 2010, every 4 years – organizing the World Cups, establishes „the new world football order”, with direct implementation of the new orientation of the scientific, technical and business goals, objectives & programs for the next 2014, 2018 & 2022 World Cups.

Study’s Objectives

1. To verify the development of „the so-called-playing-system”, research started from the period of 1978-2010 World Cups;

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2. To identify the most significant and important factors, „the winning formula of world football champions - the new concept of world champion”?

3. To convince the members of the „World Coaches Associations without Frontiers”, to learn together from the world best open football coaches 30 days course, studying the official competitions of the world cups!

Material and methods

Subjects

32 National Football Associations, with 22 players= 704 football players;
32 national Teams with average of 10 staff members (minimum) = 320-400 staff
30-40 referees

Methodology of study

1. Using the 3 dimensional Football System”, for analysis of:
 - First round qualifications: 8 groups of 4 teams=32 teams = $8 \times 3 = 24$ games;
 - 16th round; 8 round;-Semi-finals; - Finals;
2. We identify through game’s profiles analysis:
 - Evaluation of the profile (using 10 factors-profile for first round, 30 factors-profile for the, quarter finals and semi-finals and finals);
 - Diagnosis in 3-parts: the Qualities, Weaknesses & Later-Unprepared Capacities
 - Plan-programming the results for the next official game;
3. Learning and perfecting to identify the most significant factors of „Winning vs. losing official games’ formula, using a computer program;

Results

1. „General Consideration, from the World Cup 2010”

1. The President of FIFA, declared that the World Cup 2010, has been the most successful World Cup from the history of the tournament:

1.1. Financially: with a special bonus for all 208 national FA (250. 000 dollars, for education and youth development, etc.), as a postulate;

1.2. Educationally: World Cup has been an education and cultural, friendship and sport competition for all participants, as well as for the millions of spectators from all over the world;

1.3. Motivationally: Million of youth, national FA, Clubs, supporters where automatically invited, motivated and encouraged to get into this elite football world.

2. There is the need of revitalizing the structure of the world cup formula, being the most significant interest, motivation, education, football becoming the no. 1 sport for all countries around the world (FIFA- 208 National Football Association, selecting only passing from 16, to 24 and 32 was a good idea, which now become obsolete. So, we are considering that from 208, we can invite the 208 to fight for a world cup divided in three events of value, as following:

- 2.1. *Elite Events*: 16 National Teams;
- 2.2. *Second Teams Value Event*: 24 teams
- 2.3. *Third Teams Event*: 32 National teams

3. Minimum two-month preparation time prior to the world cup (every 4 years):

- 3.1. *April 1-14*: vacation and medical treatment
- 3.2. *April 15-30*: general preparation
- 3.3. *May: 1-14*: special preparation
- 3.4. *May 15-31*: pre-competition games
- 3.5. *June 1-14*: final preparation, adjusting to the conditions of the World Cup.

4. In order to make the professional progress for the National FA, National Teams, Clubs and Academies for performance, there is a need of:

- 4.1. *Concept of performance*:
 - 4.1.1. *Concept of playing System*: in Attack, Defence & Set Plays;
 - 4.1.2. *Concept of Training System*: Individual; Groups & Team;
 - 4.1.3. *Concept of Recovery Systems*: Before, During & After games& training;

5. World Football (208 national FA) need a new three-Teamwork Interdisciplinary for performance:

- 5.1. *Managerial TEAMWORK*: National FA, Technical Centre, Leagues, Managers, etc.
- 5.2. *Technical TEAMWORK*: Head and Assistant Coaches, and all support staff;
- 5.3. *Scientific TEAMWORK*: Doctor, Trainer, Massager, Nutrition, Exercise Physiology.

6. The FIFA'S MOTTO: "For the Good of the Game, for the World", the study need to add "For the Good of the people and specialists involved in the game", by accepting to change "the Laws of the Game", as followings:

- 6.1. *Playing effective official time for 70 minutes/game*;
 - 6.1.1. *Avoiding the players to delay the game to win the advantage of playing*;
 - 6.1.2. *Avoiding the Referees to extend the game as much as he wants or he is interested?*
 - 6.1.3. *Avoiding winning time by changing the players from 90-95-97 minutes of the game? Etc...*
- 6.2. *Substitution free for each official game of 16-18 players*;
 - 6.2.1. *Avoiding the coaches to force the players to play injured because the team will remained in 10, 9 players*;

6.2.2. *There is an exceptional chance for the young players to play in official games when the team is leading the game and more chances for the good reserve players;*

6.2.3. *Protecting the health and the players, avoiding to super-tired players to play 90 minutes, game by game! It's a human right to be applied to understand the changes of the obsolete – dangerous - old – spirit of the Laws of the Games!*

6.3. *Replaying in the stadium – TV Screen the strange games difficult situations:*

6.3.1. *The degeneration of the world cup and football game is starting from this major point that, “The Referees are amateurs, unprepared, unfit, to be perfect for a 90’ game, of the super-national teams in competition;*

6.3.2. *“The referees are human being”, “conform FIFA principles of good will”, are coming from all over the world countries, where the quality and value & professional requirements, are less that the level of the national teams in competition.*

6.3.3. *Scientifically, the referees are not capable to referee the games, their professionalism are most of the time, “amateur”, the games results being changed and the competition manipulated with or without a really FAIRNESS!*

7. "This study is part of our longitudinal world cups „intentional Observation and study”:

First step:

Victor Stanculescu, (in the Book of the Football Coach”, Editura Sport House, 1982, dupa CM-1982), discussing the new tendency of so called „playing systems” as 2-3-5, 4-2-4, 3-5-2; continuing with the 4-4-2; 4-3-3; 4-1-4-1-; 4-5-1, 4-2-1-2, etc. – are not the playing system, are positions-formations the teams are taking during the game!

Those are only formation which the teams are using during the game, in every moment, in attack and defence, but the game is changing every second during the 90 minutes, playing 2/3 of the game non-stop and 1/3, at the Set Plays (the ball is stopped and re-started every team being organized in the field, in another formation, NOT SYSTEM!

We identified in time that the teams are using a special balance of three lines of the team, on the vertical of the field as following:

Table no 1.

1. Playing in own field	2. Playing in Middle Field	3. Playing in the opponent field
6-4	* 4-4-2	* 3-3-4
6-2-2	* 4-3-3	* 3-2-5
5-4-1	* 4-2-4	* 2-2-6
4-1-4-1, etc. . .	* 3-4-3, etc. . .	* 1-2-7, etc. . .

Second step:

2.1. We identify three fundamental parts of the game: Playing in attack; playing in Defence; Playing at the Set Plays;

2.2. The game is playing on the vertical, horizontal and diagonal game's directions;

2.3. The game is developing in own field, in middle field and opponent field;

2.4. The barometer of the game's changes is the moment of scoring the goals;

2.5. The Strategies are imposed by the goals scored and the time to the end of the game;

2.6. Also, important changes after yellow and particularly, red cards, injuries, etc;

2.7. Changes in the game development are done also, in substitution the players;

2.8. Very important changes in the games are done by the referee mistakes;

2.9. The games are different in concept: playing home, away and neutral fields;

2.10. The game strategies are specific to the playing League, Cup, Tournament, etc;

2.11. But the special strategies of the games are when the opponent is better, or inferior;

2.12. With significant importance are: Traditions, Special celebrations, Cups, Price, etc;

2.13. The games' strategies are improved and accepted by the 208 national FA, National Teams, Clubs after any of the World Cups, we passed in our „Intentional method of Observation and Study the development of the World Cups: 1974-1978-1982-1986-1990-1994-1998-2002,2006, as well as particularly after the World Cup – 2010.

Step 3: One of the most interesting aspect of football changes are done due to the competition between the Football Confederations/Continents:

3.1. The European and South American Football competition;

3.2. The competitions between Latin & Anglo-Saxon Football, and now coming African Continental Football;

3.3. And particularly, the changes are done by the specialists which accepting the benefits of the frontiers of football sciences.

Step 4: As the major aspects of playing system performances are done taking into consideration our direct and indirect „Intentional Observation Study”, for other competitions and Coaches concepts of performance:

4.1. The Concept of Recuperations and the life concept of players and coaches and the strategies of management of energy;

4.2. The Concept of Training: national, local of the caches and players;

4.3. The Playing and Winning Concept and System of champion?

Step 5: Playing Concept is the power of mixing all the principles, methods and Programs to play, and win a game, a competition; we identify three main groups of Playing Concepts/Systems:

5.1. Latin Playing Concept: composed by 3-systems:

5.1.1. Playing Skills: They are the major factor of the game art to make show the main factor of performance and winning the games and supremacy;

5.1.2. Creative Skills, The Latino Football Playing Concept made the actual super-stars players and club teams and national teams;

5.1.3. The culture of super-stars' skills, playing free from 4-5-6 years, looking for professionalisms from 10-14 years old, they are becoming super-stars and from poor, millionaires.

5.2. Another interesting conclusion of our study is that the game is playing on the combination of the forms of attack:

1. The Anglo-Saxon Concept of Playing: combining the vertical line (Long passes) & Diagonal line of the game (Diagonal balls), of 30-40-50-60m and less then the Short ball: 5-10-20-30 meters (creative football), building a Physical Game, Strong players and less creative skills players; concept –demonstrated at the World Cup 2010, too, behind the Latino Concept and even from the African Concept of Playing football;

2. Latino Football Concept is reversed, trying to use as much as „Short Ball, Creative game, in groups of 2-3-4 players; having control of the ball, reducing and managing the Energy and having the concentration and freshness energy to play art football, efficient game and winning the world football supremacy!

3. African Football Concept, has also two major influences: The Anglo-Saxon are the former English colonies/countries who are behind the Latino/former French/Spanish/Portuguese colonies, which are very much progressing from a world cup to another world cup, and not more than 2-3 world cups, will be a world surprise for the international and world cups results.

Step 6: This is the rout to come to the Geometry of the new game, discovered – in the Latin Concept of Playing and rediscovered in the game of Spain 2008-2011:

6.1. The most important aspect of the game, is the geometry of the playing the ball. The playing small groups of 2-3-4 players, respective the geometry of the numbers of players, a new form of playing (football or playing music in a team/band of 2-3-4 players/ using the „Common special sense of the game's musicality, the game's art!";

6.2. The second important Law of the Latino Football Playing Concept, is that, they are playing in three zones of the field, combining the three zone are controlling and managing the players individually game's effort. This is the professional secret of winning, done by „the control of concentration and relaxation”, the key of the playing Latino creative football and being capable to be in the game any moment of the game, with parts of the teams, playing the entire team! This is the supremacy of the Latino/Spanish new concept of playing modern football.

7. *One of the best mutations of the Football performance has been done by passing from super-star skilled players to the Mega-Star-super-skilled players:*

7.1. *The Braziliens and Argentinians, after generation of super-stars, it is a slow-down interest for the super-stars and the politics of selling the super-stars too young, are spoiling the supers stars, development and perfection time, in their own environment;*

7.2. *The European Schools of champions are also, slowing down the interest of the clubs and academies, because, difficult to grow a new generation of super-stars;*

7.3. *The biggest growing super-stars are made with a super-formula of combining the motivation of the super-stars (Mental, Physical & Skills), being economically, value and business convenient conditions (time, money, efficiency, motivation for highest performance).*

8. *„Veni, vidi, vinci (I came, I saw, I conquered). Happened 2 month before the World Cup 2010:*

8.1. *We were invited to participate at the International Football Coaches Course, in Spain, Madrid, at the Spanish National Technical Football Centre” (One week – course and another week visiting Real-Madrid, Barcelona and Atletico Madrid;*

8.2. *The demonstration made by the Spanish Football Concept of Performance (Recovery, Training and Playing concepts, all Spanish teams from the kids (8-12 years), juniors (13-16 years) and youth(17-21 years), and of course, adults teams are playing the same football playing concept);*

8.3. *„To demonstrate the superiority of the Spanish Football, the national FA, declared „NIL the street football in Spain”, given the power of control of Teacher-Coaches, School, Clubs, Academies, Community Centres, Regional Centres, etc. making the football an educational school subject and performance concept for all age!*

9. *The statement of the Master National Coach DON Bosque in the FIFA com, No., October 2010, is similar with our study observations:*

* *In our study regarding the Spanish Football we find out that „There is not a Playing system as 4-4-2, or 4-4-3! There are only formations of players, which are changed every second of the game, according with the game’s factors:*

1. *The Coach Value of the Head coaches;*
2. *The creative art of players’ skills;*
3. *The playing strategies of the players and coaches of both teams, etc.*
4. *"Del Bosque”: stated in the FIFA. com, No. October 2010;*

• *I don’ believe and like the formations;*

• *The most important aspect of our teams is that we are playing as unity in attack as well as in defence;*

• *The formations are offering the initial position, but that all, because they are changing;*

- We are not copy other teams. And other aspect is the quality of the players;
- We are playing with exceptional midfielders and we can play the ball possession, combining the short passed with long passes
- With our physical capacity we can play equally in attack and defence, pressing to recuperate the ball, in attack and defence, in a total football, etc.

Conclusions and practical proposals

The new Playing Concept is so close from almost all major points of view of the official game of football:

1. The players are super-skilled, playing „a total game, all 90 minutes)

Step 1: "Control the situation of the game (zone 1-2-3 of the game);

Step 2: „Running in each zone, to form the geometry of the game: 2, 3 or 4 to be able to control the ball, the opponent and the game and of course the result;

Step 3: Translation of the ball through short passes, without effort, Control + Watch + 1-2-3 touches + Pass and support the ball:

- If the ball is in the own field, PASS and run behind the ball to control the filed behind the ball, to avoid to lose the ball and be discovered in defence;

- If the ball is on the field of the opponent, after PASS, the run will be in front of the ball, to penetrate the defence of the opponent team.

Step 4:

- If the ball is at the 40-30m by the opponent ball, the forwards (any players) are penetrating through 1-2 for the 3 and 4 players and shoot;

- If the ball is outside, the players crossing the ball: down; for heading and over the defensive opponent team, pass back and shoot, again!

Step 5: the translation of the ball through combination, or passing (is like playing with the hand, can be name the game of Spanish National Team (and Barcelona FC), without being wrong: Handball-Football):

- The passes are slow, advancing on the side, middle where the opposition is weak;

- This psychological strategy has a very special response: first passing left, than passing to right, and after the 3rd changing, is trying to penetrate! In this moment, the opponent is fixed and waiting, without knowing when the Spanish players are starting the changing of full speed and exceptional simple efficient combinations;

- 1-2 for the 3rd and 4th players, this is the secret of the Spanish small groups of 3-4 players.

- The game is simple: „control, watch and pass, and than run”;

- The game is very fast: every player doing the same things;

- The fantastic simplicity;

- A fantastic TIMING, which avoid to lose the ball in attack;

- The efficiency of the attack is surprising the opponent and;

- Can score when no one expected;
- One of the most effective aspects is the PRESSING, WITH THE ENTIRE TEAM, stopping the opponent to develop the attack! (forcing to throw the ball long and staying in defence 1, 2,3,4,5 times till they are losing the concentration and scoring the goal(s)!

Step 6:

- It is interesting to transfer this SCIENCE AND ART OF SPANISH, IN OUR OWN WORLD PROFESSIONAL NEEDS TO IMPLEMENT:

Table no. 2

No	Skills in attack	No	Skills in Defence	No	Skills at Set Plays
1.	Passing	1.	1 vs. 1 Pressing	1.	Free kick
2.	Dribbling	2.	Interception-art		

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ANALYTICAL RESEARCH OF GYMNASTICS EXERCISES BY HUNGARIAN AND ROMANIAN COACHES

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ABSTRACT. The best gymnasts' achievement can be one determinative consideration for the long time objectives of the Hungarian woman Gymnastics coaches. There are many different ways of analysing gymnastic exercises. Hungarian and Romanian gymnastic coaches have defined their opinions in three indicated ways in our research. It can help us to find the necessary abilities, features for Hungarian gymnastic girls' success at the international gymnastics competitions in the future. Our research points out, which countries' gymnasts can show their gymnastics exercises with the best technique, with fewest mistakes and which countries' gymnasts have the best apparatus-endurance on multi-day gymnastic competitions. On the basis of the processed data it appears that a great part of the old gymnastics-powers could keep their leading roles in one of the world. Of course other new pretender countries have appeared in this strained competition.

Keywords: *Gymnastic-powers, gymnastic exercises, analytical viewpoint, opinions of coaches*

Introduction

Sport results have several varied components. Apart from special measurability, many important factors have a role in forming the final order of results at the competitions. However, these factors are mainly revealed during the daily training work, which is especially true for gymnastics. The great international competitions always hold new information, and based on that our gymnasts can prepare for the next outstanding event. The International Gymnastics Federation (FIG) issues a new element value chart after every Olympic Games, influencing, guiding the improvement direction of gymnastics.

The following factors have significant roles at gymnastic competitions:

- perfect technical execution of the elements and routines,
- presentation of the routines without failures and faults,
- flawless presentation of the routines on several consecutive days of a competition.

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Only gymnasts who have the best genetic abilities for gymnastics and who are best prepared can fulfil these criteria. Moreover, in many cases the competitors' momentary mental state also greatly influences the results of the world championships.

However, there are regularities that only the best gymnasts of the world bring forward, corresponding to the requirements of FIG. We were interested in the factors regarding the execution of routines, so we asked the Hungarian and Romanian coaches about them.

Putting the question

The weak performance of Hungarian women's gymnastics started with the 22nd position gained at the European Championship in Amsterdam in 2004. The process had started earlier, but it is not the topic of this study. It is a sad fact that the world of international gymnastics (at European level too) has gone past by the Hungarian women's gymnastics. Is there a way back? Can we find the components that we believe are important, which can stop or improve the present unsuccessfulness on team level?

We find it important to note that the competitor of Békéscsaba Torna Club, Dorina Böczögő was the only Hungarian woman gymnast who earned the right to compete at the Olympic Games in Beijing (and already for London Olympic Games too). However, this does not provide a reason to be relieved on team level, as there was no Hungarian team present at the previous Olympic Games.

Routines with the best technique

In different sports – whether it is beating time, distance or execution of a routine (where scoring is applied) – very small differences can change the final order. Technical advantages have a significant role in winning. The energy invested in the daily training work becomes effective if the execution of the movement takes place within the shortest possible time, or if it is the most economic, also if harmonic movement execution can be accomplished.

Our study is based on gymnastics, for this reason, the definitions have special meanings. However, we can reach the special interpretations through general phrasing. According to László Nádori (1979) the technique of a sport is the implementation method of sport movements. The quality of movement execution is primarily determined by the given sportsperson's coordination and condition skills (Nádori, 1979).

The formation of the technique of movement activities are based on people's natural movements, in which practise had a great role (Prisztóka, 1998).

When coaches are forming the right technique of a sport, it is essential that they take into consideration the age characteristics, the individual condition and coordination levels, also the level of mental abilities and competences.

Sport technique is basically a special activity form to reach particular aims (Makszin, 2002, Harsányi, 2000).

We can conclude from these phrasings that we can understand the technique that is the characteristic of gymnastic movements if we use the general approaches. We agree with Harsányi that the basis of technical instructions is to practise the biomechanically correct execution at the trainings. Adjustment of movements conditioned with incorrect technique is an unsolvable task for the coaches in many cases. One condition of technical improvement is for the coach to be able to analyze the sportsperson's movement (Bartlett, 2007).

Arkaiev & Suchilin (2003) believe that the technical skills used in gymnastics depend on the technical exercises and on the preparatory movements in the preparation process.

The probability of accidents can be reduced by the biomechanically correct execution of the elements, which is considered important by the International Gymnastics Federation too (F. I. G., 2001).

Routines executed with the fewest errors

In gymnastics faulty execution of elements and routines may have several reasons. Firstly, it can be the lack of condition skills (lack of balance between the difficulty of the element and the strength of the gymnast), the lack of the necessary number of repetitions, and other reasons (Arkaiev & Suchilin, 2004).

With flawless execution of the routine the gymnast has the chance – with adequate initial score – to receive the highest total score. One most important part of flawless execution of a routine is the accurate landing on the apparatus after the execution of the elements and off the apparatus when the routine is accomplished (Deusen, 2010).

In this case our question applied for each day of a competition, when – based on the asked coaches' opinion – it turns out which country's teams accomplish their routines with the least faults.

Apparatus endurance

A particular endurance is necessary for every sport, which is called special endurance. In the sport encyclopaedia, according to Nádori (1985), endurance shows how the sportsperson's body mobilizes its energy during long term load. Apart from this, Rigler (2003) amends the definition of endurance with fighting mental tiredness that can occur during a long term sport activity. When accomplishing fast movements, the mobilized energy should be enough to make sure that the standard of the performance does not decrease (Prisztóka, 1998).

According to Harsányi (2000), endurance is the sportsperson's such condition related characteristic, when opposed to the extreme load, greater resistance and fast physiological recovery occurs. Arkaiev & Suchilin say that endurance is a crucial physical ability in modern sports, where the gymnast maintains the effective routine accomplishment despite the long term load.

In gymnastics special endurance includes abilities with complex quality.

The level of endurance depends on the gymnast's: functional level, nerve-muscle coordination, level of technical and coordination abilities, level of condition, weight, and on the quality of the preparation. Besides all these, the genetic characteristics, circulation and functional indicators can also affect the intensity of the trainings, the level of the load (Arkaiev & Suchilin, 2003, Cretu, Rus, Monea, Pop & Cretu, 2010).

After the general phrasing of endurance for sport we can reach the specific definition for gymnastics. (In gymnastics the maximum routine time for floor and beam exercises is 90 sec.). The times of the given routines on the asymmetric bars are different by individuals. The times of the three best routines of the asymmetric bars final in the Olympic Games in Beijing in 2008 year:

1. He Kexin 16.725 point Time of Uneven Bars exercise: 45 sec.
2. Nastia Liukin 16.725 point Time of Uneven Bars exercise: 53 sec.
3. Yang Yilin 16.650 point Time of Uneven Bars exercise: 51 sec.

Our conclusion is that the special endurance of gymnastics occurs in such a specific situation when the gymnasts have to present their routines during a multi-day competition system with the least possible faults.

The competition format of the Olympic Games defined by the International Gymnastics Federation:

- 1st competition day: qualification (individual and team competitions),
- 2nd competition day: team competition final,
- 3rd competition day: individual combined final,
- 4th competition day: finals for each apparatus (F.I.G. 2004, Gymbrooke Sports News, 2008).

Apart from the technically correct, optimally explosive accomplishment of movements, the main task is concentration, the training of the attention during the daily trainings. This can only be achieved in the adequate state of condition (Arkaiev & Suchilin, 2003, Koltay & Nádori, 1973).

During the daily work positive reinforcement can help in high-stake situations, which can raise the gymnasts' self-confidence and the effectiveness of further training work (Barker, 2003, Booker, 2002).

According to Nádori, attention is the sportsperson's conscious or involuntary focus on the external and internal circumstances. This manifests itself in the preciseness of the movement execution (Nádori, 1985).

The aim of the study

Through our study, by looking at bigger international competitions, we would like to point out which competitor characteristics could raise the standard of gymnastic education if it was implemented in Hungary – taking into consideration the Hungarian circumstances -, and which later could be seen in the results too.

Our aim is to examine what opinion the asked coaches have about such important questions like:

1. Which country's gymnasts execute their routines with the best technique?
2. Which country's gymnasts compete with the least faults?
3. Which country's gymnasts have the best apparatus-endurance?

Hypothesis

H1. We assume that the former gymnastics empires (the former Soviet Union, Romania, China) will still maintain their leading roles based on the results they have at great international championships.

Methods

Participants

For our study we asked 222 Hungarian and Romanian gymnastics coaches of different sexes, of different age groups and of different academic and coaching qualifications through individual interview in a written questionnaire. The questionnaires were handed out at competitions, trainings, and at coaches' further education courses. Data collection and completion of the questionnaires took place between 2004 and 2007. See Table 1.

Table 1. Distribution of surveyed coaches in the questionnaire (N=222)

Distribution of surveyed coaches in the questionnaire (N=222)									
HUN					ROM				
Sex									
Male 41		Female 25			Male 9		Female 6		
Age									
20-30 years 17	31-40 years 14	41-50 years 12	51-60 years 15	Over 60 years 8	20-30 years 5	31-40 years 5	41-50 years 3	51-60 years 2	Over 60 years -

Instruments

Completion of the questionnaire took place based on the following guidelines. The responding coaches expressed their opinion from 1 to 5 on the Likert-scale. Marking number 5 indicates that they fully agree with the given statement; number 4 means that they agree; in case of number 3 they are indecisive; in case of number 2 they do not agree; marking number 1 means complete disagreement. Description of chosen variables of our study is in table 2.

Table 2. Descriptive values of variables of our study N=222

Descriptive values of variables of our study N=222						
	Country with best technique of performances		Country with fewest errors of performances		Country with the best apparatus endurance	
HUN Sex	RUS 26		ROM 28		ROM 30	
	13 Male	13 Female	12 Male	16 female	14 Male	16 Female
ROM Sex	ROM 7		ROM 10		ROM 13	
	5 Male	2 Female	Male 7	Female 3	Male 9	Female 4
HUN Age	RUS 26		ROM 28		ROM 30	
20-30 years	8		7		6	
31-40 years	5		5		4	
41-50 years	6		5		7	
51-60 years	6		8		11	
Over 60 years	1		3		2	
ROM Age	ROM 7		ROM 10		ROM 13	
20-30 years	2		2		3	
31-40 years	1		3		5	
41-50 years	3		3		3	
51-60 years	1		2		2	
Over 60 years	0		0		0	

Data analysis

The received results were processed by the SPSS 13.0 for Windows statistical method. We used descriptive statistics to indicate the data and we used Pearson's correlation, variation analysis, F-test for the analyses. Table 3 shows the correlation data.

Table 3. Correlation values among variables of our study N=222

Correlation values among variables of our study N=222											
		1. Sex HUN	1.2. Sex ROM	3. Age (HUN)	3.1. Age (ROM)	9. Country with best technique of performances (HUN)	9.1. Country with best technique of performances (ROM)	10. Country with fewest errors of performances (HUN)	10.1. Country with fewest errors of performances (ROM)	11. Country with the best apparatus endurance (HUN)	11.1. Country with the best apparatus endurance (ROM)
1. Sex HUN	Pearson Correlation	1	,444	-,286(*)	,027	-,228	,335	-,420(**)	,065	-,200	,080
	Sig. (2-tailed)		,097	,020	,925	,066	,222	,000	,817	,108	,777
	N	66	15	66	15	66	15	66	15	66	15
1.2. Sex ROM	Pearson Correlation	,444	1	,000	-,505	,239	,071	-,010	,310	,423	,480
	Sig. (2-tailed)	,097		1,000	,055	,391	,803	,971	,261	,116	,070
	N	15	15	15	15	15	15	15	15	15	15
3. Age (HUN)	Pearson Correlation	-,286(*)	,000	1	-,566(*)	,186	,019	,096	,165	-,066	,085

Correlation values among variables of our study N=222											
		1. Sex HUN	1.2. Sex ROM	3. Age (HUN)	3.1. Age (ROM)	9. Country with best technique of performances (HUN)	9.1. Country with best technique of performances (ROM)	10. Country with fewest errors of performances (HUN)	10.1. Country with fewest errors of performances (ROM)	11. Country with the best apparatus endurance (HUN)	11.1. Country with the best apparatus endurance (ROM)
	Sig. (2-tailed)	,020	1,000		,028	,135	,947	,444	,557	,601	,763
	N	66	15	66	15	66	15	66	15	66	15
3.1 Age (ROM)	Pearson Correlation	,027	-,505	-,566(*)	1	-,350	-,172	-,077	-,419	-,245	-,434
	Sig. (2-tailed)	,925	,055	,028		,201	,541	,786	,120	,380	,106
	N	15	15	15	15	15	15	15	15	15	15
9. Country with best technique of performances (HUN)	Pearson Correlation	-,228	,239	,186	-,350	1	-,098	,534(**)	,471	,512(**)	,335
	Sig. (2-tailed)	,066	,391	,135	,201		,728	,000	,076	,000	,222
	N	66	15	66	15	66	15	66	15	66	15
9.1 Country with best technique of performances (ROM)	Pearson Correlation	,335	,071	,019	-,172	-,098	1	-,220	,312	-,347	,119
	Sig. (2-tailed)	,222	,803	,947	,541	,728		,431	,257	,205	,674
	N	15	15	15	15	15	15	15	15	15	15
10. Country with fewest errors of performances (HUN)	Pearson Correlation	-,420(**)	-,010	,096	-,077	,534(**)	-,220	1	,446	,660(**)	,447
	Sig. (2-tailed)	,000	,971	,444	,786	,000	,431		,096	,000	,095
	N	66	15	66	15	66	15	66	15	66	15
10.1 Country with fewest errors of performances (ROM)	Pearson Correlation	,065	,310	,165	-,419	,471	,312	,446	1	,445	,502
	Sig. (2-tailed)	,817	,261	,557	,120	,076	,257	,096		,096	,057
	N	15	15	15	15	15	15	15	15	15	15
11. Country with the best apparatus endurance (HUN)	Pearson Correlation	-,200	,423	-,066	-,245	,512(**)	-,347	,660(**)	,445	1	,559(*)
	Sig. (2-tailed)	,108	,116	,601	,380	,000	,205	,000	,096		,030
	N	66	15	66	15	66	15	66	15	66	15
11.1 Country with the best apparatus endurance (ROM)	Pearson Correlation	,080	,480	,085	-,434	,335	,119	,447	,502	,559(*)	1
	Sig. (2-tailed)	,777	,070	,763	,106	,222	,674	,095	,057	,030	
	N	15	15	15	15	15	15	15	15	15	15

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Results

After completing the studies we established the followings:

1. Opinions by sexes

The results from the 66 Hungarian coaches who took part in the study:

13 men (Mean 4,59 Std D. 2,915) and 13 women (Mean 3,24 Std. Deviation 2,681) coaches believe that the RUS team present their routines with the best technical performance at the competitions.

12 men (Mean 4,66 Std D. 3,079) and 16 women (Mean 2,28 Std. D. 1,137) coaches think that the ROM team have the fewest errors of performances during their routines. These values show significant differences, the F value is 13,706, the significance level is $p < 0,01$ (0,000). See table 4.

Table 4. Significant value of variance analysing by HUN sex N=222

Significant value of variance analysing by HUN sex N=222						
		Sum of Squares	df	Mean Square	F	Sig.
10. Country with fewest errors of performances (HUN)	Between Groups	87,862	1	87,862	13,706	,000
	Within Groups	410,260	64	6,410		
Total		498,121	65			

14 men (Mean 4, 000, Std. D. 2,711) and 16 women (Mean 3, 000, Std. D. 1,826) coaches say that the Romanian team has the best apparatus endurance.

The results from the 15 Romanian coaches who took part in the study:

Out of the 15 Romanian coaches 5 men (Mean 2,44, Std. D. 1,509) and 2 women (Mean 2,67, Std. D. 1,862) coaches believe that the ROM team has the best technical performance in the routines.

7 men (Mean 2,44 Std. D. 1,740) and 3 women (Mean 3,50 Std. D. 3,728) coaches say that the ROM team have the fewest errors of performances at the competitions.

9 men (Mean 2,00 Std. D. 0,000) and 4 women (Mean 3,00 Std. D. 1,549) coaches claim that the ROM team have the best apparatus endurance.

2. Opinions by age groups

The results from the 66 Hungarian coaches who took part in the study:

26 Hungarian coaches of different age groups believe that RUS gymnasts present their routines with the best technical performance. The total mean of answers is

$$\bar{X}_{Total} = 4,08, \text{ Std. D.}_{Total} = 2,884.$$

28 coaches think that the ROM team has the fewest errors of performances in their routines. The total mean of answers is $\bar{X}_{Total}=3,76$, Std. D. $_{Total}=2,768$.

30 Hungarian coaches' opinion is that the ROM team has the best apparatus endurance level. The total mean of answers is $\bar{X}_{Total}=3,62$, Std. D. $_{Total}=2,448$.

The results from the 15 Romanian coaches who took part in the study:

7 Romanian coaches from different age groups say that the ROM team does gymnastics with the best technical performance. The total mean of answers is $\bar{X}_{Total}=2,53$, Std. D. $_{Total}=1,598$.

10 coaches are confident that the ROM gymnasts are able to present their routines with the fewest errors of performances at the competitions. The total mean of answers is $\bar{X}_{Total}=2,87$, Std. D. $_{Total}=1,727$.

13 coaches claim that the ROM team has the best apparatus endurance. The total mean of answers is $\bar{X}_{Total}=2,40$, Std. D. $_{Total}=1,056$.

Reply to Hypothesis

The results of the study show that our assumption was right, namely that the former gymnastic empires Russia and Romania preserved their leading roles among the best teams of the world.

Although the Hungarian and Romanian gymnastics coaches did not mark it as the best, but based on the results of the team competitions of the Olympic Games, the USA team is outstanding. We believe that the USA team improved the most with regards to the important factors that are necessary to reach high level gymnastics results, like good technical performance, performance with few errors, good apparatus endurance.

Discussion and conclusions

We can come to the conclusion that based on the analysis of the answers by sexes and age groups the Russian gymnasts are definitely at the lead regarding technical performance. The other outstanding data is that the Romanian team's members present their routines with the fewest errors of performances. For this reason we established that a great part of the former gymnastics empires - according to the coaches from the sample - kept their leading positions, based on their results at international competitions. The former East Germany is an exception as after the reformation of the two German states, they lost their leading role in women's gymnastics. The same can be established about the Romanian and the Chinese teams. The advance of the USA team is mostly the result of the work done by the well qualified coaches emigrating from the countries of former gymnastics empires.

Woman Gymnastic Teams' results of the last six Olympic Games can be seen on Table 5.

Table 5. The best three Woman Gymnastic Teams of the last six Olympic Games

The best three Woman Gymnastic Teams of the last six Olympic Games				
Result of 1988 Olympic Games of Seoul	1.	USSR	URS	395.475
	2.	Romania	ROM	394.125
	3.	German Democratic Republic	GDR	390.875
Result of 1992 Olympic Games of Barcelona	1.	Ex-Soviet Union	EUN	395.666
	2.	Romania	ROM	395.079
	3.	United States	USA	394.704
Result of 1996 Olympic Games of Atlanta	1.	United States	USA	389.225
	2.	Russia	RUS	388.404
	3.	Romania	ROM	388.246
Result of 2000 Olympic Games of Sydney	1.	Romania	ROM	154.608
	2.	Russia	RUS	154.403
	3.	China	CHN	154.008
Result of 2004 Olympic Games of Athens	1.	Romania	ROM	114.283
	2.	United States	USA	113.584
	3.	Russia	RUS	113.235
Result of 2008 Olympic Games of Beijing	1.	China	CHN	188.900
	2.	United States	USA	186.525
	3.	Romania	ROM	181.525

We believe it is necessary for the coaches to teach the technical elements to gymnasts according to a methodical, planned program (Arkaiev & Suchilin, 2003, Vladimir, Mariana & Georgeta, 2010). Besides that, the general and special preparation has to be directed towards the multi-day competitions, starting from the trainings that prepare someone for the first competition towards the greater international competitions gradually.

Regularity and setting the adequate aims are very important for improving the concentration through the routines on the apparatuses. The well-chosen and individually adapted teaching methods can greatly improve and accelerate the preparation of the gymnasts for great international competitions, all the way to the Olympic Games.

Our opinion is that the method of the preparation for this sequence of loading should be elaborated, though practical experts believe that this is also greatly influenced by individual condition and mental abilities, characteristics (Arkaiev & Suchilin, 2003).

For the advancement of Hungarian gymnastics we find it important for the Hungarian coaches to take over the best characteristics of the gymnasts from leading countries and to apply these in Hungarian gymnasiums too. More constructive professional courses and conveyance of new information can help to reach this.

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METHODS AND TECHNIQUES OF THE STUDY OF SPORTS AS SOCIAL PHENOMENA - A THEORETICAL APPROACH

NEGRU IOAN¹

ABSTRACT. This paper aims at being a theoretical approach of the methods of research that can be applied to the especially complex field of the science of sports. Part of the methods of research approached will be part of an ample paper regarding the lifestyle of young people and their leisure time in relation to physical activities and sports.

Key words: research methods, sociological survey, interview, group focus, sport activities.

REZUMAT. Metode si tehnici de studiere a sportului ca fenomen social - abordare teoretică. Lucrarea de față se dorește a fi o abordare teoretică a metodelor de cercetare ce pot fi aplicate și în domeniul, spunem noi, deosebit de complex al științei sportului. O parte dintre metodele de cercetare abordate vor constitui parte integrantă a unei lucrări de amploare cu privire la stilul de viață al tinerilor și preocupările lor, în timpul liber, mai ales, față de participarea la activitățile fizice/sportive.

Cuvinte cheie: metode de cercetare, ancheta sociologică, interviul, focus grup, activități sportive.

I. Research – general aspects

The analysis of specialised literature concerning the notion of research has pointed out a variety of definitions for the term. Research, in specialised literature, is considered to be a “systematic process of discovery and advancement of human knowledge” (Gratton and Jones, 2004, p. 4); it can also be “a systematic and methodological process of investigation, which increases knowledge” (Amaratunga, Baldry, Sarshar, Newton, 2002 p. 17).

The characteristics of research

Research, according to Leedy 1985; Walliman, 2001 (cf. Gratton and Jones, 2004) exhibits a series of particularities such as: research is generated by a question of research of hypotheses or problems; it goes according to a plan or specific procedure; the aim of the research being that of increasing the level of understanding by interpreting factors and drawing conclusions based on these factors; it presupposes reasonable arguments that sustain the conclusions; it is repetitive, based on anterior knowledge, which should be developed.

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Types of research

Starting from the predominant movements in sociology, according to (Gavriluță and Gavriluță, 2010), the specialists in the field have developed a series of research methods. Max Weber, in his turn, having the interpretative sociology as model, has formed a methodology of research. Ethnomethodology, as highlighted by (Gavriluță and Gavriluță, 2010), gives advantage to the ethnographical methods, while qualitative and interpretative methods are dominated by symbolic interacting.

Certainly, there are several ways to classify research, according to the goal of the research, of the data being collected and not lastly, of the data being analysed. In this respect, there are four general types of research: exploratory, descriptive, explanatory, predictive.

Exploratory research. Most of the sociological research, according to Earl (2007), is oriented towards the exploration of a subject/theme, the exploration being a way to familiarise the researcher with the respective subject. Several themes from the field of sports that can be approached by means of exploratory research could be the social mobility of sportsmen or the integration in society at the end of the competitive activity.

Descriptive research. This is employed to present the particularities of a phenomenon, with a highlight on what is happening rather than on why it is happening. The research done with the goal of establishing the exact number of participants in an edition of the Olympic Games and afterwards, the total number of girls, respectively boys, out of the total number of people can be, according to Gratton and Jones (2004), the subject of a descriptive research.

Explanatory research, as explained by Neuman (2007), is done on the basis of exploratory and descriptive research. By applying it, an attempt is made at explaining the sources of social behaviours, conditions, beliefs, events, testing at the same time theories and providing reasons for the production of certain phenomena. For example, exploratory research offers a series of data from which it arises that girls of a certain age are less engaged in sports than boys of the same age.

Predictive research, according to Gratton and Jones (2004), provides predictions about future events, being based on a series of interpretations offered by means of exploratory research. For example, some assessments can be made with reference to the gender differences in the upcoming major sport competitions, such as Olympic Games, World Championships etc.

Qualitative versus quantitative

All fundamental forms of research have been developed by the human being in order to understand and to give meaning to things and phenomena taking place in the world. According to Philip (1998, cf. McEvoy and Richards, 2006), the dispute referring to the distinction between quantitative and qualitative methods is a traditional one, being

present in all of the materials focused on methodology, which often treat the two methods as being paradigmatically distinct. As established by Neuman (2007), although the two types of research are different, in a number of aspects they complete each other.

The quantitative approach presupposes standard measures and statistical techniques, being correlated with the positivist approach of social life. According to Acroyd (2004, cf. McEvoy and Richards, 2006), the goals of the positivist research are the identification of general laws, based on statistically distinguishing between dependent variables and independent variables. As part of the quantitative approach, the subjects are chosen using selection techniques, with the purpose of eliminating potential sources of confusion, and the generalisations are to be made starting from a sample test towards the entire population.

The phenomenological-qualitative model brings in the centre of attention the human subjectivity, “counting on the social environment that is built and interpreted by means of interaction of motivations, expectations, symbols etc., individual and collective” (Rotariu and Iluț, 1997, p. 24). **The qualitative research** presupposes an intense and continuous contact with the sphere of everyday life situations. Miles and Huberman (1994, cf. Amaratunga et al., 2002) argue that these situations are common and normal, reflecting the everyday life of individuals, groups or organisations, referring at the same time at people related problems, objects and situations. Neuman (2007) implies that, most of the times, qualitative research presupposes the interpretation or critique of social life, following a non-linear research model. Qualitative methods, especially the observation and the unstructured interview, allow the researcher to delineate a picture of the investigation. Studies that approach this type of research highlight cases that occur in the normal circumstances of social life. The specific process for this approach requires, among other, the execution of a long, intensive observation in an organised environment.

The two types of research have numerous aspects in common, the differences between them being generally generated by the research **design** chosen by the researchers, by the linear or non-linear model of the research and, not lastly, by the way in which the researched subjects develop.

II. Methods and techniques of studying sports as social phenomena

The method of sociological investigation

Research based on the sociological investigation has developed in the context of social sciences by means of the positivist approach. The sociological investigation, through specific instruments, “inquires a number of people (called respondents) about their convictions, beliefs, characteristics and past or present behaviours (Neuman, 2007, p. 167). The investigation is considered to be a technique which “belongs to descriptive research, aiming to determine current practices and opinions of a specific population, under the form of questionnaires, interviews or normative investigations (Thomas et al., 2005, p. 269).

The sociological investigation is the most frequently used method for collecting the data in socio-human researches, but it may also be successfully applied in other fields, such as economical sciences, juridical sciences, psychology or sports sciences etc. According to Thomas et al. (2005), the most important types of investigations employed in the field of physical activity are the questionnaire, the Delphi method, the personal interview and the normative investigation. Neuman (2007) argues that researchers are interested in several things at once, measuring numerous variables and testing several hypotheses at the same time. The reasoning used in an investigation is usually a deductive one, with the researcher starting from a theoretical problem and finishing with empirical measurements and data analysis.

The communication between the researcher and the subjects can be made verbally or in writing. In the first case, we speak about verbal or direct investigation and in the second case about written or indirect investigation, by filling out questionnaires. In the case of investigation, at the basis of gathering data lies the principle of selection or sampling, although at times it targets the entire population.

Oral or direct investigation

This is the most frequently used technique in elective investigations, in surveys concerning matters of general interest. There are two ways of applying the oral investigation: face to face and by phone call. Choosing the type of investigation is made by taking into account the targeted population, the procedure of sample testing, the theme of research and the human and material resources at the disposal of the researcher.

Indirect investigation (written or by filling out questionnaires)

The postal investigation, also denominated postal questionnaire, is the technique which “presupposes a communication at the farthest distance, in the sense that the researcher and the investigated individual do not come into direct contact, being thus the form of investigation most distant from the oral one” (Rotariu and Iluț, 1997, p. 59). The most frequent modes encountered in investigations based on filling out questionnaires are those at home or the simultaneous application (at the work place, at school, at certain reunions).

The normative investigation, quite usually encountered in the field of physical and health education, is applied to large samples of population, with the aim of presenting the results as comparative standards or norms. In the case of the normative investigation, unlike the questionnaire, the researcher has to find a series of tests which measure the performances and abilities, such as certain components of the degree of physical preparation/fitness level. In order for the results to be considered, it is highly necessary that the tests be applied according to exact standards. As stated by Thomas et al., (2005), the resulting data is collected and analysed as percentage, T scores, and afterwards norms are put together for various age groups, sex groups, level of preparation groups etc. For example, a normative investigation may consist of the

application of a standard set of tests, on large samples, to determine the level of fitness of the targeted population. Subsequently, the gathered results can be compared to those obtained at the same age level, but this time in a different geographical area.

The standard questionnaire is used both by the investigation and by the survey, consisting in a series of questions that aim at receiving data about the subject's characteristics and his behaviour, respectively people's opinions on different aspects of social life. In what concerns the usage of this instrument, according to Thomas et al. (2005), it resides in the necessity to obtain data from people that come from a large geographical area. The questionnaire is the most commonly used instrument, being considered a type of investigation employed in the descriptive research, that requires the use of pen and paper, in which the information is gathered by asking the participants to answer questions rather than by observing their behaviour. (Thomas et al., 2005).

The questionnaire is at hand when the investigator is interested in verbal answers and knows beforehand exactly the questions he would like answered. In using this technique, it is important that the questions be clear and accessible. Before organising a study with the purpose of measuring dependent variables, by means of the questionnaire, the subject is required to do a pilot study, with the scope of making sure that the interpretation of the questions is the same as the investigator's. The advantages of the questionnaire as opposed to the interview consist in standardisation: the instructions, the form, the order of the questions can be maintained constantly close by the subjects.

The test sample

According to Hatos (2002), the sampling consists of a series of systematic methods of selecting the subjects to be studied. "The set of operations by which, from the set of the population regarded for research, one chooses a part, called test sample, part that will be directly subdued to investigation" (Rotariu and Iliuț, 1997, p. 122). The test sample is one of the problems that require an immediate resolution, when the researcher wishes to make an inquiry. The size of the test sample, as stated by Thomas and Co. (2005), should also be considered from two points of view: to adequately represent the population; the time and costs necessary to apply the inquiry should be limited. The selective research presents three types of advantages: economical, applicable and of knowledge. **The test sample's specificity** consists in "its capacity to reproduce as best as possible the structures and characteristics of the population it comes from" Rotariu și Iliuț, 1997, p. 125).

The degree of specificity of the test sample depends on a series of aspects: the characteristics of the population to be studied, the size of the test sample and the sampling procedure used. The volume and specificity of the test sample depends on more factors, out of which dispersion (or homogeneity) is fundamental. In the case in which homogeneity is large, the test sample can be reduced, but should be highly representative, and the other way around. There are more types of sampling, such as: simple random, by means of stratification, pluridistal, pluriphasic, on levels, pinned down.

The interview

The interview and the questionnaire are essentially closely related, the difference being that of the way in which the questions are addressed, so if with the questionnaire the answers are written down, with the interview they are presented orally. The interview is “a technique of investigation similar to that of the questionnaire, with the exception that the participants are asked and they answer by means of oral expression and not in writing” (Thomas et al., 2005, p. 269). Another author states that the interview is “a secondary form of social interaction between two strangers, with the explicit purpose of one obtaining specific information from the other” (Neuman, 2007, p. 190). According to Ferrante (2008), the interview is a conversation that takes place, face to face or by telephone, between an interviewer and a respondent in which the interviewer addresses questions and records the answers of the respondent. By applying the method of the interview, one desires to comprehend the mechanisms behind people’s actions, to discover their motivation, to describe certain collective behaviours, based on the life experience of the interviewed.

Usually the interview requires a smaller quantity of test samples, but implies a more profound communication with the participants to the study. The face to face interview, according to Neuman (2007), offers the highest rate of answers and allows the longest forms of survey. During this interview, the conductor can observe the surrounding atmosphere and use non-verbal communication techniques or visual supports. Among the disadvantages of this type of interview one should mention the high costs necessary for travelling, training etc. The interview over the telephone is becoming, at this hour, more and more used, having, in relation to the face to face interview, a series of advantages, namely: it is cheaper, by avoiding going over to the interviewed; the time required to take the interview is more reduced; the interviews can be held, as stated by Borg and Gall (1998, cf. Thomas 2005), from a single location, using computer assisted techniques; the test sample of the study can be larger than that of the face to face interview; a lot of respondents are more sincere over the telephone rather than face to face.

The structured or quantity interview

The structured interview, as highlighted by Ferrante (2008), is an interview in which the words and the sequences of questions are established in advance and cannot be changed over the course of the interview. The information, in this type of interview, is obtained, according to Neuman (2007), by means of a structured conversation in which the interviewer formulates pre-established questions and answers and in parallel records the respondent’s answers.

The semi-structured interview

An important aspect in a semi-structured interview is the fact that, through it, one can obtain information about the motivations, aspirations, objectives, attitudes and values of a person. Over the interview, the inquirer will be able to observe not only what

the candidate wishes to declare or show, but also more subtle aspects. Through his actions, the interviewer, among other things, has to induce a natural form of expression to the candidate, spontaneous and as much as possible sincere. In achieving this type of interview, one should follow certain principles, such as: flexibility, openness, respect towards the interviewed, objectivity in evaluation, neutrality in attitude, adaptability to the interviewed, and last but not least the full use of empathy. As a formal support, the interviewer should elaborate an interview guide, in which he should mention the main objectives he follows along the discussion, and subsequently complete it with observations and details.

The individual unstructured interview

Can be the scheduled part of a research or the part that appears ‘spontaneously’ during field research, being used in combination with other methods, such as active observation.

Inside this interview, the inquirer carries completely free conversations, on a sole matter, with the members of the targeted population. Sometimes, the problem is not given, but is to be discovered along the discussions. The form and content of the individual interview differs depending on the matters discussed, the socio-demographic characteristics of the population and on the place in which these are held (home, school, office etc.)

The unstructured interview is an informal discussion whose purpose is, among others, to encourage the participants to free and open expression. The success of this type of interview depends on the efficient addressing of the reintroduction questions, so as to stimulate the interviewed, in the sense that it provides more information and at the same time avoids influencing his answers, by introducing some extra ideas and concepts.

The group interview

According to Hamel (2001), the method, also known as focus-group, was created out of the necessity to discover the reaction of the consumers and their reasons for the enthusiasm or indifference manifested towards a certain product, movie or television program. The focus-group is a qualitative method of social research, consisting in “recruiting one or more groups made out of six up to eight individuals, selected by the homogeneity criterion, initiating open discussions on various subjects and the immediate analysis through confronting the points of view of the participants” (Morgan and Krueger, 1993, p. 3). It is a method used to obtain information about the feelings, opinions of small groups towards a given problem.

The focus-group technique consists in a discussion, which usually lasts between 60 and 90 minutes, audio-video recorded, and later transcribed. The focus-group, according to (Wibeck, Dahlgren, Öberg, 2007) has a special value, because it allows researchers to study the way in which the individuals engage in discussions, how opinions are formed, how they are presented, defended and sometimes modified

according to the context of the discussions and debates with the others. The focus-group, as pointed out by Markova (2004), is a research method based on the dynamics of communication, language and thought. Using the interaction between the members of the group, the researcher can explore the way in which the accounts of the participants are argued, censored, contradicted or modified through social interaction and how these associate to the group norms. In other words, according to Wilkinson (1998a, cf. Wiebeck, 2007), the focus-group offers the researcher the opportunity to observe the action of *construction of meaning* (of sense, of understanding); it can be understood as the way of thinking of a miniature society. The focus-group is in tight connection with the social innovations, meaning any new approach, practical or product developed to ameliorate situations or solve social problems and is accepted by the organisations, institutions or communities.

The moderator, according to Basch (1987), plays a key-role in conducting the focus-group, has a considerable number of duties and must assume responsibility for: undifferentiated handling of participants; creating a climate that encourages all the members of the group to present their personal opinions; facilitating the interaction between the members of the group; making certain comments; intervening with reintroduction questions; to elaborate conclusions without a negative influence on the dialogue between the participants; to formulate clear questions; to be sensitive to the verbal changes, to the facial expressions and other non-verbal behaviours; to remain on a neutral side; to encourage the participation to the discussion of all members present; to note conclusions right after the interview.

Case study

According to Hartley (2004), the case study requires a detailed investigation, with data collected over a period of time, of a phenomenon in its context, having the purpose to give a context analysis that should solve the approached theoretical problem. The case study applies to many domains, such as anthropology, clinical psychology, sociology, medicine, political sciences and in various educational domains. It was applied and continues to be applied in domains such as the science of sports, exercise and last but not least in physical education. By means of the case study one obtains a lot of information about one or some participants. The research activity based on the case study implies the rigorous analysis of a single case that is representative for more similar cases. The results, obtained by means of several case studies, can play an important role in the inductive reasoning implied in the process of theory development. Thomas et al. (2005) suggest that the case study is frequently used in qualitative research to treat critical problems of practice, to extend the basic knowledge about certain aspects of education in general, physical education, science of sports. The information for the case study can be collected by means of interviews, observations or different documents. Numerous case studies, as underlined by Thomas et al. (2005), have been applied to physical education, having analysed in general the level of fitness/physical fitness of those regarded, but themes like the behaviour of some professors and students during the educational process were and continue to be approached.

Yin (2003, cf. Kohlbacher, 2006) identifies five important steps that together build up the design of a research based on the case study: the questions/problems of the study; the sentences of the study; the analysis units; the logical connection between the data and the sentences; the criteria for the interpretation of the results.

Of course, there are also other methods of research, be they general or specific to the study of the sports phenomena, but in this article we would like to look over just a series of research methods which are intended to be applied in an ampler paper.

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THE INFLUENCE OF COGNITIVE CONTROL OVER BASKETBALL TECHNIQUE

PĂTRAȘCU ADRIAN¹

ABSTRACT. *Background.* Cognitive control processes include a broad class of mental operations including goal or context representation and maintenance, and strategic processes such as attention allocation and stimulus-response mapping. Cognitive control is associated with a wide range of processes and is not restricted to a particular cognitive domain. *Aims.* The aims for this research are the following: 1. Applying the MGM-15 Jumping Carpet test at the beginning and at the end of the research, 2. Apply a practical basketball passing speed test; 3. Using four sessions of full body roll. *Methods.* The methods used: 1. the MGM-15 Jumping Carpet Test(Hardware and Software), 2. Basketball passing test, 3. Full body rolls sessions. *Results.* The results span at the initial test between the values of 2.26 and 10.61 for the Energetic Variability Coefficient. For the final test the values for the same coefficient span between 2.09 and 9.81. *Conclusions.* Considering that the improvement of the values from the first test was between +0.9 and -0.9 the reality is that the final test results were very close to the initial test values, with only one or two exceptions. Even though this research didn't come out with any concrete data to show the importance of full body rolls in improving the cognitive control over basketball technique, it opens the way to a further and much deeper research into the wonderful domain of human mind and it's effect over the abilities of the human body.

Key words: basketball, physical education, sport, psychology, cognitive control

REZUMAT. *Influența controlului cognitiv asupra tehnicii din baschet.*

Premize. Procesele controlului cognitiv includ a amplă clasă de operații mentale care includ reprezentanța și menținerea obiectivelor și a contextului. Totodată controlul cognitiv include și procesele strategice precum alocarea atenției și formarea hărții stimul-răspuns. Controlul cognitiv este asociat cu o largă paletă de procese care nu este restrânsă la un domeniu cognitiv particular. *Obiective.* Obiectivele acestui studiu au fost: 1. Folosirea covorului de sărituri MGM-15 pentru testarea inițială și finală, 2. Aplicarea unui test practic de pasare în viteză cu tehnica din baschet, 3. Sesiuni de rostogoliri. *Metode.* Metodele folosite: 1. Testul Covorului de Sărituri MGM-15 (Hardware și Software), 2. Testarea paselor din baschet, 3. Folosirea a patru ședințe de exerciții cu rostogoliri. *Rezultate.* Rezultatele pentru testul inițial sunt cuprinse între valorile de 2.26 și 10.61 pentru Coeficientul de Variabilitate Energetică. Pentru testul final valorile pentru același coeficient au fost cuprinse între 2.09 și 9.81. *Concluzii.* Având în vedere că îmbunătățirea valorilor între testul inițial și cel final a fost cuprinsă între valorile +0.9 și -0.9 trebuie recunoscut faptul că realitatea este că rezultatele finale au fost foarte apropiate de valorile testului inițial, cu una sau două excepții. Deși

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această lucrare nu a scos la lumină informații concrete prin care să arate importanța rostogolirilor în îmbunătățirea controlului cognitiv asupra tehnicii din baschet, ea deschide calea pentru lucrări și studii mai amănunțite în acest domeniu minunat al minții umane și al efectelor pe care aceasta le are asupra abilităților corpului.

Cuvinte cheie: baschet, educație fizică, sport, psihologie, control cognitiv, rostogoliri

Background

"Cognitive control" is a construct from contemporary cognitive neuroscience that refers to processes that allow information processing and behavior to vary adaptively from moment to moment depending on current goals, rather than remaining rigid and inflexible. Cognitive control processes include a broad class of mental operations including goal or context representation and maintenance, and strategic processes such as attention allocation and stimulus-response mapping. Cognitive control is associated with a wide range of processes and is not restricted to a particular cognitive domain. For example, the presence of impairments in cognitive control functions may be associated with specific deficits in attention, memory, language comprehension and emotional processing. Given its pervasive influence, impaired cognitive control could account for many of the widespread impairments exhibited by people with schizophrenia and other neurodevelopmental disorders. (Carter & Cho 2004)

It is the set of brain processes necessary for goal-directed thought and action. Remembering a phone number before dialing requires cognitive control. Also, anything outside routine requires cognitive control (because it's novel and/or conflicting with what you normally do). This includes, among other things, voluntarily shifting attention and making decisions.(Cole&Schneider 2007)

A mountain of evidence is accumulating that a common set of brain regions are involved in cognitive control. We looked for these regions specifically, and verified that they were active during our experiment. The brain regions are spread across the cortex, from the front to the back to either side. However, it's not the whole brain: there are distinct parts that are involved in cognitive control and not other behavioral demands. We defined the cognitive control network as the parts of the brain active during a line search task. This task involves remembering a target line orientation, attending to each probe line orientation, and making a decision about whether each probe is what is being looked for. We then looked at spontaneous neural activity during rest periods to measure how the network's regions are connected.(Cole & Schneider 2007)

Speed of Processing and Everyday Performance

Scientists have connected cognitive processing speed abilities to competent everyday performance among older adults in several areas. For example, visual information processing speed, as indicated by Useful Field of View (UFOV); UFOV is

a Registered Trademark of Visual Awareness Inc., Birmingham, AL) test performance, reliably predicts driving competency (Ball & Owsley, 1993; Ball, Owsley, Sloane, Roenker, & Bruni, 1993; Owsley et al., 1998). Older drivers with speed of processing difficulties, as measured by the UFOV test, are more than twice as likely as older adults with intact speed of processing to incur an at-fault crash during the subsequent 3 to 4 years (Ball et al., 2006). Researchers have also related processing speed measured in this manner to an elevated risk for falls (Sims, McGwin, Pulley, & Roseman, 2001; Staplin, Gish, & Wagner, 2003) and to reduced life space and driving space (Stalvey, Owsley, Sloane & Ball, 1999; Owsley, Stalvey, Wells, & Sloane, 1999). Experts associate speed of processing with performance of mobility tasks, such as transitioning from sitting to standing, as well as with balance and gait (Owsley & McGwin, 2004) and functional reach (Riolo, 2003). Additionally, scientists have related speed of processing, as measured by the UFOV test, to the performance of other instrumental activities of daily living, including quickly and accurately looking up phone numbers, counting out change, finding a particular item on a crowded shelf, and reading food and medication labels (Owsley et al., 2002). Furthermore, faster speed of processing is particularly important in that this ability is associated with maintained health status with advancing age (Hultsch, Hammer, & Small, 1993; Rosnick, Small, Borenstein Graves, & Mortimer, 2004). Considering the strong association between speed of processing and everyday performance, as well as health status, speed of processing training may particularly have the potential to enhance everyday functioning among older adults. (Ball, Edwards and Ross 2007)

Hypothesis

Identifying the effects of full body rolls on the cognitive control over the passing technique at high speed of execution.

Methods and materials

Subjects

The subjects of this study were 21 women between the ages of 10 and 11 years old.

Methods and the Steps of the Research

We used the MGM-15 Jumping Carpet for the initial and final test. The test consists of 15 jumps on both legs that must not be bent during the execution. The software from the MGM-15 Jumping Carpet laid out, among others, one measurement for each subject named “Coefficient de variabilitate energetica” (Energetic variability coefficient).

Energetic Variability Coefficient – it refers to the control capacity upon the energetic resources and it brings data regarding the quality of jump lift from the ground. It emphasizes the movement automatization that is best maximized for those

sports that need precise and identical movements. The value of this coefficient is best kept at optimal values for sports that include an opponent. An Energetic Variability Coefficient with high-end value means that the subject doesn't control final steps of the technique during high-speed repetitions.

For the intermediary test we used a simple passing exercise for the subjects. This test was implemented after the first initial test but before the application of the full body rolls exercises. We wanted to have a practical proof that the first test was correct. This practical test consisted of counting the number of fast paced passes the subjects did in 30 seconds time. The technique was the normal two-handed chest-to-chest passes, but completed as fast as possible, thus imitating the requirements for the energetic variability coefficient.

Our third step was to do the full body rolls. On the span of three weeks I had four sessions of full body rolls with the subjects. The sessions consisted of 12 minutes of full body rolls broke down into 3 series of 3 minutes of continuous repetitions each and one-minute break between series.

The last part of our research was to redo the initial test on the MGM-15 Jumping Carpet and compare the results, thus identifying if the full body rolls do influence the cognitive control over high-speed technique execution.

Results

The procentual values of the gathered data were arranged in tables.

Tabel No. 1 – The initial test values

Name	C.V.E.(B)
A. A.	5.83
B.A.	2.49
Ci.I.	2.77
Cr.A.	4.99
Cr.C.	4.82
Fa.M.	9.3
Fe.A.	5.2
Fe.M.	2.48
Fo.D.	10.61
I.P.	5.83
L.M.	6.3
Mol.A.	7.76
Mor.O.	4.08
M.-C. M.	3.53
Mu.I.	5.15
Mu.R.	2.54
P.I.M.	3.01
Se.T.	2.26
St.P.	4.02
Su.K.	6.02
Sz.-I. C.	2.78

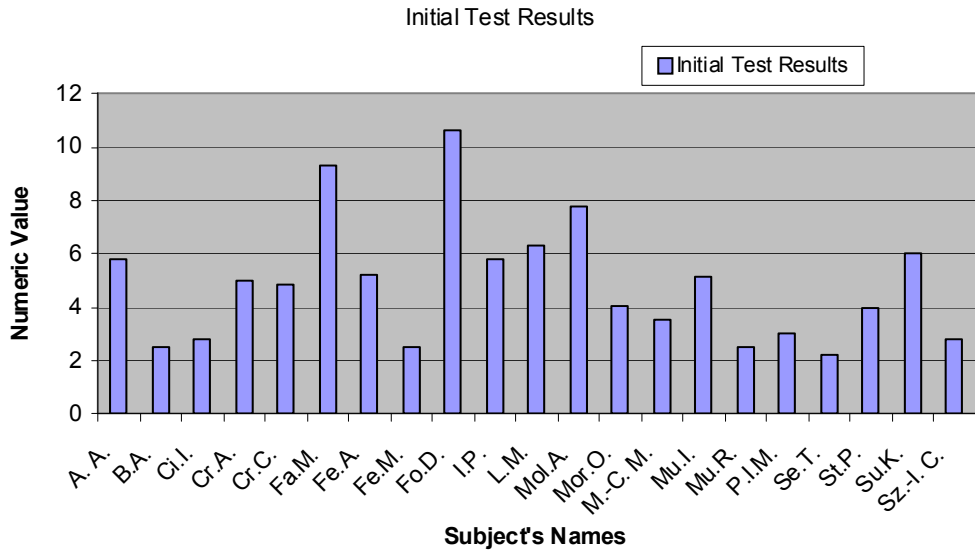
Tabel No. 2 – The speed passing test values

Name	Passing
A. A.	15
B.A.	18
Ci.I.	17
Cr.A.	13
Cr.C.	13
Fa.M.	10
Fe.A.	14
Fe.M.	18
Fo.D.	8
I.P.	16
L.M.	12
Mol.A.	11
Mor.O.	17
M.-C. M.	18
Mu.I.	14
Mu.R.	18
P.I.M.	17
Se.T.	19
St.P.	16
Su.K.	12
Sz.-I. C.	18

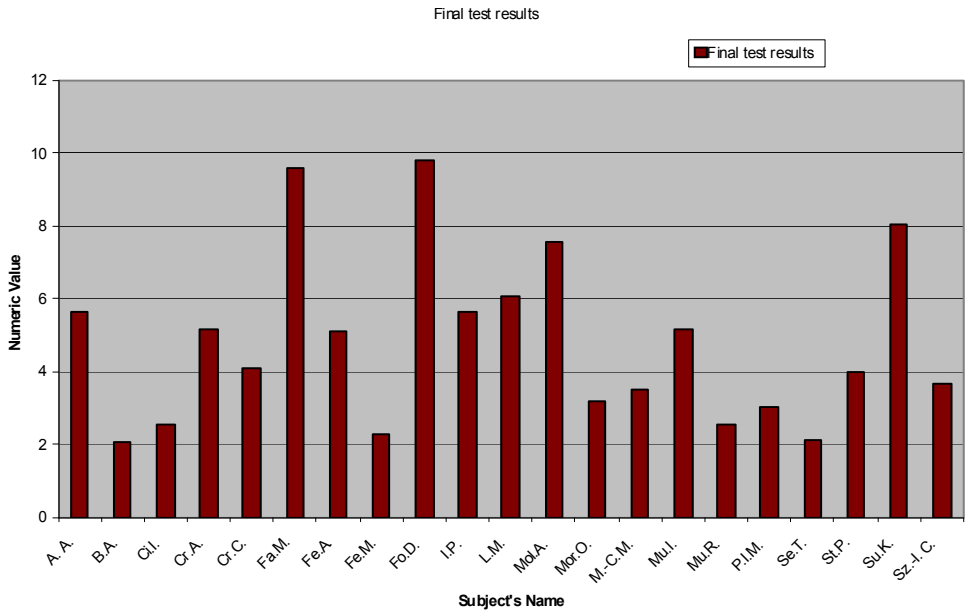
Tabel No. 3 – The final test values

Name	C.V.E.(B)
A. A.	5.63
B.A.	2.09
Ci.I.	2.57
Cr.A.	5.19
Cr.C.	4.12
Fa.M.	9.6
Fe.A.	5.1
Fe.M.	2.28
Fo.D.	9.81
I.P.	5.63
L.M.	6.1
Mol.A.	7.56
Mor.O.	3.18
M.-C. M.	3.53
Mu.I.	5.15
Mu.R.	2.54
P.I.M.	3.01
Se.T.	2.16
St.P.	4.02
Su.K.	8.02
Sz.-I. C.	3.68

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Graphic No. 1 – Initial Test Results



Graphic No. 2 – Final Test Results

Discussion of the results

The first thing that needs to be pointed out is that the value span for the first test was between 2.26 and 10.61 while for the final test the span was between 2.09 and 9.81. Considering these data, the maximum and the minimum for the Energetic Variability Coefficient, we might be inclined to conclude that the exercises we used for the experiment were successful and that the cognitive control over the basketball technique has improved. This final statement does not reflect the actual effects of the exercises used, due to the fact that the improvement of the values from the first test was between +0.9 and -0.9. The reality was that the final test results were very close to the initial test values, with only one or two exceptions.

Even though this research didn't come out with any concrete data to show the importance of full body rolls in improving the cognitive control over basketball technique, it opens the way to a further and much deeper research into the wonderful domain of human mind and its effect over the abilities of the human body.

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PHYSICAL ACTIVITY AND THE SENIORS

PERROTTA FRANCESCO¹

ABSTRACT. The importance of physical activity in old age has its reasons to be in two places: isolation off the elderly, enabling them to maintain or to acquire a good fit with the old fisica. Considerando that we encounter in many diseases, people are forced to take a large amount of drugs; play just "polypharmacy". Physical activity should be considered as an adjunct therapy, essential in everyday life. The aging process leads to a decrease in the ability to "performance" gymnastics fisica. La, considering the frequent loneliness and depression with which they are accustomed to living with the elderly, can and should be seen as a time of socialization and communication is essential. Often the creation of a training group is therefore a key element during physical activities that help to stimulate interest and sufficient emotional exchange in games for entertaining with a good collective spirit of animation, without engaging in significant physical activity. The elderly are considered private as a result of some changes in their business or their social role, such as when they become grandparents, or when, for the age you are forced to perform different and / or reduce the pace of work. We tend to believe that old age begins at age 65 because the workers begin to retire perceiving a social pension.

Keyword: physical activity in old age- depression -The aging process- quality of life- socialization and communication

Introduction

Individuals are considered elderly as a result of certain changes in their business or their social role, such as when they become grandparents, or when, for the age you are forced to carry out different and / or reduce the pace of work. You tend to believe that old age begins at age 65 because the workers begin to retire perceiving a social pension. Worldwide, the number of people aged sixty-five is rapidly increasing, this growth is mostly concentrated in developing countries. It is surely a positive sign about the quality of life, but simultaneously creates a range of needs and problems to be addressed in order to avoid serious socio-economic consequences in the future. In the field of gerontological are distinguished three types of aging. The first type (type 1 or pathological aging) is characterized by association of a progressive age-dependent reduction of the psycho-physical with the presence of chronic diseases, this type of aging, pathological aging said, it affects the most people in old age, a second type, associated with a progressive reduction of the psycho-physical in the absence of

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disease (called "usual aging" or aging type 2), covers most of the healthy elderly, and finally aging characterized by performance in the absence of physical and mental illnesses ("successful aging" or aging type 3), concerns a small minority of subjects. In this perspective we can say that physical activity is able to continuously move the "usual aging" into a state of "successful aging" and to prevent significantly the pathological aging.

Objectives

The importance of physical activity in old age has its reasons to be in two places: isolation off the elderly, allowing them to retain or acquire a good fit. Regarding the first point is simply to entertain them in games with a good collective spirit of animation, without engaging in significant physical exertion.

Regarding the second point, it is known that a well-conducted training you can get a result on various body functions diametrically opposed to that which exerts the same age. If an elderly person you train with some regularity, may at least partially cancel the negative influence of aging, (remember the farmers who, beyond the limit of pensionabilità, continue to perform regular physical activity, maintaining a level of efficiency organic significantly higher than their peers not regularly active). In order to set a proper form of physical activity, before recommending and prescribing physical activity as a garrison for a good age, you must demonstrate its real benefit on the organism and the psyche of aging.

Moreover, whereas the old one goes to meet a number of diseases, people are forced to take a large amount of drugs; play precisely a "polypharmacy". Physical activity should be considered as an additional drug, a fundamental therapy in everyday life.

The aging process involves a decrease in the ability to "performance" physics. This phenomenon can be attributed to three factors: the physiological loss of performance due solely to the passage of time, a loss of function related to sedentary lifestyle and loss of function related to the overlap of age-related diseases. In particular:

a) Muscles: As we age, muscle mass decreases. This change may be related muscle atrophy disguised by increased body fat and connective tissue. Electrophysiological and histological studies have revealed a process of older muscle denervation and reinnervation with progressive reduction of the total number of functioning motor units. The changes in muscle in the elderly seem more quantitative than qualitative. In fact, both isometric force that the dynamic force show a similar behavior with age. For a given percentage of the maximum force the muscle of the elderly has a capacity that is dynamic and isometric muscle endurance increased compared to younger subjects. In fact if you make repeated contractions over time dynamic ceilings every few seconds in the elderly is a minor reduction of strength with continued contractions, or if you sustain an isometric contraction to a subject still 50% of maximum force, the 'older will be able to maintain it for a longer time. Of course in absolute muscular endurance

capacity is greater in the young because his strength is greater than the maximum. The maximum speed of contraction of the muscle depends more on the quality not the quantity and the reduction can be observed in relation to the general phenomenon of reduced nerve conduction velocity.

b) Nervous System: The nervous system undergoes with the passing of the years of involution determined dall'atrofia important tissue, the neuroglia and myelin in the suburbs that accompanies the atrophy of muscle spindles. The loss of a cell is a permanent loss. The active cells, however, have the ability to determine a hypertrophy of the dendritic trunks and an increase in the number of plugs that arborizations and have the ability to compensate for the loss of other cells. In particular in the muscles can be a terminal arborization that side of the plate neuro-muscular (sprouting) and this explains the reinnervation found in the muscle fibers. This phenomenon, which is stimulated by exercise and by training, is present in the elderly, with individual variations. The reduction in nerve conduction velocity only partially explains the reduction of reaction time the more complex species which also depends on the activity of motor nerve and increased stiffness. The speed of the motor command is reduced by 20-30% compared to 60 years age youth. All these changes combined with sensory deficits explain the reduction of the coordination problems of the elderly and especially the learning of gestures sports complex.

c) Bones and joints: common phenomenon in old age is osteoporosis, a term used to describe the reduction of concentration of minerals in bone. This is leading to increased bone fragility, which can easily lead to fractures. Osteoporosis is due to problems of deficient nutrition, hormonal changes and reduced physical activity. Osteoporosis is exacerbated by sedentary lifestyles and inappropriate. Over the past 10 years, we have jobs, who have documented how a lack of exercise can lead to a decrease in bone mass and especially the important role that exercise has on the prevention and treatment of osteoporosis. Please note that osteoporosis is a condition characterized by a decrease in skeletal bone mass and a re-architecture of bone tissue. The prevention of bone loss is the best defense against osteoporosis in both sexes. One conclusion that emerges from numerous studies is that the intensity of the load on the skeleton seems to be the determining factor for the maintenance and improvement of welfare for the skeleton itself. Particular attention should be paid to the intensity, frequency and duration of the workout. The exercise done regularly can improve balance, coordination and muscle strength by reducing the risk of falls and the consequent possibility of fracture, with an overall improvement in quality of independent living for a greater number of years.

As regards the joints, with aging there is progressive wear of the articular cartilage with fixation at the same calcium and ligaments, arthritic phenomena characteristic of the framework. These changes have consequently a reduction in joint mobility. The modest functional limitations, however, must not push the joint subjected to further reduce their physical activity, a reduction that would result in a further

deterioration of joint function is either muscle. The exercises of mobilization in the discharge appears to be the best means for the treatment of osteoarthritis. As regards sports, considering that arthritis mostly affects the spine, the hips, knees and ankles are recommended activities "exhaust" such as swimming and cycling.

d) Cardiovascular system: With aging there is a reduction of myocardial contractile capacity for which there is a reduction in stroke volume and a reduction of the maximum heart rate. A vascular processes of atherosclerosis leading to a reduction of the elasticity with increased peripheral resistance and hence blood pressure. For these reasons, the same heart to heart rate compared to a young man not only in the periphery sends less blood per minute, but is forced to work harder. The reduction in performance associated with changes in cardiovascular and metabolic function of skeletal muscle vasculature and lead to a reduction of maximal oxygen uptake with age. The reduction is even more evident in those who had done aerobic sports on a competitive level in youth subsequently suspended all of its activities, while it is lower for those who started to practice a regular exercise endurance after maturity.

e) Respiratory: Decreased lung function with age is due to a loss of efficiency is that mechanical ventilation with a reduced gas exchange at the alveolar-capillary. The first results in a reduction of the maximum ventilation, with decreased ventilator frequency maximum amplitude of breathing because of the rib cage is dell' irrigidimento that the reduced efficiency of respiratory muscles. The reduction of gas exchange is evidenced by the reduction partial pressure of oxygen in arterial blood which fell from 100 mmHg to 75 mmHg to 20 years to 70 years. Subjects of 70 years who train two to four times a week for 30-40 minutes each time carrying out background activity, have higher values of 15% compared with sedentary age-matched vital capacity, the FEV and peak expiratory flow.

Material and methods

Based on all the considerations made so far may be evident the usefulness of exercise in the elderly. The priority must be those of the improvement of joint mobility, muscle efficiency and aerobic capacity. This program should include exercises of mobilization associated with slow static stretching regularly repeated at least twice a week. The muscle strength may increase with training based on the technique used, the voluntary commitment and the duration and frequency of sessions. And 'necessary that the subject, both at the beginning when it is already adapted, be trained regularly with at least two sessions per week. The loads must be gradually increased and the intensity, even for short periods, should be workout. Nor should it be simply that a break of two weeks to have recoverable regressions but with a regular pick-up. Particular emphasis will be given upon heating and the recovery period. Because resilience are minors, the elderly must meet recovery time more important than a young, especially in the case of particularly difficult sessions in terms of intensity and duration. In particular, avoid direct comparisons with younger subjects.

For former athletes who decide to resume business, it is appropriate to start from scratch in order to avoid damage especially to tendons and muscles. In old age is important if you want to practice regular physical activity before you start to undergo a thorough evaluation of the efficiency of various devices in order to prevent this practice will be resolved in damage to the body.

The psychological gymnastics, considering the frequent loneliness and depression with which older people are accustomed to live together, can and should be experienced as a time of socialization and communication essential. Often the creation of a group training is therefore a key element during physical activities that help to stimulate interest and emotional exchanges.

Important for the elderly is to do physical activity safely and this is first of all, considering their level of fatigue during exercise, this can be measured with instruments such as the electrocardiogram ECG, by measuring heart rate and it is always advisable to adopt a heart rate monitor for determining with more precision as well as its efforts to carry out physical security, for maximum benefit. The target heart rate (target heart rate, THR) is used to define how intense must be the year when the activities for the development of resistance. The target heart rate is the rate (beats per minute) at which a person must try to make your heart beat to have a training effect. In the elderly or people with heart this speed must be defined according to the instructions of your doctor. In this case, we recommend that you use the Borg Scale. It 'important to proceed gradually in increasing the targeted heart rate. Start doing the exercises at a level that does not feel stress, record your heart rate and proceed gradually increasing the frequency at each training session later. The lens may be 70-85% of maximum heart rate. Muscle power in older person is less than that of a young person, as well as speed, but the elderly tend to be more precise in his movements and compensates for these imbalances. The important fact is not how long it takes to perform an exercise, but its execution. The number of calories you should consume is 3500 kcal.

One way to estimate the degree of physical effort is the Borg: while the elder performs the exercises he quantifies the perception of effort that is, how heavy it seems that both the exercise, combining all the feelings of stress and fatigue perceives, the overall feeling of effort. While the customer performs a physical activity, watching a numbered scale that goes from 6 to 20: 6 means "no effort" and 20 means "maximal effort" and choose the number that best describes the level of intensity of his effort. This gives a good indication of the level of intensity of the activity taking place, and may use this information to increase or decrease the intensity. The client should try to assess their sense of effort as honestly as possible without considering the actual load not underestimate the physical but not over-estimate.

It is recommended that the development activities of the resistance is expected to gradually arrive at a 13 degree engagement, feeling that quite a physical effort, some people may feel this level of effort already walking on level ground, others when they run uphill. Both are right, only we can know what is the effort associated with a given physical activity. Resistance exercises are all those exercises that increase your heart rate

and breathing for a period of time sufficiently long (eg walking, running, swimming, cycling), you should develop their endurance gradually, starting with activities also short duration (eg 5 minutes). It is important to start from moderate levels of stress, especially if it is not long before physical activity. The aim must be to carry out activities that increase heart rate and breathing. Once you reach this level of effort to physical activity can be divided into periods of not less than 10 minutes during the day. When you are ready should the first time and then increase the level of effort, gradually increase the daily minutes of walking up to 30 more days or weeks when traveling long distances more then begin to rise gradually slopes steeper or walk or run faster. Examples of moderate endurance exercise with care for the elderly are swimming, gardening, cycling, sweeping or washing floors, while activities are resistant to high commitment climbing stairs, skiing, running. Development activities should not result in a resistance effort that can not speak, do not have to turn your head or cause chest pain. And it is advisable to warm up with light activity before the activities of resistance and conclude with a smaller phase of activity, after which it is also advisable to stretch, older people feel less thirsty with the passing of years and is therefore advisable to drink even if you are not thirsty, especially when it's hot.

In addition to the resistance also increase the strength is important, even small changes in muscle size can make a big difference in strength, especially in people who have lost a lot of muscle mass, you can have major improvements in the ability to rise from a chair or climbing the stairs. Exercises for strength development are such lift or push weights and must gradually increase the weight used. You can use wrist weights to your wrists or ankles, or bottles filled with water or actual weight. And it is advisable to do exercises for the development of strength at least twice a week. Never exercises the same muscles on consecutive days. Tissues such as tendons and joints and muscles must accustom themselves gradually to the load weight. It is best to start with a minimum weight (or 1 ½ kg) and then increase it gradually. This avoids the risk of injury. It is important to gradually increase the weight to increase strength. When you do an exercise for the force is necessary to repeat 8 to 15 times, then wait 1 minute to recover and then repeat. While waiting you can do stretching exercises for other muscles to increase muscle elasticity. Use 3 seconds to lift the weight, keep it in position for 1 second and then lower it in 3 seconds. Never let the weight fall suddenly. We must hear a strain of the heavy and very heavy (15-17 on the Borg scale) but not at full capacity. The weight is too heavy if you are unable to do for 8 times the exercise is too light and if it fails for more than 15 times. Stretch after strength exercises, the muscles warm, or already heated by at least moderate activity.

Do not hold your breath during strength exercises. Breathe normally. Holding your breath during exertion blood pressure changes, especially to people with cardiovascular disease. Exhale when you lift or push, inhale when you relax. And it is not having a normal muscle soreness for a few days but the sense of fatigue, joint pain or a feeling of excessive tension of muscles or tendons are not normal and indicate that you are exaggerating.

Discussion

Examples of strength exercises are: lateral raises to strengthen the muscles of the arms of the shoulders, rising from his chair with his hands crossed over his chest to strengthen the muscles of the abdomen and thighs, biceps flexing with weight to strengthen the muscles of the arm exercises plantar flexion (get up on pointe, without weight first, then ankle weights) for the triceps surae, triceps extension with weight and thrust to get up from his seat by appealing to the arm, or, knee flexion, hip , shoulder or extension of same.

In addition to its strength and muscle strength in the elderly we must aim to restore balance to prevent falls incalculable thus avoiding disability that could achieve the fall! Many strength exercises are also suitable for balance, adding a few changes like learning to keep a table or chair to increase your balance, keep a table with one hand and gradually keep only one finger, then try not to keep anything, if you feel steady on your feet without doing the exercises and keep your eyes closed, having always someone next door if you feel unstable.

How to increase the flexibility instead? Stretching (stretching) exercises after each strength and endurance, let them at least 3 times a week for at least 20 minutes per session, each exercise should be repeated 3-5 times in each session. Slowly stretch into the desired position and hold for 10-30 seconds. Rest and repeat stretching more. Always warm up before stretching exercises (for example, have them after the exercise of force or resistance or after a short walk with sweeping movements of the arms). The lengthening of the muscles can lead to damages that are not heated. Stretching (elongation) should never hurt, and in particular it must not hurt the joints. If you feel pain means that you are straining or stretching too much. And 'need to hear only a slight discomfort but not beyond. Never stretch to shots but always gradually. Legs and arms should be in an upright position and there should be no twists. There must always be a small part of tension in the joints but never excessive.

Conclusions

By 2050, the number of the EU population will grow by 70% ultra-sixty-five, while people over 80 by 170%. This will imply important implications for the 21 century should meet increased demand for service, adapt health systems to the needs of older people and at the same time ensuring that they remain viable for companies with a workforce that decreases

The main purpose will be to promote healthy aging but active older people in Europe, giving life to years and years to life because a greater number of years in good health means better quality of life, greater autonomy and independence and the ability to stay active. An aging population in good health also means less burden on health systems, as well as a reduction net of retirements for health reasons, consequently with a favourable impact on economic growth in Pil of Europe.

The European Union is now involved with all Member States to promote healthy aging through initiatives aimed at improving the health of older workers, children and young people, and prevent disease throughout the lifespan. through to practice motor and alimentation The EU will also seek to improve the living conditions of older people through sensitization to practice motor activities for the elderly

In conclusion we can say that physical activity, physiological in children, should be part of daily life at any age, of course if there are no ongoing diseases such as contraindicated. This, coupled with hygienic rules of life (food and smoking in particular), should not make everyone in marathon runners, only a small low-intensity activities, but with constant effort, such as a "jog" of no more than an hour, three times a week.

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THE EXAMINATION OF THE 4:4 GAME AT DIAMOND AND SQUARE

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ABSTRACT. Our study deals with one of the segments of a training of age group training. This is called 4:4 game, with a small side games with an identical staff number lifted from the area of games. Here, than in another little and big game's case, we may distinguish an alignment form with more types. The trade uses it with predilection and rings changes on it this types. We examined the two frequentest positions, the diamond and the square alignment form mostly. We compare these two positions based on the incidence of the technical elements and his implementation. During the measurement between the technical elements owed the good passing, the bad passing, the tackling and the ball losing. We examined 3 age groups in the course of our surveys (U-11-13 age groups) at a Hungarian second-class club and a first-class club. The examinations showed that we found a significant difference in the 11 year age groups in the case of the mending's, in the 12 year age groups in the case of the good and bad passes and at all technical elements in the case of the 13 years age groups. Furthermore we deducted smaller inferences the average based on results. In the case of the diamond alignment form necessary technical elements reported themselves more densely to the game with a more offensive ghost, while the square alignment form was more efficient at the defensive game It's not possible to separate the two line-up forms from each other sharply, in that during the game. In a certain measure, in the case of both positions took shape a positional play and moving away order-like.

Keywords: football, age group training, line-up, small side games

Introduction

The junior training in the football is a very important viewpoint, than in the case of all other sports, because the technical-tactical and conditioned elements acquired during the training are one of the bases of the adult career. „The most responsible and heaviest part of the trainer work is the dealing with the junior training. The deficiency of dealing with the children comes to light in the adult age mostly” (Tóth, Tóth jr., 2011) It's possible to bring up players- started from a little age entirely, built up gradually, spotlighting the multi-faceted training, taking into consideration the age group features, viewpoints and even special claim - who are able to hold out the domestic one, possibly in the international forefront equally. More roads may lead to the aim (for example continent or country properties). The syllabus may be different,

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but if the construction is uniform and was built a top each other, his efficiency may not be in a question. We have to acquaint the players with many kinds and type practices during the age group trainings apart from the individual technical practices (Tóth, Tóth jr., 2010, a,b), through the cooperation of the 2-3 players (Tóth, Tóth jr., 2010 c) until pass practices made in different formations (Szalai, 2000).

Then with time, we have to have it practiced equally these staff numbers in identical, staff number superiority and staff number disadvantage situations (Szalai, 1998) too. We have to have practiced equally these staff numbers in identical, staff number superiority and staff number disadvantage situations (Szalai, 1998) too. Becomes unambiguous so that the realization of game 4:4 games turns into inescapable one in the case of the little games, onto which gate, in line games or ball keeping may act with a character. (Tóth, Tóth jr., 2011). In our case the examined age groups went to the period of year 11-13 ages. Now we list those more capital viewpoints without the claim of the completeness, which are important events in the case of the given age groups and they influence the process of the upbringing education training.

Age group 4., U 11-12 year.

- the realization of the grounding of the football , preparation on to the big orbit game
- the forming of ball safety , the accurate execution of the technical elements
- common appearance of the technique and tactics
- the practice of a positional game and his knowledge
- the emphasized role of training games
- the period of the aerobic capacity speed up
- the sensitive period of the development of the velocity
- ball keeping with the development of the peripheral vision
- short pass small games, one or two tangent games
- compelling passes 3:1 and 3:in 2 forms
- game from 2:1, 7:7, to 8:8

Age group 5., U-13-14 year.

- the acquisition of a match experience , transition the special one preparing his period
- the accuracy and the quickness is technical basis requirement
- the intellectual characteristics are advanced to the tactical solutions and interplay
- small games from 1:1, according to the technique or an aim in differing staff numbers
- positioning the team's ball possession place exchanges without a ball, cross-motion, arrival into open space)
- positioning at the adversary's ball possession without a ball
- attacking movement with 3-4 player together

(Tóth, Tóth jr., 2011)

Aims

Aim that let us prove it, that in the cooperation of the four players the diamond alignment forms more successfully applicable opposite the square alignment.

Methods

This game is more important, because in a Futsal (Kis, Jakab and Hermans, 2008) and in a football at young groups (Bicskei, 1997), was a basic match line-up. In time, at the bigger groups it will be a small side of game. (Bicskei, 2008 a,b,c,d,e), witch may prepare the footballers for different game and match situation. Based on these, the importance of the game may not be in a question. But this, than all other games and a situation it's necessary to build up at a player and it is necessary to develop different abilities to the practices. The alignment forms of the different games may be different. Among other things these his variation may contribute to the multi-faceted training, but the different alignment forms may be more efficient at the other one in single situations. The trainers prefer different alignment forms hereby for the trade matter of discussion, which alignment it is possible to apply more efficiently in the different games. The trainers prefer different alignment forms, so it's a matter of discussion for the trade, which alignment it is possible to apply more efficiently in the different games. This isn't differently int he case of 4:4 games. The 2 frequentest alignment forms owes the diamond (1. figure) and the square (2. figure), concerned the positions slightly delayed his variants, according to the ranges of duties. Nowadays many people swears on the square alignment rather, that works better, than the diamond character position. We think, that the diamond alignment form working more efficiently all in the attack, all in the defence, because the number of the electoral opportunities bigger in the case of the passes, the covers are more effecient in terms of a positioning because of the latitudinal and abyssal divisions.

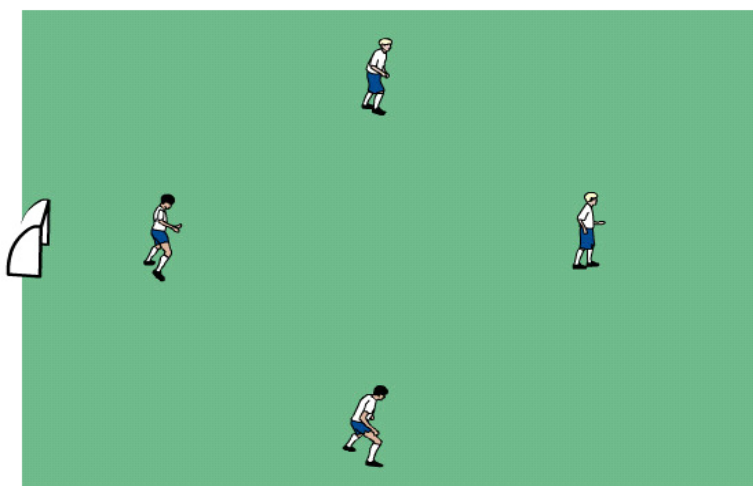


Fig. 1. The diamond alignment form

In the case of lozenge alignment we can see, that the players settle down in the area relatively proportionally. A defensive one (classically so-called sweeping one) player in a line, who do his position adequately defender and ensuring tasks. Tries to be shifted in width and to help the companion of the two extreme midfielders, who withdraw their part equally in defense and attacking. The player in the peak mainly an aggressor plays a role, but the role defending himself because of the abyssal resignation falls to him, his latitudinal motion though not only the defense, but arising may help in building.

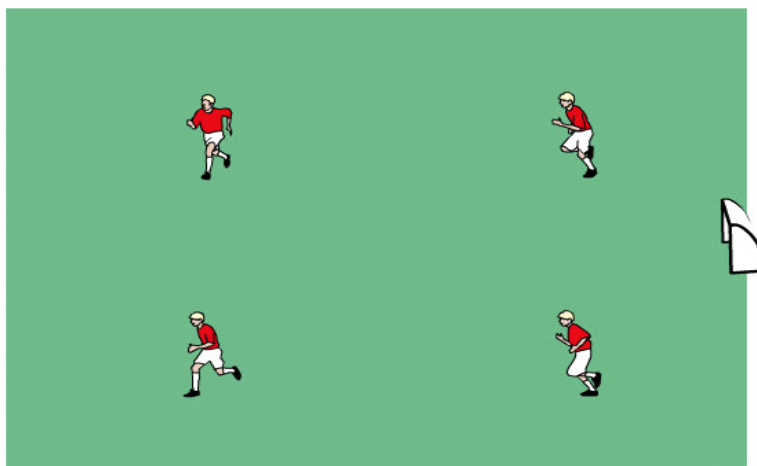


Fig. 2. The square alignment form

In the case of the square alignment two saving players and two more offensive players can be observed. Beside the role of defender and reducing area, the two defender players plays the role as attacker, since he manages to develop a staff number superiority situation in this case only quasi. Depends on that how the adversary's attack building is going on, on which side, from the aggressors' part the resignation is essential, concerned with being shifted and the ensuring the defense begins in the offensive line already.

Successful offensive play only in that case can be developed, if they try to play the playground with continuous moving, they assure each other of the side of the defense continuously in a depth and width.

Hypothesis

Our opinion in the cooperation of the four players the lozenge alignment form more successfully applicable opposite the square alignment, which one presents himself equally in the technical implementations. We did our cross-section examinations in the two different clubs (a club with a first class and with a second- class), in which case of these we examined in the 11-13 year age groups the diamond the efficiency of an

alignment form (N=48, 12 team). We grouped concerned with each other against each other in all cases in 4:4 games, without a goalkeeper, 1X2 employed for a goal. We grouped with an identical ability and level of knowledge players with each other or against each other based on the conditioned and technical tests. We examined the given team's alignment efficiency indirectly through the technical implementations. On the one hand we selected the size of the goal because of the measurement be concentrated onto the team of four only and we exclude the goalkeeper's influence, his role from the potential field play. On the other hand, it is more concentrated is implementation of the technique. From among the 2 teams, one of played in the square alignment form, one of played in the diamond alignment form the 1X4 minute matches. If the ball left it the playground (30x20m), the game may have continued with kicking in, which one played with adult size 5 ball.



Fig. 3. The 4:4 games with diamond-square alignment form

We indicated on the evaluative sheet the result, the number of the good and bad passes, the number of the tackling and ball losing. After the mach we applied 1:1 resting proportion, changed the alignments and the teams played again 1X4 minute match against each other. We did the distinctness examination with two sample t-test in the processing of the data. Where the value of the significance was $p < 0,05$. We did the calculations with the help of SPSS program.

Results

In our first table we present the aggregated average of technical elements in case of different age groups, in which case the results of the diamond and square alignment figures jointly.

Table 1. Basic statistic about age group

			Statistics			
Age group			good pass	bad pass	tackling	lost ball
	N	Valid	0	0	0	0
		Missing	9	9	9	9
U11	N	Valid	32	32	32	32
		Missing	0	0	0	0
	Mean		11,03	6,00	6,31	7,25
	Median		11,00	6,00	6,00	7,00
	Mode		12	6	6	7
	Std. Deviation		1,694	1,191	1,857	1,016
U12	N	Valid	32	32	32	32
		Missing	0	0	0	0
	Mean		13,06	4,91	6,66	8,84
	Median		13,00	5,00	7,00	9,00
	Mode		12	5	7	9
Std. Deviation		2,805	1,254	1,753	1,706	
U13	N	Valid	32	32	32	32
		Missing	0	0	0	0
	Mean		17,34	5,44	5,88	7,72
	Median		17,50	6,00	6,00	7,50
	Mode		18	6	5	7
Std. Deviation		2,179	1,435	1,454	1,420	

From the table you can see the basis statistics calculations (average, standard deviation, median, etc.) It can be seen unambiguously, that by the increase of the age group the numbers of the technical elements was growing too.

After the watching of 11 year old players we received the next results:

Table 2. The examination of the 11 year age group

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
good pass	Equal variances assumed	,012	,913	-,308	30	,760
	Equal variances not assumed			-,308	29,970	,760
bad pass	Equal variances assumed	,268	,609	-1,514	30	,140
	Equal variances not assumed			-1,514	28,306	,141
tackling	Equal variances assumed	,606	,442	2,719	30	,011
	Equal variances not assumed			2,719	29,248	,011
lost ball	Equal variances assumed	2,532	,122	,343	30	,734
	Equal variances not assumed			,343	28,620	,734

As the table shows it, significant difference can be discovered in the case of the tackling.

Table 3. The results of the 11 year age group

Group Statistics					
	Alignment form	N	Mean	Std. Deviation	Std. Error Mean
good pass	square	16	10,94	1,692	,423
	diamond	16	11,13	1,746	,437
bad pass	square	16	5,69	1,302	,326
	diamond	16	6,31	1,014	,254
tackling	square	16	7,13	1,821	,455
	diamond	16	5,50	1,549	,387
lost ball	square	16	7,31	1,138	,285
	diamond	16	7,19	,911	,228

From the results can be seen, that in the case of the good passing the difference is minimal for the good of the diamond alignment form. The number of the bad passes shows a lower value on average in the case of the square alignment form. With this in parallel the number of the tacklings are bigger in the square alignment too, the ball losing shows an identical value at both groups. Based on the averages, in the one year older age group can be found already bigger differences.

Table 4. The examination of the 12 year age group

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
good pass	Equal variances assumed	,072	,790	-6,605	30	,000
	Equal variances not assumed			-6,605	29,908	,000
bad pass	Equal variances assumed	,005	,945	-2,613	30	,014
	Equal variances not assumed			-2,613	29,999	,014
tackling	Equal variances assumed	1,474	,234	-1,773	30	,086
	Equal variances not assumed			-1,773	26,890	,088
lost ball	Equal variances assumed	,417	,523	-,512	30	,612
	Equal variances not assumed			-,512	29,670	,613

As you can see from the table, that here can be discovered significant difference in the case of the good and bad passing as opposed to the previous age group.

In the case of the good passes the difference is much bigger for the good of the diamond alignment form. Similarly to the previous age group, in the square alignment can be found the more favorable value in terms of the bad passes. On the other hand, the number of the tackling strengthens the diamond alignment form in this age group. The ball losing show now bigger difference, than in the previous age group, right quasi with only three tenth, in favor of the square form.

Table 5. The results of the 12 year age group

Group Statistics					
	Alignment form	N	Mean	Std. Deviation	Std. Error Mean
good pass	square	16	10,94	1,769	,442
	diamond	16	15,19	1,870	,467
bad pass	square	16	4,38	1,147	,287
	diamond	16	5,44	1,153	,288
tackling	square	16	6,13	1,962	,491
	diamon	16	7,19	1,377	,344
lost ball	square	16	8,69	1,815	,454
	diamond	16	9,00	1,633	,408

Interesting results can be seen in the case of the one year older age group.

Table 6. The examination of the 13 year age groups

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
good pass	Equal variances assumed	,359	,554	-3,247	30	,003
	Equal variances not assumed			-3,247	29,794	,003
bad pass	Equal variances assumed	,169	,684	2,073	30	,047
	Equal variances not assumed			2,073	29,658	,047
tackling	Equal variances assumed	1,909	,177	-2,660	30	,012
	Equal variances not assumed			-2,660	27,775	,013
lost ball	Equal variances assumed	1,736	,198	-2,252	30	,032
	Equal variances not assumed			-2,252	27,371	,033

Table 7. The results of the 13 year age groups

Group Statistics					
	Alignment form	N	Mean	Std. Deviation	Std. Error Mean
good pass	square	16	16,25	1,983	,496
	diamond	16	18,44	1,825	,456
bad pass	square	16	5,94	1,289	,322
	diamond	16	4,94	1,436	,359
tackling	square	16	5,25	1,125	,281
	diamon	16	6,50	1,506	,376
lost ball	square	16	7,19	1,109	,277
	diamond	16	8,25	1,528	,382

Here, than in the overtaking two cases, in the diamond alignment form it was possible to count more good passing. The number of the bad passes are more favorable in the case of the diamond alignment form. The tacklings appeared more frequently in the diamond alignment form too, but the number of the ball losing's are in an average bigger, than in the case of square alignment.

Table 8. The examination of the aggregated results of the age groups

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
good pass	Equal variances assumed	1,597	,210	-3,272	94	,001
	Equal variances not assumed			-3,272	92,569	,002
bad pass	Equal variances assumed	,361	,550	-,824	94	,412
	Equal variances not assumed			-,824	93,638	,412
tackling	Equal variances assumed	,423	,517	-,655	94	,514
	Equal variances not assumed			-,655	92,662	,514
lost ball	Equal variances assumed	,056	,814	-1,324	94	,189
	Equal variances not assumed			-1,324	93,962	,189

In the examination of the aggregated results of the age groups his case the good passes we may find a significant difference.

Table 9. The aggregated results of the age groups

Group Statistics					
	Alignment form	N	Mean	Std. Deviation	Std. Error Mean
good pass	square	48	12,71	3,094	,447
	diamond	48	14,92	3,506	,506
bad pass	square	48	5,33	1,404	,203
	diamond	48	5,56	1,319	,190
tackling	square	48	6,17	1,814	,262
	diamond	48	6,40	1,608	,232
lost ball	square	48	7,73	1,526	,220
	diamond	48	8,15	1,557	,225

Discussions

Observable, that at what we applied it in older players' case the 4:4 game, the number of the technical elements and its average was growing, except for between the 11 and 12 year age groups, where the square is the bad passing in an alignment and in the case of the taking away of the ball depreciation can be experienced. The changes of the average values between the age groups is due to the differences between the age groups, which is due to the grew for velocity, for the more accurate and more dynamic implementations and not in a last row for the mature interpretation of rules. Considering the age groups in terms of the good passes, in the case of all three age groups the taller value the diamond occurred in an alignment. We may not declare this already unambiguously in the case of the rest of the technical elements.

The bad passes in the first two age groups the square alignment form a lower value is showed, but in the case of the eldest ones already the diamond alignment form we may find the best value, all in terms of an age group.

The number of the taking away of the ball the square form is more appropriate for an alignment form at year 11, but in the next two groups the diamond alignment form is better in this case. Important to mention that we found a significant difference in the 11 year age groups at this technical element only.

The group of the ball losing yielded one of the most interesting results, since both alignments produced a similar achievement in the of younger kids, the smaller difference can be attributed in favor of the diamond alignment. It was possible to produce less ball losing in the square alignment form in both cases in the following two age groups. It is possible to deduce from all these that the square one is an alignment that esteem the better and losing ball less, but the number of good passes and the opportunity of the transmission is smaller contrary to the diamond alignment, therefore, the diamond alignment form is more offensive than the other one. Follows from this, it may have occurred because of this that the more attractive game may entail a bigger mistake proportion, that the number of the bad passes it a taller value was showed in two age groups onto the disadvantage of the diamond alignment. The number of the potential taking away the ball may be growing in favor of the square alignment hereby, but in the case of the elderly these two elements already strengthens the diamond alignment form, so the deep technical implementations may compensate for the potential mistake opportunities in the case of players with the bigger experience in taking action.

We may declare it looking at the games with an exterior eye, that in the case of the diamond alignment form the abyssal passes received a more emphasized role to forming of the situations, which alignment form appeared as the position keeping game. The practice showed it in the case of the square alignment, that in almost all cases, it can be reached a goal or a goal situation with a moving away system to develop diamond character positions and in the bigger part of the cases the square alignment causes the latitudinal one because of abyssal positioning. Important to observe that it was not possible to manifest a significant difference in all cases statistically between the groups/alignment forms, - so our hypothesis proved true partly only -, despite this the practice showed it, that even the smaller differences case produced field superiority, which ones present in the final result of the battles. Let us give it another thought into the practice, a team, if only minimally, can produce more ball carrying on a match, it can achieve dot or dots with this. Spotlighting the saying appearing funny even sometimes that it is necessary to shoot more with only one always the adversary, the tactics which cannot be carried out actually without the manifestations with an offensive ghost.

Conclusions

As a summary can be related, that significant difference cannot be manifested in all cases statistically between the two alignment forms. Based on the average values of numbers and the examination of distinctness the diamond alignment appears more efficient in respect of attack, while the square position is appropriate for the game with

a more successful defensive character though. We may have observed that the two alignment forms may appear in a mixed form during the game during the measurements, since the moving away order-like game brought successful implementations only in the case of the square alignment, while the position keeping appeared more frequently in case of the diamond alignment in contrast with the other position. Hereby can be related, that in the case the education and the practicing both alignment forms are recommended, so the versatile training will be provided in accordance. During the game against each other the choice may fall in that direction among others (in case of suitable practice), which adjusts to the given team's tactics better. We recommended cordially for the trainers dealing with the children, hoping that we contributed with our work to training more successful footballer supply.

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INFLUENCE OF ACUTE OZONE AND HYPOBARIC HYPOXIA EXPOSURE ON THE SERUM OXIDANT/ANTIOXIDANT BALANCE IN PHYSICAL EXERCISE

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ABSTRACT. *Aims:* The influence of acute O₃ and hypobaric hypoxia exposure on the serum oxidant/antioxidant balance under rest and exercise conditions was studied. *Material and methods:* The research was performed in 5 groups of white male Wistar rats (n = 10 animals /group) with a weight of 280-300 g: Group I – control group, sedentary rats under normoxia conditions; Group II – sedentary rats, acutely exposed to O₃; Group III – animals acutely exposed to O₃, followed by exercise under normoxia conditions; Group IV – sedentary rats exposed to acute combined stress: acute O₃ + hypobaric hypoxia (corresponding to a 2500 m altitude); Group V – animals exposed to acute combined stress (acute O₃ + moderate hypoxia), followed by exercise (under normoxia conditions). The exposure to moderate hypoxia was for 3 days, 20 hours/day at values of 2500 m using hypoxic rooms. The rats were exposed to ozone for 3 days, 5 min/day. Groups III and V were trained daily for 3 days under normoxia conditions by swimming. In order to determine the indicators of the oxidant/antioxidant balance, venous blood samples were taken from the retro-orbital sinus. In the third day were determined: malondialdehyde (MDA), protein carbonyls (PC), hydrogen donor capacity (HD) and total sulfhydryl (thiol) group content (SH). *Results:* that acute exposure to combined stress: O₃ and hypobaric hypoxia influences the serum oxidant/antioxidant (O/AO) balance, with the increase of oxidative stress (OS) on account of PC in sedentary animals (group IV) compared to controls, and stimulates the AO defense capacity on account of HD in both sedentary animals (group IV) and animals undergoing physical exercise (group V) compared to the controls. *Conclusions:* Acute O₃ and hypobaric hypoxia exposure causes an increase in OS on account of MDA and PC in sedentary animals. Physical exercise after acute O₃ and hypobaric hypoxia exposure determines, compared to sedentary animals exposed to the same factors, an increase in AO defense on account of HD and a decrease in AO on account of SH groups. Associated O₃ and hypobaric hypoxia exposure has modulatory effects on the serum O/AO balance in sedentary animals and animals undergoing physical exercise.

Keywords: acute exposure, hypobaric hypoxia, ozone, oxidant/antioxidant balance, effort.

REZUMAT. **Influența expunerii acute la ozon și hipoxie hipobară asupra balanței serice oxidanți/ antioxidanți în efort fizic.** *Obiective:* S-a studiat influența expunerii acute la ozon și hipoxie hipobară asupra balanței serice oxidanți/ antioxidanți în condiții de repaus și efort. *Materiale și metode:* Cercetările au fost efectuate pe 5

loturi de șobolani albi masculi rasa Wistar (n = 10 animal/ lot), cu greutate de 280-300 g: Lotul I. – control, sedentari în condiții de normoxie; Lotul II. – sedentari, expuși acut la ozon (O₃) ; Lotul III. – animale expuse acut la O₃, urmat de efort în condiții de normoxie; Lotul IV. – sedentari expuși la stres combinat acut: O₃ acut + hipoxie hipobară (corespunzător altitudinii 2500 m); Lotul V. – animale expuse la un stres acut combinat (O₃ acut + hipoxie moderată), urmat de efort (în condiții de normoxie); Expunerea simulată s-a făcut la camera hipobarică timp de 3 zile, 20 de ore pe zi la 2500 m. Expunerea la ozon s-a făcut timp de 3 zile, zilnic 5 min. Loturile III. și V. au fost antrenate zilnic timp de 3 zile în normoxie prin înot. În vederea determinării indicatorilor balanței oxidanți/ antioxidanți (O/ AO) s-au recoltat probe de sânge venos din sinusul retroorbital. În ziua a 3-a s-au determinat: malondialdehida (MDA), proteinele carbonilate (PC), capacitatea de donori de hidrogen (DH) și conținutul de grupări sulfhidril totale (SH). *Rezultate:* Expunerea acută la un stres combinat: O₃ și hipoxie hipobară influențează balanța cu creșterea stresului oxidativ (SO) pe seama PC la animale sedentare (lotul IV), față de martori, și stimulează capacitatea de apărare AO pe seama DH atât la animale sedentare (lotul IV), cât și la cele supuse efortului fizic (lotul V), față de martori. *Concluzii:* Postexpunerea acută la O₃ și la hipoxie hipobară determină creșterea SO pe seama MDA și PC la animale sedentare. Efortul fizic efectuat postexpunere acută la O₃ și la hipoxie hipobară determină, față de animale sedentare expuse la aceiași factori, creșterea apărării AO pe seama DH și scăderea AO pe seama grupărilor SH. Expunerile asociate O₃ și hipoxie hipobară are efecte modulatorie asupra balanței O/AO la animale sedentare și animale supuse efortului fizic.

Cuvinte cheie: *expunere acută, hipoxia hipobară, ozon, balanța O/AO, efort.*

Introduction

Many researches have investigated physiological oxidative-nitrosative stress (ONS) under experimental conditions and in human subjects, in relation to physical exercise, depending on its intensity, duration (acute or chronic) and the sport discipline; in amateurs and athletes, related to the competitive calendar; depending on environmental factors (air pollutants, temperature, atmospheric pressure, radiation); psychoemotional factors; nutrition; nutritional and non-nutritional antioxidant supplementation.

The subject was approached by more than 300 original studies published starting with 1978 (Fisher-Wellman et al., 2009).

Ozone (O₃) is an unstable gas, present in small amounts in the atmosphere (0.03%), generated by natural photochemical reactions or produced artificially. It is a non-radical reactive oxygen species with a pro-oxidant effect (Halliwell, 1991). O₃ has many beneficial biological effects: analgetic, myorelaxant, antiinflammatory, antibacterial, antiviral and antifungal, immunomodulatory, improving peripheral circulation and stimulating the function of organs and systems. It is used for the therapy of locomotor disorders, cancer, hepatitis C; in food and tobacco industry; in zootechny for water

desinfection and soil decontamination. The increase in O₃ concentration in the soil can cause negative respiratory and ocular effects and photochemical oxidant smog can result, which affects the quality of air and climate (Olinescu, 1994; Tache, 2001; Țăran, 2010).

Altitude exposure constitutes ONS, the sources of reactive O₂ and N₂ species (RONS) being the alteration of the mitochondrial respiratory chain, membrane and cytosolic changes, endothelial cell changes, as well as lipid and protein disturbances. These are caused by hypobaric hypoxia, UV radiation and possibly, temperature variations, dehydration and nutritional deficiency. Oxidative metabolism is altered, and anaerobic metabolism is activated (Tache, 2000).

Our previous experimental researches (Ugron et al., 2011) on the effect of acute O₃ pre-exposure and the reduction of maximal exercise capacity, as well as on the effect of acute O₃ and moderate hypobaric hypoxia pre-exposure with the significant increase of maximal exercise capacity, made us study the acute biochemical changes in the O/AO balance under the same conditions, considering ONS generated by exercise and environmental factors: acute O₃ and hypobaric hypoxia.

Aims

The influence of acute O₃ and hypobaric hypoxia exposure on the serum O/AO balance under rest and exercise conditions was studied.

Material and methods

The researches were performed in the experimental laboratory of the Department of Physiology of the "Iuliu Hațieganu" University of Medicine and Pharmacy Cluj-Napoca, in 5 groups of white male Wistar rats (n=10 animals/group), with a weight of 280-300 g, maintained under adequate vivarium conditions. The animal protection legislation in force was observed during the experimental researches.

Groups

The groups were divided as follows:

- Group I – control group, sedentary rats under normoxia conditions;
- Group II – sedentary rats, acutely exposed to O₃;
- Group III – animals acutely exposed to O₃, followed by exercise under normoxia conditions;
- Group IV – sedentary rats exposed to acute combined stress: acute O₃ + hypobaric hypoxia (corresponding to a 2500 m altitude);
- Group V – animals exposed to acute combined stress (acute O₃ + moderate hypoxia), followed by exercise (under normoxia conditions).

Methods

- a) *The exposure to acute moderate hypoxia*

The exposure to moderate hypoxia was for 3 days, 20 hours/day at values of 2500 m, pO_2 – 117 mmHg, using hypoxic rooms from the Experimental Laboratory of the Department of Physiology.

b) *The exposure to ozone*

The rats were exposed to ozone for 3 days, 5 min/day at values of 0.5 ppm, according to EU norms, using an AIR O₃NE Labor apparatus (SC Triox SRL).

c) *Exercise test*

Groups III and V were trained daily for 3 days under normoxia conditions by swimming in the swimming pool.

d) *Exploration of the oxidant-antioxidant balance*

Biochemical determinations were performed in the Laboratory for the Study of Oxidative Stress of the Department of Physiology of the "Iuliu Hațieganu" University of Medicine and Pharmacy Cluj-Napoca.

In order to determine the indicators of the oxidant/antioxidant balance, venous blood samples were taken from the retro-orbital sinus. From the centrifuged blood, the serum was separated for the determination of these indicators. The analyzed moment was day 3.

The following oxidative stress indicators were determined:

- malondialdehyde (MDA) (the fluorescence dosage method, according to Conti, 2001). The concentration values are expressed in *nmol/ml*.
- protein carbonyls (PC) (determination of protein carbonyls according to Reznick, 1994). The concentration values are expressed in *nmol/ml*.

The following antioxidant defense indicators were determined:

- hydrogen donor capacity (HD) (dosage method according to Janaszewska, 2002). The values were expressed as per cent of free radical inhibition (*i%*);
- total sulfhydryl (thiol) group content (SH) (determination of SH groups according to Hu, 1994). The values are expressed in $\mu\text{mol/ml}$.

- e) *Statistical analysis* was performed using SPSS 19.0 and Microsoft Excel. The level of statistical significance was set at $p \leq 0.05$.

Results

1. *The descriptive statistical analysis for the indicators of the oxidant/antioxidant (O/AO) balance* is shown in Table 1.
2. *Comparative statistical analysis of the indicators of the O/AO balance*

The indicators of the O/AO balance in the animals undergoing physical exercise under normoxia conditions after O₃ and hypobaric hypoxia exposure were compared. The majority of the comparisons were significant (Table 2).

Table 1. Descriptive statistical parameters of the O/AO balance in the studied groups

Indicators of the oxidant/antioxidant balance	Group	Mean	Std. Deviation	Std. Error
MDA (nmol/ml)	Group I	2.18	0.16	0.08
	Group II	3.30	0.24	0.12
	Group III	4.62	0.16	0.08
	Group IV	3.29	0.14	0.07
	Group V	4.83	0.36	0.18
PC (nmol/mg prot)	Group I	1.23	0.07	0.03
	Group II	1.24	0.12	0.06
	Group III	1.86	0.08	0.04
	Group IV	1.50	0.12	0.06
	Group V	1.67	0.18	0.09
DH (inhibition %)	Group I	37.70	1.77	0.88
	Group II	35.76	1.69	0.84
	Group III	31.59	1.28	0.64
	Group IV	39.59	1.20	0.60
	Group V	39.86	1.23	0.61
SH groups	Group I	0.16	0.01	0.007
	Group II	0.13	0.01	0.006
	Group III	0.12	0.01	0.009
	Group IV	0.14	0.01	0.005
	Group V	0.08	0.01	0.007

Table 2. Comparative statistical analysis of the indicators of the O/AO balance in the groups of animals undergoing physical exercise after ozone and hypoxia exposure

Group A	Group B	MDA	PC	DH	SH
Group I	Group III	.000	.000	.001	.028
Group I	Group V	.000	.004	.094	.000
Group III	Group V	.337	.110	.000	.007

The indicators of the O/AO balance in the animals undergoing physical exercise after ozone exposure under normoxia or hypoxia conditions were compared. The majority of the comparisons were significant (Table 3).

Table 3. Comparative statistical analysis of the indicators of the O/AO balance in the groups of sedentary animals exposed to ozone and hypoxia

Group A	Group B	MDA	PC	DH	SH
Group I	Group II	.000	.915	.163	.034
Group I	Group IV	.000	.010	.128	.144
Group II	Group IV	.971	.024	.010	.226

3. Correlations for the indicators of the serum O/AO balance by groups

Pearson r correlation coefficients between the indicators of the serum O/AO balance in each group of animals are presented. Significance was considered for $p \leq 0.05$ and $p \leq 0.01$.

Table 4. Correlation between the indicators of the O/AO balance in the studied groups and significance

Indicators		Group I.	Group II.	Group III.	Group IV.	Group V.
MDA - PC	r	0.943	-0.978*	0.94	0.792	0.648
	p	0.057	0.022	0.06	0.208	0.352
MDA - DH	r	-0.835	0.689	-0.508	.995**	0.724
	p	0.165	0.311	0.492	0.005	0.276
MDA - SH	r	0.934	0.116	-0.815	0.108	-0.105
	p	0.066	0.884	0.185	0.892	0.895
PC - DH	r	-0.743	-0.555	-0.67	0.808	0.935
	p	0.257	0.445	0.33	0.192	0.065
PC - SH	r	.994**	0.042	-0.629	0.165	-0.575
	p	0.006	0.958	0.371	0.835	0.425
DH - SH	r	-0.676	0.798	0.463	0.201	-0.248
	p	0.324	0.202	0.537	0.799	0.752

**Significance for $p \leq 0.01$

Discussion

In sedentary animals, acute O₃ exposure (group II) causes a significant increase in MDA and a significant decrease in SH groups compared to the controls (group I). The association of acute O₃ and hypobaric hypoxia exposure (group IV) determines a significant post-exposure increase in OS on account of MDA and PC compared to the controls (group I). The comparative analysis of the indicators of the serum O/AO balance for the 2 groups shows that acute exposure to combined stress: O₃ and hypobaric hypoxia (group IV), induces a significant increase in PC and HD compared to the control group exposed to O₃ alone (group II).

In animals undergoing physical exercise after acute O₃ exposure (group III), a significant increase in OS on account of MDA and PC, and a significant decrease in AO defense on account of HD and SH groups are found compared to the controls

(group I). The association of acute O₃ and hypobaric hypoxia exposure before exercise (group V) determines a significant increase in OS on account of MDA and PC and a significant decrease in AO defense on account of HD and SH groups compared to the controls (group I), changes similar to those found after exercise following O₃ exposure. The comparative analysis of the indicators of the serum O/AO balance for the 2 groups of animals undergoing physical exercise shows that the association of acute O₃ and hypobaric hypoxia pre-exposure (group V) causes a significant increase in HD and a significant decrease in SH groups compared to the group acutely pre-exposed to O₃ alone (group III).

The analysis of the correlations between the indicators of the serum O/AO balance evidences significant correlations in the sedentary animals between PC and SH in group I, between MDA and PC in group II, and between MDA and HD in group IV.

Our results show that acute exposure to combined stress: O₃ and hypobaric hypoxia influences the serum O/AO balance, with the increase of OS on account of PC in sedentary animals (group IV) compared to controls, and stimulates the AO defense capacity on account of HD in both sedentary animals (group IV) and animals undergoing physical exercise (group V) compared to the controls.

Our researches can explain the increase in the maximal exercise capacity of animals after combined stress exposure (Ugron et al., 2011), which can be attributed to the increase in HD evidenced in the same groups of animals. Hypoxic O₃ preconditioning has the most significant effects on the increase in maximal exercise capacity, which can be due to the protective effects of O₃ on skeletal muscle during exercise and exercise-induced oxidative stress via glutathione, heme-oxygenase-1 (HO-1) and metallothionein, which mediate antioxidative capacity (Saxena, 2010).

The acute exposure to associated environmental factors, O₃ and moderate hypobaric hypoxia, could be recommended for the improvement of physical performance and AO defense capacity in athletes.

Conclusions

1. Biochemical changes in the serum O/AO balance occur rapidly after acute exposure to pro-oxidant environmental factors.
2. Acute O₃ exposure determines an increase in OS in sedentary animals on account of MDA.
3. Acute O₃ and hypobaric hypoxia exposure causes an increase in OS on account of MDA and PC in sedentary animals.
4. Physical exercise after acute O₃ exposure induces an increase in OS on account of MDA and PC, and a decrease in AO defense capacity on account of HD and SH groups.
5. Physical exercise after acute O₃ and hypobaric hypoxia exposure determines, compared to sedentary animals exposed to the same factors, an increase in AO defense on account of HD and a decrease in AO on account of SH groups.

6. Associated O₃ and hypobaric hypoxia exposure has modulatory effects on the serum O/AO balance in sedentary animals and animals undergoing physical exercise.

Mention

This paper is based on researches for the first author's doctoral thesis.

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ARGUMENTS FOR PROMOTING THE RIGHT TO PRACTICE SPORTS AS A FUNDAMENTAL RIGHT

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ABSTRACT. The theme of this article covers the benefits of sport for society in general, but also the provisions of Romanian Law no. 69/2000 on Physical Education and Sport, as subsequently amended, as well as all the relevant Romanian legislation arising from the provisions of European Union (EU) law on the subject, in particular The White Paper on Sport and the Charter of Fundamental Rights of the European Union, documents which entered into force pursuant to the Treaty of Lisbon. Last but not least, the article debates the possibility of enhancing the importance of practicing physical education and sport as an inherent human right.³

Keywords: sport, Physical education, fundamental rights and liberties, natural law

REZUMAT. Câteva argumente în vederea valorizării dreptului de a practica sportul ca drept fundamental al omului. Studiul de față își propune să prezinte beneficiile sportului în societate, dar și prevederile Legii nr. 69/2000 a educației fizice și sportului, cu modificările ulterioare, paralel cu legislația română izvorâtă din acquis-ul comunitar, în special din Cartea albă a sportului și Carta drepturilor fundamentale a Uniunii Europene. Într-un final, articolul pune în discuție încurajarea practicării sportului și educației fizice ca și un drept fundamental al omului, având în vedere, înainte de toate, articolul 1 din Carta Internațională UNESCO privind educația fizică și sportul.⁴

Cuvinte cheie: sport, educație fizică, drepturi și libertăți fundamentale, drept natural

*„Play is a uniquely adaptive act,
not subordinate to some other adaptive act,
but with a special function of its
own in human experience.”*

Johan Huizinga

The sporting phenomenon – a significant social phenomenon

Every individual is keen on developing speculations and debates regarding the causes, consequences and even the content itself of various phenomena and processes that he or she might encounter in daily life. The most probable outcome of such an

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⁴ The present paper is an updated version of the paper entitled *Practicing sports as a fundamental right* by Voicu A.V, Fuerea A, Visoiu D.F, Sustaq Z.D, Bocsa M. I presented at the 17th International Sports Law Congress IASL 2011 in Moscow, 27-30 September 2011.

endeavor would most probably be that of referring to these subjects from different perspectives that is, ascertaining different point of views – subjectivity owing, in this case, mainly to conditional experience and common sense. Therefore, one must position himself in a position that claims a prudent attitude – if not total rejection – towards intuition, speculation, horse sense (the fundamentals of common sense), and strive for the rigors of the scientific method.

It is thought that human rights are an ideological projection in order to justify certain social actions, a philosophy, a concept on the world and the existence. Human rights are, foremost, a sociology of contemporary life, inasmuch that they encompass facts, phenomena, social processes and relationships alike, mentalities, states of mind, imagery, representations, interests and perceptions. Max Weber spoke of the design of the world and man's place in it. The topic on human rights is often reduced to a legislative concept, and human rights education bears a technical nature – law articles, pros and cons debates in sustaining a certain idea, case analysis etc. In this particular context, one cannot ignore the existence of a sporting phenomenon, which has developed into an important social phenomenon. Its importance is foremost justifiable by man's dependence on his physiological and social needs to participate in organized or random sporting activities, also used – more recently – with the aim of satisfying a professional avocation (professional sports).

We see it imperative to remind ourselves that man “is not static, he is profoundly dynamic, he is a living reality in a tireless state of wanting, restless until reaching his goal” (Mărgineanu N., 1999, p. 78). It is from this psychology-of-the-(dynamic)-person perspective that we will be able to appreciate the three forms of human development: biological, dynamic and psychological, reaching the conclusion that these are the working fundamentals of the motivational theories. Whether one agrees or not – ultimately confident in the social-cultural calling of the human nature – man is concurrently nature and culture. That is why one can argue that the need to exert physical activity – viewed as a means of physical education and sport, whether professional or amateur – is also a biological need that is integrated in man's various organic necessities, as are those “linked to the assimilation and dissimilation process, or anabolism and catabolism, such as hunger, thirst and breathing, on one hand, and the necessity to preserve the species, or sexual instinct, on the other” (Mărgineanu N., 1999, p. 79).

Every single need-related work motivation theory drawn up by authors such as Maslow, Clayton Alderfer (ERG theory – Existence, Relatedness, Growth), McClelland (Gary J, 1996) (Necessities theory), Faverge J.M (Faverge J.M, 1976), states that until elementary necessities, more urgent and pressing, have not been fulfilled, all others remain in the background; as one category of needs is satisfied, another, superior one, is sought after.⁵ This justifies our statement that human

⁵ For example, according to Maslow, the needs hierarchy is as follows: 1. physiological needs 2. security needs 3. social needs 4. self-esteem needs 5. self actualization needs.

needs have been reevaluated, in time, as being inherent rights of the human being – transposed in generations of fundamental human rights⁶.

Therefore, taking into consideration that *the need to practice sports is an inherent right of the human being*, the European Sports Minister of the Council of Europe has already ascribed a **legal value** to this need, appreciating it as a *fundamental right* through the European Sport for all Charters in 1975. The first article stated that *every individual shall have the right to participate in sport*. “From that date on, sport policies in Europe were endowed with a common programme based on the conviction that the values of sport would contribute to the fulfilment of the ideals of the Council of Europe”⁷ Later, in 1992, inspired by the same charter, the European Sport Charter was adopted with the aim of providing a common set of principles for the European countries. The Charter was completed afterwards with the Code of Sport Ethics, promoting the principle of fair play⁸.

On international level, in 1978 the General Conference of the UNESCO adopted the International Charter of Physical Education and Sport, which expressly states in its first article that the practice of sport is a fundamental right for all.

Similarly, a child’s right to play has been enshrined in article 31 of the Convention on the Rights of the Child, which recognizes “the right of the child to rest and leisure, to engage in play and recreational activities appropriate to the age of the child”.

“Several other United Nations instruments also acknowledge the importance of access to and participation in sport, such as the Convention on the Elimination of All Forms of Discrimination against Women. Similarly, ILO Conventions Nos. 138 and 182 concerning child labor require Governments to establish policies for the rehabilitation of child laborers. Here, sport is considered an effective policy tool.”⁹

In spite of these international instruments, the right to sport and play is often denied or neglected, often gender and ability based discrimination. It is also frequently due to political neglect of the importance of sport in society, exemplified by the decline in spending on physical education and the lack of appropriate spaces and resources necessary for sport.¹⁰

Human rights are inherent to the human being, “taken individually or as part of a predetermined social group” (Niciu M. I, 1997, p. 196). Human rights are fundamental to our nature. The deprivation or denial of these rights amount to the inability to exist

⁶ Intangible rights (e.g. the right to life, the right to have a personal development), conditional rights (e.g. the right to education, the right to privacy), indirect rights (e.g. foreigner rights) and the so-called third generation rights (Augustin Fuerea, „*Introducere în problematica dreptului internațional al drepturilor omului*” (*An Introduction into the Notion of International Human Rights Law*), Editura Era, 2000).

⁷ History of the European Sport Charter http://www.coe.int/t/dg4/sport/sportineurope/charter_en.asp

⁸ See http://www.coe.int/t/dg4/sport/sportineurope/charter_en.asp

⁹ Report from the United Nations Inter-Agency Task Force of Sport for Development and Peace, 2003, http://www.unep.org/sport_env/documents/taskforce_report.pdf, p. 4

¹⁰ Ibidem

as humans beings and open the path to political and social disorder. Exercising these rights freely can only be possible in a legal protection system that guarantees and implements human rights. In the preamble of the *Universal Declaration of Human Rights*¹¹ (par. 1) it is stated that “recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world”.

The functions and values of sports

It seems that the present day finds us witnessing an overturning of all values. We deny everything, even that which not long ago surrounded us with respect. Still, we must not forget that the struggle of values for preeminence is defined by a permanent contradiction. History shows us that the values which are imposed on everyone are only those that “completely satisfy the logical and psychological criteria of the human soul” – the foundation of a value needs to be based on logic and the theory of knowledge. The wideness and validity of value can only be established through logic. Two points of view are to be taken into consideration when discussing the issue of value, as follows: a. *subjective-psychological*, which induces a value-based psychology, and b. *objective-logical*, which determines the most profound and thorough research, *the logic of value* (Petre A, 1997).

The concept of sport is attributed numerous functions, more significantly: *conative function* (satisfaction of the desire to move, to act), *competition function* (stimulation and satisfaction of the desire to compete), *performance maximizing function* (performance capacity development in a biological, psychological and social scheme), *social function* (integration, social assertion, communication, emulation – also comprising the national identity representation, cultural and economic functions).

The sporting culture is an essential element of economic development and social regeneration and stands as an indicator of the quality of life and individual welfare. The law – seen as a normative phenomenon – is also entrusted to create the legal framework in an ample social phenomenon such as sports. It is imperative that all participants to sporting activities are guaranteed a legal reliability, in the sense that individual behavior needs to be influenced in the name of value requirements that encompass both legal values and positive values of sports – more so in the current context, marked by the excessive commercial nature of sports and its transformation into an instrument of political manipulation (which can lead to a legitimization of illicit behavior both in and off “the court”).

The sporting phenomenon requires a prior understanding and embracing of meanings attributed to various notions and concept, such as: society and globalization, social system, state, culture, politics, deontology, law, rights and liberties, social values,

¹¹ Universal Declaration of Human Rights of December 10th, 1948 – issued by The General Assembly of the United Nations, published in the Brochure of December 10th, 1948.

interest groups etc. If we accept Warren Weaver's definition of communication – mainly relevant through its pragmatism - „Communication is *the totality of processes by which one mind can influence another*” (Prutianu Ş, 2008, p. 339) - then we can understand the importance of the functions served by all communicators (Fournier, 2010)¹² (medics, priests, pedagogues, psychologists, coaches, athletes, managers, science communicators, actors, artists, lawyers, magistrates etc.) – including mass-media which – not seldom – act as a social control tool, a source of social pressure on the individual (Noelle-Neumann E, 2004).

Communication made by sports communicators has a political dimension, but also a cultural conditionality. It is in this respect that cohabitation between systems of different cultures should be promoted – *cultural cohabitation* – truly a unity in diversity, more effective than multiculturalism seen as a prerequisite of a nation-state (Allemand S, 2010). ”While sport and play are repeatedly acknowledged as a human right, they are not always seen as a priority and have even been called the “forgotten right”. Sports is seen as a by-product of development, not as an engine.”¹³

Human rights should not form an enclosed philosophical, political, religious and social system. They should be kept open to diverse ways of thinking, to diverse beliefs, cultures and social practices. Each person is a subject of law. This is a common feature which establishes the link with society. The human being has inalienable rights, irrespective of the will of the authorities. The concept of fundamental rights makes a direct reference to the natural rights philosophy, inspired from the European humanist movement.

Debates over natural rights are open as a result of new situations that arise in human life, of new claims – both on a national and international level. The international human rights law constitutes a summation of natural rights expressed in the present context of globalization, to which states must associate in order to transform them in positive rights – rights that establish common principles and can be applied by a concrete international jurisdiction. Contemporary legal papers on the protection of human rights provide a large number of philosophical notions that can constitute the basis for a consensus. This international law of human rights texts focus on the link between the individual and the authorities, on the legitimacy of the latter's actions and on the conditions under which individuals with equal rights coexist. Owing to the respect of each individual and the equality in rights and dignity, human rights constitute an open system for the peaceful coexistence of a multitude of cultures, beliefs, practices and social organizations (Voinea M, Bulzan C, 2004).

¹² See also the best medic-communicator (in Romanian) - <http://www.i-medic.ro/stiri/tudor-ciuhodaru-cel-mai-bun-comunicator-medic>;

¹³ Report from the United Nations..., p. 2

Returning to natural law – starting point for promoting other fundamental rights

Research on human rights has developed a history of concepts related to them, as well as a history regarding the struggle to validate these rights. The philosophy of rights originates from individualist theories (Gheorghe D, 2011). According to these theories, the legitimacy of power centers on human individuality. Power is legitimate only if it acknowledges the rights of the individual as an entity. Starting from here, we can question ourselves regarding the historic origins of individualism.

On a long term, human rights encourage self-interest to the prejudice of community spirit, because they favor individualism without balancing it with the community. It is a well-known fact that individualism is the fundament of human rights, hence the critic upon human rights transforms into a critic upon modernity, which, in turn, is based on individualism. First generation human rights arise from the affirmation of the individual, which has substantially marked the destiny of modernity up to present times.

The term “human rights” remained unknown until the French Revolution of 1789. That is why it has been said that it represents a construct meant to create a new authority, to replace the divine authority. The cause of this authority was found in *man* and his will power. It is extremely difficult now to renounce rights, if not impossible without creating insurmountable difficulties. What can and should be done is to bring individual rights in balance with the community spirit, considering the fact that individual rights cannot exist unless the *relationships* between humans change substantially – that is to say liberty – e.g. – cannot manifest without the background of a well organized society. Only a person with optimal relations with others can benefit from freedom. From here, a come-back to natural law is inherently necessary, more so in order to promote the right to practice sporting activities as a fundamental human right.

The actuality, utility and definition of the legal grounds for the existence of acquired rights

First generation fundamental rights and liberties cannot be extended to all citizens without a proper protection of second generation rights. In this case, the two generations of rights are not only non-contradictive, but complementary. One cannot talk about the right to life, to freedom, if these comprise only a part of society, the rest being eluded through various means. In fact, there is considerable controversy about what should constitute ‘human rights’ and what rights are most important, including topics such as the excessive promotion of individual rights over collective rights, civil and political rights while neglecting economic and social rights (Kidd B, Donnelly P) Another set of debates covers the tension between the rights and the corresponding responsibilities. However, state intervention can assure a certain degree of social equilibrium. Profound social movements have changed the balance between social forces and have required the state to intervene in order to grant first generation rights to everybody.

One of the causes for the decline of human rights is their unjustified multiplication and extension to various fields that, often, seem utterly fanciful. Their multiplication leads to a decrease in their importance, which in turn can provoke an increase in the state's power stance. This ambiguity of human rights derives from the paradoxical nature of the human being, which strives on being free of constraints while concurrently stating the necessity of order. What should be considered is that the two concepts should be balanced and mutually dependable. We agree with the statement that "individual freedom cannot be limitless, but the same forces that determine the necessity for limitations can, if permitted, unbearably restrain the scope of human freedom" (Dănișor G, 2011, p. 83)¹⁴. The multiplication of human rights cannot be measured only from a quantitative and qualitative perspective. If in the field of quantity, the essential aspect is measurement, we ask ourselves if the right to life and freedom can be measured.

Considering the social importance of the sporting phenomenon, it is necessary to promote the right to practice sports – as a fundamental right of the human being – because this right identifies itself with many civil, political and economical and social rights (the right to work, the right to health welfare), cultural ones (the right to benefit from education, the right to participate in cultural life, the right to have a protection of the moral and material interests deriving from one's work – with emphasis on sporting creations), a person's right to fulfill their economic, social and cultural rights in order to maintain dignity – laid down as fundamental rights in national and international legislations. Along the history of the last half century it has been held, that along other international conventions, such as, the Convention on the Elimination of All Forms of Racial Discrimination, the Convention on the Elimination of Discrimination Against Women, the Convention on the Rights of the Child, etc, the Charter on Physical Education and Sport proclaimed by UNESCO has "contributed to a much broader commitment to human dignity throughout the world, in both in the abstract and in the concrete". (Donnelly, Kidd, p. 6)

The updating methods are conceived differently by the theorists that have pondered in this field. A concern for updating the concept of freedom has always been present, and it focuses on the relationship between individual freedom and power, a relationship which leads to a conception on human rights. As latency is updated, history unfolds itself, and human rights tend to impose themselves. We feel that the multitude of acquired rights – comprised of the third generation fundamental human rights - are in decline also because they are not justified from a legal point of view. These have to be defined by bringing together four essential conditions, without which no right can exist, both in the positive and natural law: **1.** a *bearer* who can exert a right; **2.** a *scope* that can give meaning to that right; **3.** *opposability* which allows the bearer to exert his right in court; **4.** an organized *sanction* (as to realize the right) (Dănișor G, 2011, p. 86)¹⁵.

¹⁴ with reference to James M. Buchanan, *Limitele libertății. între anarhie și Leviathan (The Limits of Liberty: Between Anarchy and Leviathan)*, Institutul European, 1977, p. 17.

¹⁵ with reference to la Guy Haarscher, *Philosophie des droits de L'Homme*, Editura de L'Universite de Bruxelles, 1993, p. 12, 42.

The right to practice sports and its role, as prescribed by the law

In Romania, according to Article 2, par. (5) Of Law no. 69/2000 on Physical Education and Sport, “the practice of physical education and sport is a human right, without any discrimination, guaranteed by the state. Exercising this right is free and voluntary and independently undertaken or as part of associated sports structures.” Physical education and sport stand for “all forms of physical activities aimed, through an organized or independent participation, to express or improve physical fitness and mental well-being, to establish civilized social relations and lead to results in competitions at any level” – art. 1 par. (2). As prescribed by the law, physical education and sports activities include physical education, school and university sports, sports for all persons, high-level sports performance, exercise carried out for maintenance, physical development or therapeutic purposes – art. 2 par. (3).

By guaranteeing the promotion of this right, its social importance arises from the content of art. 2 and 3 of the law: “Art. 2 - (1) physical education and sports are activities of national interest supported by the state, (2) In accordance to the applicable legislation, the state recognizes and stimulates organizational actions to promote physical education and sports, held by public authorities and, where appropriate, non-governmental organizations focusing on education, the national defense institutions, public order, national security, health, in companies and other sectors of social life, (4) The State guarantees the performance of specific functions in the public and private sector in physical education and sport, in accordance with the principles of collaboration and responsibility of all interested parties, (5) The practice of physical education and sport is a human right, without discrimination and guaranteed by the state. Exercising this right is free and voluntary and undertaken independently or as part of associated sports structures, (6) The State recognizes and guarantees the natural and legal right to free association for the establishment of sports entities. Art. 3 par. (1) The government units and educational institutions, sports institutions and nongovernmental organizations have the obligation to support sports for all persons and high-level sport performance and to ensure organizational and material conditions for practicing physical education and sport in local communities, (2) The public government authorities and institutions referred to in paragraph (1) shall foremost ensure proper conditions for practicing physical exercises with respect to preschool children, young persons and the elderly, for purposes of social integration, (3). The public administration authorities must offer the necessary conditions for practicing physical education and sport to persons with physical, sensory, mental and other handicaps in order to sustain their personal development and integration within society and the resources to allow disabled athletes to participate in national and international competitions organized for such persons”.

It is necessary to make a clarification of terminology, to distinguish between the definition provided by the Romanian legislature in year 2000 with respect to “physical education and sport activities”, with that established and enshrined in the European Union’s White Paper on Sport. For reasons of clarity and simplicity, the White Paper on Sport uses the definition of „sport” which was established by the Council of

Europe in its European Sports Charter: „*Sport* means all forms of physical activity, which, through casual or organized participation, aims at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels.” (EU’s White Paper on Sport, fn. 2)

In consistency with one of its objectives – the welfare of its citizens, in all forms – the E.U. declared 2004 as the “European Year of Education through Sports” (Fuerea A, 2011). The aims of this initiative were established as follows: to make educational institutions and sports organizations aware of the need for cooperation in order to develop education through sport and its European dimension, given the great interest that young people take in all kinds of sports; to take advantage of the values conveyed through sport to develop knowledge and skills whereby young people in particular can develop their physical prowess and readiness for personal effort and also social abilities such as teamwork, solidarity, tolerance and fair play in a multicultural framework; to promote the educational value of student mobility and exchanges, particularly in a multicultural environment, through the organization of sporting and cultural contacts as part of school activity; to create a better balance between intellectual and physical activity in school life by encouraging sport in school activities etc.¹⁶

In 2007, the Lisbon Treaty introduces sports within the categories and fields of competence of the EU. Therefore, according to art. 6 of the Treaty on The Functioning of the European Union¹⁷ (TFUE), the Union shall have competence to carry out actions to support, coordinate or supplement the actions of the Member States. The areas of such action shall, at European level, be:

- (a) protection and improvement of human health;
- (b) industry;
- (c) culture;
- (d) tourism;
- (e) education, vocational training, youth and **sport**¹⁸;
- (f) civil protection;
- (g) administrative cooperation.

Title XII - Education, Vocational Training, Youth and **Sport**¹⁹ provides, in article 165 TFUE that **the Union shall contribute to the promotion of European sporting issues, while taking account of the specific nature of sport, its structures based on voluntary activity and its social and educational function**²⁰. Union action shall be aimed at developing the European dimension in sport, by promoting fairness and openness in sporting competitions and cooperation between bodies responsible for sports, and by protecting the physical and moral integrity of sportsmen and sportswomen, especially the youngest sportsmen and sportswomen.

¹⁶ Decision no. 291/2003/EC of the European Parliament and of the Council, of 6 February 2003, establishing the European Year of Education through Sport 2004.

¹⁷ Consolidated version (JOUE C 83/120, 30.3.2010).

¹⁸ Authors’ emphasis.

¹⁹ Idem.

²⁰ Idem.

The importance of sports in achieving the objectives set forth at EU level, among which resides the free movement of persons (Fuerea A, 2006), is obvious, furthermore taking into consideration that, according to the European Court of Justice in Luxemburg²¹, professional athletes are considered workers in terms of EU law and are therefore provided with all rights that occur from this quality.

Olympic Charter in force as from 8 July 2011 provides the Fundamental Principles of Olympics:

1. Olympics is a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind. Blending sport with culture and education, Olympism seeks to create a way of life based on the joy of effort, the educational value of good example, social responsibility and respect for universal fundamental ethical principles.

2. The goal of Olympics is to place sport at the service of the harmonious development of humankind, with a view to promoting a peaceful society concerned with the preservation of human dignity.

3. The Olympic Movement is the concerted, organized, universal and permanent action, carried out under the supreme authority of the IOC, of all individuals and entities who are inspired by the values of Olympics. It covers the five continents. It reaches its peak with the bringing together of the world's athletes at the great sports festival, the Olympic Games. Its symbol is five interlaced rings.

4. **The practice of sport is a fundamental right.** Every individual must have the possibility of practicing sport, without discrimination of any kind and in the Olympic spirit, which requires mutual understanding with a spirit of friendship, solidarity and fair play.

5. Recognizing that sport occurs within the framework of society, sports organizations within the Olympic Movement shall have the rights and obligations of autonomy, which include freely establishing and controlling the rules of sport, determining the structure and governance of their organizations, enjoying the right of elections free from any outside influence and the responsibility for ensuring that principles of good governance be applied.

6. Any form of discrimination with regard to a country or a person on grounds of race, religion, politics, gender or otherwise is incompatible with belonging to the Olympic Movement.

7. Belonging to the Olympic Movement requires compliance with the Olympic Charter and recognition by the IOC.

²¹ Bosman Case (CJE Decision of December 15th 1995, Case no. C-415/1993, Royal Belgian Football Association (ASBL), Royal Club Liégeois SA and European Football Association Union (UEFA) c. Jean-Marc Bosman).

Closing statements

The purpose of this article was to describe the importance of the role attributed to sports in contemporary society. Our initiative can contribute to a more concrete and circumstantial legalization of the sporting domain, by using the protection and guarantee instruments that are particular to fundamental rights.

Sport is a growing social and economic phenomenon which makes an important contribution to the European Union's strategic objectives of solidarity and prosperity. The Olympic ideal of developing sport to promote peace and understanding among nations and cultures as well as the education of young people were born in Europe and have been fostered by the International and the European Olympic Committees. Sport attracts European citizens, with a majority of people taking part in sporting activities on a regular basis. It generates important values such as team spirit, solidarity, tolerance and fair play, contributing to personal development and fulfillment. It promotes the active contribution of EU citizens to society and thereby helps to foster active citizenship. The Commission acknowledges the essential role of sport in European society, in particular when it needs to bring itself closer to citizens and to tackle issues that matter directly to them. In addition, the United Nations holds that "sport is about participation. It is about inclusion and citizenship. Sport brings individuals and communities together, highlighting commonalities and bridging cultural and ethnic divide."²² However, sport is also confronted with new threats and challenges which have emerged in European society, such as commercial pressure, exploitation of young players, doping, racism, violence, corruption and money laundering. (White Paper on Sport, Introduction, par. 1-3).

In this context we find it necessary to underline the following: "*The case law of the European courts and decisions of the European Commission show that the specificity of sport has been recognized and taken into account. They also provide guidance on how EU law applies to sport. In line with established case law, the specificity of sport will continue to be recognized, but it cannot be construed so as to justify a general exemption from the application of EU law.*"²³

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²² Report from the United Nations ..., p. 2

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