

DOI: 10.2478/tpelj-2013-0001

A Comparison of Physical Self-Concept between Physical Education and Non-Physical Education University Students

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Abstract

The purpose of this study was to compare physical self-concept between physical education and non-physical education university students. The target population of this study was all male and female physical education and non-physical education university students in Rasht city of Iran. After translating the Physical Self-Description Questionnaire (PSDQ) and adjusting some of the questions, the questionnaire was evaluated by the specialists in the context of validity and the reliability achieved by test-retest (Cronbach Alpha value of 0.84). We then, according to the Odneski table selected 180 physical education and non-physical education males and 190 physical education and non-physical education females opportunistically. The collected data was analyzed by 2×2 MANOVA for determine differences between gender and major. The results showed mean vector scores of physical education in the following scales: physical activity; global physical; competence; sports; strength; endurance and flexibility were significantly ($p < 0.05$) higher than that of non-physical education major students. Also, the results shows that mean vector scores of male in the following scales: health; coordination; physical activity; body fat; global physical; competence; sports; global physical self-concept and global esteem were significantly ($p < 0.05$) higher than female. Based on the result of our study the physical self-concept non-physical education and female is lower, than that physical education and male. The results may reflect that male and physical major education students, who usually spend more time on physical activity and sport training to have better fitness and skill oriented self concept than their counterparts.

Key Words: Self-Concept, Students, Physical Education, Non- Physical Education.

Rezumat

Scopul acestui studiu a fost de a compara studenții de la facultatea cu profil educație fizică cu studenții altor specializări universitare. Populația țintă au acestui studiu a fost studenții de la facultatea cu profil educație fizică și studenții cu altă specializare decât educația fizică din orașul Rasht, Iran. După traducerea chestionarului PSDQ și ajustarea unor întrebări, chestionarul a fost supus validării (Cronbach Alpha având valoarea de 0.84). Apoi, conform tabelului Odneski au fost selectați aleator 180 de studenți (bărbați și femei) cu specializarea educație fizică și 190 studenți din alte specialități. Datele colectate au fost analizate cu ajutorul testului 2×2 MANOVA pentru a determina diferențele de gen și apartenență (educație fizică și specializare universitară). Rezultatele au aratat că scorurile medii ale vectorilor pentru studenții cu profil educație fizică, în următoarele scale: activitate fizică, aspect fizic, competență, sportivitate, putere, rezistență și flexibilitate, sunt semnificativ ($p < 0.05$) sunt mai mari decât pentru studenții cu alt profil. De asemenea, rezultatele arată că scorurile medii ale vectorilor pentru genul masculin, în următoarele scale: sănătate, coordonare, activitate fizică, masa țesutului adipos în organism, aspect fizic; competență; sportivitate, conceptul de sine și mândria, sunt semnificativ ($p < 0.05$) mai mari decât pentru genul feminin. Rezultatele reflectă faptul că studenții de gen masculin precum și cei de la facultatea cu profil educație fizică, care de obicei, petrec mai mult timp efectuând activități fizice sau antrenament sportiv au o condiție fizică superioară și conceptul de sine orientat spre îndemânare mai mult decât decât omologii lor din alte specialități.

Cuvinte cheie: concept de sine, studenți, educație fizică.

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Introduction

Over the last couple of decades, the critical role of physical activity in promoting health and preventing disease has become apparent. Strong evidence exists for physical activity as a factor in reducing the risk of diabetes [1], osteoporosis [2], heart disease [3] and some forms of cancer [4]. Evidence for the role of physical activity in psychological well-being also has accumulated, with research indicating that physical activity may be effective in treating and/or reducing the risk of depression and anxiety [5].

Concern with the link between physical activity and psychological well-being has also brought attention to the role that physical activity may play in bolstering self-esteem, the value we place on our self, and self-concept, our perception of self [6-7].

Self-concept may be differentiated from self-esteem, although the terms have been used interchangeably. Self-concept is defined broadly to include cognitive, affective and behavioral aspects whereas self-esteem refers to a smaller, evaluative component of an individual's self-perception [8-9]. Self-esteem is considered to be «an individual's positive or negative attitude toward the self as a totality» [10] and as such has cognitive and affective components. Conceptually, self-esteem is closely related to self-worth, so people with high self-esteem see themselves as having worth, whereas people of low self-esteem may be dissatisfied with themselves.

These two terms are often used interchangeably and, as self-concept is the broader concept from which self-esteem is derived, we will henceforth use the term self-concept. Evidence shows that self-concept is protective against depression and obesity [11], as well as maladaptive behaviors such as substance abuse and violence [12-13].

The importance of physical self-concept rests in the relationship between the individual's personal set of beliefs and their subsequent behavior. The

measurement of physical self-efficacy has been utilized to establish relationships among one's overall self-perceptions and their subsequent participation in physical activities. To increase overall self-worth through a positive change in physical self-concept does not automatically result from participation in physical activity programs but such programs can be utilized "to incrementally improve" the physical self-concept perceptions of the individual [14]. In this sense, investigations conducted by Sonstroem et al. [15], Page et al. [16] and Asçi [17] have found that more favorable perceptions of one's physical capacity contribute to an increase in levels of participation in physical activity.

In reference to gender, research indicates that boys and girls usually differ in both global and specific self-concept dimensions [6]. In general, investigators have noted less favorable physical self-perceptions for females in comparison to males. [18-20], These less favorable self-perceptions for girls have been found with regard to specific physical self-concept dimensions, including perceived sport competence, physical condition and strength, [17, 20-21], physical attractiveness [21-23], and overall physical self-appraisals [17, 20-21]. Even in the early days, researchers had reported a positive influence of physical activity on improving body-image and self-esteem [24-25]. Previous studies, reported that alterations on the body as a result of physical training could logically be expected to change one's body image, which is highly correlated with and might be expected to extend to self-concept [20, 23-26]. However, it could be hypothesized that physically well-training persons would have higher level of physical self-concept than those with less training. As to the researcher's knowledge, there are limited studies conducted in this area. Therefore the purpose of this study was to compare physical self-

concept between physical education and non-physical education university students.

Material and methods

Subjects

The target population of this study was all physical education and non-physical education university students in University of Guilan in Iran among them 180 males and 190 females, selected opportunistically. The condition of the study was thoroughly explained to all subjects, and written informed consent was subsequently obtained. The study protocol was approved by the Ethics Committee of University of Guilan.

Measurements

The physical Self-Description Questionnaire (PSDQ) (Marsh et al. 1994) was used to measure subject's physical self-concept. The PSDQ consists of 70 items which under 11 scales: Health; Coordination; Physical Activity; Body Fat; Global Physical; Competence; Sports; Appearance; Strength; Endurance; Flexibility and Esteem. Confirmatory factor analysis of multitrait-multimethod supported the convergent and discriminated validity of the PSDQ [27]. The PSDQ was administered to high school student on 4 occasions over 14-months period. Across the 11 scales, the internal consistency at each occasion was good (median $\alpha = 0.92$) and the stability over time varied from median $r = 0.83$ for a 3-months period to median $r = 0.69$ for the 14-months period [28]. A 6-point Likert scale, from False (1) to true (6) was used with the PSDQ in this study. The scoring for the negatively

worded items (1, 4, 12, 15, 22, 23, 26, 31, 33, 37, 40, 41, 44, 45, 48, 56, 59, 62, 67, 68, and 70) was reversed. Total score of the PSDQ is ranged from 70 to 420.

Procedure

Upon receiving permission from the participations and their respective tutors, the researcher conducted the pencil-paper measurements during the physical education classes. Informed consent was obtained from students prior in test. Confidentiality of subject's information and data was addressed. Subjects were instructed to complete the PSDQ sincerely and no discussion was allowed throughout the test.

Data analysis

Descriptive statistics was used to compare the mean and standard deviation of the total mean PSDQ scores and the 11 scales scores for the subjects. The 2×2 independent group MANOVA was conducted to compare the mean vector scores between gender (male and female) and major (physical education and non-physical education) on each of the scales. The above statistical analyses were conducted by using the SPSS 18 for Windows.

Results

Descriptive statistical analyses of the mean vector scores of 11 scales were presented in table I. Basic assumption for the use of MANOVA procedures in data analyses were tests through computation of the Bartlett-Box, Box M test, and Bartlett Test of Sphericity. The results are presented in table II.

Table I. Description statistics for the PSDQ mean vector scores (mean (SDPQ)) for both gender and major (N=370)

	Gender		Major	
	Male	Female	Physical education	Non-physical education
Appearance	4.20±0.88	4.13±0.76	4.10±0.88	4.3±0.84
Activity	3.90±1.11	3.83±1.2	3.95±1.13	3.80±1.2
Body Fat	4.23±1.7	3.96±1.15	4.3±0.76	3.89±0.63
Coordination	3.78±0.91	3.50±0.86	3.63±0.88	3.78±0.72
Endurance	3.80±1.20	3.44±1.14	3.75±1.14	3.69±1.3
Flexibility	3.93±0.84	3.82±0.75	4.1±0.67	3.93±0.34
Health	4.30±0.33	4.12±0.50	4.15±0.39	3.99±0.48
Sport Competence	3.83±0.87	3.72±0.92	3.88±0.44	3.79±0.57
Strength	3.93±0.81	3.72±0.65	3.90±0.72	3.80±0.66
Global Physical Self-Concept	3.83±0.72	3.67±0.87	3.90±0.66	3.78±0.73
Global Esteem	4.21±0.65	4.12±0.55	4.4±0.89	3.85±0.55

Table II. Basic assumption for 2 × 2, independent group MANOVA

	Bartlett-Box F-Ratio	P Values
Appearance	4.101	0.021*
Activity	3.356	0.044*
Body Fat	1.211	0.654
Coordination	0.671	0.347
Endurance	2.782	0.236
Flexibility	2.341	0.153
Health	3.251	0.047*
Sport Competence	0.546	0.261
Strength	0.193	0.832
Global Physical Self-Concept	0.167	0.553
Global Esteem	1.791	0.447

* Significant difference at level of $p < 0.05$

The Bartlett-Box F-Ratios for body fat, coordination, endurance, flexibility, sport competence, strength, global physical self-concept and global esteem were non significant ($p > 0.05$); however, appearance, activity and health were significant ($p < 0.05$). The Bartlett-Box F-Ratios were significant ($p < 0.05$) indicating that there were significant differences in variance, covariance matrices for the two independent groups.

The MANOVA program was utilized to compare the mean vectors of PSDQ scale scores using gender and major as the independent variable. The results of the analysis were presented in table III.

Table III. MANOVA comparing physical self-concept scales for physical education and non-physical education

Effect	Wilks Lambda	F	P Values
Sex	0.88	6.96	0.01 *
Major	0.78	3.12	0.04 *
Sex & Major	0.84	4.86	0.02 *

* Significant difference at level of $p < 0.05$

Significant ($p < 0.05$) mean vector differences were found in both main effects: sex and major. The interaction however was significant difference with respect to the 11 scales of the PSDQ. The Univariate F-test for each of the 11 dependent variables is presented in the table IV. The results showed that mean vector scores of physical education in the following scales: physical activity; global physical; competence; sports; strength; endurance and flexibility were significantly ($p < 0.05$) higher than that of non-physical education major students. Also, the results shows that mean vector scores of male in the following scales: health; coordination; physical activity; body fat; global physical; competence; sports; global physical self-concept and global esteem were significantly ($p < 0.05$) higher than female.

Table 4. Univariate F-Ratio comparing Gender (male and female) and Major (Physical education and non- Physical education) student on physical self concept scales

	Gender Male/Female	Major Physical education/ Non-physical education
Appearance	0.07	0.16
Activity	0.01 *	0.00 *
Body Fat	0.05 *	0.34
Coordination	0.03 *	0.21
Endurance	0.18	0.03 *
Flexibility	0.60	0.05 *
Health	0.05 *	0.39
Sport Competence	0.03 *	0.02 *
Strength	0.66	0.05 *
Global Physical Self-Concept	0.00 *	0.11
Global Esteem	0.04 *	0.28

*Significant difference at level of $p < 0.05$.

Discussions

The purpose of this study was to compare physical self-concept between physical education and non-physical education university students.

The result showed that differences were significant in major and mean vector scores of physical education in the following scales: physical activity; global physical; competence; sports; strength; endurance and flexibility were significantly ($p < 0.05$) higher than that of non-physical education major students. Several researchers have documented that athlete have higher self-concept as compared to non-athlete [26, 29, 30-31]. Self-selection may be the main cause of these differences.

Marsh [32] conducted a study to compare self-esteem between athlete and non-athlete and concluded that athletes had a higher positive attitude, attractive sociable and successful than their counterparts. To increase overall self-worth through a positive change in physical self-concept does not automatically result from participation in physical activity programs but such programs can be utilized

to incrementally improve the physical self-concept perceptions of the individual [14]. In this sense, investigations conducted by Sonstroem et al [15] Page et al [16] and Asçi [17] have found that more favorable perceptions of one's physical capacity contribute to an increase in levels of participation in physical activity. Other researchers have also articulated a link between the athletes greater physical endurance, coordination, reflexes and a more positive body image for the athletes which could in turn, generalize to the athletes overall self-esteem [26-29]. Previous studies, reported physical education student and athlete had invested heavily in their sports performance and frequently received positive informational feedback were essential for the development and maintenance of self-esteem. From the studies revealing that strong relationship between physical activity and physical self-concept [14, 32, 33-34], as well as physical fitness and physical ability self-concept [26, 29, 30-31] It could be conclude that individual with more activity involvement tend to have better motor skill and physical fitness and higher physical ability self-concept. Moreover, studies result of Fox [14], Goñi et al [18], Sonstroem et al [15] Rahmani-Nia et al [31] shows that physical activity and fitness provide the ability to correct Self-perceived in school-aged children, youth and adults.

Also, the results showed that differences were significant in gender and mean vector scores of male in the following scales: health; coordination; physical activity; body fat; global physical; competence; sports; global physical self-concept and global esteem were significantly ($p < 0.05$) higher than female. The finding on gender partly support Wylie's [35] research finding in which, who concluded that there was no evidence for sex differences in overall self-concept at any age level, however, sex differences would exist in specific

components of self-concept. Research indicates that male and female usually differ in both global and specific self-concept dimensions [6]. In general, investigators have noted less favorable physical self-perceptions for females in comparison to males [18, 19, 20-36]. Marsh [20] also found that males had higher self-concept in physical ability and appearance whereas; Rahmani-Nia et al [31] indicated that males scored higher on perceived physical performance capacity than females. Chung [26] also obtained similar findings—males scored higher than females on perceived physical appearance and perceived athletic competence. These less favorable self-perceptions for female have been found with regard to specific physical self-concept dimensions, including perceived sport competence, physical condition and strength [17, 21-22] physical attractiveness [21-22] and overall physical self appraisals [17, 20, 21-37]. The social cultural context exerts a clear effect on physical self-concept characteristics. Moreno et al [37], Mañano et al [21] and Ruiz et al [38] have noted that motor competence diminishes with age in female which can have correspondent effects on perceived competence. A lack of perceived competence can affect level of involvement in physical activity. Gender stereotypes about various physical activities in sport can also influence the sport and physical activity of females. The study by Solmon et al [39] indicated that when females perceived an activity to be more appropriate for males than for females, they typically demonstrate lower perceived competence in that activity. In this same way, Ruiz et al [38] speak of clashing self-concepts. Males may be more motivated to participate in competitive activities and females in cooperative activities as a consequence of differences in preferred styles of social interaction. The study by Asçi [17] indicated that Turkish girl's score lower on self-ratings of physical

attractiveness than do Turkish boys and the same patterns hold for American girls, whereas Estonian girls score more highly than their Turkish and American counterparts [40]. Education provides an important socialization experience for youngsters. Physical Education contributes to the development of the physical self-concept of youngsters and to attitudes toward the practice of physical activity that can extend through the lifetime. In most studies, are shown the ratio of male to female in a positive and correct self-perceived in physical fitness, among children who are physically active, different genders there is not significant [21, 24-31]. Physical activity levels can be an important determinant in self-perceived and self-concept measure physical fitness to be considered. Also, Children who have physical activity in, than children who do not have a physical activity, correct Self-perceived in physical fitness. On average, female the ratio of in male in low activity and may understand little of physical fitness. Also, other studies that the effect of gender on the self-perceived check, result shows that female more try-the protected person placed the ability of their less shows, but the male always like to have the ability to show their more subjective assessment of your ability so the male more than female [2,27,28,30-31]. Seems to be a gender difference over the impact of factors related to the physiological differences and anatomic (structural) associated with the role of gender and the views of people about specific tasks and the female and male in a given society.

Conclusions

The result showed that differences were significant in both gender and major. The male and physical education major students had higher scores in most of the scales of PSQD than their counterparts. Also,

the result showed that there were significant interactions (sex & major).

The relationship between self-concept and behavior tendencies has been researched extensively over years. Roid et al [41] stated that the individual's self-concept has been demonstrated to be highly influential in much of his/her behavior and also to be directly related to general personality and mental health. It can be expected that individuals with positive physical self-concept may be more active and those who activity involved in physical activity may have higher physical self concept. In fact, the positive effects of physical training on self-concept and body-concept are well documented [24, 29, 30-42]. The cultural stereotypes females suggest that they should be inactive, weak and decent but do not limit them from participating in physical activity and in building up self-confidence for females in performing physical activity.

The PSDQ is a reliable, valid and comprehensive inventory for reflecting one's physical self-concept. However, it seems difficult for subjects to complete 70 items of statements consecutively with focused attention. It is desirable to simplify the questionnaire and to develop an Iranian version of the PSDQ for future studies.

Perspectives

On the one hand, the use of physical activity is increasingly being promoted as a means of prevention of chronic disease (overweight, obesity and blood pressure...). On other hand; the economic resources for health care are limited and increase physical self concept.

Acknowledgements

The authors would like to thank the Physical Education students at University of Guilan, and the

non-athlete male and female students for their willing participation in this study.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

1. Kriska A. (2003) *Can a physically active lifestyle prevent type 2 diabetes?* Exercise and Sport Science Reviews, 31(3):132-137;
2. Todd J., Robinson R. (2003). *Osteoporosis and exercise.* Postgraduate Medicine Journal, 79:320-323;
3. Thompson P., Buchner D., Pina I., et al. (2003) *Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: A statement from the council on clinical cardiology (subcommittee on exercise, rehabilitation, and prevention) and the council on nutrition, physical activity, and metabolism (subcommittee on physical activity).* Circulation, 107:3109-3116;
4. Friedenreich C., Orenstein M.R. (2002) *Physical activity and cancer prevention: Etiologic evidence and biological mechanisms.* Journal of Nutrition, 132(11):3456-3464;
5. Hall E., Ekkekakis P., Petruzzello S. (2002) *The affective beneficence of vigorous exercise revisited.* British Journal of Health Psychology, 7:47-66;
6. Ekeland E., Heian F., Hagen K.B., Abbott J., Nordheim L. (2004) *Exercise to improve self-esteem in children and young people.* Cochrane Database Syst Rev, (1): 36-83;
7. Sonstroem, R.J. (1997) *Physical activity and mental health.* Philadelphia, PA, US: Taylor & Francis. *Physical activity and self-esteem*, 127-143;
8. Boyd K.R., Hrycaiko D.W. (1997) *The effect of a physical activity intervention package on the self-esteem of pre-adolescent and adolescent females.* Adolescence, 32(127):693-709;
9. Byrne B.M. (1988) *Adolescent self-concept, ability grouping and social comparison: re-examining academic track differences in high school.* Youth and Society; 20: 46-67;
10. Rosenberg M., Schooler C., Schoenbach C., Rosenberg F. (1995) *Global self-esteem and specific self-esteem: different concepts, different outcomes.* American Sociological Review, 60(1): 141-156;
11. Park J. (2003) *Adolescent self-concept and health into adulthood.* Health Reports, 14: 41-52;
12. Kirkcaldy B.D., Shephard R.J., Siefen R.G. (2002) *The relationship between physical activity and self-image and problem behaviour among adolescents.* Social Psychiatry and Psychiatric Epidemiology, 37 (11):544-550;

13. Nelson M.C., Gordon-Larsen P. (2006). *Physical activity and sedentary behavior patterns are associated with selected adolescent health risk behaviors*. Pediatrics, 117(4):1281-1290;
14. Fox K.R. (2000) *Self-esteem, self-perceptions and exercise*. International Journal of Sport Psychology, 31: 228-240;
15. Sonstroem R.J., Speliotis E.D., Fava J.L. (1992) *Perceived physical competence in adults. An examination of the Physical Self-Perception Scale*. Journal of Sport and Exercise Psychology, 10:207-221;
16. Page A., Ashford B., Fox K., Biddle S. (1993) *Evidence of cross-cultural validity for the Physical Self perception Profile*. Personal Individual Differences, 14(4): 585-590;
17. Asçi F. (2005) *The construct validity of two physical self-concept measures: An example from Turkey*. Psychology of Sport and Exercise 2005, 2: 1-11;
18. Goñi A., Zulaika L.M. (2000) *Relationships between physical education classes and the enhancement of fifth Grade pupils' self-concept. Perceptual and Motor and Skills*, 91:146-150;
19. Hagger M., Biddle S., Wang C.K. (2005) *Physical Self-Concept in Adolescence: Generalize ability of a Multidimensional, Hierarchical Model Across Gender and Grade*. Educational and Psychology Measurement, 65(2):297-322;
20. Marsh H.W. (1998) *Age and Gender Effects in Physical Self-Concept for Adolescent Elite Athletes and Nonathletes: A Multicohort-Multioccasion Design*. Journal of Sport and Exercise Psychology 1998, 20: 237-259;
21. Maïano C., Ninot G., Bilard J. (2004) *Age and gender effects on global self-esteem and physical self-perception in adolescents*. European Physical Education Review, 10: 53-69;
22. Welk G.J., Eklund B. (2005) *Validation of the children and youth physical self perceptions profile for young children*. Psychology of Sport and Exercise, 6: 51-65;
23. Hagbord W.J. (1994) *The Rosenberg self-esteem scale and Harter's self-perception profile for Adolescents: a concurrent validity study*. Psychology in the Schools, 30: 132-136;
24. Tucker LA. (1983) *Effect of weight training on self-concept*. AM Psychol, 36: 373-389;
25. Guay F., Marsh H.W., Boivin M. (2003) *Academic self-concept and academic achievement: developmental perspectives on their causal ordering*. Journal of Educational Psychology, 95: 124-136;
26. Chung P.K. (2003) *Physical self-concept between PE major and non-PE major students in Hong Kong*. Journal of Exercise Science and Fitness, (1): 41-46;
27. Marsh H.W., Richards G.E., Johnson S., Roche L., Tremayne P. (1994) *Physical self-description questionnaire: psychometric properties and a multitrait-multimethod analysis of relations to existing instruments*. Journal of Sport and Exercise Psychology, 16: 270-305;
28. Marsh W.H. (1996) *Physical self-description questionnaire: Stability and discriminate validity*. Res Q Exerc Sport 1996, 67(3): 249-264;
29. Schneider M. (2008) *Physical Activity and Physical Self-Concept among Sedentary Adolescent Females. An Intervention Study*. Psychol Sport Exerc, 9(1): 1-14;
30. Ireson I., Hallam S. (2009) *Academic self-concepts in adolescence: Relations with achievement and ability grouping in schools*. Learning and Instruction, 19: 201-213;
31. Rahmani-Nia F., Damitchi A., Azizi M. , Hoseini R. (2011) *Associations Between Self-Perceived and Measured Physical Fitness of Male College Students*. World Applied Sciences Journal, 14 (9): 1331-1338;
32. Marsh H.W., Peart N.D. (1988) *Competitive and cooperative physical fitness training programs for girls: Effects on physical fitness and multidimensional self-concepts*. Journal of Sport and Exercise Psychology, 10: 390-407;
33. Van de Vliet P., Knapen J., Onghena P. (2002) *Assessment of physical self-perceptions in normal Flemish adults versus depressed psychiatric patients*. Personality and Individual Differences, 32:855-863;
34. Murcia JAM. (2007) *Physical Self-Concept of Spanish Schoolchildren: Differences by Gender, Sport Practice and Levels of Sport Involvement*, 1(2): 1-17;
35. Wylie R. (1979) *The self-concept, volume 2: theory and research on selected topics*. University of Nebraska Lincoln;
36. Jackson S.A., Marsh H.W. (1986) *Athletic or antisocial? The female sport experience*. Journal of Sport Psychology, 8: 198-211;
37. Moreno J.A., Cervelló E. (2005) *Physical self-perception in Spanish adolescents: Gender and involvement in physical activity effects*. Journal of Human Movement Studies, 48: 291-311;
38. Ruiz L.M., Graupera J.L., Rico I., Mata E. (2004) *Preferencias participativas en Educación Física de los chicos y chicas de la Educación Secundaria mediante La Escala GR de participación social en el aprendizaje*. European Journal of Human Movement 2004, 12: 151-168;
39. Solmon M.A., Lee A.M., Belcher D., Harrison L., Wells L. (2003) *Beliefs about Gender Appropriateness, Ability, a Competence in Physical Activity*. Journal of Teaching in Physical Education, 22: 261-279;
40. Raudsepp L., Kais K, Hannus A. (2004) *Stability of Physical Self-Perceptions during Early Adolescence*. Pediatric Exercise Science, 16: 138-146;
41. Roid G.H., Fitts W.H. (1988) *Tennessee self-concept scale: Revised manual*. Los Angeles, CA: Western Psychological Services;
42. Finkenber M.E., Shows D., Dinucci J.M. (1994) *Participation in adventure-based activities and self-concepts of college men and women*. Percept Mot Skills, 78: 1119-22.

DOI: 10.2478/tperj-2013-0002

Assessment of the Prevailing Motivation within the Sports Teams from the City of Iasi

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Abstract

Seen as a psycho-social products, motivation, attitudes and the view of life depends on the education, socio-cultural environment etc. The individual's personality marks his activities, motivations and interests, as it ensures the direction and dynamics of the participation to it. Within the group, the individual seeks to satisfy personal needs, in agreement with the achievement of the organizational goals. The level of motivation of the individual is determined by the action of several factors, and the contribution of each member of the group's performance is different. We aim to assess the level of motivation of the members of sports groups. The research sample was composed of athletes (N=158, 55 females, 103 males) from the sports groups within the city of Iasi, part of the first and second sports divisions (basketball, football, handball, rugby, and volleyball). The respondents answered to a adapted to the Romanian population 32-item questionnaire; the items were grouped into four factors: *leadership (power needs)*, *expertise / performance (achievement needs)*, *bonding (affiliation needs)*, *subsistence (existence needs)*. The homogeneity instrument was assessed for the entire scale, as well as independently for each factor. The lack of variance homogeneity made it impossible to get outcomes for the interaction of the independent variables such as the type of club and the status. No gender-based differences were found regarding the power needs. If the type of club does not influence the expert/performance factor, have identified a partial influences of this variable over the bonding factor. Professional athletes are more motivated to achieve the performance than semi professional athletes.

Key words: *sports group, motivaion in sport, local community*

Rezumat

Văzute ca produse psiho-sociale, motivația, atitudinile și concepția despre viață a individului depind de educație, ambientul socio-cultural etc. Personalitatea individului își pune amprenta asupra activității desfășurate, motivele și interesele susținând, direcționând și dinamizând participarea în aceasta. În cadrul grupului, individul urmărește satisfacerea necesităților personale, acordate cu atingerea obiectivelor grupului. Nivelul de motivație al individului este determinat de acțiunea mai multor factori, iar contribuția fiecărui membru al grupului la obținerea performanței grupului este diferită. Ne propunem să evaluăm nivelul de motivare a membrilor grupurilor sportive. Lotul de subiecți a fost constituit din sportivi (N=158, 55 de gen feminin, 103 de gen masculin) care activează în cadrul echipelor sportive locale din primele eșaloane valorice în baschet, fotbal, handbal, rugby și volei. Respondenții au completat Cestionarul DM etalonat pe populație românească, de 32 de itemi, grupați pe patru factori (conducere, expertiză/performanță, relaționare, subzistență). Omogenitatea instrumentului a fost evaluată pentru întreaga scală, precum și independent pentru fiecare factor. Lipsa de omogenitate a varianțelor a condus la imposibilitatea obținerii de rezultate în cazul interacțiunii variabilelor independente tip de club și statut. Variabila gen nu influențează dimensiunea conducere la subiecții studiați. Dacă tipul de club nu influențează factorul expertiză/performanță, s-au identificat influențe parțiale ale acestei variabile asupra factorului relaționare. Pe dimensiunea expertiză/performanță, sportivii profesioniști sunt mai motivați comparativ cu sportivii semi-profesioniști.

Cuvinte cheie: *grup sportiv, motivație în sport, comunitate locală*

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Introduction

Motivation alongside attitudes or the view on world and life are psychosocial products. They depend on education, social environment, and educators' morality. Sport has favourable or unfavourable educational consequences, depending on its organization and management.

The athlete's personality marks his activities, motivations and interests, as it ensures the direction and dynamics of the participation to sport competitions. The attitudes specific to the individuals who practice this type of activities has made the object of studies elaborated by several authors [1,2,3]. On one side, a series of theories of motivation analyze the intrinsic motivations of behaviour, be they innate or acquired, conscious or unconscious, physiological needs or abstract ideals [4].

In the opinion of analytical psychologists, sport competition is a mechanism of liberation, of symbolic compensation for the problems of everyday life. Sport provides the athlete with the possibility to let go of the frustrations accumulated daily, thus directing the aggressiveness toward constructive finalities. Sport provides the individual with the satisfactions he needs for his mental economy, often frustrated by the conditions of life [5].

On the other side, a series of theories of motivation explain the athlete's behaviour based on the psychological factors, which can be related – to a certain extent – to the primary elements, such as needs, impulses, but which are necessarily anchored in the social conditions of human existence. Needs and reasons generate different attitudes in direction, intensity, complexity, etc, towards the self, the others, towards things, ideas, acts, etc. [4]

Studies have pinpointed several reasons for practicing sports: physical development, fun and

pleasure, discovery of the unknown, energy consumption, the wish of parents or friends, rehabilitation of physical or mental disabilities, acknowledgment, fame, rewards, etc. The hierarchy of motivations suffers alterations, depending on several factors (age, gender, duration and type of practiced sport). All of the above make it difficult to determine a classification in this sense.

Arriving to an *optimal motivational level* – alongside other variables (positive image of the self, specialized psycho-pedagogical assistance etc) – contributes to reaching a goal [6].

In sport, like in other human activities, the individual seeks to show his skills; according to Nicholls [7], this phenomenon is based on two views:

- a) *the ego-involved goal orientation*, when the individual is concerned with demonstrating high ability in comparison to other people;
- b) *the task-involved goal orientation*, when self-esteem exists and the goal is simply to develop our ability in an undifferentiated sense.

On the other hand, Craciun [8] proposes two types of motivational climate in the sports environment, in direct relation with the ego-involved goal orientation. The *task-oriented climate*, which focuses on achievement, is characterized by a focus on increasing the efforts of athletes towards co-operation and positive support from the part of the coach, while the *competition-oriented climate* (concerning the athletes' ego) encourages social comparison. The author points that the development of athlete's learning, self-confidence and perceived skills depend on the effectiveness of the task-oriented climate.

The individual may be motivated by getting to know the multitude of personal needs, which provides with the possibility of satisfying them, in agreement with the achievement of the organizational goals. The individual can cope with the changes only if the

managers are oriented towards motivation and subordinates' satisfaction. All manager-subordinate relationships affect motivation. The motivating factors that could increase the subjective value of work are related to determining lucrative objectives, to appreciating the employees' success, to encouraging initiative and novelty within the organization, to stimulating a creative climate at the workplace by stimulating autonomy and freedom in the decision-making process, etc.

The general motivation level of the members of a sport group depends on the action of factors such as previous successful experiences, agreement with the team's management style, depending on the common goals. All these factors contribute to the moral state and to the performance of the team.

Considering that not each member contributes equally to the team's performance, it is necessary to identify the strategies that increase the perceived value of the team members, concerning themselves and the team.

In a study on the social-cognitive perspectives of motivation in sport, Thill [9] underlines the negative influence of money on some of the athlete's states, thus complaining about the increase in the importance of extrinsic motivation in the sports activity. The relation between extrinsic and intrinsic motivation is also discussed within the *control theory*, which focuses on the concepts of goal and feedback. In order to reach a goal and to improve his performance, the athlete has to assess both goals and feedbacks. Nicholls' cognitive evaluation theory explains a part of the achievement motivation mechanism.

The extrinsic motivation – that reflects the ego-involved goal orientation by comparison with others, which implies promises of rewards, of appreciation – is associated with the “external causality,” which tends to force the individual towards achievement-

specific behaviours, thus reducing the felling of autonomy and the intrinsic motivation, implicitly.

Epuran [4] brings to attention McClelland's viewpoint; the latter pinpoints that women are less motivated for success. Horner (cited by 4) defines this tendency as “fear of success”: women tend to avoid success, as society does not have a good opinion on female success.

The **purpose** of this research is to assess the prevailing motivation level of the members of sports teams in Iași – basketball (females and males), football (males), handball (males), rugby (females and males), volleyball (females) – activating in the national championships, in the first performance levels.

The research **objective** is to study the influences of certain variables (*biologic gender, performance level, club type, status of the athlete*) on the motivation of the members within the teams studied.

Research hypotheses

Two general hypotheses were formulated:

1. *There are interaction effects of the variables biologic gender, level, type of club, and athlete's status on the four dimensions of prevailing motivation on the level of the studied sports teams.*
2. *There are statistically significant differences concerning the dimensions of prevailing motivation between the athletes of the sports teams from the city of Iași, depending on the four variables: biologic gender, level, type of club, athlete's status.*

Within the second general hypothesis, five other specific hypotheses were formulated:

Specific hypothesis No. 2.1. The level of power (leadership) needs is significantly higher for athletes in male teams compared to athletes in female teams.

Specific hypothesis No. 2.2. We suppose that the level of motivation regarding the achievement (*expertise / performance*) needs in the athletes of the studied teams is directly proportional with the infusion of private capital.

Specific hypothesis No. 2.3. The level of achievement (*expertise / performance*) needs is significantly higher in professional athletes compared to semi-professional athletes.

Specific hypothesis No. 2.4. The level of affiliation (*bonding*) needs is significantly higher in semi-professional athletes compared to professional athletes.

Specific hypothesis No. 2.5. We suppose that the level of motivation regarding the affiliation (*bonding*) needs in the athletes of the studied teams is reversely proportional with the infusion of private capital.

Material and methods

The research sample is relatively small (N = 158, 55 females, 103 males), considering that there are only a few teams activating in the first division of the Romanian national championships: basketball (females and males), football (males), handball (males), rugby (females and males), and volleyball (females).

Procedure

The questionnaire was applied within the training program (right after the practice, in the locker rooms), towards the end of the competition periods. We have been granted permission by the coaches and the management of the clubs; we have asked the subjects to complete the questionnaire in a personal manner and we have ensured them of the confidentiality of answers.

Instrument

To assess the degree of motivation of athletes – members of the sports teams studied – the “Prevailing Motivation” (DM) questionnaire was used; this instrument was applied to the Romanian population by Constantin [10]. A number of terms used in the questionnaire were calibrated change, this outgoing claims, meaning aiming to adapt to the specific sports activity [11]. The questionnaire includes 32 items scored on a Likert scale from 1 (never true) to 7 (always true) and grouped into four factors: *leadership (power needs)* [1, 2, 3, 4, 17, 18, 19, 20], *expertise/performance (achievement needs)* [5, 6, 7, 8, 21, 22, 23, 24], *bonding (affiliation needs)* [9, 10, 11, 12, 25, 26, 27, 28], *subsistence (existence needs)* [13, 14, 15, 16, 29, 30, 31, 32].

Research variables

The independent variables refer to the following: biologic gender of the subjects (*males and females*), performance level (*performance level I*: the teams activate in the first division of the championship with different names depending on the sports branch: A-Division, National Division – the level I football males and volleyball females, rugby females and males, basketball females; *performance level II* with different names: A-Division, B-Division, and C-Division – the level II football males and volleyball females, handball and basketball males), the club type (we have labelled a *public club* the ones functioning exclusively with public financing – for handball, rugby males; *private club* – the ones with exclusive private financing – for rugby females, volleyball – level I team; *mixed club* – with both public and private funds: for football, basketball males and females, volleyball females – level II team), the status of athletes within the sports team (*professional player* – including here the level I male

football players and female volleyball players; *semi-professional player* – the athletes of the other sports branches included in the study).

The *dependent variables* are represented by the factors of the utilized instrument: *leadership (power needs)* focused on the individuals' desire to influence the other group members; *expertise / performance (achievement needs)* concerns the tendency or the wish to do our best in any activity we engage in; *bonding (affiliation needs)* focuses on the individual's desire to establish relationships with the others; *subsistence (existence needs)* is oriented on the individual's interest to ensure the basic needs of his existence.

For the analysis of the data, the One Way Anova was used for the variable *type of club*, the independent-samples t-tests of significance between means for independent samples, and the two-way analysis of variance.

Results

The homogeneity of the instrument was assessed for the entire scale, as well as on the two factors independently, with the following results: for the entire scale $\alpha = 0.88$, for the scale of leadership factor $\alpha = 0.83$, for the scale of expertise / performance factor $\alpha = 0.80$, for the scale of bonding factor $\alpha = 0.87$, and for the scale of subsistence factor $\alpha = 0.84$.

The analysis of the results was structured considering that the effect was to obtain bonding effects of the independent variables *biologic gender* – *level* on the dimensions of prevailing motivation. For the other designs, the one-way ANOVA could not be applied given the lack of homogeneity of the variances.

For the dependent variable *leadership (power needs)*, the two-way analysis of variance indicates a

main significant effect of the level variable [$F(1.154) = 4.06$, $p = 0.04 < 0.05$], but not also of the biologic gender [$F(1.154) = 2.60$, $p = 0.10 > 0.05$], as well as of the interaction effect between the two variables [$F(1.154) = 1.25$, $p = 0.26 > 0.05$].

For the dependent variable *expertise / performance (achievement needs)*, the two-way analysis of variance shows a main significant effect of the level variable [$F(1.154) = 5.44$, $p = 0.02 < 0.05$], while the rest of the effects are insignificant: for the variable biologic gender [$F(1.154) = .003$, $p = 0.95 > 0.05$] and for the interaction effect between the two variables [$F(1.154) = 0.03$, $p = 0.85 > 0.05$].

There is no main significant effect of the variables biologic gender and level on the dependent variables *affiliation (bonding) needs* and *subsistence (existence) needs*. Furthermore, there are no interaction effects between the two variables.

The application of independent-samples t tests and of the Anova One Way for the variable *type of club* led to an emphasis on the differences concerning the *power (leadership) needs*, the *achievement needs (expertise/performance)*, the *affiliation (bonding) needs*, the *subsistence (existence) needs*, between the studied groups depending on the independent variables *biologic gender*, *level*, *athlete's status*, *type of club*.

Specific hypothesis No. 2.1.

The results showed no statistically significant differences between male and female athletes concerning the *power (leadership) needs* [$t(156) = 1.402$, $p = 0.65 > 0.05$]. The hypothesis is not confirmed.

Specific hypothesis No. 2.2.

The ANOVA One Way applied for the level of motivation concerning the achievement/performance (expertise) needs underlines the following results: [$F(2.155) = 1.8250$, $p = 0.16 > 0.05$]. Hence, there is no statistically significant effect of the type

of club on the satisfaction level regarding the achievement / performance needs; thus, the hypothesis is not confirmed.

Thus, the level of motivation concerning the achievement needs of the athletes with private financing sources is not different from that of the athletes with mixed or public financing sources.

Specific hypothesis No. 2.3.

The professional athletes (male soccer players and female volleyball players, members of sports teams who play in first-level competitions) are more motivated on the dimension of *the achievement (expertise / performance) needs* compared to semi-professional athletes (all the other subjects of the research sample). The difference is statistically different [$t(156) = 2.022$, $p = 0.04 < 0.05$]. The results also show the means of the scores obtained by the athletes in question. Hence, the hypothesis is confirmed.

Specific hypothesis No. 2.4.

The semi-professional athletes (male handball, male and female basketball, male and female rugby, female volleyball and male soccer – members of the teams within the second level) are more motivated on the dimensions of the *affiliation (bonding) needs* than professional athletes (male soccer players and female volleyball players who play on the first level). The results indicate a statistically significant difference [$t(156) = 7.022$, $p = 0.001$], thus confirming the hypothesis.

Specific hypothesis No. 2.5.

The ANOVA One Way shows the following results on the level of motivation concerning the affiliation (bonding) needs: [$F(2.155) = 5.516$, $p < 0.05$]. Hence, overall, there is a significant effect of the type of club on the level of motivation concerning the affiliation needs.

The hypothesis is confirmed partially. We conclude that the level of motivation concerning the affiliation needs for athletes with public financing sources is significantly higher than that of the athletes with mixed and private financing sources. However, there are no statistically significant differences between the athletes with mixed and those with private financing sources.

Discussions

The results of our investigative approach have pinpointed the extent to which the level of motivation of the members within the studied sports groups influence the team's goal reaching, meaning the team's sport performance. A series of independent variables – which can represent the fundament of explanations concerning the variability of the prevailing motivation for the athletes within the sports teams in the city of Iasi – were taken into account. Thus, the hypothesis was that *the biologic gender, the level of sports branch practice, the type of club*, and the *athlete's status* within the studied sports teams may have consequences on their motivational level.

Based on the data obtained in the analyses, we pinpoint that the hypotheses were confirmed partially. The results of our study allow us to utter a series of conclusions.

No gender-based differences were found regarding the power needs (the *leadership* factor) of the athletes within the studied sports teams. Our hypothesis was not confirmed, though the research literature notes that the female instrumental qualities are defined by competence, success-orientation and high occupational status, while the male ones also include physical force, demonstration of the male differences and superiority, spirit of initiative (Bell, cited by 12). The members of the male teams did not get different

scores than the female athletes regarding the wish to influence the other group members in order to achieve sport performance. The results do not confirm the hypothesis according to which women would be less motivated for success; actually, the women's status – even in sports and mainly within certain sports branches – has been changing continually.

The hypothesis regarding the influence of the type of club in explaining the achievement / performance needs of the athletes was not confirmed either. The level of motivation concerning the achievement needs for the athletes within teams with private financing sources is not different from that of the athletes within teams with private or mixed financing sources.

In exchange, the partial influences of the type of club were obtained on the level of affiliation needs of the athletes within the studied teams. Hence, the level of motivation concerning the affiliation needs for athletes with public financing sources is significantly higher than that of the athletes with mixed and private financing sources. However, there are no statistically significant differences between the athletes with mixed and those with private financing sources. The level of engagement in sports activities – in case of athletes within public clubs – may be determined more by the wish to spend the leisure in a pleasant and healthy way, and less by the desire to get high sports results. Hence, the athletes are more social-oriented and less performance-oriented within group activities.

The contribution of the professional status of the athletes within the studied sports teams to explaining their achievement / performance needs is not surprising. It is obvious that professional athletes are more motivated for sports performance than semi-professional athletes are. There is a direct relation between the status of the athlete, the

extrinsic motivation and the professional development opportunities. The professional athlete is much more pragmatic about this relation and he follows consequently his professional development, which he relates to performance.

The wish of the athletes to have higher performances by getting to practice the sport on the professional level and by enjoying the mobility of the sports branch (changing teams – for the better, if the player is good) determines a certain relationship downside (maybe they do not get to make friends within the team). The hypothesis formulated concerning the differences between semi-professional and professional athletes on the level of affiliation (bonding) needs is confirmed.

Conclusions of the study

Our investigative approach allowed studying certain variables (*biologic gender, the level of sports branch, the type of club, the status of the athletes within sports teams*) which influence the level of the prevailing motivation of the athletes within the local sports teams.

The results allow pinpointing that the uttered hypotheses were confirmed partially. Furthermore, a series of conclusions can be formulated:

1. No gender-based differences were found regarding the power needs. Both male and female subjects wish to influence their teammates in order to get sport success.
2. The wish to achieve sport performance is not influenced by the typology of the athletes' club. Irrespective of the type of financing sources, the athletes are oriented towards getting high results.
3. On the other hand, the wish to establish socio-affective relationships with the teammates and to perform in a pleasant climate is higher in the

athletes of public clubs than in athletes within clubs with mixed or private financing.

4. The status of professional athlete and becoming aware of the consequences involved influences the athlete's orientation towards high performances and less towards bonding needs. For the professional athlete, sport is a profession that requires personal investment.

References

1. Moran A.P. (2004) *Sport and Exercise Psychology*, Routledge, New York;
2. Murphy S. (2005) *The Sport Psych Handbook*, Human Kinetics, USA;
3. Weinberg R.S., Gould D. (1997) *Psychologie du sport et de l'activité physique*, Edisem Vigot, Toronto;
4. Epuran M., Holdevici I., Tonița F. (2001). *Psihologia sportului de performanță: teorie și practică*, Ed. FEST, București;
5. Ancona L. (1965). *Psicodinamica dell'Agonismo*, în *Psicologia dello sport*, Atii del 1° Congresso Internazionale di Psicologia dello Sport, Roma;
6. Popovici I. (2008) *Implicațiile motivației și ale imaginii de sine în traseul performanțial al unui sportiv*. Sport și Societate, Iași, nr. 1, p. 56-62;
7. Nicholls J.G. (1992) *The general and the specific in the development and expression of achievement motivation*, în Roberts G.C. (coord.), *Motivation in sport and exercise*, Champaign, IL, Human Kinetics, p. 31-56;
8. Crăciun M. (2008) *Psihologia sportului*, ed. RISOPRINT, Cluj Napoca;
9. Thill E. (1989) *Motivation et strategies des motivations en milieu sportif*, Paris, PUF;
10. Constantin T. (2004) *Evaluarea psihologică a personalului*, ed. Polirom, Iași;
11. Rusu O. (2009) *Dimensiuni psiho-sociale ale grupurilor mici în spațiul comunitar local. Studiu de caz – echipele sportive*, teză de doctorat nepublicată, Universitatea „Al.I.Cuza” Iași;
12. Stănciulescu E. (1997) *Sociologia educației familiale*, ed. Polirom, Iași.

DOI: 10.2478/tperj-2013-0003

Reference Values and Gender Differences of the Functional Parameters in Romanian Elite Junior Tennis Players

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Abstract

Purpose: To establish the reference values and gender differences regarding fitness, strength, and time reaction of the Romanian elite junior tennis players. **Material and Methods:** Thirty four junior tennis players (19 male, 15 female) with a mean age of 15 years were selected from the database of the Cardiopulmonary Effort Testing and Physical Performance Laboratory from Faculty of Physical Education and Sport, West University of Timisoara. To be included in the study, a tennis player had to belong to the Romanian Tennis Federation as a junior, be among the 50 best players in his/her category, and have no pathology at the evaluation moment. All subjects underwent functional evaluation by performing a maximal cardiopulmonary exercise test, the counter movement jump test and complex opto-acoustic reaction test. **Results:** The functional performance are significantly different for males and females in all parameters studied, with male tennis players showing better performance than female tennis players. **Conclusions:** The mean values of functional parameters of the Romanian elite junior tennis players are lower than international competitive tennis athletes. There are significant gender differences in junior tennis players. We hope that the present study results provide useful reference values for coaches and physical trainers in order to improve functional performance of their junior tennis players.

Key words: tennis, functional performance, fitness, strength, complex reaction

Rezumat

Scop: Stabilirea valorilor de referință și diferențele de gen dintre acestea în ceea ce privește condiția fizică, puterea și timpul de reacție a jucătorilor practicanți ai tenisului de câmp în campionatul național de juniori. **Material și metode:** treizeci și patru de jucători de tenis juniori (19 bărbați, 15 femei), cu o vârstă medie de 15 ani au fost selectați din baza de date a laboratorului de testare cardiopulmonară la efort și evaluare a performanței motrice a Facultății de Educație Fizică și Sport, Universitatea de Vest din Timișoara. Pentru a fi incluși în studiu, fiecare jucator de tenis trebuia să fie înregistrat ca junior în cadrul Federației Române de Tenis și să fie printre cei mai buni 50 de jucători din categoria sa. Toți subiecții au urmat o evaluare funcțională prin efectuarea unei testări cardiopulmonare la efort de tip maximal, testul săriturii maxime în înălțime și a testul de reacție complexă la stimuli opto-acustici. **Rezultate:** performanțele funcționale sunt semnificativ diferite pentru bărbați și femei pentru toți parametrii studiați, juniorii practicanți ai tenisului de câmp de sex masculin având o performanță superioară celor de sex feminin. **Concluzii:** Valorile medii ale parametrilor funcționali ai jucătorilor practicanți ai tenisului de câmp în campionatul național de juniori sunt mai mici decât cele ale sportivilor competitivi pe plan internațional. Există diferențe semnificative între sexe la jucători de tenis juniori. Sperăm ca rezultatele acestui studiului să furnizeze o sursă pentru valorile de referință ale parametrilor funcționali, pentru antrenori și preparatori fizici, în scopul de a îmbunătăți performanța sportivă a practicanților tenisului de câmp la nivel de juniori.

Cuvinte cheie: tenis, performanță, forță, putere, reacție complexă.

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Introduction

Tennis is characterized as a short-duration and high intensity sport that is physically demanding on the body. Age, gender, physical, technical and psychological components will all influence the performance of the tennis player. Optimal planning and training programmes will improve the safety and effectiveness of players game [1].

Improving training sessions and optimizing the profile of the junior tennis players requires a good knowledge of functional parameters (strength, power, endurance, heart rate, etc.), that can contribute to the tennis player's profile and consequently should be take into account when planning training sessions [2].

To our knowledge, no study has evaluated these functional parameters in Romanian elite junior tennis players. This is extremely useful to improve performance, and for prevention and rehabilitation of sport injuries, especially in younger tennis players. Therefore, our **aim** is to establish the average values and gender differences regarding fitness, strength, and time reaction of the Romanian elite junior tennis players.

Material and Methods

Thirty four junior tennis players (19 male, 15 female) with a mean age of 15 years (range, 12–16) were selected from the database of the Cardiopulmonary Effort Testing and Physical Performance Laboratory from Faculty of Physical Education and Sport, West University of Timisoara. Mean weight for male and female players was 64.3 ± 8.6 and 49.8 ± 10.9 kg, respectively, and mean height was 175.7 ± 6.4 and 159.8 ± 11.9 cm. To be included in the study, a tennis player had to belong to the Romanian Tennis Federation as a junior, be among the 50 best players

in his/her category, and have no pathology at the evaluation moment.

The Isometric muscle strength evaluation was performed using a digital manometric dynamometer (Chatillon K-FCE-200, USA). Taking into account the individual needs of athletes, we evaluat following muscle groups as important determinants of physical performance in tennis: flexors, internal rotator and abductor muscles of the arm. We present in the following paragraphs the evaluation methodology for the three most important muscle groups on the dominant side of the tennis players:

1. The arm internal rotators isometric strength was tested from the position of maximal external rotation of the shoulder, arm resting on a table and elbow at 90 degree, with the dynamometer placed on the wrist.
2. The arm abductors isometric strength was tested with the subject in standing position and the non-dominant side in contact with a wall. The dominant superior limb was placed in the anatomic position with the dynamometer placed on the external epicondyle.
3. The forearm flexors isometric strength was tested from the position of 90 degree flexion of the arm and forearm; arm resting on a table, with the dynamometer placed on the wrist.

The aerobic fitness was evaluated after performing a maximal cardiopulmonary exercise test (using a Metalyzer 3B gas exchange device, Germany) on bicycle ergometer (Lode Corival, Holland). We recorded peak oxygen uptake ($\dot{V}O_{2peak}$), oxygen uptake at anerobic threshold ($\dot{V}O_{2AT}$), and respiratory equivalents for oxygen ($\dot{V}E/\dot{V}O_2$) and carbon dioxide ($\dot{V}E/\dot{V}CO_2$).

All subjects underwent measurements of explosive power of the lower limbs by performing the *Counter*

movement jump test and *Complex opto-acoustic reaction test* (using Optojump Next system, Italy). The time reaction was assessed in each subject by making a move outside a perimeter and reaching a target located at a distance of 1 meter and 25 centimetres from the floor – this type of movement involved, in different proportions, the lower limbs muscles, trunk and upper limbs muscles, along with coordination skills, and explosive power.

Results and discussions

Providing training sessions for tennis players requires a good understanding of the physiological variables important to optimize performance. Tennis

requires short explosive bursts of energy repeated many times per match or practice session. A tennis match because is not limited in time (unlike many other sports), may last less than one hour or as long as five hours (in five-set matches). This situation requires tennis athletes to have high endurance and fitness in order to be successful and avoid injury [1].

Our study results shows that evaluated parameters are significantly different for males (Table I and Table II) and females (Table III and Table IV) in all parameters studied, with male tennis players showing better performance than female tennis players.

Table I. The endurance and aerobic fitness performance of the Romanian male junior tennis players

	V'O ₂ _AT (ml/min/kg)	V'O ₂ _peak (ml/min/kg)	VE/V'O ₂	VE/V'CO ₂
Minimum	17.0	30	30.5	25.5
25% Percentile	24.0	38	31.1	29.4
Median	29.0	44	35	31.7
75% Percentile	36.0	47	38	34.3
Maximum	45.0	59	39.4	37.5
Mean	30.2	43.2	34.7	31.9
Std. Deviation	7.3	8.4	3.1	3.2
Variation Coefficient (%)	24.2	19.4	8.9	10.1

Table II. The strenght and power performance of the Romanian male junior tennis players

	Forearm flexion (KgF)	Arm internal rotation (KgF)	Arm abduction (KgF)	Jump height (cm)	Explosive power (W/Kg)	Time reaction (s)
Minimum	14.9	8.8	14	22.5	13.0	1.31
25% Percentile	20.9	15	22.5	31.1	16.6	1.32
Median	27.3	20	27.9	36.3	41.7	1.32
75% Percentile	31.8	23.5	31.5	44.7	62.8	1.35
Maximum	35.5	28.7	41	49.5	74.5	1.46
Mean	26.4	19.5	27.3	36.6	40.5	1.34
Std. Deviation	6	5.4	6.9	8.4	22.6	0.04
Variation Coefficient (%)	22.8	27.8	25.2	22.9	55.7	2.6

Table III. The endurance and aerobic fitness performance of the Romanian female junior tennis players

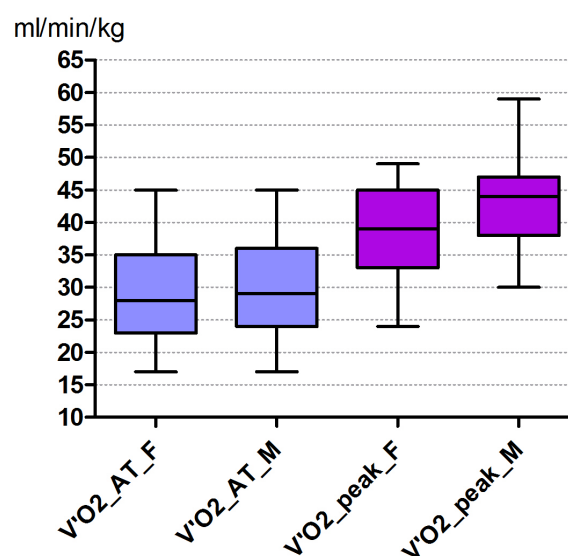
	V'O ₂ _AT (ml/min/kg)	V'O ₂ _peak (ml/min/kg)	VE/V'O ₂	VE/V'CO ₂
Minimum	17	24	30.7	25.6
25% Percentile	23	33	31.3	29.4
Median	28	39	35.2	32
75% Percentile	35	45	38.1	34.5
Maximum	45	49	39.7	37.9
Mean	28.9	38.4	34.8	32.2
Std. Deviation	7.7	7.9	3.2	3.2
Variation Coefficient (%)	26.5	20.7	9.1	10.1

Table IV. The strenght and power performance of the Romanian female junior tennis players

	Forearm flexion (KgF)	Arm internal rotation (KgF)	Arm abduction (KgF)	Jump height (cm)	Explosive power (W/Kg)	Time reaction (s)
Minimum	13	8.4	13.4	18.2	10.7	1.32
25% Percentile	15.4	9.9	16.4	24.6	16.9	1.43
Median	16.3	11.4	18.4	28.5	22.6	1.49
75% Percentile	19.4	15.2	22.4	32.9	35.8	1.53
Maximum	20.8	17.2	24.6	36.1	67.7	1.54
Mean	16.9	12.2	19.1	28.3	27.8	1.48
Std. Deviation	2.4	2.9	3.5	5.4	15.4	0.06
Variation Coefficient (%)	13.9	24.2	18.4	19.2	55.6	4.3

Cardiopulmonary exercise testing (CPET) is considered the gold standard for aerobic exercise capacity assessment [3]. Competitive male tennis athletes have maximal oxygen uptake values 50 to 65 ml/min/kg [4]. Differences in peak oxygen uptake have been observed in relation to age - the lowest values have been found in youth, while junior players have higher values [5]. Regarding oxygen uptake during a tennis match, the average values are 23 – 40 ml/min/kg. However, these values represent an average intensity of approximately 50-60% of the V'O₂peak, and this value is higher when the level of the player is lower [2].

Our study shows that in both sexes, all variables related to endurance (V'O₂_AT) and aerobic fitness (V'O₂_peak) performance were significantly greater ($p < 0.001$) for man then women. (Figure 1)


Figure 1. Anaerobic treshold (V'O₂_AT) and peak oxygen uptake (V'O₂_peak) in males (M) and females (F) Romanian elite junior tennis players

The peak oxygen uptake of the Romanian elite junior tennis players are lower than international compe-

titive tennis athletes, with a mean $\dot{V}O_{2peak}$ of 43.2 ml/min/kg in males and 38.4 ml/min/kg in females. This may be due to poor accessibility to testing and training facilities with a big impact on sports performance. (Figure 1)

Metabolic equivalents for oxygen and carbon dioxide ($VE/\dot{V}O_2$ and $VE/\dot{V}CO_2$) are both important indices of respiratory performance during exercise. We found that there are no significant differences between metabolic respiratory equivalents in male and female elite junior tennis players. (Figure 2)

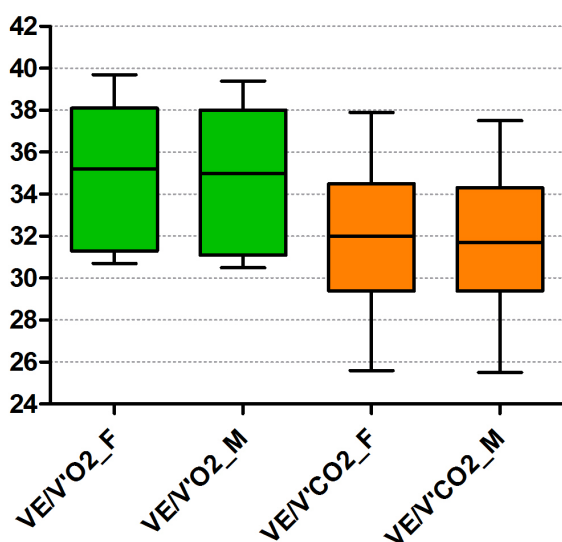


Figure 2. Metabolic equivalents for oxygen ($VE/\dot{V}O_2$) and carbon dioxide and ($VE/\dot{V}CO_2$) in males (M) and females (F) Romanian elite junior tennis players

Strength is required in arm and forearm muscles of a tennis player, both for performance (ball velocity) enhancement and to reduce injuries (protection of joints, ligaments, tendons) [1]. During the tennis serve, it has been shown that the greatest contribution to final speed of the racket was provided by: upper arm internal rotation, wrist flexion, upper arm horizontal adduction, forearm flexion, and forward movement of the shoulder [1,6,7].

Regarding strength performance evaluation in our study we found significant differences between males and females isometric strength during forearm flexion (56%), arm internal rotation (59%) and arm abduction (43%). (Figure 3)

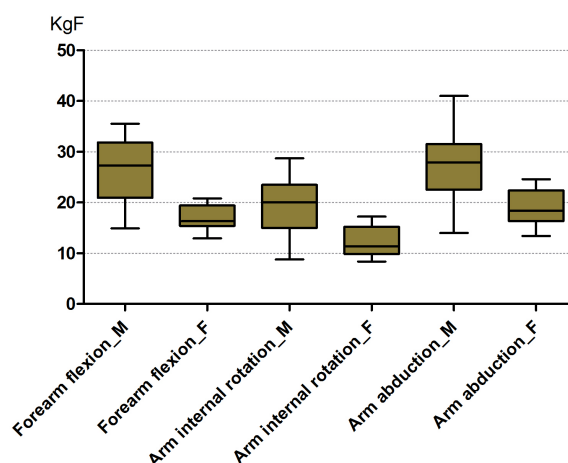


Figure 3. Strength performance evaluation or the three most important muscle groups from the dominant side of the males (M) and females (F) Romanian elite junior tennis players

Most of tennis injuries have been reported to occur in the lower body. Therefore is very important to include lower body strengthening exercises for tennis players. Even there were found significant differences between left and right upper limbs strength, lower body strength have been shown to be symmetrical in tennis players [1,8,9].

Evaluation of lower limbs strength and power performance in our study have shown significant differences between genders regarding jump height (29%, $p=0.002$) but not for explosive power (46%, $p=0.072$). (Figure 4)

Tennis is a sport based on unpredictability. Every shot of the opponent can have a different velocity, spin and be placed in different parts of the court. This complexity requires tennis athletes to have fast reaction times [1,10].

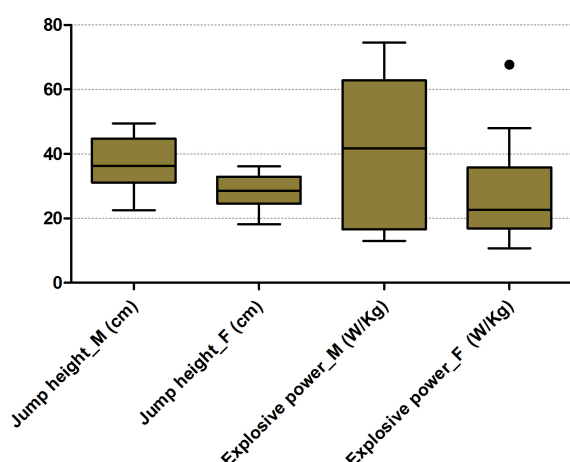


Figure 4. Lower limbs muscular performance in males (M) and females (F) Romanian elite junior tennis players

Simple reactions of a human body is depending on the overall speed of the perceptual and motor systems and is genetically determined [11]. There are significant differences between males and females in regard to simple reaction time, but there is no difference between novice and expert sportsmen [11, 12]. Comparing to simple reactions, the complex reactions (involving an important part of the body) might be influenced by specific training. In our study we found that the male and female group were quite homogenous (the coefficient of variation was only 2.6% for males and 4.3% for females) in regard to time reaction to random optic and acoustic stimulus. The mean time reaction of males was 1.34 seconds and 1.48 seconds for females, the difference being statistically significant ($p < 0.001$). (Table I and Table II)

Conclusions

The mean values of functional parameters of the Romanian elite junior tennis players are lower than international competitive tennis athletes. There are significant gender differences in junior tennis players, most of them being genetically influenced. We hope that the present study results provide useful reference values for coaches and physical

trainers in order to improve functional performance of their junior tennis players. Further studies on larger groups of tennis players and parameters are needed in order to establish gender reference values of functional parameters in junior tennis players.

References

- Kovacs M. (2006) *Applied physiology of tennis performance*. Brit J Sport Med, 40:381-386;
- Torres-Luque G., Sánchez-Pay A., Bazaco M.J., Moya M. (2011) *Functional aspects of competitive tennis*. J. Hum. Sport Exerc. Vol. 6, No. 3, pp. 528-539;
- Wasserman K., Hansen J.E., Sue D.Y., et al, (2007) *Principles of exercise testing and interpretation*. Philadelphia, Lippincott Williams & Wilkins, USA;
- Kovacs M. (2007). *Tennis physiology. Training the competitive athlete*. Sports Med, 37(3):189-198;
- Therminarias A., Dansou P., Chirpaz-Oddou M., Quirino A. (1990) *Effects of age on heart rate response during a strenuous match of tennis*. J Sport Med Phys Fit, 30:389-396;
- Elliott B.C., Marshall R.N., Noffal G.J. (1995) *Contributions of upper limb segment rotations during the power serve in tennis*. J Appl Biomech, 11:433-442;
- Springs E., Marshall R., Elliott B., et al. (1994) *A three-dimensional kinematic method for determining the effectiveness of arm segment rotations in producing racket head speed*. J Biomech, 27:245-254;
- Bylak J., Hutchinson M.R. (1998) *Common sports injuries in young tennis players*. Sport Med, 26:119-132;
- Ellenbecker T.S., Roetert E.P. (1995) *Concentric isokinetic quadriceps and hamstring strength in elite junior tennis players*. Isokinet Exerc Sci, 5:3-6;
- Groppel J.L. (1986) *The biomechanics of tennis: an overview*. Int J Sport Biomech, 2:141-155;
- Mero A., Jaakkola L., Komi P.V. (1989) *Neuromuscular, metabolic and hormonal profiles of young tennis players and untrained boys*. J. Sport Sci, 7:95-100;
- Nielsen D., McGown C. (1985) *Information processing as a predictor of offensive ability in baseball*. Percept. Mot. Skills, 60:775-781.

DOI: 10.2478/tpelj-2013-0004

Study Regarding the Effectiveness of Manual Lymphatic Drainage in the Case of Patients with Breast Cancer that Present Lymphedema

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Abstract

Lymphedema is defined as a persistent increase of tissue volume caused by the blocked or absent lymphatic drainage. The purpose of this study is to analyse the effectiveness of lymphatic drainage in the treatment of lymphedema after a mastectomy, with the aim of reducing the volume of the lymphedema and improving overall symptomatology, as well as providing information regarding the impact of this treatment on quality-of-life and the physical limitations of these patients. With these objectives in mind, a series of articles evaluating the effectiveness of manual lymphatic drainage in the case of patients with breast cancer and lymphedema have been studied. The parameters under observation were: duration of lymphedema reduction and improved symptomatology (pain, a feeling of swelling of the upper limb, functional limitation, and patient dissatisfaction towards their body image). Following this analysis, one can conclude that the association of manual lymphatic drainage to physical exercise and physiotherapy has produced changes in the volume of the limb affected by the lymphedema; however, its isolated use has not resulted in significant changes.

Key words: lymphedema, manual lymphatic drainage, breast cancer, volume, effectiveness

Rezumat

Limfedemul este definit ca fiind creșterea persistentă de volum a unui țesut cauzată de blocarea sau absența drenajului limfatic. Scopul acestui studiu este de a analiza eficacitatea drenajului limfatic manual în tratamentul limfedemului postmastectomie, cu scopul reducerii volumului limfedemului și îmbunătățirii simptomatologiei, precum și furnizarea informațiilor cu privire la impactul acestui tratament asupra calității vieții și a limitărilor fizice ale acestor pacienți. Pentru aceasta am studiat o serie de articole recente care au evaluat eficacitatea drenajului limfatic manual la pacienții cu cancer de sân care prezintă limfedem. Parametrii urmăriți au fost: durata reducerii limfedemului și îmbunătățirea simptomatologiei (durere, senzația de tumefiere a membrului superior, limitarea funcțională, nemulțumirea pacientului față de propria imagine corporală). În urma analizei noastre concluzionăm că asocierea drenajului limfatic manual cu exercițiul fizic și cu fizioterapia au produs modificări ale volumului brațului afectat de limfedem, dar utilizarea lui izolată nu a dus la modificări semnificative.

Cuvinte cheie: limfedem, drenaj limfatic manual, cancer de sân, volum, eficacitate

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Introduction

At present, breast neoplasm has an incidence of 35-45 new cases in 100,000/year, with a rising frequency. [1]

The early detection and treatment of breast neoplasm has significantly improved during the last decades, a factor which makes the survival rate higher.

Special attention is currently being given to lymphatic oedema that appears after the removal of axillary lymph nodes.

Lymphedema consists of the accumulation of lymph in the interstitial spaces caused by the blocked or absent lymphatic drainage, followed by the increase in volume of the arm with 200 ml or more compared to the value before surgical intervention, or a difference of 2 cm or higher in the diameter of the arm.[2,3,4]

The problems that appear after lymphedema has installed are: pain, discomfort, a feeling of weight in the upper limb, deformation of the arm, reduction of the degree of mobility, infections, erysipelas, a sense of psychological suffering which can lead to social isolation.[5]

The methods of therapy used are: compressive bandages, manual lymphatic drainage, physical exercises combined with CPT – Complex Physical Therapy.

The purpose of this study was to analyse the effectiveness of applying manual lymphatic drainage in the treatment of lymphedema after mastectomy, either isolated or associated with other techniques, aiming to reduce the volume of the lymphedema and improve symptomatology.

The present paper provides an analysis of recent studies regarding the effects of manual lymphatic drainage in preventing and treating lymphedema after mastectomy.

The vast majority of the studies had inconclusive results, most probably caused by the small sample groups used in the research.

The criteria of selection used in the studies taken from the specialised literature were:

1. The criteria of inclusion and exclusion used to select the patients
2. The technique of manual lymphatic drainage used
3. The technique of compression used
4. The definition of lymphedema
5. The evaluation of the severity of the lymphedema
6. The association of physical exercises
7. The association of CPT – Complex Physical Therapy

A number of studies have been excluded because they fulfilled at least one of the following criteria:

1. They involved patients who did not have they are axillary lymph nodes removed
2. The clinical results were not clearly specified

The studies used in the research were found by searching the PubMed database, using the following keywords: manual lymphatic drainage, breast cancer or breast neoplasm, lymphedema.

Martín M. L. et al. (2011) have conducted a clinical study on 58 female patients that presented lymphedema after mastectomy and have divided them into two groups: the control group of 29 patients who followed a standard treatment - skin care, exercises and compressions, application of bandages for a month and, ultimately, compression clothing - and the experimental group consisting of 29 patients that underwent the standard treatment coupled with manual lymphatic drainage. In this study, the treatment was applied on a daily basis over a period of four weeks, while the state of the patients was evaluated after a month, three months and six months after the treatment commenced. The parameters under scrutiny were to reduce the

volume of the arm, the duration of the lymphedema's reduction and the improvement of symptomatology (pain, tumefaction, functional impotence, dissatisfaction with body image). The reduction of the arm's volume was the only result achieved. The condition for a lymphedema to be considered is a difference of at least 200 ml between the volume of the affected arm (measured with a circometer and calculated using the truncated cone formula) and the volume of the collateral arm. The response is considered to be good when a reduction of at least 20% in volume is reached after applying treatment to the lymphedema in the affected area, when compared to the initial value. These measurements will be conducted at the beginning of the study, after the first month, after the third month and after six months since the investigation's commencement. The difference in volume was used to predetermine the size of the sample group. [6]

The treatment of lymphedema remains a problem even in the context of modern methods of treatment, such as Complex Physical Therapy (CPT). Also called Complex Decongestive Physiotherapy, it is a scheme of treatment that includes a meticulous hygiene of the skin, manual lymphatic drainage, bandages, exercises and supportive clothing. This therapy is conducted into phases: in the first phase (treatment), the purpose is to mobilise the accumulated lymph, to reduce fibrous tissue and to improve the skin's state of health by using Manual Lymphatic Drainage (MLD) on a daily basis. Furthermore, the patients receive instructions in regards to skin care, measures of prophylaxis and use of multilayer bandages. In the second phase (maintenance), compression bandages, regular physical exercises and weight control are employed. [7]

Although the first results have been optimistic, CPT did not clearly demonstrate superiority when compared to other alternatives in the studies conducted by Ramos A.M. et al. (1999), and no study has evaluated the patients' preference for a specific treatment or the effects of the treatment on quality-of-life. [8]

Wozniowski M. et al. (2001) and Mcneely M. et al. (2004) suggest that this technique should be used only in selected cases. Using CPT to stimulate drainage of the lymph has a profound physiological basis; however, the quality of the evidence regarding the relative effectiveness of this type of therapy is unsatisfactory. On the other hand, the fact that CPT involves a number of techniques (manual lymphatic drainage, skin care and multilayer bandages followed by an item of compressive clothing to reduce the oedema, therapeutic exercises) makes it difficult to recognise which one of them is truly effective when treating lymphedema. [9,10]

Only three small studies have evaluated manual lymphatic drainage for the lymphedema of the arm. In the first study conducted by Johansson K. et al. (1999), the compression with bandages coupled with manual lymphatic drainage has been compared to compression with simple bandages. 38 patients participated in the study, who underwent compression with simple bandages for two weeks and compression with bandages coupled with manual lymphatic drainage for one week. The average value of volume reduction in the case of the lymphedema was 20 ml for the treatment using compression with simple bandages, and 47 ml for the treatment using compression with bandages coupled with manual lymphatic drainage. These differences were not significant. [11]

In the second study conducted by Johansson K. et al. (1998), manual lymphatic drainage was compared with Sequential Pneumatic Compression

(SPC) for the treatment of lymphedema at the arm in the case of 28 patients previously treated for breast cancer. Both treatments were conducted for two weeks. The lymphedema was reduced by 49 ml (7%) in the case of treatment with SPC, and 75 ml (15%) when MLD was employed. Both MLD and SPC have led to the decrease in volume of the lymphedema; however, no significant difference has been noticed between the two methods. [12]

The third study conducted by Andersen L. et al. (2000), which involves 42 patients with stage I or II lymphedema, has compared standard therapy with MLD + standard therapy and initiation in self massage. The standard therapy included compression clothing (personalised sleeve and glove used during the day), instruction regarding physical exercises, education in skin care, as well as information and recommendations regarding lymphedema. Both groups have obtained a significant reduction in volume at the level of the limbs, a decrease in discomfort and an increase in joint mobility over a period of time. Still, there are no significant differences between the two groups as regards the objective measures to the changes in volume of the limbs or the subjective measures linked to symptoms of lymphedema. This study has investigated the effects of 8 sessions of MLD for 2 weeks, so the time of application was relatively low and the study group was limited to those with slight to moderate swelling (20-30% of the difference).[13]

Discussions:

The results of this study will supply information regarding the effectiveness of MLD and its impact on quality-of-life and the physical limitations of these patients.

The published studies that aimed the effectiveness of MLD have presented contradictory results.

Vignes S. et al. (2011) conducted a prospective study on 682 cases in which various treatments for lymphedema have been evaluated. The results were:

- The risk of failure following the application of intense decongestive physiotherapy has been associated with young obese patients with a BMI (body mass index) of over 30kg/m².
- The applications of an elastic sleeve and the treatment with multilayer bandages have been associated with a reduced risk of failure.
- The use of MLD as an adjuvant therapy was not mentioned. [14]

Lacomba M.T. et al. (2010) have shown a preventive effect of a combination between MLD and therapy through physical exercise in the development of the lymphedema. They have included hundred and 20 patients who underwent removal of axillary lymph nodes; their treatment lasted for four weeks; one year after the operation, 7% of the patients from the target group and 25% of the patients from the control group (those who did not undergo MLD and physical exercises; they only used compressive bandages) developed lymphedema. This occurred 6-12 months after surgical intervention. [4]

The compression bandages have been proven effective when dealing with lymphedema. Badger C. et al. (2000) have conducted a study to compare the usage of compression bandages for 18 days followed by compression clothing (treatment group) as opposed to using only compression clothing (comparison group). These authors have reported a significant reduction in volume at the level of the limbs after 24 weeks in the case of the treatment group, as opposed to the comparison group. [15]

The revisited studies have investigated numerous types of therapy through compression. McNeely M. (2004) has noted that the figure of eight method has been more effective in maintaining a correct position of bandage and a level of comfort for the patient,

when compared to spiral bandaging. McNeely M. (2004) has replaced bandages five times a week during the treatment period (which lasted for four months), while Johansson replaced bandages every two days for three weeks [9].

Devoogdt N. et al. (2011) have evaluated the effective MLD used together with therapy through exercises and instruction to prevent lymphedema in the case of 160 patients with breast cancer and lymph nodes in the unilateral axillary area; the patients were ordered according to BMI and axillary irradiation. [16]

Conclusions

Devoogdt N. et al. (2011) have concluded that manual lymphatic drainage is not likely to have a moderate to high effect in reducing the incidence of lymphedema on a short-term, when compared to compressive bandages and therapy through exercises after the removal of the axillary lymphatic nodes. [16]

The conclusion of the analysis conducted by Tsai-Wei Huang et al. (2013) is that the addition of MLD to compression therapy and exercises when treating lymphedema after operating on lymphatic nodes in the axillary area for breast cancer is not likely to produce a significant reduction in the volume of the affected arm. No significant difference in the incidence of lymphedema in the case of patients treated with or without MLD assets are. [17]

Following this analysis, one can conclude that associating MLD with physical exercise and physiotherapy has produced changes in the volume of the arm affected by lymphedema, but its isolated use has not led to significant changes.

References

1. Mortimer P.S., Bates D.O. (1996) *The prevalence of arm edema following treatment for breast cancer*. QJM, 89:377-80;
2. Brennan M.J. (1992) *Lymphedema following the surgical treatment of breast cancer: a review of pathophysiology and treatment*. J Pain Symptom Manage, 7(2):110-6;
3. Box R.C., Reul-Hirche H.M., Bullock-Saxton J.E., Furnival C.M. (2002) *Physiotherapy after breast cancer surgery: results of a randomised controlled study to minimise lymphoedema*. Breast Cancer Res Treat, 75:51-64;
4. Lacomba M.T., Sanchez M.J.Y., Goni A.Z., Merino D.P., del Moral O.M., Tellez E.C. et al. (2010) *Effectiveness of early physiotherapy to prevent lymphoedema after surgery for breast cancer: randomised, single blinded, clinical trial*. BMJ, 340:b5396;
5. Moffatt C.J., Franks P.J., Doherty D.C., Williams A.F., Badger C., Jeffs E., Bosanquet N., Mortimer P.S. (2003) *Lymphoedema: an underestimated health problem*. Quarterly Journal of Medicine, 96(10):731-738;
6. Martín M.L., Hernández M.A., Avendaño C., Rodríguez F., Martínez H. (2011) *Manual lymphatic drainage therapy in patients with breast cancer related lymphoedema*. BMC Cancer, 11:94;
7. Badger C., Preston C., Seers K., Mortimer P. (2004) *Physical therapies for reducing and controlling lymphoedema of the limbs*. Cochrane Database of Systematic Reviews, 4:CD003141 [http://www.update-software.com];
8. Ramos A.M., O'Donnel L.S., Knight G. (1999) *Edema volume, not timing, is the key to success in lymphedema treatment*. Arm Surgery, 178:311-5;
9. McNeely M., Magee D.J., Bagnall K.M., Haykowsky M., Hanson J. (2004) *The addition of manual lymph drainage to compression therapy for breast cancer related lymphedema: a randomized controlled trial*. Breast cancer Res Treatment, 86:95-106;
10. Wozniowski M., Jasinski R., Pilch U., Dabrowska G. (2001) *Complex physical therapy for lymphedema treatment of the limbs*. Physiotherapy, 87:252-252;
11. Johansson K., Albertsson M., Ingvar C., Ekdahl C. (1999) *Effect of compression bandage with or without manual lymph drainage in patients with postoperative arm lymphedema*. Lymphology, 32:103-110;
12. Johansson K., Lie E., Ekdahl C., Lindfeldt J. (1998) *A randomized study comparing manual lymph drainage with sequential pneumatic compression for treatment of postoperative arm lymphedema*. Lymphology, 31:56-64;
13. Andersen L., Hojris I., Andersen J. (2000) *Treatment of breast cancer-related lymphedema with or without manual*

- lymphatic drainage- a randomized study. Acta Oncol*, 39(3):399-405;
14. Vignes S., Porcher R., Arrault M., Dupuy A. (2011) *Factors influencing breast cancer-related lymphedema volume after intensive decongestive physiotherapy. Support Care Cancer*, 19:935–940;
15. Badger C., Peacock J.L., Mortimer P.S. (v) *A randomized, controlled, parallelgroup clinical trial comparing multilayer bandaging followed by hosiery versus hosiery alone in the treatment of patients with lymphedema of the limb. Cancer*, 88:2832–2837;
16. Devoogdt N., Christiaens M.R., Geraerts I., Truijen S., Smeets A., Leunen K., Neven P., Van Kampen M. (2011) *Effect of manual lymph drainage in addition to guidelines and exercise therapy on arm lymphoedema related to breast cancer: randomised controlled trial. BMJ*, 343:d5326;
17. Huang T.W., Tseng S.H., Lin C.C., Bai C.H., Chen C.S., Hung C.S., Wu C.H., Tam K.W. (2013) *Effects of manual lymphatic drainage on breast cancer-related lymphedema: a systematic review and meta-analysis of randomized controlled trials. Huang et al. World Journal of Surgical Oncology*, 11:15.

DOI: 10.2478/tperj-2013-0005

A Statistical and Technical-Tactical Study of the Dribbles Conducted by Three Midfielders in Three 1st League matches, in the 2011-2012 Competitive Year

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Abstract

Technical preparation implies training increasingly skilled players, with an ever-improving capacity of performing, in order to succeed and cope with the demands of contemporary football. In order to achieve this objective, a continuous increase of quality and efficiency when selecting the players is needed; furthermore, the optimization of the process of preparation and discovery of the most efficient methods in the training process are also necessities to be dealt with. By observing the various technical executions made by the players on the football field, one can obtain practical demonstrations and optimal solutions of how to improve the technical-tactical way of playing of the entire team and can foreground the problematic areas and the less skilled executions of each player and of the entire team.

Key words: *dribble, offensive midfielder, ball control, deceptive moves.*

Rezumat

Pregătirea tehnică presupune formarea de jucători din ce în ce mai bine pregătiți, cu o capacitate de performanță mereu îmbunătățită pentru a face față și a se impune în fotbalul actual. În vederea realizării acestui obiectiv, este necesară o creștere continuă a calității și eficienței selecției și instruirii, și, de asemenea, o optimizare a procesului de pregătire și de descoperire a celor mai eficiente metode și mijloace în procesul de antrenament. Urmărirea diferitelor execuții tehnice ale jucătorilor pe terenul de fotbal poate să ofere modele practice și soluții optime de îmbunătățire a jocului tehnico-tactic al întregii echipe și poate marca zonele deficitare și execuțiile mai puțin reușite ale fiecărui jucător și a întregii echipe.

Cuvinte cheie: *dribling, mijlocas ofensiv, conducerea mingii, mișcări înșelătoare*

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Introduction

In the entire activity of a football coach, regardless of his qualification or the team that he is training, the most important element is the harmonious blend between practical and theoretical work, as one completes the other and both contribute to raising the level of individual performances as a coach and, implicitly, of the performances of the team and the players [1].

When promoting football as a super competition, technical training is of utmost importance; it has increasingly felt the infiltrations of logic and reason, because every match is approached using different tactical patterns, an aspect which requires adequate technical means and scientific training. The process of forming a technique cannot be based solely on learning certain moves, but must also take into account the conditions that the match implies. In this sense, the internal logic of the match has shown that pressing exercises conducted at a higher tempo, in small spaces and that offer more complicated solutions of playing are to be favoured. Despite all this, technical training does not make the player; this is why the technical training must always be conducted in relation to individual tactics [2].

The demands posed by training and competitions are increasingly more evident through increased physical and psychological participation. All these elements have implications on the behaviours posed by the players' training pattern, on the methodology of teaching the technique, through the increase of rate, intensity and complexity of training.

Thus, given the current view on football coaching, the technical-tactical training is an integral part of the system of preparing for professional football. In this context, the quantity, but especially the quality of the training process represent decisive factors for ensuring a superior capacity of performing in football, at the level of the demands posed by the

current level of the game and taking into account the perspective of its evolution [3].

Departing from these premises, the necessity of elaborating a statistical and technical-tactical study of the dribbles conducted by three 1st League offensive midfielders presents itself. The achievement of this objective is conditioned by the study of the teams from the 1st League, first and foremost, in order to find the midfielders that fit into the given data.

A special contribution to solving these problems has been brought by scientific research, both the fundamental type, which studies the mass base of professional football in all its complexity, conceptually, essentially, as well as in the applied type, which approaches more limitative, but concrete aspects; these aspects are specific to the practice and methodology of football, as practiced at this level. Moreover, numerous studies of an applied nature have been conducted on a worldwide level, to which numerous experts have made contributions in the form of studies and items of research in recent years.

The choice of this topic is based on the fact that, within football, handling dribbles effectively is a quality that significantly increases the value of a given player. Through this study on a number of important offensive midfielders, one can emphasize this technical element and its manifestations within 1st League matches.

On a theoretical level, this study seeks to complement the pallet of scientific research of an applied nature, making some clarifications regarding the technical-tactical capacities of 1st League players acting as offensive midfielders. It is considered that they should possess the technical abilities required and apply them in official matches, within diverse playing conditions.

The objectives of this study are:

- To identify the three offensive midfielders who are to be studied taking into consideration the dribbles they have conducted;
- To evaluate the technical abilities of handling the ball by each of the studied players;
- To elaborate observation sheets of the technical abilities which are the object of this study;
- To establish the hypothesis and create the adequate conditions for conducting the study.

The purpose of this paper is to professionally perfect coaches, in order to train players capable of performance and to perfect their technical-tactical skills. This performance will not be possible in the coming years without a complex process of training, in which the technical factor (the 'tacticization' of the technique) must occupy an important role even at the level of training children and junior players.

The studies and research conducted by specialists in football are permanently looking for new ways and means to improve and increase the technical effectiveness of technical training at the child and junior levels and, implicitly, of the models of learning and perfecting the technique, which have a substantial influence on the quality of the game, as well as on increasing the technical-tactical mastery of the players [4].

Research hypothesis:

By elaborating a statistical and technical-tactical study on the dribbles conducted by three offensive midfielders, data will be obtained which will determine, with a certain degree of probability, an increase of the rates of incidence of this technical element in the training and competitive process.

Material and methods

The statistical and technical-tactical study involves the observation of three offensive midfielders

during three matches from the 2011-2012 football league championship. The object of the study is composed by counting the dribbles these players have conducted and establishing the purpose which drives their ball handling in their respective situations imposed by the match.

Thus, we have considered that the players who fit the requirements of this study are the following:

1. L.S. offensive midfielder, FC Vaslui
2. C.M., offensive midfielder, FC Dinamo București
3. O.H., offensive midfielder, Rapid București

The 1st League matches during which these players have been studied are the following:

L.S.

1. F.C. Vaslui - F.C. Dinamo, round 6 match
2. Petrolul Ploiești- F.C. Vaslui, round 19 match
3. F.C. Vaslui – Gaz Metan Mediaș, round 30 match

C.M.

1. F.C. Vaslui - F.C. Dinamo, round 6 match
2. Pandurii Târgu-Jiu - F.C. Dinamo, round 20 match
3. F.C. Dinamo – Sportul Studentesc, round 21 match

O.H.

1. Rapid București - C.S. Mioveni, round 10 match
2. CFR 1907 Cluj – Rapid București, round 25 match
3. F.C. Dinamo – F.C. Steaua București, round 28 match

In order to conduct this study, we have established, as a work method, the compiling of protocol sheets which include the technical elements and procedures linked to ball handling; this is done in order to compose a technical and statistical study of the concrete modality of achieving contact with the ball and, implicitly, losing control over it during the match.

After elaborating the protocol sheets, the individual assessment of each player was conducted. All the data have been recorded for each individual player; then, the analysis and interpretation of this data commenced, taking into account the percentages and the specific procedures used to conduct the dribbles.

To finalize the study, various parameters of the central tendency have been calculated; the data has been recorded in graph form, for a better visualization of the results obtained. Thus, a comparison between the players has also been attempted, even though these players play on different positions, in the sense that two of them mainly play in the central part of the field: C.M. and O.H., while L.S. plays on the left side of the field.

An important observation must be made: the dribble in itself can be conducted in various ways, which involve ball handling, protecting it from opponents and, evidently, the concrete tackle with the opponent.

The observation sheets have been conceived so that the following elements can be highlighted:

- Ball handling
- Ball protection
- Deceiving moves
- Overtaking the opponents

We have followed these technical procedures during the three aforementioned matches, for each of the three players mentioned, divided for each of two halves of the match and, totally, for the entire match. Thus, we present a systematization for a better exemplification of the studied elements.

Results

L.S. - F.C. Vaslui

In the first match, F.C. Vaslui - F.C. Dinamo (3-1), from round 6 of the championship, we have recorded the following executions in the case of the studied

player: Handling the ball with interior lacing – 6 executions; Handling the ball with exterior lacing – 18 executions; Handling the ball with lacing – 16 executions; Handling the ball with the sole – 1 execution; Overtakes through dribbles – 6 successful executions; Deceiving moves with the ball – 5 executions; Deceiving moves without the ball – 7 executions. (Table I)

Table I. L.S.'s execution record in the first match

L.S.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	4	2	5
	With lacing	9	6	16
	With exterior lacing	7	11	18
	With the tip of the foot	-	-	-
	With the sole	1	-	1
Deceiving moves	With the ball	1	-	1
	Without the ball	4	1	5
Overtaking the adversary (dribble)		4	3	7

In the second match, Petrolul Ploiesti - F.C. Vaslui (2-1), from round 6 of the championship, we have recorded the following executions in the case of the studied subject: Handling the ball with interior lacing – 7 executions; Handling the ball with exterior lacing – 9 executions; Handling the ball with lacing – 15 executions; Overtakes through dribbles – 5 successful executions; Deceiving moves with the ball – 6 executions; Deceiving moves without the ball – 5 executions. (Table II)

In the third match, F.C. Vaslui - Gaz Metan Medias (4-0), from round 30 of the championship, we have recorded the following executions for the studied subject: Handling the ball with interior lacing – 7 executions; Handling the ball with exterior lacing – 12 executions; Handling the ball with lacing – 13

executions; Handling the ball with the sole – 2 executions; Overtakes through dribbles – 3 successful executions; Deceiving moves with the ball – 3 executions; Deceiving moves without the ball – 2 executions. (Table III)

Table II. L.S.'s execution record in the second match

L.S.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	3	4	7
	With lacing	6	9	15
	With exterior lacing	3	6	9
	With the tip of the foot	-	-	-
	With the sole	1	-	1
Deceiving moves	With the ball	2	4	6
	Without the ball	1	4	5
Overtaking the adversary (dribble)		1	4	5

Table III. L.S.'s execution record in the third match

L.S.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	2	5	7
	With lacing	6	7	13
	With exterior lacing	4	8	12
	With the tip of the foot	-	-	-
	With the sole	2	-	2
Deceiving moves	With the ball	2	1	3
	Without the ball	-	2	2
Overtaking the adversary (dribble)		-	3	3

C.M. - F.C. Dinamo Bucuresti

In the first match, **F.C. Vaslui - F.C. Dinamo Bucuresti** (3-1), from round 6 of the championship, we have recorded the following executions in the case of the studied player: Handling the ball with interior lacing – 8 executions; Handling the ball with exterior lacing

– 11 executions; Handling the ball with lacing – 8 executions; Handling the ball with the sole – 4 executions; Handling the ball with the tip of the foot – 3 executions; Overtakes through dribbles – 3 successful executions; Deceiving moves with the ball – 3 executions; Deceiving moves without the ball – 3 executions.

Table IV. C.M.'s execution record in the first match

C.M.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	3	5	8
	With lacing	4	4	8
	With exterior lacing	4	7	11
	With the tip of the foot	3	1	4
	With the sole	2	2	4
Deceiving moves	With the ball	2	1	3
	Without the ball	1	2	3
Overtaking the adversary (dribble)		1	2	3

In the second match, **Pandurii Targu Jiu - F.C. Dinamo Bucuresti** (2-2), from round 20 of the championship, we have recorded the following executions for the studied subject: Handling the ball with interior lacing – 7 executions; Handling the ball with exterior lacing – 17 executions; Handling the ball with lacing – 14 executions; Handling the ball with the sole – 5 executions; Handling the ball with the tip of the foot – 5 executions; Overtakes through dribbles – 2 successful executions; Deceiving moves with the ball – 3 executions; Deceiving moves without the ball – 7 executions.

Table V. C.M.'s execution record in the second match

C.M.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	5	2	7
	With lacing	7	7	14
	With exterior lacing	9	8	17
	With the tip of the foot	2	3	5
	With the sole	2	3	5
	Without the ball			
Deceiving moves	With the ball	1	2	3
	Without the ball	5	2	7
Overtaking the adversary (dribble)		-	2	2

In the third match, **F.C. Dinamo București - Sportul Studențesc** (3-1), from round 21 of the championship, we have recorded the following executions for the studied subject: Deceiving moves without the ball – 2 executions; Handling the ball with interior lacing – 5 executions; Handling the ball with exterior lacing – 9 executions; Handling the ball with lacing – 11 executions; Handling the ball with the sole – 1 execution; Handling the ball with the tip of the foot – 5 executions; Overtakes through dribbles - 5 successful executions; Deceiving moves with the ball – 2 executions; Deceiving moves without the ball – 9 executions.

O.H. - Rapid București

In the first match, **Rapid București - C.S. Mioveni** (4-0), from round 10 of the championship, we have recorded the following executions for the studied subject: Handling the ball with interior lacing – 5 executions; Handling the ball with exterior lacing – 8 executions; Handling the ball with lacing – 8 executions; Handling the ball with the sole – 3 executions; Overtakes through dribbles - 4 successful executions; Deceiving moves with the ball – 8 executions; Deceiving moves without the ball –

11 executions.

Table VI. C.M.'s execution record in the third match

C.M.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	3	2	5
	With lacing	6	5	11
	With exterior lacing	4	5	9
	With the tip of the foot	-	2	2
	With the sole	-	1	1
	Without the ball			
Deceiving moves	With the ball	2	-	2
	Without the ball	6	3	9
Overtaking the adversary (dribble)		3	2	5

Table VII. O.H.'s execution record in the first match

O.H.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	3	2	5
	With lacing	5	3	8
	With exterior lacing	5	3	8
	With the tip of the foot	2	3	5
	With the sole	2	1	3
	Without the ball			
Deceiving moves	With the ball	6	2	8
	Without the ball	4	7	11
Overtaking the adversary (dribble)		4	1	4

In the second match, **C.F.R. 1907 Cluj - Rapid Bucuresti** (5-0), from round 25 of the championship, we have recorded the following executions for the studied subject: Handling the ball with interior lacing – 12 executions; Handling the ball with exterior lacing – 15 executions; Handling the ball with lacing – 13 executions; Handling the ball with the sole – 3 executions; Handling the ball with the tip of the foot – 3 executions; Overtakes through dribbles - 8

successful executions; Deceiving moves with the ball – 8 executions; Deceiving moves without the ball – 7 executions

Table VIII. O.H.'s execution record in the second match

O.H.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	6	6	12
	With lacing	5	8	13
	With exterior lacing	6	9	15
	With the tip of the foot	2	3	5
	With the sole	1	2	3
Deceiving moves	With the ball	4	4	8
	Without the ball	4	3	7
Overtaking the adversary (dribble)		4	4	8

Table IX. O.H.'s execution record in the third match

O.H.		Technical procedures executed by the subject		
		1 st Half	2 nd Half	Total
Ball handling	With the flat side	-	-	-
	With interior lacing	2	2	4
	With lacing	2	5	7
	With exterior lacing	3	5	8
	With the tip of the foot	-	1	1
	With the sole	1	1	2
Deceiving moves	With the ball	4	2	6
	Without the ball	2	2	4
Overtaking the adversary (dribble)		-	2	2

In the third match, **Rapid Bucuresti – Steaua Bucuresti** (1-1), from round 25 of the championship, we have recorded the following executions for the studied subject: Handling the ball with interior lacing – 4 executions; Handling the ball with exterior lacing

– 8 executions; Handling the ball with lacing – 7 executions; Handling the ball with the sole – 2 executions; Handling the ball with the tip of the foot – 1 execution; Overtakes through dribbles – 2 successful executions; Deceiving moves with the ball – 6 executions; Deceiving moves without the ball – 4 executions

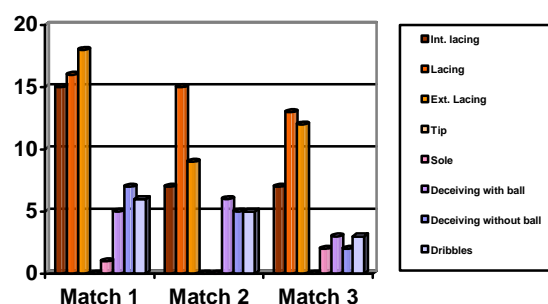


Figure 1. Graphical representation of L.S.'s executions

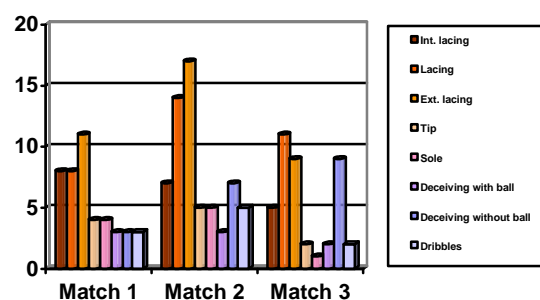


Figure 2. Graphical representation of C.M.'s executions

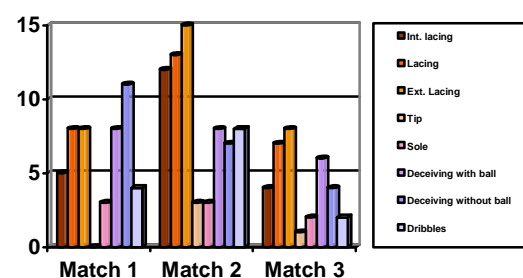


Figure 3. Graphical representation of O.H.'s executions

Taking into account the topic of this present paper, out of the executions conducted by the offensive midfielders one must emphasize the handling of the ball that resulted in overtaking the opponent by the

subjects in real time. Thus, the deceiving moves with the ball and dribble itself have these traits. The comparison between the three offensive midfielders is depicted in the following table.

Table X. Comparison between the offensive midfielders in 3 matches

Technical procedures executed	L.S.			C.M.			O.H.		
	Match 1	Match 2	Match 3	Match 1	Match 2	Match 3	Match 1	Match 2	Match 3
Deceiving moves with the ball	5	6	3	3	3	2	8	8	6
Overtaking the opponent through dribbles	6	5	3	3	5	2	4	8	2

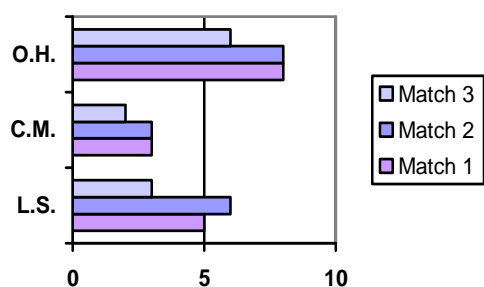


Figure 4. The graphical contrastive representation of deceiving moves with the ball conducted by the three offensive midfielders

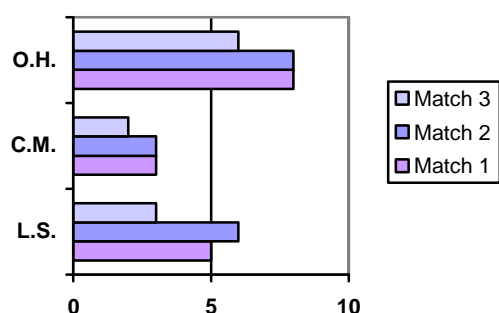


Figure 5. The graphical representation of the dribbles conducted by the three midfielders

Discussions

By processing and interpreting the data, the comparative analysis and the graphical representation, one can draw the following conclusions:

The three subjects tracked during the research, were studied initially in terms of management and ball handling; the data obtained in some way expresses the reality of our strongest championship. To conclude if the actions by which the three subjects achieved to overcome the opponent have a proper share in the match, we can say that it is important that once huge action, to overcome the opponent is started, it is important that it be completed successfully. The comparison between the three midfielders, namely the results obtained by them are heavily dependent on their tactical and technical characteristics and the specificity of each team and the game studied in itself.

The comparative reading of the results regarding the techniques for handling the ball has revealed those that support the action to overcome the opponent by dribbling, are:

L.S.

In the three matches studied, he has conducted:

- 19 executions of the ball with interior lacing
- 44 executions of the ball with lacing
- 39 executions of the ball with exterior lacing
- 3 executions with the sole
- 14 deceiving moves with the ball
- 14 deceiving moves without the ball
- **14 overtakes of the opponent through dribbles**

C.M.

In the three matches studied, he has conducted:

- 20 executions of the ball with interior lacing
- 33 executions of the ball with lacing
- 37 executions of the ball with exterior lacing
- 11 executions with the tip

- 10 executions with the sole
- 8 deceiving moves with the ball
- 19 deceiving moves without the ball
- **10 overtakes of the opponent through dribbles**

O.H.

In the three matches studied, he has conducted:

- 21 executions of the ball with interior lacing
- 28 executions of the ball with lacing
- 31 executions of the ball with exterior lacing
- 4 executions with the tip
- 8 executions with the sole
- 22 deceiving moves with the ball
- 22 deceiving moves without the ball
- **14 overtakes of the opponent through dribbles**

Conclusions

It appears that the three midfielders have a rich tactical and technical baggage in that the manifestation of the technical elements, by which they control the ball with the purpose of overcoming the opponent.

Looking strictly at the dribbles conducted, the differences are minor – only 4 executions – and can be ‘blamed’ on the match itself and not on the impossibility of conducting them. We must mention that the midfielders studied have proven that they possess both the specific technical abilities with the ball, but especially the technical capacities, these being those which ensure success within the match itself.

We can state that the research hypothesis has been confirmed by the data we have obtained, these being the ones which ensure a real feedback regarding the training of the players and their preparation for the official competition.

We recommend the study of a variety of high level matches as regards this technical procedure, in a

relation of adversity, in order to act more efficiently in the technical and tactical training.

References

1. Dumitrescu V. (2005) *Metode statistico-matematice în sport*, Editura Stadion, București;
2. Mitra Gh., Mogoș A. (2004) *Dezvoltarea calităților motrice*, Editura Sport-Turism, București;
3. Brîndescu S. (2012) *Jocul de fotbal*, Editura Mirton, Timișoara;
4. Gârleanu D. (2005) *Selecții pentru dezvoltarea calităților motrice la fotbaliști*, Editura Sport-Turism, București.

DOI: 10.2478/tperj-2013-0006

Aspects Regarding the Beneficial Effect of Reflexology in Low Back Pain

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Abstract

Reflexology is based on the digital pressure on certain reflex points situated on the sole of the foot, which represents a “map” of the entire body. The aim of this paper is to highlight the importance of reflexology in low back pain treatment. To accomplish the objectives of this paper, a lot of 12 patients, of both genders, with low back pain, was formed. Out of these patients, 66.67% were male and 33.33% were female, the majority coming from an urban area (75%). The average age \pm the standard deviation of the patients was 43.58 ± 13.02 years. The group of patients was subdivided into an experimental group, composed of 7 patients (58.33%), who, besides the classic drug treatment, also underwent reflexology, and a control group, composed of 5 patients (41.67%), who underwent only drug treatment. The treatment linked to reflexology was conducted by a single practitioner of reflexology, using the Morrell technique. Both in the case of the experimental group and in the control one there was a statistically significant reduction in finger to ground index ($p < 0.01$, respectively $p < 0.05$). Also, there was a highly statistically significant reduction of pain ($p < 0.01$). Due to the small number of patients involved in the study, the data obtained cannot be generalised, as further studies are required to highlight the beneficial effect of reflexology in the case of low back pain.

Key words: reflexology, low back pain, finger to ground index

Rezumat

Reflexoterapia se bazează pe exercitarea digitală a unei presiuni asupra anumitor puncte reflexogene situate în talpa piciorului, aceasta reprezentând o „hartă” a întregului corp. Scopul lucrării este reprezentat de evidențierea importanței reflexoterapiei în tratarea pacienților cu durere lombară joasă. Pentru realizarea obiectivelor cercetării am constituit un lot de 12 pacienți, de ambele sexe, cu diagnosticul de durere lombară joasă. Dintre aceștia, 66,67% au fost de sex masculin și 33,33% de sex feminin, majoritatea provenind din mediul urban (75%). Vârsta medie \pm deviația standard a pacienților a fost de $43,58 \pm 13,02$ ani. Lotul de pacienți a fost subîmpărțit într-un lot experimental, format din 7 pacienți (58,33%), care pe lângă tratamentul clasic medicamentos au urmat și reflexoterapie și un lot martor, format din 5 pacienți (41,67%), care au urmat doar tratament medicamentos. Tratamentul reflexoterapeutic a fost efectuat de un singur reflexoterapeut, utilizând tehnica Morrell. Atât la pacienții lotului experimental, cât și la pacienții lotului martor, s-au produs reduceri foarte semnificative statistic ($p < 0.01$) ale durerii finale față de cea inițială, dar totodată, s-au produs îmbunătățiri foarte semnificative statistic ($p < 0.01$) ale valorilor indicelui degete-sol la pacienții lotului de cercetare, pe când în cazul pacienților din lotul martor, îmbunătățirea acestui indice a fost doar semnificativă statistic ($p < 0.05$). Datorită numărului mic de pacienți luați în studiu, datele obținute nu pot fi generalizate, fiind necesare studii ulterioare de mai mare amploare pentru evidențierea efectului benefic al reflexoterapiei în durerea lombară joasă.

Cuvinte cheie: reflexoterapie, durere lombară joasă, index degete-sol

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Introduction

Reflexology is a therapeutic method which complements conventional medicine and has its origins in ancient China. It is based on the digital pressure on certain reflex points situated on the sole of the foot, which represents a “map” of the entire body. The same principle can be applied to hands and ears. [1,2] Thus, massaging the reflex points from the sole of the foot can influence the distal areas of the body by modifying the flux of energy (Qi) which travels through the body by energy meridians.

The possible mechanism of action involves the conversion of the generated energy (information) by applying mechanical pressure on the reflex points under nervous impulse which is transmitted to superior integrative structures, via the autonomous nervous system. Thus, reflexology seems to act through the redistribution of the blood flow at the level of the affected organs. [3, 4]

At the same time, reflexology determines areal decongestion, increase of the cell membranes' permeability, with an increased local influx of nutrients, relief of toxic substances from the organism, neurovegetative rebalance, improvement of metabolism and reconstruction of the organism's defence potential. [5,6]

One of the frequent use of reflexology is the chronic low back pain, a major health problem of contemporary society. Chronic low back pain is defined as an unsolved episode of back pain which has been lasting for over 12 weeks. A significant number of patients orient themselves towards alternative treatment methods of this disease, either because they are not satisfied with classic therapy or because they have high confidence in this alternative type of treatment. [7]

The aim of this paper is to highlight the importance of reflexology in low back pain treating. In order to achieve this purpose, the research had the following

aims:

- to organise the group of patients
- to establish the means of evaluating the pain in the lower back area
- to establish an individualised program of reflexology
- to analyse and interpret the results
- to elaborate the conclusions and recommendations.

Material and methods

The study was conducted within the “Salted Baths Rehabilitation Centre” from the County Hospital in Deva; however, some patients from the research group underwent the treatment at home. The length of the treatment was 10 months, from July 2010 to April 2011, with two hospitalizations (lasting 15 days) in the rehabilitation centre and the rest of the treatment being conducted at the patients' homes. In order to accomplish the objectives of the research, a group of 12 patients was formed; the patients were of both genders and were diagnosed with low back pain. Out of these patients, 66.67% were male and 33.33% were female, the majority coming from an urban area (75%). The average age \pm the standard deviation of the patients was 43.58 ± 13.02 years, with age limits between 21 and 60.

The lot of patients was subdivided into an experimental group, composed of 7 patients (58.33%), who, besides the classic drug treatment, also underwent reflexology, and a control group, composed of 5 patients (41.67%), who underwent only drug treatment. The experimental group was composed of 4 women and 3 men, with an average age \pm the standard deviation of 49.71 ± 5.55 years; the control group consisted of 4 men and 1 woman, with an average age \pm the standard deviation of 35 ± 16.20 years. (table I)

Table I. The group of patients (experimental and control group)

No.	Initials	Gender	Area of provenience	Age (years)	Main Diagnosis	Secondary diagnosis
1.	I.I.	M	U	58	Lombosciatics First degree lumbar discopathy	First degree of hypertension
2.	B.A.	F	U	23	L5-S1 osteophytosis, Lumbar lordosis	First degree of obesity
3.	R.A.	M	R	55	Lumbar discarthrosis, Renal lithiasis	Hyperthyroidism
4.	S.I.	M	U	48	Lombosciatics	First degree of hypertension
5.	C.L.	F	R	46	Renal lithiasis	Hyperuricemia
6.	C. A.	M	U	42	Lumbar discopathy	Overweight
7.	S.R.	M	U	21	Lumbar discopathy	-
8.	L.C.	M	U	29	First degree lumbar discopathy, Right lumbar L1 paraspinal scar - post aggression	-
9.	I.E.	F	U	52	Lumbar discopathy, Renal lithiasis	Hyperthyroidism
10.	M.D.	M	U	42	Lombosciatics	-
11.	T.A.	M	R	60	Lumbar discopathy, Lumbar osteophytosis	Second degree of hypertension
12.	R.P.	F	U	47	Lumbar discarthrosis	Second degree of obesity
Mean±SD				43.58±13.02		

Legend: R – rural area, U – urban area, F – female, M – male, SD – standard deviation

The drug treatment consisted of antihypertensive therapy, antialgic therapy, antidepressants, non-steroidal anti-inflammatory drugs and allopurinol.

Relaxation techniques were applied at the beginning of each session of reflexology: the back and forth technique, flexing the diaphragm and solar plexus, and rotating the ankle. The reflex therapy treatment was conducted by only one practitioner of reflexology using the Morrell technique, which implies the firm but gentle application of a compression by the hands of the therapist on the reflex points from the soles of the feet, which correspond to other parts of the body. (table II)

The effects of the therapy on low back pain have been evaluated with the help of the VAS (Visual Analogue Scale), used for evaluating pain, and with the help of the finger to ground index.

Table II. The treatment performed by both patient groups

No.	Initials	Gender	Age (year)	Drug treatment	Reflex therapy
1.	I.I.	M	58	x	x
2.	B.A.	F	23	x	-
3.	R.A.	M	55	x	x
4.	S.I.	M	48	x	x
5.	C.L.	F	46	x	x
6.	C. A.	M	42	x	-
7.	S.R.	M	21	x	-
8.	L.C.	M	29	x	-
9.	I.E.	F	52	x	x
10.	M.D.	M	42	x	x
11.	T.A.	M	60	x	-
12.	R.P.	F	47	x	x

The evaluations were conducted initially 5 months after the study began and at the study's end. VAS is a scale of psychometric response used to evaluate

the subjective pain of the patients with various pathologies. It consists of a linear scale graded at the two ends with "0" and "10", where "0" means lack of any pain, while "10" means severe pain.

The finger to ground index measures the distance between the tip of the fingers and the ground when the patient goes from standing upright with stretched knees to a maximum forward flexion of the torso. In the case of normal persons, this index is "0".

Results

Table III. Pain evaluation with VAS - experimental group

No.	Initials	Low back pain			Difference between initial and final assessment of pain
		Initial	Intermediate	Final	
1	II	7	4	0	7
2	RA	6	3	1	5
3	SI	7	4	1	6
4	CL	6	3	0	6
5	IE	6	3	1	5
6	MD	7	4	1	6
7	RP	6	3	0	6
Mean±SD		6.42±0.53	3.42±0.53	0.57±0.53	5.97±0.69

Table IV . Pain evaluation with VAS - control group

No.	Initials	Low back pain			Difference between initial and final assessment of pain
		Initial	Intermediate	Final	
1	BA	7	5	3	4
2	CA	7	4	2	5
3	SR	6	4	2	4
4	LC	7	4	2	5
5	TA	8	6	3	5
Mean±SD		7±0.70	4.6±0.89	2.4±0.54	4.6±0.54

Furthermore, an important reduction of the final pain was noticed, as opposed to the initial pain, which results in an average difference of 4.6 ± 0.54 (from 7 ± 0.70 at the beginning of the treatment, to 2.4 ± 0.54 at the end of the treatment).

By comparing the final values of the pain's evaluation in the case of the two groups of patients with the help of the Student test, a value of $p < 0.01$ was obtained, which indicates a very significant

Following the comparison of the initial and final pain of the patients from the experimental group with the help of the Student test, a $p < 0.01$ value was obtained, which indicates a very significant statistically reduction. Furthermore, an important reduction of the final pain was noticed, as opposed to the initial pain, which results in an average difference of 5.97 ± 0.69 (from 6.42 ± 0.53 at the beginning of the treatment, to 0.57 ± 0.53 at the end of the treatment). (table III and table IV)

Following the comparison of the initial and final pain of the patients from the control group with the help of the Student test, a $p < 0.01$ value was obtained, which indicates a very significant statistically reduction.

statistically reduction of the pain in case of the experimental group.

By comparing the final and initial values of the patients' finger to ground index, a value of $p < 0.01$ was obtained, which indicates a very significant improvement. A significant statistically improvement was obtained when the initial and final values of these indexes were compared in the case of the patients from the control group ($p < 0.05$). (table V)

Table V. Finger to ground index – experimental group

No.	Initials	Gender	Finger to ground index (cm)		Difference
			Initial	Final	
1.	I.I.	M	9	0	9
2.	R.A.	M	25	5	20
3.	S.I.	M	20	3	17
4.	C.L.	F	13	0	13
5.	I.E.	F	9	0	9
6.	M.D.	M	15	4	11
7.	R.P.	F	20	5	15
Mean \pm SD			15.85 \pm 6.06	2.42 \pm 2.37	13.42 \pm 4.15

p < 0.01

Table VI. Finger to ground index – control group

No.	Initials	Gender	Finger to ground index (cm)		Difference
			Initial	Final	
1.	B.A.	F	10	4	6
2.	C.A.	M	8	4	4
3.	S.R.	M	12	10	2
4.	L.C.	M	15	9	6
5.	T.A.	M	25	10	15
Mean \pm SD			14 \pm 6.67	7.40 \pm 3.13	6.60 \pm 4.97

p < 0.05

Still, by comparing the final values of the finger to ground index in the case of the two groups (experimental and control) with the help of the Student test, a significant statistically improvement was obtained in the case of the experimental group, as opposed to the control group ($p=0.0197$, $p<0.05$). (table VI)

Discussions

The mechanism by which reflexology acts on some distal areas or organs, with profound physiological effects, is not precisely known. Still, there are a series of theories such as: peripheral vasodilatation (which allows the removal of local accumulations of toxins), the “gate” theory which explains the reduction of the perception of pain, the placebo effect (involved in relaxation), therapeutic interaction, the impact of touch of the tegument by the therapist (with release of endorphins and enkephalins which produces pain reduction and installation of a positive state) and the theory of the

nervous impulse (the opening of ionic canals from the plasmatic membranes, under the pressure applied on the cellular receptors, and with the onset of local action potentials). [4, 5]

A current theory is that of electromagnetism, which is based on the assumption that our biological rhythms depend on the interaction of the electrical brain waves with the Earth's electromagnetic field. [8]. Another theory which tries to explain the effects of reflexology is the gravitational one, which state that serum deposits of calcium and uric acid accumulate due to gravity at the level of the foot (in the areas corresponding to the affected organs). These deposits can be diagnosed, being painful on palpation, and also can be mobilized and dispersed through reflexology, helping to restore body homeostasis. [2, 8]

Our findings are similar to those in the literature. Thus, Quinn F. et al [9] have investigated the effectiveness of reflexology in the management of low back pain in a trial with 15 participants, randomised in two groups: reflexology group and

sham group. Following reflexology was obtained an important reduction in average pain assessed by VAS (Visual Analogue Scale) in the reflexology group. Also, McGill pain questionnaire scores indicated a reduction in low back pain in both groups. Similar effect of reflexology on chronic back pain intensity was obtained by Eghbali M. et al [10] in a double blind clinical trial with 50 nurses (female and male). Pain intensity was measured using a numeric analogue scale for pain. The result of this trial showed a significantly reduction in pain intensity scores in the group who received a reflexology treatment. On the other hand, there are studies in the literature which showing only insignificant influence of reflexology in chronic back pain. Thus, Poole H. et al [7] in a controlled trial with 243 participants with chronic back pain (randomised in three groups – reflexology, relaxation and usual care) show that reflexology is no more effective than usual care alone. Moreover, there was a greater pain intensity reduction in the reflexology group, but not significantly different from the others groups.

Conclusions

One of the important indications of reflexology is low back pain. This alternative therapy must be used at the same time with classic methods of treatment, with the aim of obtaining better results.

In the case of the groups of patients studied by us, following the application of reflexology techniques, combined with drug therapy in some conditions which determine low back pain, a very significant statistically reduction of the pain has been produced ($p < 0.01$). Moreover, reflexology combined with drug therapy determined a very significant statistically improvement of the finger to ground index ($p < 0.01$) in the case of patients from the experimental group. Both in the case of the patients from the experimental group, and in the case of the patients

from the control group, statistically significant reductions of the final pain as opposed to the initial pain took place ($p < 0.01$), while strong statistically significant reductions of the finger to ground index values ($p < 0.01$) also took place, the improvement of this index for the patients from the control group was only statistically significant ($p < 0.05$).

Due to the small number of patients involved in the study, the data obtained cannot be generalised; still, numerous studies which support these results can be found in the scientific literature. Further studies are required to certify the importance of reflexology in diverse pathologies, including in the case of lower back pain.

References

1. Chiruță I., Postolică V. (2006) *Incursiuni în reflexoterapie. Sănătate prin masaje și remedii naturiste*. Editura Corint, București;
2. Bliss J., Bliss G. (2000) *How does reflexology work? Theories on why it does work*. Reflexology Association of California;
3. Piquemal M. (2005) *Global effect of reflexology on blood flow*, presented at the "10th ICR International Conference, Amsterdam, September 2005;
4. Marquardt H. (2000) *Reflexotherapy of the feet*. Thieme: Stuttgart;
5. Tiran D., Chummun H. (2005) *The physiological basis of reflexology and its use as a potential diagnostic tool*. *Complementary Therapies in Clinical Practice*, 11 (1): 58-64;
6. Lidell L. (2003), *Masajul. Ghid practic de tehnici orientale și occidentale*, Ed. Pro Editura, București;
7. Poole H., Glenn S., Murphy P. (2007) *A randomized controlled study of reflexology for the treatment of chronic low back pain*. *European Journal of Pain*, 11: 878-887;
8. Saunders T. (2003) *Health hazards and electromagnetic fields*. *Compl. Ther. Nurs Midwifery*, 9(4): 191-197;
9. Quinn F., Hughes CM, Baxter GD (2008) *Reflexology in the management of low back pain: a pilot randomized controlled trial*. *Complementary Therapies in Medicine*, 16: 3-8;
10. Eghbali M., Safari R., Nazari F., Abdoli S. (2012) *The effects of reflexology on chronic low back pain intensity in nurses employed in hospitals affiliated with Isfahan University of Medical Sciences*. *Iranian Journal of Nursing and Midwifery Research*, 17(3): 239-243.

DOI: 10.2478/tpelj-2013-0008

Fruit, Vegetables and Fast Food Consumption among University Students

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Abstract

Purpose: To establish the prevalence of fruit, vegetables and fast food consumption among students from Timisoara university center and provide evidence based information for increasing healthy food choices in order to prevent cardiovascular diseases. **Material and Methods:** We perform a cross-sectional study on 435 university students from the Timisoara university center, Romania (mean age: 22±4.8 years). The students were recruited using internet and public announcements in the student's campus. All students completed a self administered diet questionnaire. **Results:** Two thirds of students are not eating fruits and vegetables daily. The prevalence of daily fruit consumption is even lower - 25%. Regarding fast food consumption we found that 26% of students are often consume these unhealthy products. Three main determinants was identified for choosing unhealthy diet: lack of time, school programme and lack of money. **Conclusions:** The unhealthy food consumption among students from Timisoara university center is highly prevalent. Increasing students' nutrition-information knowledge and provision of nutrition education is recommended.

Key words: fruit, vegetables, fast food, students, cardiovascular prevention.

Rezumat

Scop: stabilirea prevalenței consumului de fructe, legume și a produselor fast-food în rândul studenților din centrul universitar Timișoara precum și furnizarea de informații bazate pe dovezi pentru îmbunătățirea preferințelor alimentare sănătoase în vederea prevenirii bolilor cardiovasculare. **Material și metodă:** Am efectuat un studiu transversal care a cuprins 435 studenți din centrul universitar Timișoara, România (vârsta medie: 22±4.8 ani). Studenții au fost recrutați prin anunțuri publice postate pe internet și în campusul universitar. Toți elevii au completat un chestionar auto-administrat cu privire la dietă și comportamentul alimentardietar. **Rezultate:** două treimi dintre studenți nu consumă fructe și legume zilnic. Prevalența consumului zilnic de fructe este chiar mai scăzută - 25%. În ceea ce privește consumul produselor de tip fast-food, am constatat că 26% dintre studenți consumă frecvent aceste produse. Au fost identificați trei factori determinanți ai alegerilor nesănătoase în ceea ce privește dieta: lipsa de timp, programul școlar și problemele financiare. **Concluzii:** consumul de alimente nesănătoase în rândul studenților din centrul universitar Timișoara este foarte răspândit. Sunt recomandate măsuri pentru îmbunătățirea nivelului de informare cu privire la alimentația sănătoasă în rândul tinerilor, în vederea reducerii riscului de boli cardiovasculare.

Cuvinte cheie: fructe, legume, fast-food, studenți, prevenție cardiovasculară.

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Introduction

Cardiovascular disease is largely preventable. Diet and physical activity play an important role - seven of the eight risk factors (alcohol use, smoking, high blood pressure, overweight, high blood cholesterol, high blood glucose, low fruit and vegetable intake and physical inactivity) which collectively account for 61% of cardiovascular deaths are related to diet and physical activity. Reducing exposure to these eight risk factors would increase global life expectancy by almost five years [1].

The studies suggest that eating more portions of fruit and vegetables will significantly reduce the risk of cardiovascular diseases such as coronary heart disease and stroke. The more consumed the greater the risk reduction [2,3].

High proportions of youth do not meet the World Health Organization goal of a daily intake of at least 400 grams of fruit and vegetables [4,5]. Longitudinal studies suggest that eating behaviour in youth tracks into adulthood and those food preferences and eating habits established in adolescence tend to be maintained into adulthood [6]. This fact emphasizes the importance of establishing healthy eating behaviour earlier in life.

The **aim** of the present study is to establish the prevalence of fruit, vegetables and fast food consumption among students from Timisoara university center and provide evidence based information for increasing healthy food choices in order to prevent cardiovascular diseases.

Material and Methods

We perform a cross-sectional study on 435 university students from the Timisoara university center, Romania. (mean age: 22 ± 4.8 years). The students were recruited using internet and public announcements in the student's campus. All

students completed a self administered diet questionnaire.

In the present study we considered "fruit and vegetables" any fresh, frozen, dried and canned fruits and vegetables except potatoes (excluded because these are consumed as starchy staples and are major sources of complex carbohydrates). Fast food refers to food sold in a restaurant or store with preheated or precooked ingredients, and served to the customer in a packaged form for take-out/take-away.

Results and discussions

Two thirds of the university students from Timisoara are not eating fruits and vegetables daily. (Figure 1) This findings are far from current guidelines recommendations of 5 portions of fruit and vegetables per day in order to maintain the cardiovascular health [7]. The prevalence of daily fruit consumption is even lower - 25% (Figure 1).

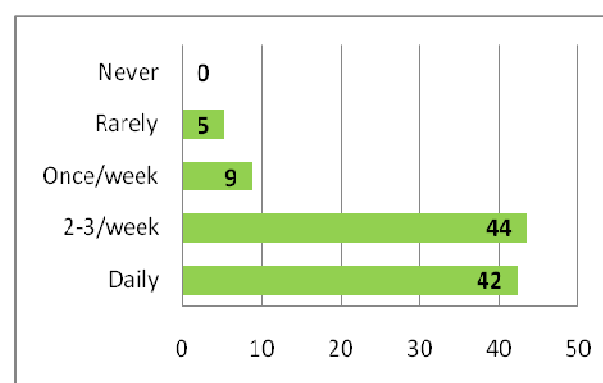


Figure 1. Frequency of fruit and vegetables consumption among students from Timisoara university center.

European Heart Network commissioned a series of scientific reviews to examine the latest evidence and proposed two sets of population goals for fruit and vegetables consumption in order to prevent cardiovascular diseases: An intermediate population goal - more than 400 g/day; and a longer-term goal - more than 600 g/day [8].

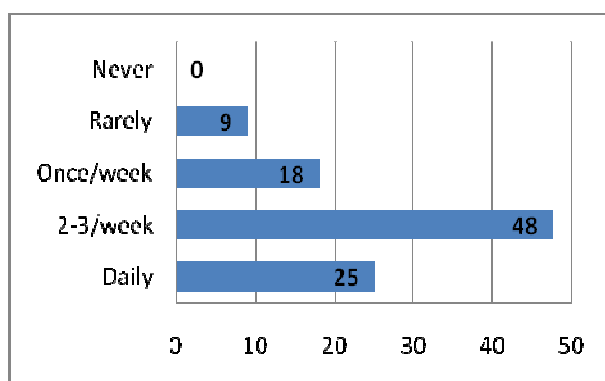


Figure 2. Frequency of fruit consumption among students from Timisoara university center.

While fruit and vegetable consumption has increased, in the last decades, in most European countries, southern European countries (including Romania) have seen meat supplies increase nearly four-fold in a generation [8].

A review of 98 quantitative studies of fruit and vegetable intake among youth showed that the determinants for high consumption levels of fruit and vegetable were female gender, low age, high socio-economic status, high parents intake of fruit and vegetables and high availability of fruit and vegetables at home [9]. We can conclude that higher age, male gender and low socio-economic status are the three main determinants for low level of fruit and vegetable consumption. This findings are not encouraging due to the fact that the first two determinants are non-adjustable and the last one are hardly changed in the current socio-economical European context.

What are the benefits of fruit and vegetables consumption for the prevention of cardiovascular diseases?

Fruits and vegetables contains high amounts of antioxidants (Polyphenols and vitamins A, E, C) which could influence the blood vessel walls and reduce the inflammatory and endothelial dysfunction and thereby prevent cardiovascular diseases [8].

Polyphenols (flavonoids, phenolic acid, tannins and lignans), highly contained in fruit and vegetables and plant-derived foods and beverages, have been linked to reduced risk of chronic diseases, especially cardiovascular disease [10,11].

The polyphenols mechanisms of action for reducing the risk of chronic diseases go beyond antioxidant functions. Polyphenols influence cell metabolism, through regulation of gene expression and interactions with receptors, enzymes and other proteins [8]. A study of Huxley and collaborators demonstrates the relationship between dietary flavonols (found in high quantities in tea and also in apples, beans, berries, broccoli, onion, red wine, tea, tomato) and coronary heart disease. The study showed that subjects who had a high flavonols intake from fruit and vegetables, had a 20% reduction in the risk of coronary heart disease [12].

Hollman and collaborators demonstrates in a meta-analysis that intake of flavonols is protective against nonfatal and fatal stroke. The results showed that a high intake of flavonols compared with a low intake is associated with a 20% decreased risk of stroke incidence [13].

However, polyphenols dietary supplementation (isoflavone) for 2 weeks to 12 months, did not improve endothelial function in postmenopausal women with high baseline endothelial dysfunction, but led to significant improvement in women with low baseline endothelial dysfunction. The results suggests that oral polyphenol supplementation could be effective to targeted subjects, but not to all individuals [14].

The European Food Safety Agency confirmed that vitamin C and vitamin E can protect DNA, proteins and lipids from oxidative damage, which is directly related to cardiovascular health [15]. However, a study of Knekt and collaborators who investigate the relation between antioxidant vitamins (vitamins E, C

and beta carotene) and coronary heart disease, showed that the Vitamin C contained in fruit and vegetables did not offer much protection against the incidence of coronary heart disease. Supplementation with vitamin C (>700mg per day) did significantly reduce the coronary heart disease risk by 25% [16].

Fruit and vegetables are rich in potassium (as are unrefined cereals in general). Studies showed that increasing potassium intake from fruit and vegetables, decrease blood pressure values in the normal blood pressure individuals, with a greater decrease in the high blood pressure individuals [17]. Fruit and vegetables are also rich in dietary fibres which have a distinct metabolic effect. It was estimated that an average goal of 16 to 24g/day dietary fibres (for adults) would limit constipation. An upper limit of 24 g/day (especially as whole grain cereal intakes) increases the intake of phytates and might inhibit the absorption of iron and zinc (important minerals in blood cell formation and immunity defence) [18].

The importance of pectins and guar gums in the dietary fibres of whole grain cereals, fruit and vegetables in lowering blood cholesterol levels is known but is difficult to quantify [8].

There is also studies which demonstrates that increased dietary fibre intake reduce blood pressure and decrease insulin secretion of the pancreas [19,20].

A study of Pereira and collaborators, showed greater protection from fruit fibres than vegetable fibres. Therefore, fruit fibre afforded a 16% reduction in coronary heart disease risk, compared to no risk reduction from vegetable fibre [21].

Regarding fast food consumption we found that 26% of students from Timisoara university center, are often consume these unhealthy products (Figure 3).

Three main determinants for choosing unhealthy diet identified in students from Timisoara university center: lack of time, school programme and lack of money (Figure 4).

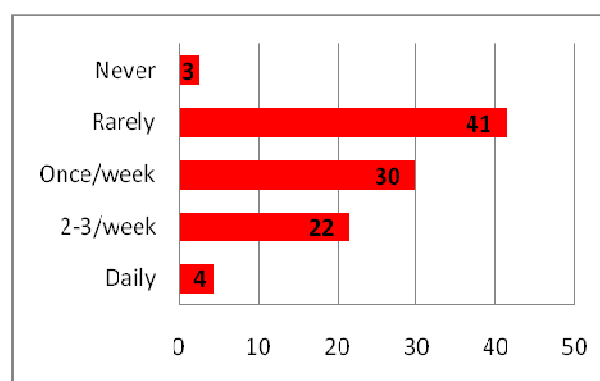


Figure 3. Frequency of fast food consumption among students from Timisoara university center

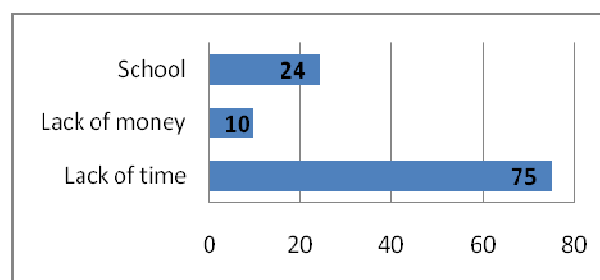


Figure 4. The main reasons for choosing unhealthy diet in students from Timisoara university center

These findings are compliant with the results of a UK national survey which shows that consumption of fast food products is linked to social class differences. Lower income groups (especially young men in lower income groups), are the highest users of fast food restaurants [22].

What are the mechanisms by which fast food consumption threaten cardiovascular health?

The fast food portions are often larger and the food is generally high in calories, saturated and trans fat and low in nutrients and dietary fibres. There are increasing evidence that fast food intake increase the risk of diabetes and cardiovascular diseases. A study recently published article in the American

Heart Association's journal, found that people who consume fast food even once a week increase their mortality risk from coronary heart disease by 20 percent in comparison to people who avoid fast food [23].

Fast foods contains high amount of trans fatty acids. The trans fatty acids are found in larger quantities in processed foods, where they have been generated from high temperature cooking (French fries), margarines and fats used for baked food (biscuits, pastries, pies). World Health Organization current recommendation for population intakes of trans fatty acids to is below 1% of total food energy, equivalent to less than 2 grams of trans fat per day [24].

A study conducted in 2005 by Stender and collaborators showed that a standard single portion of French fries and chicken in KFC fast food restaurants from Hungary contains 24 grams of trans fat, this amount being 12 times more than World Health Organization current recommendation [25]. A follow-up of Stender and collaborators study conducted in 2009, found that the amount of trans fatty acids had decreased in north-western European countries, but not significantly in eastern European countries [8].

Salt plays an important role in developing cardiovascular diseases, especially hypertension. The use of salt is likely to be linked to snack foods and fast foods consumption. It confers the processed and potentially poorer-flavoured foods, more palatable and enjoyable taste [8].

The importance of accessibility/affordability of unhealthy food

The accessibility of low-cost energy dense food is widely spread in many European countries [26]. Economical data show significant growth in sales of snacks, confectionery and soft drinks throughout the south-east European region. Similarly, there is a

dramatic rise in fast food restaurants throughout the region over recent decades [8]. The traditional foods are increasingly being replaced by a "modern" diet with a greater proportion of calories coming from oils and fats, sugars and processed starches. In two decades (from 1989 to 2009) the number of McDonald's restaurants - the leading investor in fast foods operating in the European region - increased 1000 times. The McDonald's company, in 2009 had 6,669 company-owned or franchised stores in the European region, serving 12 million meals per day, each meal usually providing 300-500 kcal with ingredients which are higher saturated and trans fats, sugar and salt and lower in fruit, vegetables and dietary fibre, compared with the recommendation of dietary guidelines [8].

Several dietary behaviours are linked with unhealthy food intake, including increased number of meals eaten outside the home and snacking (the consumption of foods and drinks between meals including milk drinks, regular soft drinks, sports drinks and energy drinks). In European countries, snacking is highly prevalent [27].

A study conducted by Savige and collaborators showed that the most common contexts for snacking among youth are: after school (4.6 times per week), while watching TV (3.5 times per week) and while hanging out with friends (2.4 times per week) [28].

A study of Jago and collaborators demonstrated that among adolescent males, residing further away from a small food store and close to a fast food restaurant was associated with increased fruit and vegetable consumption [29]. For this reason, it is needed better instruments for limiting accessibility to unhealthy foods (such taxes or restriction of fast food availability in schools or other public institutions).

The importance of nutritional education

There is evidence that nutritional education and nutritional labelling encourage choice of “healthier” foods over junk food. Many healthy eating approaches have been centred on increasing fruit and vegetable consumption and providing public health messages about the health benefits of eating fruit and vegetables. Most of them had success in increasing consumption [30]. Messages about the health effects of junk food and social normative messages about intake of junk food can motivate people to reduce their consumption of unhealthy food [31].

European Heart Network calls for “a comprehensive and integrated European food and nutrition policy”. The European Heart Network developed a call for action in which promotes the production of more plant-based foods and a shift towards more plant-based diets, with reduced consumption of meat and saturated fat and increased consumption of fruit, vegetables and whole grains. Further progress is needed, in translating these strategic documents into concrete action [8].

Conclusions

The unhealthy food consumption among students from Timisoara university center is highly prevalent. Increasing students' nutrition-information knowledge and provision of nutrition education is recommended. More than this, creating an eating environment with more affordable healthy food such fruit and vegetables and less fast food is needed for implementation of effective nutrition strategies in universities.

References

1. Mackenbach J.P. (2006) *Health Inequalities: Europe in Profile*. An independent expert report commissioned by the UK Presidency of the EU. London: Department of Health;
2. Mente A., de Koning L., Shannon H.S., Anand S.S. (2009) A systematic review of the evidence supporting a causal link between dietary factors and coronary heart disease. *Arch Intern Med*, 3:659-69;
3. He F.J., Nowson C.A., MacGregor G.A. (2006) *Fruit and vegetable consumption and stroke: meta-analysis of cohort studies*. *Lancet*, 367(9507):320-6;
4. Guenther P.M., Dodd K.W., Reedy J., Krebs-Smith S.M. (2006) *Most Americans eat much less than recommended amounts of fruits and vegetables*. *J Am Diet Assoc*, 106:1371-1379;
5. Krølner R., Rasmussen M., Brug J., Klepp K.I., Wind M., Due P. (2011) *Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies*. *Int J Behav Nutr Phys Act*, 14;8:112;
6. Te Velde S.J., Twisk J.W., Brug J. (2009) *Tracking of fruit and vegetable consumption from adolescence into adulthood and its longitudinal association with overweight*. *Br J Nutr*, 98:431-438.
7. Perk J., De Backer G., Gohlke H., Graham I., Reiner Z. et al. (2012) *European Guidelines on cardiovascular disease prevention in clinical practice (version 2012)*. *European Heart Journal*, 33(13):1635-701;
8. European Heart Network (2011) *Diet, Physical Activity and Cardiovascular Disease Prevention*. European Heart Network, Brussels;
9. Rasmussen M., Krølner R., Klepp K.I., Lytle L., Brug J., Bere E., Due P. (2006) *Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: quantitative studies*. *Int J Behav Nutr Phys Act*, 11;3:22;
10. Holst B., Williamson G. (2008) *Nutrients and phytochemicals: from bioavailability to bioefficacy beyond antioxidants*. *Curr Opin Biotechnol*, 19:73-82;
11. Williamson G., Holst B. (2008). *Dietary reference intake value for dietary polyphenols: are we heading in the right direction?* *Br J Nutr*, 99:S55-S58;
12. Huxley R.R., Neil H.A. (2003) *The relation between dietary flavonol intake and coronary heart disease mortality: a meta-analysis of prospective cohort studies*. *Eur J Clin Nutr*, 57(8):904-8;
13. Hollman P.C.H., Geelen A., Kromhout D. (2010). *Dietary flavonol intake may lower stroke risk in men and women*. *J Nutr* 2010;140:600-604;
14. Li S-H., Liu X-X., Bai Y-Y., Wang X-J., Sun K., Chen J-Z., Hui R-T. (2010) *Effect of oral isoflavone supplementation on vascular endothelial function in postmenopausal women: a meta-analysis of randomized placebo-controlled trials*. *Am J Clin Nutr*, 91:480-486;

15. EFSA Panel on Dietetic Products, Nutrition and Allergies. (2010). *Scientific opinion on the substantiation of health claims related to vitamin C and the reduction of tiredness and fatigue, contribution to normal psychological functions, regeneration of the reduced form of vitamin E, contribution to normal energy yielding metabolism, maintenance of the normal function of the immune system and protection of DNA, proteins and lipids from oxidative damage pursuant to Article 13 (1) of Regulation (EC) No 1924/2006*. EFSA Journal, 8(10):1815;
16. Knekt P., Ritz J., Pereira M.A., O'Reilly E.J., Augustsson K., Fraser G.E., et al. (2004) *Antioxidant vitamins and coronary heart disease risk: a pooled analysis of 9 cohorts*. Am J Clin Nutr, 80(6):1508-20,
17. Appel L.J., Moore T.J., Obarzanek E., Vollmer W.M., Svetkey L.P., Sacks F.M., et al. (1997) *A clinical trial of the effects of dietary patterns on blood pressure*. DASH Collaborative Research Group. N Engl J Med, 336:1117-24;
18. World Health Organization (1990) *Diet, Nutrition and the Prevention of Chronic Diseases*. WHO Technical Report, Series 797. Geneva: World Health Organization;
19. Keenan J.M., Pins J.J., Frazel C., Moran A., Turnquist L. (2002) *Oat ingestion reduces systolic and diastolic blood pressure in patients with mild or borderline hypertension: a pilot trial*. J Fam Prac, 51(4):369;
20. Chandalia M., Garg A., Luthjohann D., von Bergmann K., Grundy S.M., Brinkley L.J. (2000) *Beneficial effects of high dietary fiber intake in patients with type 2 diabetes mellitus*. N Engl J Med, 342(19):1392-8;
21. Pereira M.A., O'Reilly E., Augustsson K., Fraser G.E., Goldbourt U., Heitmann B.L., et al. (2004) *Dietary fiber and risk of coronary heart disease: a pooled analysis of cohort studies*. Arch Intern Med, 164(4):370-6;
22. Henderson L., Gregory J., Swan G. (2002) *The National Diet & Nutrition Survey: adults aged 19 to 64 years. Volume 1: Types and quantities of foods consumed*. Office of National Statistics. London: HMSO;
23. Odegaard A.O., Koh W.P., Yuan J.M., Gross M.D., Pereira M.A. (2012) *Western-style fast food intake and cardiometabolic risk in an Eastern country*. Circulation, 126(2):182-8;
24. World Health Organization (2003) *Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint WHO/FAO Expert Consultation*. WHO Technical Report Series No. 916. Geneva: World Health Organization;
25. Stender S., Dyerberg J., Astrup A. (2006) *High Levels of Industrially Produced Trans Fat in Popular Fast Foods*. New Engl J Med, 354:1650-2;
26. Darmon N., Drenowski A. (2008) *Does social class predict diet quality?* Am J Clin Nutr, 87(5):1107-17;
27. Marques-Vidal P., Ravasco P., Dias C.M., Camilo M.E. (2006) *Trends of food intake in Portugal, 1987-1999: results from the National Health Surveys*. European Journal of Clinical Nutrition, 60:1414-1422;
28. Savage G., Macfarlane A., Ball K., Worsley A., Crawford D. (2007) *Snacking behaviours of adolescents and their association with skipping meals*. International Journal of Behavioral Nutrition and Physical Activity, 4:36;
29. Jago R., Baranowski T., Baranowski J.C., Cullen K.W., Thompson D. (2007) *Distance to food stores & adolescent male fruit and vegetable consumption: mediation effects*. International Journal of Behavioral Nutrition and Physical Activity, 4:35;
30. Snyder L.B. (2007) *Health communication campaigns and their impact on behaviour*. Journal of Nutritional Education Behavior, 39:32-40;
31. Robinson E., Harris E., Thomas J., Aveyard P., Higgs S. (2013) *Reducing high calorie snack food in young adults: a role for social norms and health based messages*. Int J Behav Nutr Phys Act, 5:10(1):73.

DOI: 10.2478/tperj-2013-0009

Aspects Regarding the Role and the Importance of Physical Preparation in the Modern Football Game

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Abstract

In order to achieve the great performance, the physical preparation represents one of the most important factors of the sports training. The development of speed, of force resistance and of skill at superior parameters should represent major objectives in the training of the football teams which aim to attain the top of the national and international hierarchies. The results of the assessments of the football games at high level, confirm this hypothesis that is why the physical preparation should be reconsidered and adapted to the requirements of the modern play. According to the opinion of the great specialists of the field, the physical qualities have a weight of 47% compared with the other qualities which a top football player should possess. For us the trainers, it is only about to find the most appropriate means in order to develop and exploit at maximum, those qualities.

Key words: *physical preparation, development, football.*

Rezumat

În atingerea marii performanțe, pregătirea fizică reprezintă unul dintre cei mai importanți factori ai antrenamentului sportiv. Dezvoltarea vitezei, forței rezistenței și îndemânării la parametri superiori trebuie să constituie obiective prioritare în pregătirea echipelor de fotbal care își propun să acceadă spre vârful ierarhiilor interne și internaționale. Rezultatele evaluărilor jocurilor de fotbal la nivel înalt confirmă această ipoteză, motiv pentru care pregătirea fizică trebuie reconsiderată și adaptată cerințelor jocului modern. Conform opiniei marilor specialiști ai domeniului, calitățile fizice au o pondere de 47% în raport cu celelalte calități pe care trebuie să le posede un jucător de fotbal de top. Nu ne rămâne, ca antrenori, decât să găsim mijloacele cele mai potrivite pentru a dezvolta și exploata la maximum aceste calități.

Cuvinte cheie: *pregătire fizică, dezvoltare, fotbal.*

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Introduction

The physical preparation represents a system (ensemble) of measures to assure a high functional capacity of the body, through the high level of the development of the motility capacities, optimal values of the morpho-functional indices, fully mastering of the used exercises and a state of perfect health.

The physical preparation includes two aspects as follows:

1. The general physical preparation (GPP) which ensures the development of the basic motility capacities and of the functional capacities, enhances the general background of motility abilities and assures the harmonious development of the morpho-functional indices, which conditionate the practising of the sport branch;
2. The specific physical preparation (SPP), which ensures the development of the effort capacity specific to a sport branch, and also of the motrical qualities priority combined and differently implied, determining, at last the specific efficiency. [1] (Figure 1)



Figure 1. the general physical preparation (GPP) and the specific physical preparation (SPP)

The physical effort implies the muscular, energetical, information transmitting and processing system and determines a specific level of body stress which has as an effect the development of the physical, functional-biochemical and mental capacities, at different levels. From the stress point of view, the

physical effort can be exhaustive, maximal, under-maximal, medium and small.

The characteristics of the physical effort in football are the following:

- a. The long –term competitive calendar which extends on a period of about 9-10 months ;
- b. The regularity of the official games (weekly cycles) which lead to rhythmic stress;
- c. The variability of the sporting shape which must ensure the maximum efficiency of the team players at the stipulated dates and periods, in perfect correlation with the representatives calendar;
- d. The great duration of the playing period, plus the possible prolongations (90' plus 30');
- e. The big dimensions of the football pitch (120/90 m) and its quality;
- f. The big number of players (of both teams – 22);
- g. The performing of the game outdoors irrespective the weather conditions or on a covered football pitch (SUA 1994) with excessive temperature and humidity;
- h. On the whole playing period, the activity is performed on total engagement conditions and in a constant rhythm, alternating the compartments and lines of players according to the applied game system;
- i. The complex character of the effort in the football play given by the necessity of upkeeping the tempo and of the total engagement till the last second of the game (physical and mental freshness). [2]

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For a better illustration of the physical factor's weight in the actual football game, it should be reminded that at the final tournament of the World Football Championship in 1954, performed in Switzerland, a player used to cover during a match, a distance of about 4 km, while at the World Championship in 2010, which took place in South

Africa, the players covered a distance ranged between 8 and 12 km per match. Depending on the position on which they play, the average distance

covered by the top players and the physiological stress in football, is as following (Table I).

Table I. The average distance covered by the top players

Average distance(km) covered by the position	Way of moving					
	Walking	Running 2/4	Running 3/4	Sprint	Others	
A	9.5	2.5	4	1.25	0.8	0.95
H	11	2.8	5	1.5	1	0.8
D	8.5	2.5	3.5	1.1	0.6	0.8

Legend: A - Attackers; H - Halfbacks; D - Defender

The percentage of the implied energetical systems in the football game is the following (Table II):

Table II. The percentage of the implied energetically systems in the football game

Anaerobic alactacide	Anaerobic lactacide	Aerobic
15%	15%	70%

From the prevailing energetic system point of view, on positions, we can conclude that (Table III):

Table III. Energetic system point of view, on positions

Position	Anaerobic alactacide	Anaerobic lactacide	Aerobic
Goalkeeper	X		
Defender	X	X	
Halfback		X	X
Attacker	X	X	X

The distance between 8 and 12 km are covered by the players during the matches, as follows (Figure 2):

- walking - 2.6 km, with a speed of 3.6 km/h;
- running in a moderate tempo - 3.3 km, with a speed ranged between 8 and 14 km/h;
- speed running - 1.2 km, with a speed ranged between 15 and 25 km/h;
- maximal speed - 750 m, with a speed ranged between 26 and 32 km/h;
- running backwards the direction - 350m.

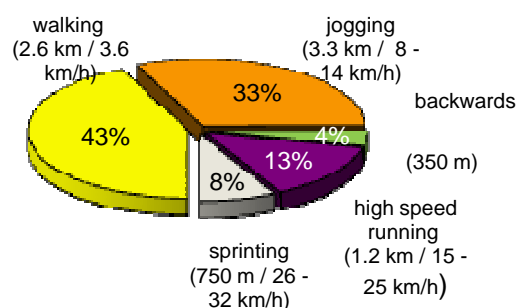


Figure 2. The distance between 8 and 12 km are covered by the players during the matches

It results that a big part of the effort performed by the football players takes place in the form of jogging, where from the necessity of the development of the aerobic capacity, base of making long term efforts capacity and of possibilities of rapid recovering after the effort. .

The modern football implies, at the senior level, somewhere around 60 - 70 matches on season, many of them decided on the final of the game, at which if we add the long distances for covering during the moving, we obtain a clear picture of the necessity for aerobic capacity development at the parameters imposed by the great performance.

It is to be mentioned that the semiprofessional players cover during a match, about the same distance, the difference being in the speed of the running and its quality.

The last years have brought a significant increase in the volume of the runnings of great intensity, from values ranged between 8 - 12%, to values ranged between 24 - 28%, from the total covered distance . (Figure 3)



Figure 3. The volume of the running of great intensity [6]

Since 1996, one of the most famous technicians, Valeri Lobanovsky, said: “the players should react faster. Each action takes place with an increased rapidity. React faster, play faster – this is the future of football.” The actual football totally confirms the hypothesis of the great technician.

The sprints with the ball at the foot reach at present at an amount of 160 - 300m, which represents between 1.7–3.1% from the distance covered during a match. The moving speed developed in this form has attained values difficult to imagine. For example, the Portuguese player, Cristiano Ronaldo develops with the ball at foot, a speed of 33.6km/h, a value very closet o that developed by the fastest man of the planet Usain Bolt on the distance of 200m flat – 37.15km/h. (Figure 4)

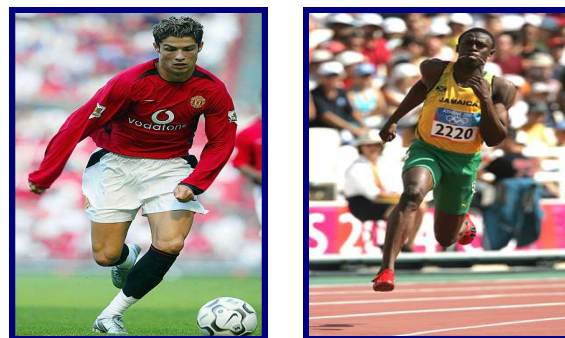


Figure 4. Speed developed by C. Ronaldo [7] and U. Bolt [8]

In order to comply to the requirements of the actual football, the players must develop a speed which should allow them the covering of a distance of 5m in less than a second and of the distance of 30m in less than 4 sec.

The accelerating in a very short time capacity ultimately makes the difference, the game implying during ita course no fewer than 1100 changes of intensity. The researches show that at every 40 -45 sec. there an increased intensity effort.

Those mentioned above are supported also by the cardiac frequency during a football match graphs, shown in figure 5, which indicates the fact that the cardiac frequency is situated on a period of 28 min. at 85 - 90% from the maximum CF, 19 min. at 90 - 95% from maximum CF and 9 min. at 95 - 100% from maximum FC . In other words, 2/3 from the game CF is situated at values above 85% from the maximum CF, so the effort is an intense one. [3]

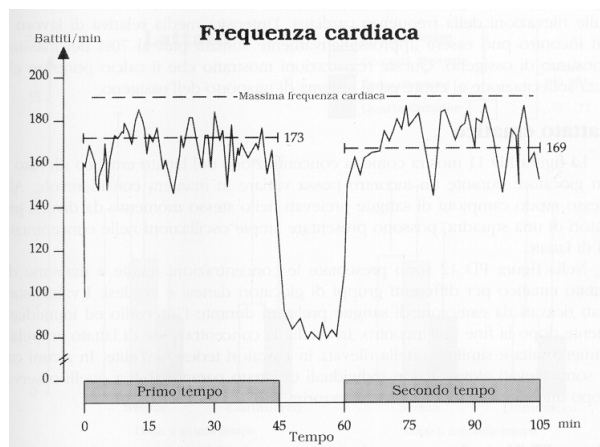


Figure 5. Cardiac frequency during a football match. [5]

Another characteristic of the modern football game is represented by the force, figure 6 showing the continual increasing of the number of the game duels during the last two decades. We cannot talk about an efficient expression in regime of adversity, without a corresponding force, under its all forms of manifestation [4].

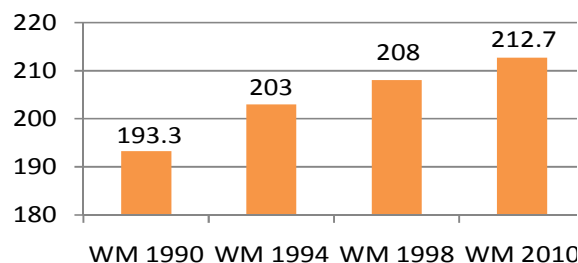


Figure 6. The number of the game duels during the last WM

The improving of the coordination and of the individual technique represent also desideratum without which we cannot cope with the rigours imposed by the actual football. The constraints determined by the constant increasing density of players on the different zones of the football pitch and of the greater and greater playing speed, impose a coordination and a technical expression of a perfect accuracy.

Conclusions

We can conclude that football is a sport which, from physical point of view implies intense actions, performed on a relatively long period of time, in a permanent adversity regime, which leads to the necessity of training the sportsman in order to cope to those requirements through:

- extraordinary aerobic capacity;
- force/strength;
- elasticity / explosion in segments;
- extraordinary speed;
- rapid comeback after intense and repeated actions.

The trainings should be such structured and conceived as to contribute to:

- increasing of the aerobic capacity for the improving of recovering ;
- development of the maximum aerobic power;
- training on intervals- intermittently training ;
- improving of spring (force and speed);
- coordination/technique improving.

References

1. Bompa T.O. (2001) *Teoria și metodologia antrenamentului sportiv*. C.N.F.P.A. București;
2. Hoff J. (2005) *Training and testing physical capacities for elite soccer players*. *Journal of Sports Sciences*, 23(6): 573 – 582;
3. Achten J., Jeukendrup A.E. (2003) *Heart rate monitoring: Applications and limitations*. *Sports Medicine*, 33, 517 – 538;
4. Wisloff U., Helgerud J., Hoff J. (1998) *Strength and endurance of elite soccer players*. *Medicine and Science in Sports and Exercise*, 30, 462 – 467.
5. Bagsbo J. (2003) *Fitness training in soccer - a scientific approach*. Reedswain Publishing, Michigan, pg. 71.
6. <http://ilrigorista.blogspot.ro>
7. <http://www.realitatea.net/tag/cristiano-ronaldo>
8. <http://usainbolt.com>