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Editorial Office of the Journal of
„Palestrica of the Third Millennium”
Civilization and Sport
Street: Clinicilor no. 1
400006, Cluj-Napoca
Telephone: 0264-598575
E-mail: palestrica@gmail.com

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ORIGINAL STUDIES

A study regarding alcohol consumption and knowledge on alcohol among Romanian medical students

Studiu privind consumul de alcool și cunoștințele despre alcool la studenții mediciniști români

Bogdana Adriana Năsui [1], Codruța Alina Popescu [2]
[1] Department of Community Health, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca
[2] Department of Social Science and History of Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Romania

Abstract

Background. Young adults are at the highest risk for alcohol-related harm.

Aims. The purpose of this study was to assess alcohol consumption among Romanian university medical students, as well as their knowledge regarding alcohol and the effects of alcohol consumption on the body.

Methods. A cross-sectional study was applied on 458 undergraduate medical university students selected randomly from the "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca. Of these students, 166 were males and 292 were females. The mean age of the students was 21.90 ± 3.22 years. Participants completed a self-administered questionnaire consisting of questions assessing quantity and frequency of alcohol intake, and alcohol knowledge. Each participant received a total score with regard to their alcohol and drinking practice, ranging from 0 to 31. Data were analyzed using SPSS version 20.

Results. Male students drank more units of alcohol per week than female students (10.66 units of alcohol/week for males versus 7.06 units of alcohol/week for females, p< 0.001).The study revealed that students had relatively low levels of knowledge regarding the effect of alcohol on the body, myths about alcohol and facts about alcohol beverages (M = 14.49 ± 4.10). Males had statistically significantly higher scores than females (15.42 ± 4.11 versus 14.00 ± 3.99; p< 0.001), and students in the third year of medical school had higher knowledge scores than first year students.

Conclusions. This study showed a high alcohol consumption among Romanian medical university students. Efforts to educate students about drinking practices should be enhanced throughout university.

Key words: students, alcohol consumption, alcohol knowledge.

Rezumat

Premize. Adulții tineri sunt cei mai expuși pericolelor datorate consumului excesiv de alcool.

Obiective. Scopul acestui studiu a fost de a estima consumul de alcool la studenții mediciniști, precum și cunoștințele acestora legate de alcool și de efectele consumului de alcool asupra organismului.

Metode. S-a folosit un studiu transversal, care a inclus 458 studenți de la Universitatea de Medicină şi Farmacie „Iuliu Haţieganu", Facultatea de Medicină, Cluj-Napoca. Dintre participanții la studiu, 166 au fost băieți și 292 au fost fete. Vârsta medie a lotului a fost de 21,90 ± 3,22 ani. Studenții au completat un chestionar autoadministrat, care a cuprins întrebări referitoare la consumul de alcool (cantitate-frecvență), precum și întrebări privind cunoștințele legate de alcool. Fiecare participant a obținut un scor de la 0 la 31, legat de practicile referitoare la consumul de alcool. Datele au fost analizate în programul SPSS versiunea 20.

Rezultate. Băieții au consumat semnificativ mai mult alcool decât fetele (10,66 unități alcool/săptămână față de 7,06 unități alcool/ săptămână la fete, p< 0,001). Studiul a arătat că studenții au relativ puține cunoștințe legate de miturile despre alcool și efectele asupra organismului (scor mediu al lotului 14,49±4,10 față de 31 maxim). Băieții au avut un scor semnificativ mai crescut decât fetele (15,42±4,11, față de 14,00±3,99; p< 0,001). Studenții din anul al treilea prezintă un scor al cunoștințelor mai mare, decât al celor din primul an de studiu.

Concluzii. Studiul scoate în evidență un consum relativ crescut de alcool la studenții mediciniști. Totodată, rezultatele studiului arată necesitatea educării studenților asupra obiceiurilor defectuoase relaționate consumului excesiv de alcool.

Cuvinte cheie: studenți, consum de alcool, cunoștințe legate de alcool.

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Address for correspondence: "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Louis Pasteur Str. No. 6, Hygiene Discipline
E-mail: nasuibogdana@yahoo.ro
Corresponding author: Bogdana Adriana Năsui; nasuibogdana@yahoo.ro
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Introduction

Young adults aged 18-29 years are at the highest risk for both short and long-term alcohol-related harm. In particular, university students have been repeatedly identified as being especially vulnerable, with surveys revealing that the majority of university students drink alcohol and some of them drink at hazardous or harmful levels (Baker & Stockton, 2012). A few studies have indicated that students on the whole have a lack of knowledge concerning mood modifiers, including alcohol. Most of the authors of these previous studies concluded that knowledge about alcohol and drugs was not very good, and they recommended adequate educational programs on mood modifying substances (Granville-Chapman et al., 2001).

Interest in preventing alcohol abuse among this population has prompted the development and implementation of a range of intervention and prevention programs. Although there is mixed evidence with respect to the efficacy of these programs in reducing alcohol consumption, individuals still require knowledge about responsible drinking practices so they can make informed decisions about their alcohol consumption (White et al., 2005). Studies in this area, most of which have been conducted on university students in the USA, generally reveal low levels of knowledge in relation to alcohol and drinking practices.

Objectives

The objective of this study was to estimate students' alcohol consumption, for both males and females, and to determine students' knowledge about alcohol so as to provide information for health educators as an aid to program development.

Hypothesis

In Romania, there are few studies investigating alcohol consumption among university students, and none of them has examined knowledge about alcohol and safe drinking.

Material and methods

Research protocol

This study received the approval of the Ethical Committee of "Iuliu Hatieganu" University, No. 765/17.05.2013. The participants in the study gave their informed consent.

a) Period and place of the research

The study was performed during the academic years 2013-2014 and 2014-2015. The participants were randomly selected first, third and fourth year students at the Medical Faculty of "Iuliu Hațieganu" University Cluj-Napoca.

b) Subjects and groups

The sample comprised 458 male and female undergraduate students.

The Romanian education system requires 6 years of university education in medical school. Of these students, 166 were male and 292 were female. The mean age was 22.19 (SD=3.22) for males and 21.74 (SD=3.21) for females, with a mean age of the sample of 21.90 (SD=3.22). Of the study group, 144 participants (30.76%) were in the first year, 171 (36.53%) were in their third year and 153 (32.69%) were in the fourth year of university.

c) Tests applied

Participants completed a self-administered questionnaire that consisted of questions assessing quantity and frequency of alcohol intake, and alcohol knowledge. The questionnaires were administered during mandatory activities (such as practical activities) to encourage participation. All students agreed to complete the questionnaire. The informed consent form explained both the study and participants' rights. These rights included the options to not participate or stop at any time without any negative consequences. During data collection, the research team was present in the classrooms. The instrument was called Student Alcohol Questionnaire (Engs, 1975). Permission was granted to use the questionnaire for this study from researchers at Indiana University. The 31 alcohol knowledge true/false questions were based on information found in pamphlets published by the American Medical Association, Alcoholics Anonymous and the National Council of Alcoholism. Some questions were adapted to Romanian customs and regulations. The questions contained items regarding: facts about alcohol (e.g. alcohol is usually classified as a stimulant); the effect of alcohol on the body (e.g. drinking milk before drinking an alcoholic beverage will slow absorption of alcohol into the body); myths about drinking (e.g. drinking coffee or taking a cold shower can be an effective way of sobering up); and facts about alcoholic beverages (e.g. beer usually contains 2-12% alcohol by volume) (Engs & Hanson, 1989). The reliability of the Romanian version of Student Alcohol Questionnaire is similar to that of the English version (Engs & Hanson, 1994).

In the administration of the test, students were asked to mark "true", "false" or "don't know". The questionnaires were anonymous and confidential so as to minimize either faked true or faked false answers. The questionnaire took approximately 25-30 minutes to complete. Those who participated in this study did so voluntarily and were offered no compensation.

The instrument assessed the usual frequency and quantity of beer, wine and spirits consumed by the student. The frequency response categories were assigned constant values allowing to calculate units per week (every day = 7.0, at least once a week but not every day = 3.5, at least once a month but less than once a week = 0.5, more than once a year but less than once a month = 0.12, once a year or less or not at all = 0). To compute the drinks of alcohol consumed on a weekly basis, a mean score was calculated by multiplying the quantity by the recoded frequency weight for each beverage type and summing the three scores.

A drink was defined as a glass of any alcoholic beverage (beer, wine, spirits), assuming that a standardized glass of beer, wine or spirits contains a similar quantity of alcohol (10-12 g).

Drinking knowledge score

Each participant received a total score, ranging from 0 to 31. Participants received one mark for every correct answer on the questionnaire and the total score represented overall knowledge about alcohol and drinking practices.

This total score was calculated by summing one mark for every correct answer on the questionnaire. Knowledge scores were calculated both for males and females.

d) Statistical processing

As this study employed an exploratory quantitative approach, the data in this paper were primarily presented using descriptive statistics and were analyzed using a series of t-tests and chi-square analyses, and ANOVA with Games Howell post-hoc testing for multiple comparisons. Data were analyzed in SPSS 20.

Results

The results of our study showed that beer was the favorite drink for both males and females. Males drank significantly more alcohol than female students (Table I).

Table I

Units of alcohol consumed by the students

Variable	Gender	Mean	Std. deviation	p-value (t test)
Units of beer/week	Male	5.95	8.13	0.000
	Female	3.26	6.47	
Units of wine/week	Male	3.05	5.18	0.131
	Female	2.50	4.87	
Units of spirits/week	Male	1.66	3.35	0.518
	Female	1.30	2.96	
Total units of alcohol/week	Male	10.66	12.44	0.001
	Female	7.06	10.65	

Out of 31 possible correct answers, the total group obtained a mean score of 14.5, which represented 46.77% or slightly less than half of the questions answered correctly. Many students adhered to myths about alcohol. Approximately 70.7% subscribed to the myth that alcohol is a stimulant and about 91.9% thought that drinking coffee or taking a cold shower was an effective way of sobering up. Most of the students (81.8%) did not know how much alcohol distilled alcoholic beverages contain (Table II).

There were many misconceptions regarding the actions of alcohol on the body or facts about beverages. About 33% of students did not know that the legal definition for intoxication in Romania regarding driving was 0.08% blood alcohol concentration (BAC). About 90.4 students did not know that eating or drinking milk before drinking alcohol could slow down the absorption of alcohol into the body (Table II).

The study reveals a highly significant relationship ($p<.001$) between gender and scores, with a higher percentage of male students scoring above the mean than female students. This could mean that in classes or universities primarily composed of female students, more emphasis should be placed on information about alcohol due to their apparent greater lack of knowledge about the subject (Table III). There appeared to be a significant statistical difference relationship between class level and students' alcohol knowledge, students in the third year of study (at the medical university) having higher knowledge scores than students in the first year of study. Students with a background of Orthodox, Catholic and Reformed religion, which allows drinking, appeared to have higher scores than students with backgrounds that do not allow drinking (Islamic) or without religion, but statistical analyses of scores and religion indicate that this relationship was not statistically significant ($p=0.43$).

Table II

Questions about alcohol and correct answers

Nr.	Question content	Students' correct answers (percentage %)
1.	Drinking milk before drinking an alcoholic beverage will slow the absorption of alcohol into the body (t)	9.6
2.	Wines are made by fermented grains (f)	75.6
3.	Alcoholic beverages do not provide weight-increasing calories (f)	65.6
4.	In Romania/other countries, drinking is usually considered an important socializing custom in business, for relaxation and for improving interpersonal relationships (t)	53.4
5.	Alcohol is usually classified as a stimulant (f)	29.3
6.	Alcohol is not a drug (f)	47.9
7.	In Romania, a blood alcohol level of 0.08 g per hundred is an offense for driving on public roads (t)	66.7
8.	Approximately 10% of fatal highway accidents are alcohol related (t)	56
9.	Alcohol was used for centuries as a medicine in childbirth, for sedation and surgery (t)	55.6
10.	Table wines contain 2-12% alcohol by volume (t)	57.9
11.	Many people drink to escape from problems, loneliness and depression (t)	86.5
12	Liquor mixed with soda pop will affect you faster than liquor drunk straight (f)	29.5
13	The most commonly drunk alcoholic beverages in Romania are distilled liquors (tuica, vodka) (t)	8.3
14.	A person cannot become an alcoholic by just drinking beer (f)	26.3
15	A 150 pound person, to keep his/her blood alcohol concentration below the legally intoxicated level, would have to drink fewer than 3 beers in an hour (f)	18.6
16	To prevent getting a hangover, one should sip one's drink slowly, drink and eat at the same time and not drink over one's limit (t)	57.3
17	Responsible drinking can result in relaxation, enhanced social interactions and a feeling of well-being (t)	74.1
18	Distilled liquors (whisky, gin, vodka) usually contain about 15-20% alcohol by volume (f)	18.2
19	Moderate consumption of alcoholic beverages is generally not harmful to the body (t)	53.4
20	An ounce of whisky contains about 60 calories (f)	5.3
21	Many people drink for social acceptance, because of peer group pressure and to gain adult status (t)	73.3
22	It takes about as many hours as the number of beers drunk to completely burn up the alcohol ingested (t)	18.6
23	Liquors such as gin, scotch and whiskies are usually distilled from mashes made from fermenting grains (t)	51.6
24	There is usually more alcoholism in a society that accepts drunken behavior than in a society that frowns on drunkenness (t)	39.3
25	Beer usually contains 2-12% alcohol by volume (t)	64.1
26	Eating while drinking will have no effect on slowing down the absorption of alcohol in the body (f)	56.6
27	Drinking coffee or taking a cold shower can be an effective way of sobering up (f)	8.1
28	Wines throughout history have been commonly drunk at religious ceremonies and family gatherings (t)	87.8
29	Throughout history, many societies have banned alcohol for religious reasons (t)	54.1
30	Alcohol has only been used in very few societies throughout history (f)	38.9
31	Liquor taken straight will affect you faster than liquor mixed with water (t)	61.8

The study also analyzed the knowledge scores in students living in different conditions. Apparently students who lived in university campus had higher scores of knowledge ($M=15.28$, $SD=3.73$) than students who lived with their parents or in rent apartments, but these differences were not statistically significant ($p=.09$) (Table III).

Table III
Demographic variables and score of knowledge

Variable	Number of respondents	Mean score ± SD
Year of study[a]		
First	144	14.27 ± 3.57
Third	171	15.51± 3.81
Fourth	143	14.99± 4.61
Gender[b]		
Male	166	15.43 ± 4.11
Female	292	14.06 ± 3.99
Religion[c]		
Without	23	14.30 ± 4.07
Orthodox	265	14.81± 3.89
Catholic	28	15.71 ± 3.90
Reformed	18	13.53 ± 4.95
Neoprotestant	18	13.95 ± 3.52
Islamic	6	13.66 ± 3.82
Living conditions[d]		
Home with parents	11	14.08 ± 4.41
Rent apartment alone	133	13.94 ± 4.02
Rent apartment with friends	179	14.78 ± 3.98
University campus	119	15.28 ± 3.73
Private university building	16	14.54 ± 4.09

[a] ANOVA F (2,465) = 9.26, p< .001; [b] t (2,466) = 3.640, p<.001; [c] ANOVA F (5,354) = 0.973, p=0.43; [d] ANOVA F (4,450) = 1.990, p=0.09

Discussion

College student drinking has been studied extensively in North America (Wechsler & Nelson, 2001), the problem receiving frequent media attention, research funding and intervention programming (***, 2002). Several factors have been found to be associated with alcohol use, abuse and dependence, such as genetic factors, environmental factors, emotional and psychological instability, gender, sexual identity, cognitive factors, peer pressure, family history and achievement (Presley, 2002). Although the problem of alcohol use is evident in most countries of the world, there is a comparatively small amount of research from a few European countries (Karam et al., 2007) and from Australia (Dowling et al., 2006; Lindsay, 2001).

According to Espad Report, the trend in alcohol use in Romania remains high, associated with an increase in illicit drug use (***, 2015). Studies have shown a higher intake of alcohol among male students compared to female students (Lorant et al., 2013).

The results of the present study appear to confirm the opinions that factual information held by students concerning alcohol and drinking is lacking. The total sample answered slightly less than half of the knowledge questions correctly. Results from this study, particularly the finding that students with more alcohol knowledge also drank more, suggest that interventions have to be focused on them to reduce drinking behavior. On the other hand, the generally low score of all participants suggests that these young people are potentially harming themselves without knowing it.

The highest scores of knowledge are those of medical school students in their third year of study. Healthcare professionals represent the main group of health workers with an important role in prevention, early detection and treatment of alcoholism. These suggest that greater efforts should be made to improve alcohol education at the university level.

The study showed that many students did not know the alcoholic content of alcoholic beverages, especially distilled liquors, so they would not be able to estimate the safe level of drinking. This can lead to an increase in alcohol consumption levels. Students in Romania had relatively poor knowledge of alcohol metabolism, risky drinking levels, and permissible consumption levels for driving. Approximately 8.1% of the participants correctly identified that nothing (i.e. only time, rest and sleep) can be done to lower BAC levels. This lack of knowledge can engage students in binge drinking (White et al., 2003). Students who binge drink are more likely to experience a wide range of problems, including academic difficulties, social conflict, risky sexual behavior, risky driving behavior, vandalism, injury and alcohol overdose (Nasui et al., 2016; Guo et al., 2016). Binge drinkers were also more likely to engage in other risk behaviors such as tobacco and illicit drug use (Miller et al., 2007). In addition to the harm drinkers cause to themselves, they cause problems to others on and around the campus, to the larger campus community (MacArthur et al., 2012; Mekonen et al., 2017).

Policies of excessive drinking prevention and alcohol poisoning should include education about alcohol and its effects, confidential help for those in difficulty and procedures for managing individuals with drinking problems.

Although further research is required to investigate the impact of educational interventions on knowledge and the impact of improving knowledge on consumption (Sharmer, 2001), the results of this study highlight the need for increased alcohol awareness, particularly in relation to responsible drinking practices among university students. Social norms initiatives have been demonstrated to be effective in reducing alcohol use on college campuses by changing the perceived norms related to alcohol use (Perkins, 2003).

Regardless of whether education is an important component of prevention and intervention programs for alcohol abuse, knowledge on drinking practices is necessary for individuals to make an informed decision about their alcohol consumption (Martin et al., 1991). Efforts to educate students about drinking practices should be enhanced throughout university. In fact, the low average scores of the study group may suggest that it is important to implement alcohol education programs at the earliest feasible age, such as primary or secondary school (Wechsler et al., 2002).

Conclusions

1. The study reveals a high percentage of drinkers, among both males and females.

2. Low students' knowledge about alcohol and drinking practices suggests the need for implementing alcohol education programs among students.

Conflicts of interests
There are no conflicts of interests.

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Phytotherapeutic modulation of the impact of facial expressions in intense physical stress

Modularea fitoterapică a impactului expresiilor faciale, în stresul de efort fizic intens

Ramona Jurcău [1], Ioana Jurcău [2], Nicolae Colceriu [3], Călin Gîrlea [4]
[1] Department of Pathophysiology, Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania
[2] Emergency Clinical Hospital for Children, Cluj-Napoca, Romania
[3] University of Veterinary Medicine and Agricultural Sciences, Cluj-Napoca, Romania
[4] Dacia Plant Company, Bod, Brașov, Romania

Abstract

Background. Facial expressions (FE) can have an important impact on physiological and psychological reactions, under the conditions of physical exercise. On the other hand, it is known that there are plants that can modulate the impact of stress on the human body.

Aims. The aim of the present research is the evaluation of phytotherapeutic modulation of the impact of FE in intense physical stress.

Methods. Sedentary volunteers (n = 24 males) were divided into two groups: a) no treatment (C = 12) and b) who received a phytotherapeutic product containing plants with an adaptogenic role, PAD (AD = 12). The chosen FEs were: neutral (N), disappointment (D) and encouragement (E). FEs were displayed on a screen in front of the subject. Physical stress (PS) was represented by a short-term intense physical effort, made on a Monark Ergomedic 839E cycle ergometer. PAD administration was 2x1 capsules/day, 21 days. The analyzed indicators were heart rate (HR), anxiety (A) and glycemia (G). Statistical analysis was made on the basis of the Student test.

Results. HR: compared with AD, C values were significantly higher immediately pre- and post-stress. A and G: values in C were significantly higher compared to AD, immediately pre- and post-stress.

Conclusions. 1) Influence of PS+N/D/E was significantly more intense on C versus AD, more intense on FC and A than on G. 2) FE type D increased and FE type E reduced physical stress, while N did not influence it. 3) Compared to C, PAD decreased the effect of FE type D and increased the FE type E effect. 4) PAD could be used as a modulator of FE impact on physical stress, and this involvement should be studied through further research.

Key words: facial expressions, physical stress, heart rate, anxiety, glycemia, phytotherapeutic modulation

Rezumat

Premize. Expresiile faciale (EF) pot avea un impact important asupra reacțiilor fiziologice și psihologice, în condițiile realizării unui efort fizic. Pe de altă parte, se știe că există plante care pot modula impactul stresului asupra organismului uman.

Obiective. Obiectivul studiului este evaluarea modulării fitoterapice a impactului EF, în stresul de efort fizic intens.

Metodă. Subiecții voluntari sedentari (n=24 bărbați) au fost împărțiți în două grupe: a) fără tratament (C=12) și b) care a primit un produs fitoterapic, conținând plante cu rol adaptogen, PAD (AD=12). EF alese au fost: neutru (N), dezamăgire (D) și incurajare (Î), EF au fost afișate pe un ecran situat în fața subiectului. Stresul a fost reprezentat de un efort fizic intens și de scurtă durată, realizat cu un cicloergometru Ergomedic 839e Monark. Administrarea PAD a fost de 2x1 cps/zi, 21 zile. Indicatorii analizați au fost frecvența cardiacă (FC), starea de anxietate (A) și glicemia (G). Evaluarea statistică s-a făcut pe baza testului Student.

Rezultate. FC: comparativ cu AD, valorile la C au fost semnificativ mai crescute, imediat pre- și post-stres. A și G: valorile la C au fost semnificativ mai crescute comparativ cu AD, imediat pre- și post-stres.

Concluzii. 1) Influența PS+N/D/Î a fost semnificativ mai intensă asupra C comparativ cu AD, mai intensă asupra FC și A decât asupra G. 2) EF de tip D a crescut și EF de tip Î a scăzut stresul fizic, în timp ce N nu l-a influențat. 3) Comparativ cu C, PAD a scăzut efectul EF de tip D și a crescut efectul EF de tip Î. 4) PAD ar putea fi folosit ca modulator al impactului EF asupra stresului fizic, iar această implicare ar trebui studiată prin cercetări ulterioare.

Cuvinte cheie: expresii faciale, stres fizic, ritm cardiac, anxietate, glicemie, modulare fitoterapică.

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Address for correspondence: "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca 400012, Victor Babes Str. no. 8
E-mail: ramona_mj@yahoo.com
Corresponding author: Ramona Jurcău; ramona_mj@yahoo.com
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Introduction

According to psychological models as well as common intuition, intense positive and negative situations evoke highly distinct emotional expressions (Wenzler et al., 2016). For example, coherent increases in sympathetic activation accompanied a film containing violent threats, whereas a surgery film yielded greater electrodermal activation, as well as heart rate deceleration (Palomba et al., 2000). In sport, athletes from relatively urban, individualistic cultures expressed their emotions more, whereas athletes from less urban, collectivistic cultures masked their emotions to a greater extent (Matsumoto et al., 2009).

The present work is a continuation of our concerns for assessments in physical stress, as well as for the modulation of physical stress (Jurcău et al., 2011; Jurcău et al., 2013; Jurcău & Jurcău, 2014; Jurcău & Jurcău, 2015).

Hypothesis

Facial expression (FE) can have an important impact on physiological and psychological reactions under conditions of physical exercise. On the other hand, it is known that there are plants that can modulate the impact of stress on the human body.

Objectives

The objective was to highlight how a phytotherapeutic product containing plants with an adaptogenic role can influence the impact of FE, under intense physical stress, on sedentary persons.

Material and methods

Research protocol

a) Period and place of the research

The study and measurements were carried out in July 2018, in the 122 Medical Family Practice in Cluj-Napoca. Participation of all subjects in the study was voluntary.

b) Subjects and groups

Sedentary volunteers (n = 24 males) were divided into two groups: a) no treatment (C = 12) and b) who received a phytotherapeutic product containing plants with an adaptogenic role, PAD (AD = 12). Average age: 24.4 ± 3 (C), 30.1 ± 4 (AD). They underwent the same kind of physical effort.

c) Tests applied

- *Study design*

The chosen FEs were: neutral (N), disappointment (D) and encouragement (E). FEs were displayed on a screen in front of the subject. The FEs were presented in three short films while the subject pedaled, with 30-minute breaks between them. The stress was short-term intense physical exercise performed on the Monark Ergomedic 839E cycle ergometer, in three successive physical sequences (PS), in the order: PS+N → PS+D → PS+E.

PAD administration was 2x1 capsules/day, for 21 days. PAD is called Fitotensin and its composition includes (1): Hypericum perforatum, Verbena officinalis, Angelica archangelica, Ocimum basilicum, Passiflora incarnata, Melissa officinalis, Valeriana officinalis, Lavandula angustifolia.

- *The indicator determination program* was as follows:

Evaluations were performed: 24 h (T1) and 15 minutes before PS+N (T2); 15 minutes after PS+N (T3), PS+D (T4) and PS+E (T5); 24 hours after PS+E (T6).

- *Explorations*

Heart rate (HR) was evaluated on the cycle ergometer; anxiety (A) was assessed with Beck Anxiety Inventory; glycemia (G) was evaluated with a portable glucometer.

d) Statistical evaluation

- The results obtained were analyzed using SPSS 13.0. statistical package.
- For continuous data examination, Student's t test was used.
- The differences were considered significant at a $p< 0.05$.

Results

Mean, standard deviation and p values for C-AD comparison are shown in the tables below.

Heart rate (HR) (Table I). Compared with AD, C values were significantly higher immediately pre-stress: T2 (p = 0.005) and post-stress: T3 (p = 0.0001), T4 (p = 0.002) and T5 (p = 0.005). The most significant difference was at T3. At T6, differences were not significant.

Table I

Modification of HR at T1-T6 moments

Moments	Groups	HR		
		Mean	SD	p
T1	C	69.17	3.1841	ns
	AD	68.92	2.9849	
T2	C	138.08	140.25	0.005
	AD	140.25	1.0103	
T3	C	154.25	2.3139	0,0001
	AD	149.33	2.8963	
T4	C	165.08	3.5463	0.0002
	AD	159.33	2.8963	
T5	C	130.25	1.0104	0.005
	AD	128.08	2.3258	
T6	C	72.58	1.801	ns
	AD	70.16	3.387	

Anxiety (A) (Table II). Values in C were significantly higher compared to AD immediately pre- and post-stress: T2 (p = 0.003), T3 (p = 0.005), T4 (p = 0.01) and T5 (p = 0.004). The most significant difference was at T2. At T6, differences were not significant.

Table II

Modification of A at T1-T6 moments

Moments	Groups	A		
		Mean	SD	p
T1	C	0.93	0.3374	ns
	AD	0.89	0.3094	
T2	C	34.33	5.6025	0.003
	AD	26.08	7.0292	
T3	C	22.91	6.0063	0.005
	AD	15.5	6.6269	
T4	C	28.08	5.8659	0.01
	AD	21.58	6.4737	
T5	C	19.16	5.8142	0.004
	AD	11.33	6.7618	
T6	C	4.66	1.0274	ns
	AD	3.83	1.4624	

Glycemia (G) (Table III). Values in C were significantly higher compared to AD immediately pre- and post-stress: T3

(p = 0.04), T4 (p = 0.01), T5 (p = 0.02) and T6 (p = 0.005). The most significant difference was at T6. At T2, differences were not significant.

Table III
Modification of G at T1-T6 moments

Moments	Groups	G		
		Mean	SD	p
T1	C	75.36	5.2271	ns
	AD	74.66	4.7667	
T2	C	75.16	4.7929	ns
	AD	74.91	4.9909	
T3	C	117	6.0138	0.04
	AD	112.66	4.8705	
T4	C	150.91	5.5295	0.01
	AD	145.66	4.0483	
T5	C	146.25	5.9037	0,02
	AD	141.58	4.0509	
T6	C	113.16	9.8896	0.005
	AD	101.16	10.3346	

Discussion

Analysis of the results of the present study

Action on HR. The relationship between the effect of PAD and facial expressions in AD versus C: PAD reduced the negative effect of D (T4); PAD reduced the N (T3) effect to a greater extent compared to the D effect; PAD potentiated the beneficial effect of E (T5) on HR.

Action on A. The relationship between PAD effect and facial expressions in AD compared to C: PAD reduced the effect of D (T4) and N (T3) on A; PAD summed with E (T5) determined a significant decrease of A.

Action on G. The relationship between PAD effect and facial expressions in AD compared to C: PAD moderately reduced the negative effect of D (T4); PAD reduced the N (T3) effect to a greater extent compared to the D effect; PAD increased the beneficial effect of E (T5) on G.

FE and sport

FE of individuals participating in a contest is important for the performance of those athletes. Less is known about how phytotherapeutic products can influence the impact of FE on physical stress.

Emotion category and facial expression intensity differentially affect performance on explicit and implicit emotion-processing tasks (Herba et al., 2006). Thus, professional sports performance is influenced by emotional expressions and implies that performance can potentially be improved by taking this into account (Cheshin et al., 2016). For example, recognition of facial emotions plays a role in the action prediction in combat sports such as taekwondo (Shih & Lin, 2016).

The results obtained support the literature data regarding the effects of plants in the PAD composition on the studied parameters, some of which are mentioned below.

St John's wort (Hypericum perforatum, HP). HP increased sensitization and binding to various receptors, including glutamate, adenosine and GABA (Butterweck, 2003; Mennini & Gobbi, 2005; Zanoli, 2004). Long-term treatment (6 weeks) with St. John's wort in young and healthy men may affect glucose tolerance by reducing insulin secretion (Stage et al., 2016).

Verbena (Verbena officinalis, VO). The anticonvulsant, anxiolytic and sedative activities of VO have been scientifically proven, which provides support for its utilization in various neurological diseases such as epilepsy, anxiety and insomnia (Khan et al., 2016).

Angelica (Angelica archangelica, AA). AA has been used since historic times in traditional European and Asian medicine, for its anxiolytic effects (Bhat et al., 2011; Sigurdsson et al., 2004). AA has been evaluated for anxiolytic activity and has been found to have significant potential for it (Kumar, Bhat, 2012).

Basil (Ocimum basilicum, OC). OC is a popular herb that has a wide range of uses in traditional medicine as a treatment for anxiety, diabetes, cardiovascular disease and headache (Bora et al., 2011).

Passiflora (Passiflora incarnata, PI). PI showed an anxiolytic effect similar to that of midazolam, and was safe and effective for the conscious sedation of adult patients who underwent three mandibular molar extractions (Dantas et al., 2017). The single administration of passion fruit extract, as well as piceatannol in its composition, reduced the blood glucose levels of mice to which they were administered (Uchida-Maruki et al., 2015).

Melissa (Melissa officinalis, MO). MO officinalis is a potential source for the treatment of a wide range of conditions, especially anxiety and other CNS disorders (Shakeri et al., 2016). The essential oil of MO administered in low concentrations is an effective hypoglycemic agent, probably due to increased absorption of glucose and its metabolism in the liver and adipose tissue and inhibition of gluconeogenesis in the liver (Chung et al., 2010). Also, Melissa officinalis (Cases et al., 2011) and Passiflora (Miroddi et al., 2013) are known for their anti-stress effects.

Valeriana (Valeriana officinalis, VO). In pharmacological studies, valepotriate constituents have demonstrated sedative and spasmolytic effects of VO, and sesquiterpene and valeric acid have been shown to produce sedation (Plushner, 2000; Lefebvre et al., 2004).

Lavender (Lavandula angustifolia, LA) essential oil. The anxiolytic and antidepressant effects of LA may be due to an antagonism on the NMDA receptor and the serotonin transporter inhibitor (López et al., 2017).

Conclusions

1. Influence of PS+N/D/E was significantly more intense on C versus AD, more intense on HR and A than on G.
2. FE type D increased and FE type E reduced physical stress, while N did not influence it.
3. Compared to C, PAD decreased the effect of FE type D and increased the FE type E effect.
4. PAD could be used as a modulator of FE impact on physical stress, and this involvement should be studied through further research.

Conflicts of interest

Nothing to declare.

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Brief analysis of the Sport-Ginseng relationship, from the perspective of PubMed publications

O scurtă analiză a relaţiei Sport - Ginseng, din perspectiva publicaţiilor PubMed

Ramona Jurcău [1], Ioana Jurcău [2], Dong Hun Kwak [3]
[1] Department of Pathophysiology, Faculty of Medicine, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania
[2] Emergency Clinical Hospital for Children, Cluj-Napoca, Romania
[3] Korean Lectorate, "Babeş-Bolyai" University, Cluj-Napoca, Romania

Abstract

Background. Sport (S) and Ginseng (GSG) represent subjects of research interest, but the S-GSG relationship is, yet, rarely investigated.

Aims. The purpose of the present paper is a brief analysis of the Sport-Ginseng (S-GSG) relationship, from the perspective of PubMed publications.

Methods. The S-GSG relationship was analyzed in two types of investigations. A) Comparative analysis for the keyword combinations: Sport AND Ginseng (S-GSG), Sport AND Ginseng AND Fatigue (S-GSG-F), Sport AND Ginseng AND Performance (S-GSG-P), Sport AND Ginseng AND Endurance (S-GSG-E). B) Analysis for all keyword combinations, evaluating the Sex filters, with the corresponding subfilters: male (M), female (F).

Results. The total number of S-GSG publications was 150, for a period of 35 years, since 1983 to date. % of publications from S-GSG are: 17% for S-GSG-F; 38% for S-GSG-P; 24.6% for S-GSG-E. % of publications for M are: 63.3% for S-GSG, 40% for S-GSG-F, 54.3% for S-GSG-P, 62.1% for S-GSG-E. % of publications for F are: 20% for S-GSG, 8% for S-GSG-F, 21% for S-GSG-P, 13.5% for S-GSG-E.

Conclusions. 1) The average number per year of PubMed publications for S-GSG is 4.2, and the number of publications for 2018 is 7. 2) Of S-GSG, most of the publications were for S-GSG-P. 3) Most M publications were for S-GSG-E, and most F publications were for S-GSG-P. 4) Studies on the S-GSG relationship, although numerically reduced, are still increasing in recent years, covering the areas of interest F, P and E.

Key words: sport, Ginseng, fatigue, performance, endurance, PubMed filters

Rezumat

Premize. Sportul (S) și ginsengul (GSG) reprezintă subiecte de interes științific, dar relația S-GSG este, totuși, modest investigată.

Obiective. Scopul lucrării este o scurtă analiză a relației S-GSG, din perspectiva publicațiilor PubMed.

Metode. Relația S-GSG a fost analizată în două tipuri de investigații. A) Analiza comparativă pentru combinațiile de cuvinte cheie: sport și ginseng (S-GSG), sport și ginseng și oboseală (S-GSG-F), sport și ginseng și performanță (S-GSG-P), sport și ginseng și anduranță S-GSG-E). B) Analiza pentru toate combinațiile de cuvinte cheie, fiind evaluate filtrele Sex, cu subfiltrele corespunzătoare: masculin (M), feminin (F).

Rezultate. Numărul total de publicaţii S-GSG a fost de 150, pentru o perioadă de 35 de ani, din 1983 până în prezent. % de publicaţii din S-GSG sunt: 17% pentru S-GSG-F; 38% pentru S-GSG-P; 24.6% pentru S-GSG-E. % de publicaţii pentru M sunt: 63.3% pentru S-GSG, 40% pentru S-GSG-F, 54.3% pentru S-GSG-P, 62.1% pentru S-GSG-E. % de publicaţii pentru F sunt: 20% pentru S-GSG, 8% pentru S-GSG-F, 21% pentru S-GSG-P, 13.5% pentru S-GSG-E.

Concluzii. Numărul de publicaţii PubMed pentru S-GSG are o medie de 4,2 publicaţii per an, iar numărul de publicaţii pentru 2018 este de 7. Dintre S-GSG, cele mai multe au fost pentru S-GSG-P. Cele mai multe publicaţii cu M au fost pentru S-GSG-E, iar cu F, pentru S-GSG-P. Studiile referitoare la relaţia S-GSG, deşi puţin numeroase, sunt în creştere în ultimii ani, acoperind arii de interes precum F, P și E.

Cuvinte cheie: sport, ginseng, oboseală, performanţă, anduranţă, filtre PubMed

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Address for correspondence: "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca 400012, Victor Babes Str. no. 8
E-mail: ramona_mj@yahoo.com
Corresponding author: Ramona Jurcău; ramona_mj@yahoo.com
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Introduction

Ginseng (Panax ginseng C.A. Meyer; Araliaceae) has been used for several thousand years in Asian culture, for its adaptogenic properties, including resistance to fatigue (Caldwell et al., 2018), as a tonic, prophylactic and "restorative" agent (Bahrke & Morgan, 1994). Panax ginseng provides anti-fatigue effects in patients with idiopathic chronic fatigue (Kim et al., 2013). Physical performance is related to the ability to complete physical tasks faster, with a higher power, with higher intensity (EFSA Panel, 2014). Ginseng is a popular herb used by athletes as an ergogenic aid for many years, to enhance physical performance (Bahrke & Morgan, 1994) and endurance (Yeh et al., 2011).

The present article is a continuation of the authors' previous research concerning the assessment of stress in situations of physical exertion (Jurcău & Jurcău, 2013; Jurcău & Jurcău, 2014a) and the relationship between exercise and stress, through an analysis of PubMed publications (Jurcău & Jurcău, 2014b; Jurcău & Jurcău, 2018).

Hypothesis

Ginseng is historically known for its anti-fatigue effects as well as for improving results in sports.

Objectives

The aim of the current study is the evaluation of research papers regarding the relationship between sport and Ginseng (S-GSG) by using several keywords.

Material and methods

Fatigue (F), performance (P) and endurance (E) are frequently approached in sports, both for professional athletes and sedentary persons. On the other hand, gender can influence these three parameters - F, P and E.

The S-GSG relationship was analyzed in two types of investigations:

a) Comparative analysis for the keyword combinations: Sport AND Ginseng (S-GSG), Sport AND Ginseng AND Fatigue (S-GSG-F), Sport AND Ginseng AND Performance (S-GSG-P), Sport AND Ginseng AND Endurance (S-GSG-E).

b) Analysis for all keyword combinations, evaluating the Sex filters, with the corresponding subfilters: male (M), female (F).

c) Because animal studies have also been conducted, the *Other Animals* subfilter was analyzed comparatively. Also, given the importance of synthesis papers for summarizing the information over a certain period of time, we analyzed comparatively the *Review* subfilter as well.

d) Evaluation was performed for 35 years, the 1983-2018 time period, and had the following *elements of analysis*:

- *the average number of publications per annum* for decades 1980-89, 1990-99, 2000-2009; and the number of publications per year for the years 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018;
- *the percentage % of the total number of publications*, for gender subfilters and keyword combinations, for the entire period 1983-2018, as well as for the decades and years taken into consideration.

Results

Data collection was performed in October 2018. For all groups, data distribution was normal, according to the Kolmogorov-Smirnov test. The analysis was made on the chosen time periods.

A. Analysis for the combinations of the chosen keywords

Table I includes: the periods of time within which the PubMed studies retrieved using these keyword combinations were published; length of these periods (no of years); total number of publications for the entire period (N); and number of publications per year (N/year).

N and N/year is highest for S-GSG, and lowest for S-GSG-F, although the publishing periods are equal, 35 years. Publishing periods are equal for S-GSG-P and S-GSG-E, but N and N/year are higher for S-GSG-P.

Table I
Analysis for the combinations of the chosen keywords

		Period	No of years	N	N/year
Sport AND Ginseng	S-GSG	1983-2018	35	**151**	4.31
Sport AND Ginseng AND Fatigue	S-GSG-F	1983-2018	35	*25*	0.71
Sport AND Ginseng AND Performance	S-GSG-P	1985-2018	33	57	1.72
Sport AND Ginseng AND Endurance	S-GSG-E	1985-2018	33	37	1.12

Analysis for the combinations of selected keywords and analyzed subfilters (Fig.1)

Most reviews were for S-GSG, while the fewest were for S-GSG-F. Most animal studies were for S-GSG; the fewest were for S-GSG-E. Most studies with HM, HF and HM+HF were for S-GSG; the fewest were for S-GSG-F. Animal studies were more numerous than studies on human subjects, only for S-GSG-F. Compared to the An, HM, HF, and HM+HF subfilters, the Review subfilter retrieved the smallest number of articles for all combinations of the chosen keywords.

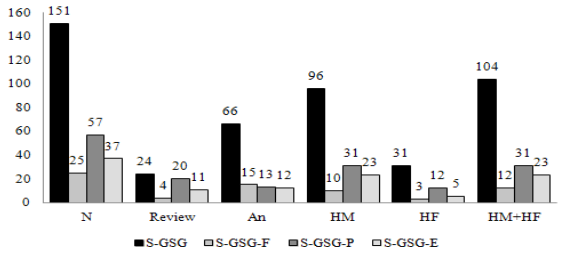

Fig. 1 – N for the combinations of selected keywords and the analyzed subfilters

B. Analysis of S-GSG for the combinations of the chosen keywords, depending on the analyzed subfilters (Table II, Fig. 2)

Analysis of the total number of publications (Table II). Most publications were: of all keyword combinations, for S-GSG; of all subfilters, for HM+HF. The fewest publications were: of all keyword combinations, for S-GSG-F; of all subfilters, for HF.

Percentage analysis (%) of S-GSG. For N, Review, HM, HF and HM + HF, the highest % of S-GSG was for S-GSG-P, and the lowest % was for S-GSG-F. For An, the

highest % of S-GSG was for S-GSG-F, and the lowest % was for S-GSG-E. Although the Review subfilter had the lowest N compared to the other analyzed subfilters, the % of S-GSG for the combinations of the chosen keywords was the highest. The highest % of S-GSG was for the Review subfilter, for S-GSG-P; the smallest % of S-GSG was for the HF subfilter, for S-GSG-F.

Table II
Analysis of the total number of publications

	N	Review	An	HM	HF	HM+HF
S-GSG	151	24	66	96	31	104
S-GSG-F	25	4	15	10	3	12
S-GSG-P	57	20	13	31	12	31
S-GSG-E	37	11	12	23	5	23

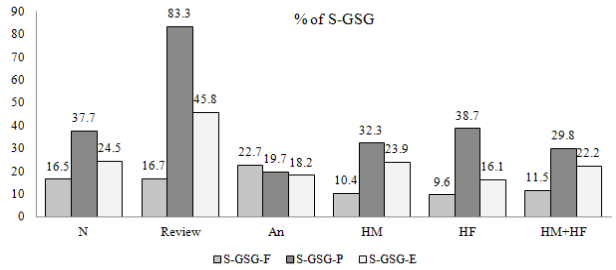

Fig. 2 – % of S-GSG for the combinations of the chosen keywords,depending on the analyzed subfilters

C. Analysis of S-GSG for N/year (Table III, Fig. 3)

In the case of S-GSG, for N, HM, HF and HM + HF, the evolution curves for 1980-2018 had the lowest values between 1980-1989. Most N/year were: for N and HF in 2016; for HM and HM+HF in 2011. In the case of H subfilters, N/year: had the same value for HM and HM+HF during 1980-1989, 1990-1989, 2010, 2012, 2013, 2014; had a higher value for HM+HF in the other periods; had the lowest value for HF in all periods.

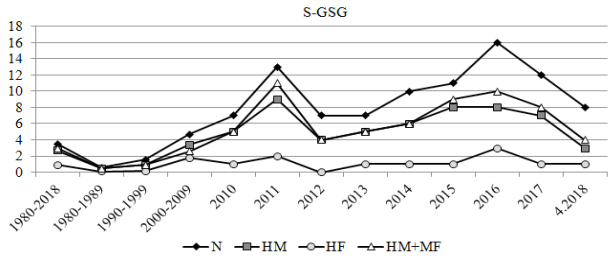

Fig. 3 – Analysis of S-GSG for N/year

D. Analysis of S-GSG-F for N/year (Table IV, Fig. 4)

Most N/year were: for N in 2015 and 2016; for HM in 2010 and 2014; for HF and HM+HF in 2014, 2015 and 2016. In the case of H subfilters, N/year: had the same value for HM and HM+HF in the years 2010, 2013, 2014, 2017, 2018; had a higher value for HM+HF in the other periods; had the lowest value for HF in all periods.

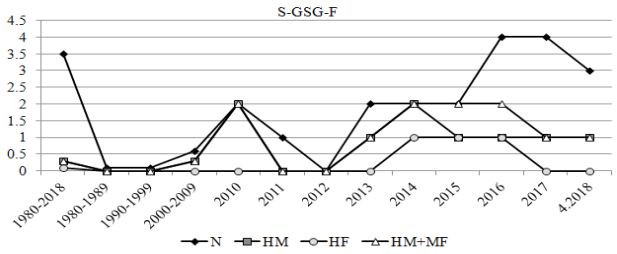

Fig. 4 – Analysis of S-GSG-F for N/year

Table III
Analysis for S-GSG of N/Year

S-GSG	1980-2018	1980-1989	1990-1999	2000-2009	2010	2011	2012	2013	2014	2015	2016	2017	4.2018
N	3.5	*0.6*	1.6	4.7	7	13	7	7	10	11	**16**	12	8
HM	2.7	*0.5*	0.9	3.4	5	**9**	4	5	6	8	8	7	3
HF	0.9	*0.1*	0.2	1.8	1	2	0	1	1	1	**3**	1	1
HM+MF	3	*0.5*	0.9	2.6	5	**11**	4	5	6	9	10	8	4

Table IV
Analysis for S-GSG-F of N/Year

S-GSG-F	1980-2018	1980-1989	1990-1999	2000-2009	2010	2011	2012	2013	2014	2015	2016	2017	4.2018
N	3.5	0.1	0.1	0.6	2	1	0	2	2	2	**4**	**4**	3
HM	0.3	0	0	0.3	**2**	0	0	1	**2**	1	1	1	1
HF	0.09	0	0	0	0	0	0	0	**1**	**1**	**1**	0	0
HM+MF	0.3	0	0	0.3	2	0	0	1	**2**	**2**	**2**	1	1

Table V
Analysis for S-GSG-P of N/Year

S-GSG-P	1980-2018	1980-1989	1990-1999	2000-2009	2010	2011	2012	2013	2014	2015	2016	2017	4.2018
N	3.3	0.1	0.8	2	**4**	**4**	3	3	1	**4**	**4**	3	5
HM	0.9	0.1	0.4	1.2	2	3	1	1	0	**4**	2	2	2
HF	0.7	0.1	0.1	0.9	**1**	0	0	0	0	0	0	0	0
HM+MF	0.9	0.1	0.4	1.2	2	3	1	1	0	**4**	2	2	2

Table VI
Analysis for S-GSG-E of N/Year

S-GSG-P	1980-2018	1980-1989	1990-1999	2000-2009	2010	2011	2012	2013	2014	2015	2016	2017	4.2018
N	3.3	0.1	0.5	1.4	2	**4**	3	1	1	2	2	2	2
HM	0.7	0.1	0.3	1.1	1	**4**	1	0	0	2	1	0	0
HF	0.1	0.1	0	**0.4**	0	0	0	0	0	0	0	0	0
HM+MF	0.7	0.1	0.3	1.1	1	**4**	1	0	0	2	1	0	0

E. Analysis of S-GSG-P for N/year (Table V, Fig. 5)

Most N/year were: for N in 2010, 2011, 2015 and 2016; for HM and HM+HF in 2015; for HF in 2010. In the case of H, N/year: had the same value for HM and HM+HF in all the analyzed periods; had the same value for HM, HF and HM+HF during 1980-1989; had the lowest value for HF in all periods.

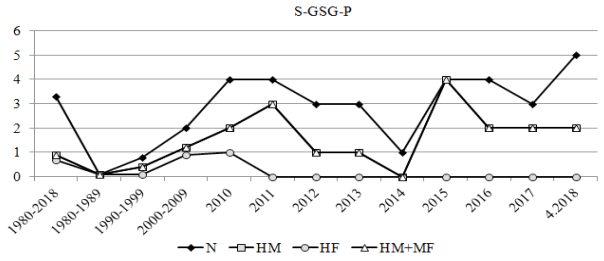

Fig. 5 – Analysis of S-GSG-P for N/year

F. Analysis of S-GSG-E for N/year (Table VI, Fig. 6)

Most N/year were: for N in 2011; for HM and HM+HF in 2011; for HF in 2000-2009. In the case of H, N/year: had the same value for HM and HM+HF in all the analyzed periods; had the same value for HM, HF and HM+HF during 1980-1989; had the lowest value for HF in all periods.

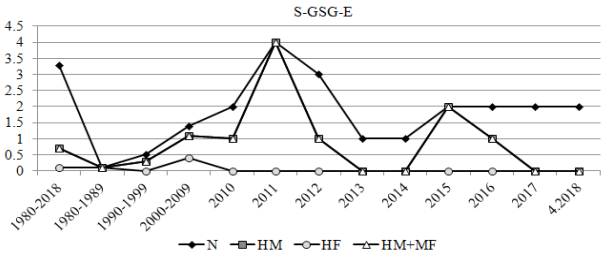

Fig. 6 – Analysis of S-GSG-E for N/year

Discussion

Dynamic evolution of S-GSG, S-GSG-F, S-GSG-P and S-GSG-E shows that between 1983-2018, so for a 35-year period, the number of studies including these subfilters was quite reduced.

There was no mention: a) of *S-GSG,* for HF in 2012; b) of *S-GSG-F:* for N in 2012; for HM, HF and HM+HF in 1980-1989, 1990-1999, 2011, 2012; in addition, for HF in 2013, 2017, 2018; c) *of S-GSG-P:* for HM, HF and HM+HF in 2014; in addition, for HF in 2011, 2012, 2013, 2015, 2016, 2017, 2018; d) *of S-GSG-E:* for HM, HF and HM+HF in 2013, 2014, 2017 and 2018; in addition, for HF in 2010, 2011, 2012, 2015, 2016.

From the combinations of the chosen words, the greatest interest of research was in S-GSG-P (57 publications) and HP subfilter (38.7%). The average number of publications per annum was the largest: A. For the combinations of the chosen words: a) for S-GSG in 2016; b) for S-GSG-F in 2016, 2017; c) for S-GSG-P in 2015, 2016; d) for S-GSG-E in 2011. B. From the chosen subfilters, for HM+HF: a) for S-GSG in 2011; b) for S-GSG-F in 2014, 2015, 2016; c) for S-GSG-P in 2015; d) for S-GSG-E in 2011.

S-GSG-F

Although GSG is considered an important anti-fatigue remedy, S-GSG studies are so far few (25 in 35 years). However, in the current year, 2018, there are already 3 publications by April. We mention below some important references:

Fatigue can be a normal and important response to physical activity, emotional stress, boredom, or lack of sleep (1). In patients with idiopathic chronic fatigue, Panax ginseng significantly reduced the visual analogue scale score, reactive oxygen species and malondialdehyde, and increased total glutathione content and glutathione reductase activity (Kim et al., 2013). Ginseng treatment provided effective adaptation to fatigue and increased endurance in both male and female mice, in the fatigue stress of forced swim test; and in locomotor activity tests, ginseng did not depress motility (Banerjee & Izquierdo, 1982). Also, ginseng has anti-fatigue properties in moderately trained individuals (Talbott & Hughes, 2007). Ginseng improves fatigue resistance through cortisol stimulation (Ahuja et al., 1992). Ginseng oligopeptides possess anti-fatigue effects, which may be attributed to the inhibition of oxidative stress and the improvement of mitochondrial function in skeletal muscles (Bao et al., 2016). Ginseng polysaccharides inhibit fatigue indicators, creatine phosphokinase, lactic dehydrogenase and malondialdehyde in the forced swim test (Wang et al., 2010). Thus, supplementation with American ginseng for 4 weeks prior to exhaustive aerobic treadmill running reduces leakage of plasma creatine kinase during exercise (Hsu et al., 2005). Also, Korean ginseng reduces creatine kinase and blood urea nitrogen (BUN) in serum; it has regulatory effects on the serum metabolic profile, which could reflect in its anti-fatigue effect (Yan et al., 2018).

In the case of our research, only 16.5% of S-GSG was related to fatigue.

S-GSG-P

Performance is a very important aspect in sports. This is also proven by the fact that S-GSG-P publications were much more numerous than S-GSG-F and S-GSG-E (57 in 33 years). We mention below some important references:

Ginseng has been used in exercise and sports, with ergogenic effects, to improve physical *performance* in cycling or running endurance (Chen et al., 2012). Also, the use of standardized Asian ginseng extracts of dried root improved exercise *performance* and muscle strength, maximal oxygen uptake, work capacity, serum lactate and heart rate (Bucci, 2000).

The importance given to the study of GSG in relation to sport performance is evidenced by the fact that in the case of our research, S-GSG-F represented the largest proportion of S-GSG, 37.7%.

S-GSG-E

Modulation of endurance is a concern in sport. Studies on S-GSG-E, although relatively few (37 in 33 years), are proof of this. We mention below some important references:

Ginseng saponin complex is effective in improving exhaustive cycling test performance in humans (Yeh et al., 2011). Changbai Mountain ginseng extract administration before an acute exercise challenge increases muscle weight, grip strength and endurance swimming time; decreases fatigue parameters – the levels of serum lactate, ammonia,

creatine kinase, blood urea nitrogen (Ma et al., 2017). Also, ginseng extract (GS) administration before prolonged swimming exercise increases the biochemical capacity of skeletal muscles to oxidize free fatty acids (FFA), through a decrease in lactic acid, pyruvic acid and plasma FFA (Avakian et al., 1984). Ginsenoside-Rb1 (G-Rb1) administered before swimming exercise-induced oxidative stress in male mice could prolong the exhaustive swimming time and improve the exercise endurance capacity of mice, increase blood lactate clearance and decrease serum CK activities (Qi et al., 2014).

In the case of our research, 24.5% of S-GSG was related to endurance.

The evaluation elements for sport and ginseng by analyzing the combination of these two keywords with fatigue, performance and endurance, although numerically reduced compared to all S-GSG related publications, are important through the role granted to these parameters.

Conclusions

1. The average number per year of PubMed publications for S-GSG is 4.2, and the number of publications for 2018 is 7.

2. Of S-GSG, most of the publications were for S-GSG-P.

3. Most M publications were for S-GSG-E, and most F publications were for S-GSG-P.

4. Studies on the S-GSG relationship, although numerically reduced, are still increasing in recent years, covering the areas of interest F, P and E.

Conflicts of interest

Nothing to declare.

Acknowledgement

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Multifactorial introspective analysis of the individual impact at the end of an athlete's performance sports career

Analiza introspectivă multifactorială a impactului individual la încheierea carierei sportive de performanță

Alexandra-Camelia Gliga, Nicolae Neagu, Tiberiu Bățagă
Department of Functional and Complementary Sciences, University of Medicine, Pharmacy, Science and Technology of Târgu Mureș, Romania

All authors have equal contributions to this study.

Abstract

Background. Retirement from sport is a difficult stage in the life of each athlete, representing the renunciation of a major self-defining activity. The need to adapt to a new lifestyle and the implementation of a gradual disengagement program is well known, having a major influence on both the psyche and the body. However, in many cases, sports clubs do not provide moral support to athletes at the end of their career.

Aims. The aim of this study is a multifactorial analysis of the individual impact at the end of a sports performance career. The main hypothesis from which we started in this research is to verify and validate statistically whether career termination adversely affects the former high performance athlete from a triple perspective: morphological, physiological, and psychobehavioral.

Methods. The research was conducted over a five-week period (9 July - 13 August 2018) on a total of 30 former high performance athletes. In the research we used a questionnaire that looked not only at aspects regarding current health status and morphofunctional changes, but also opinions about the impact of high performance sports activity on several aspects of one's personal life (lifestyle, diet, smoking, alcohol consumption, psychobehavioral balance, etc.).

Results. From the comparative analysis of the statistical significance of the differences between the means of positive and negative effects on the subjects and the calculation of the "t" test, it results that at a probability threshold of $P < 0.05$, the difference of the means of the two data strings is insignificant statistically, the calculated value of "t" being $t = 1.227$ and $R^2 = 0.05471$.

Conclusions. The overall conclusion, after analyzing and interpreting the data, invalidates our hypothesis that the end of a high performance sports career has a multifactorial negative impact on former athletes. Although we have seen a number of adverse effects following withdrawal from competitive sport, they are not influences with individual disturbing effects. On a number of issues, we found that sports performance has positive effects even after retirement.

Key words: sudden disengagement, progressive disengagement, sports performance, retirement from sport

Rezumat

Premize. Retragerea este o etapă dificilă în viața fiecărui sportiv, aceasta reprezentând renunțarea la o activitate majoră auto-definitorie. Necesitatea adaptării la noul stil de viață și implementarea unui program de dezantrenare treptată este bine cunoscută, având influență majoră atât asupra psihicului, cât și asupra fizicului. Cu toate acestea, deseori, cluburile sportive nu acordă suport moral sportivilor în momentul încheierii carierei de performanță.

Obiective. Acest studiu urmărește analiza multifactorială a impactului individual la încheierea carierei sportive de performanță. Ipoteza principală de la care am plecat în realizarea acestei cercetări este aceea potrivit căreia să verificăm și să validăm statistic dacă încheierea carierei afectează negativ fostul sportiv de performanță, din triplă perspectivă: morfologică, fiziologică și psiho-comportamentală.

Metode. Cercetarea a fost realizată pe o perioadă de cinci săptămâni (9 iulie - 13 august 2018), pe un lot total de 30 de foști sportivi de performanță. În cercetare am utilizat un chestionar care a vizat aspecte privind situația actuală a sănătății și a modificărilor morfo-funcționale survenite, dar și opinii privind impactul activității sportive de performanță asupra unor multiple aspecte ale vieții personale (stil de viață, alimentație, fumat, consum de alcool, echilibru psiho-comportamental ș.a.).

Rezultate. Din analiza comparativă a semnificației statistice a diferențelor înregistrate între mediile efectelor pozitive și ale

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Address for correspondence: University of Medicine, Pharmacy, Science and Technology, Târgu Mureș, Gheorghe Marinescu Str. No. 38, PC 540139, Romania
E-mail: alexandracamelia@yahoo.com
Corresponding author: Alexandra-Camelia Gliga, alexandracamelia@yahoo.com
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celor negative asupra subiecților și calcularea testului „t" rezultă că la un prag de probabilitate de $P < 0.05$, diferența mediilor celor două șiruri de date este nesemnificativă din punct de vedere statistic, valoarea calculată a lui „t" fiind de $t = 1,227$ și a lui R^2 de 0,05471.

Concluzii. Concluzia generală, după analiza și interpretarea datelor, infirmă ipoteza emisă de noi, conform căreia încheierea activității sportive de performanță are un impact multifactorial negativ asupra foștilor sportivi. Deși am constat o serie de efecte negative consecutive retragerii, ele nu sunt de natura unor influențe cu efecte perturbatorii individuale. La o serie de aspecte, am constatat că activitatea sportivă de performanță a avut efecte pozitive sustenabile și după retragere.

Cuvinte cheie: dezantrenare bruscă, dezantrenare treptată, performanță sportivă, retragere.

Introduction

High performance athletes train intensely for years, making huge personal sacrifices to fulfill their dreams. Regardless of the season or their mood, athletes attend practice, maintaining a lifestyle based on rigor and discipline. Given that high performance involves strong will and full commitment, this has the potential to form characters.

Retirement from sport is a difficult stage in the life of each athlete, representing the renunciation of a major self-defining activity (Lavallee & Robinson, 2007; Lotysz & Short, 2004; McGillivray et al., 2005). The reasons for choosing to end a sports career are multiple. A study conducted on 19 elite athletes in Finland evidences the aspects leading to sports career termination, mentioning that these are different depending on sex (Ronkainen et al., 2016). Thus, female athletes reported having various difficulties in the last year of their career, such as health problems, feeling lonely, social pressure and lack of support from the family, while a lower proportion of male athletes felt social pressure and even reported that friendship with the team members was a major reason to delay withdrawal from sport. Furthermore, Wylleman et al. (2004) showed that following retirement, athletes may experience depression, identity crises, alcohol or drug abuse, as well as a reduction of self-confidence and an increase in the amount of foods consumed. Although athletes make a living by practicing sport in various clubs for long time periods, the lack of financial satisfaction is a frequent reason for career termination. In Romania, life annuities have been introduced for the benefit of former champions, winners of medals in European and World Championships or in Olympic Games. However, a large proportion of athletes do not reach such performances and, in the absence of training in a particular field, end up as unqualified workers. Most frequently, education is neglected during high performance sports practice, from lack of awareness that any sports career will inevitably end (Cosh & Tully, 2014). A study conducted on 17 elite athletes evidences the need to implement career assistance programs encouraging athletes to focus their attention on personal success, in addition to sport glory (Ryan, 2015). Thus, the intervention of a psychologist is essential for guiding athletes towards a direction that best suits their abilities and wishes, as a starting point at the end of the sports career (Lopez de Subijana et al., 2015). Over time, four main areas have been identified in which former athletes most frequently work after ending their career: coaching, media, business, and community initiatives.

The individual impact of sports career termination is stronger when retirement is sudden. The need for adaptation to a new lifestyle and implementation of a gradual disengagement program is well known, having a major influence on both the psyche and the body (Agnew, 2015). Research in this area evidences a significantly higher incidence of gonarthrosis and coxarthrosis in former athletes compared to the population who did not practice high performance sport (Turner et al., 2000; Drawer & Fuller, 2001; Conaghan, 2002). These diseases can be associated with a high body mass index (Arliani et al., 2014).

We consider that maintaining a stable body weight is indicative of a rational quality diet. While during the competition period, intense training requires adequate energy support and effective energy dosing, after sports career termination, these aspects are no longer given the same attention. Athletes' awareness of correct eating strategies and of the impact of physical activity is due to the intervention of a multidisciplinary team, including a nutritionist, a coach, a physical trainer and a psychologist. Thus, a series of factors favor weight gain at the end of a sports performance career (Neagu & Gliga, 2017). The most common factor is maintaining the same eating habits, despite a significant decrease in the intensity and frequency of training or even its absence.

A large proportion of former elite athletes declare performing no physical activity after having withdrawn from competitive sport. Accepting the fact that any sports career comes to an end is not an easy task; the transition to a "normal" life is often brutal and requires a long period of adaptation and support from the family, as well as from specialized persons (Roberts et al., 2015; Stronach et al., 2014). Giving up a sports performance career is both a challenge and a relief (Jones & Denison, 2017). This also represents a shift towards independent management of everyday life (Schwenk, 2007). The lifestyle changes and the loss of personal identity that accompany sports career termination pose a high risk of depression (Cosh et al., 2012; Weigand et al., 2013; Sanders & Stevinson, 2017).

A study conducted on 62 former elite athletes, regarding quality of life at the end of their sports careers, reveals the fact that athletes who voluntarily retired from sport believe that their life changed for the better (Martin et al., 2014; Alfermann et al., 2004; Taylor & Ogilvie, 2001). Also, experience (positive or negative) during high performance sports practice is essential to explain transition following retirement and adaptation to the post-sport career (Tshube & Feltz, 2015).

Most often, sports clubs do not provide moral support to athletes at the end of their career (Surujlal & Zyl, 2014). We consider that implementing psychological counseling programs and increasing awareness about the positive effects of progressive disengagement programs might play an extremely important role (Padrao dos Santos, 2016; Surujlal, 2016). Also, sports clubs might assist

former athletes by organizing various physical activities, workshops or competitions for sports veterans.

Despite evidence of adaptation difficulties experienced by former athletes, the multiple factors that have a major impact are studied to a limited extent (Giannone et al., 2017; Knights et al., 2016).

Certainly, not all former athletes are facing these difficulties (Lagimodiere & Strachan, 2015). In this regard, we wish to emphasize the following aspect: "Sport can help us to become wiser, to learn how to lose or win, and especially, to always find the strength to start over again" (Cara, 2015).

Hypothesis

The aim of this study is a multifactorial analysis of the individual impact at the end of a sports performance career. The main hypothesis from which we started in this research is that career termination adversely affects former high performance athletes. The transition towards a "normal" life is often brutal, and requires a long period of adaptation and support from both the family and specialized persons.

This research aims to draw attention to the psychological impact of this major change in the life of former high performance athletes and to the importance of implementing a well-designed awareness program.

Material and methods

Research protocol

a) Period and place of the research

This study was conducted over a five-week period (9 July - 13 August 2018), using an online questionnaire applied to a total number of 30 former high performance athletes.

b) Subjects and groups

Regarding the dependent variable, we mention that all the 30 subjects included in the study were informed about the aim of the research and gave their consent for the use of their personal data, while remaining anonymous. Data related to age, gender, the sport practiced, and membership of representative Romanian teams were recorded (Table I). Also, the best results obtained in different National, Balkan, European, World Cups and Championships and in the Olympic Games are presented in Table II.

In addition, the reason for sports career termination and the length of the sports career were also taken into consideration (Table III).

c) Tests applied

Data regarding the individual impact at the end of the high performance sports career were recorded using an online questionnaire entitled "Life after sport", which was developed and structured in two parts. The first part includes 21 items related to current health status, continuation of maintenance exercise and morphofunctional changes, while the second part comprises individual opinions based on 14 items related to the impact of high performance sports activity on multiple aspects of personal life (lifestyle, diet, smoking, alcohol consumption, psychobehavioral balance,

Table I

Distribution of subjects depending on age, sex, the sport practiced, and membership of representative Romanian teams

Subjects				Distribution by sport							Members of representative Romanian teams		
Age (years)		Sex											
Intervals	n	Women	Men	Basketball	Volleyball	Rowing	Football	Handball	Swimming	Body building	Olympic team	National team	Extended National team
20-29	5	0	5	0	5	0	0	0	0	0	0	4	1
30-39	8	0	8	2	4	0	1	0	1	0	1	3	4
40-49	8	5	3	0	1	5	0	0	1	1	0	7	1
50-59	9	7	2	0	1	7	0	1	0	0	1	8	0
Total	30	12	18	2	11	12	1	1	2	1	2	22	6
%	100%	40%	60%	6.67%	36.67%	40.00%	3.33%	3.33%	6.67%	3.33%	6.67%	73.33%	20.00%

Table II

Distribution of subjects depending on the best personal results obtained in various competitions

Current age (years)	Ranking													
	National Championships		Balkan Championships		European Championships		World Championships		Olympic Games		Romanian Cup		European Cups	
	I-III	IV-VIII	I-III	IV-VIII	I-III	IV-VIII	I-III	IV-VIII	I-III	IV-VIII	I-III	IV-VIII	I-III	IV-VIII
20-29	5	0	2	0	0	0	0	0	0	0	0	0	0	0
30-39	4	0	1	0	1	1	1	0	0	1	2	0	1	0
40-49	6	0	2	0	0	1	2	0	0	0	1	0	0	0
50-59	5	0	0	0	0	0	5	0	1	0	2	0	0	0
Total	20	0	5	0	1	2	8	0	1	1	5	0	1	0
%	66.67%	0.00%	16.67%	0.00%	3.33%	6.67%	26.67%	0.00%	3.33%	3.33%	16.67%	0.00%	3.33%	0.00%

Table III

Distribution of subjects depending on the reason of retirement from high performance sports activity

Current age (years)	Mean length of the sports career (years)	Reason of withdrawal						
		Injury	Club conflict	Financial	Starting a family	Disease	Sports age limit	Professional career
20-29	13.40	1	0	2	0	0	0	2
30-39	18.63	2	0	2	0	1	1	2
40-49	12.25	2	2	0	0	3	0	1
50-59	11.56	1	2	0	3	1	2	0
Total	13.96	6	4	4	3	5	3	5
	%	20.00%	13.33%	13.33%	10.00%	16.67%	10.00%	16.67%

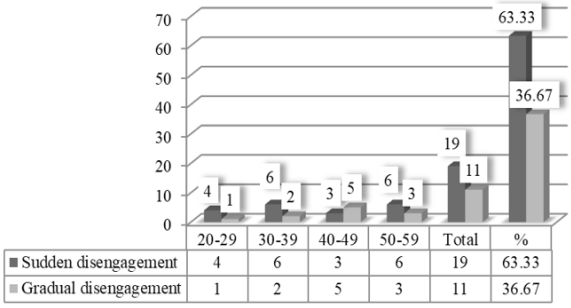
family life), the subjects' responses being grouped into two categories: disagreement and agreement. After collection of the questionnaires, each item was assigned a positive or negative effect on quality of life; thus, the subjects' responses were treated taking into consideration this aspect.

d) Statistical processing

Data were processed using the *GraphPad Prism 7* software, analyzing values such as the *"t" test*, differences between the means, R^2, 95% confidence intervals, etc. The graphic method was also used.

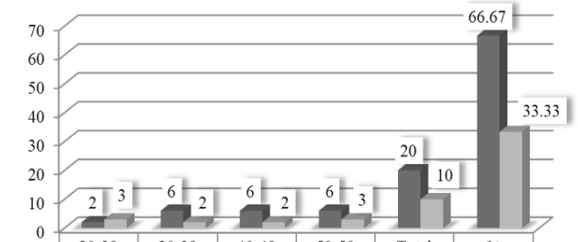
Results

The concept of progressive disengagement is known by 66.67% of the subjects included in this study (Fig. 2). However, 63.33% declare that they interrupted sports activity suddenly, while only 36.67% went through gradual disengagement (Fig. 1). Maintenance exercise is continued with a frequency of 2-3 days per week by 46.67% of the subjects, while 36.67% of these report performing no physical activity after having ended their high performance sports career. Also, the frequency of these maintenance physical activities decreases with age; 66.67% of subjects aged 50-59 years perform no physical exercise (Fig. 3).



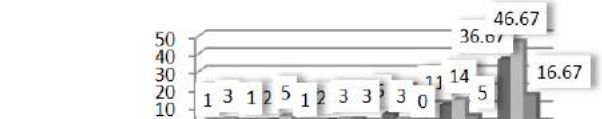
	20-29	30-39	40-49	50-59	Total	%
Sudden disengagement	4	6	3	6	19	63.33
Gradual disengagement	1	2	5	3	11	36.67

Fig. 1 – Gradation of disengagement



	20-29	30-39	40-49	50-59	Total	%
Yes	2	6	6	6	20	66.67
No	3	2	2	3	10	33.33

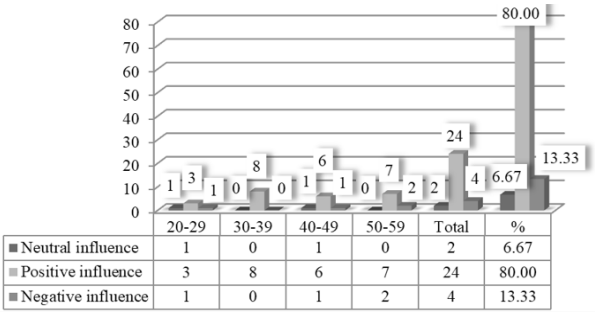
Fig. 2 – Knowledge of the concept of gradual disengagement



	20-29	30-39	40-49	50-59	Total	%
No	1	2	2	6	11	36.67
2 - 3 days per week	3	5	3	3	14	46.67
4 - 6 days per week	1	1	3	0	5	16.67

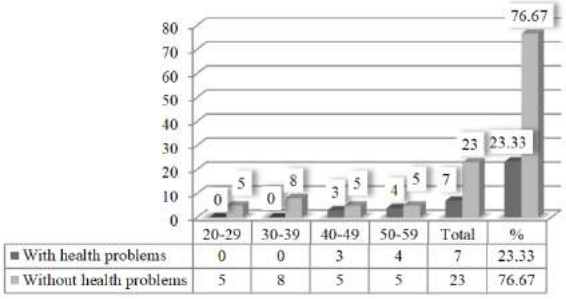
Fig. 3 – Continuing physical activity after retirement

Eighty percent of the subjects included in this study believe that sport had a positive influence on their health, while 13.33% consider that it had a negative influence (Fig. 4). Among the medical conditions found in 23.33% of former high performance athletes after their withdrawal from sport, we mention hypothyroidism, peripheral circulatory insufficiency, fibromyalgia, gonarthrosis, coxarthrosis, uric arthritis and ankylosing spondylitis (Fig. 5).



	20-29	30-39	40-49	50-59	Total	%
Neutral influence	1	0	1	0	2	6.67
Positive influence	3	8	6	7	24	80.00
Negative influence	1	0	1	2	4	13.33

Fig. 4 – The influence of sport on health after retirement

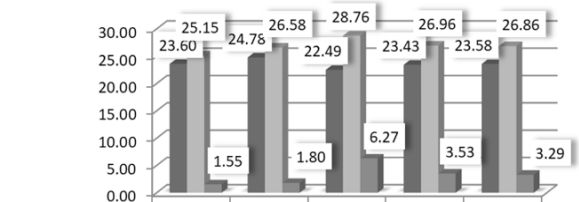


	20-29	30-39	40-49	50-59	Total	%
With health problems	0	0	3	4	7	23.33
Without health problems	5	8	5	5	23	76.67

Fig. 5 – Emergence of health problems after retirement

Data related to height, current weight and weight during high performance sports practice were recorded and converted to body mass index. Without exception, for all age categories, the body mass index during high performance sports practice ranged within the *minimum health risk* category (BMI = 18.5-24.9), while the current body mass index ranged within the *moderate health risk* category (BMI = 25-29.9) (Fig. 6).

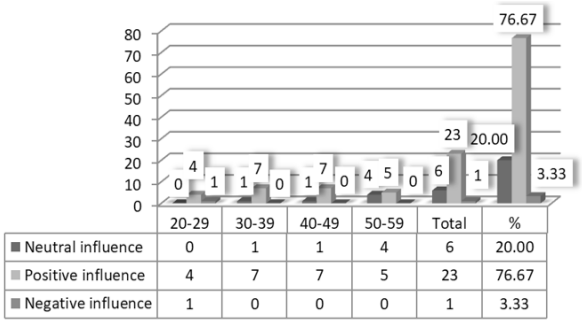
Regarding the difference between BMI values during the sports performance career and current BMI values, the smallest difference was found in subjects aged 20-29 years (Δ_{BMI} = 1.55), while the greatest difference was found, somewhat unexpectedly, in the 40-49 age group (Δ_{BMI} = 6.27). It would have been expected to find the greatest difference in the 50-59 age group. The mean difference for the entire group of subjects was Δ_{BMI} = 3.29.



	20-29	30-39	40-49	50-59	Average
BMI as an athlete	23.60	24.78	22.49	23.43	23.58
BMI now	25.15	26.58	28.76	26.96	26.86
Δ	1.55	1.80	6.27	3.53	3.29

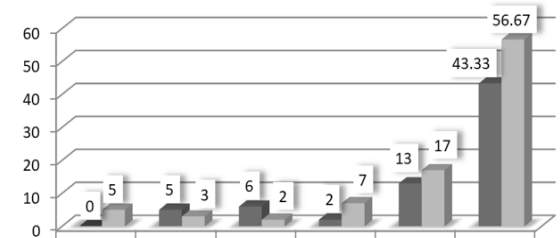
Fig. 6 – The variation of BMI after retirement from sport

Concerning the influence of sport on the quality of professional life, 76.67% of the subjects included in this study consider that their current professional career was positively influenced by their sports career; 3.33% report a negative influence, and 20.00% believe that sports practice had no influence on their current professional life (Fig. 7). In addition, the current profession has nothing to do with sports activity in 56.57% of cases, including subjects with occupations such as cook, carpenter, nurse, lawyer, art restorer, policeman, etc. On the other hand, 43.33% of the subjects work as coaches, referees, physical education and sport teachers, kinesiotherapists, and fitness and body building trainers (Fig. 8).



	20-29	30-39	40-49	50-59	Total	%
Neutral influence	0	1	1	4	6	20.00
Positive influence	4	7	7	5	23	76.67
Negative influence	1	0	0	0	1	3.33

Fig. 7 – Influence on professional life



	20-29	30-39	40-49	50-59	Total	%
Yes	0	5	6	2	13	43.33
No	5	3	2	7	17	56.67

Fig. 8 – Professional activity is due to sports careers

The answers given by the interviewed subjects to the 14 questions related to the impact of high performance sports activity on multiple aspects of their personal life (lifestyle, diet, smoking, alcohol consumption, psychobehavioral balance, family life) were grouped into two categories: disagreement and agreement. Also, depending on the influence exerted on the subjects, their responses were grouped into positive and negative effects.

The distribution of answers to the questions assessing the positive and negative effects on quality of life after withdrawal from sports activity is shown in Table IV.

The comparative analysis, statistically processed using the *GraphPad Prism 7* software, of the statistical significance of differences between the means of *positive and negative effects* on the subjects, for the 14 questions-statements evaluating the effects of withdrawal from competitive sport on quality of life, and the calculation of the *"t" test* show that at a probability threshold of $P < 0.05$, the difference of the means of the two data strings is statistically *insignificant*, the calculated value of "t" being t = 1.227 and $R^2 = 0.05471$, with a 95% confidence interval ranging between *-9.174 and 2.316* (Table V).

Table V

Statistical indicators of the significance of the difference between the means of positive effects compared to negative effects.

Statistical indicators	Values
P value	0.2309
Significantly different?	No
t, df	t=1.227 df=26
Mean ± SEM of column A	16.71 ± 1.976, n=14
Mean ± SEM of column B	13.29 ± 1.976, n=14
Difference between means	-3.429 ± 2.795
95% confidence interval	-9.174 to 2.316
R squared	0.05471

The central trendline and the graphic representation of the distribution of answers given by the subjects to the 14 items related to the effects of retirement from sport on quality of life are as follows (Fig. 9).

Table IV

Distribution of answers given by the subjects (n=30) and effects of retirement from sport on quality of life

n	Statements	Categories of answers		Effects				Δ (E_+ - E_-)
		Disagreement	Agreement	Positive (+)		Negative (-)		
		n	n	n	%	n	%	
1	My life changed for the better	8	22	22	73.33	8	26.67	14
2	I cut down the amount of foods consumed	17	13	13	43.33	17	56.67	-4
3	I was supported by my family and friends	8	22	22	73.33	8	26.67	14
4	I received psychological counseling	27	3	3	10.00	27	90.00	-24
5	I received nutritional counseling	23	7	7	23.33	23	76.67	-16
6	I was explained the importance of continuing maintenance exercise	16	14	14	46.67	16	53.33	-2
7	The technical staff followed up my mental and physical state	25	5	5	16.67	25	83.33	-20
8	I tried to follow weight loss diets	14	16	16	53.33	14	46.67	2
9	I had difficulties in adapting to the new lifestyle	19	11	19	63.33	11	36.67	8
10	I experienced depression and sadness	24	6	24	80.00	6	20.00	18
11	I maintained the same eating habits (qualitatively)	12	18	18	60.00	12	40.00	6
12	I sometimes ate because I was upset	23	7	23	76.67	7	23.33	16
13	I started smoking	22	8	22	73.33	8	26.67	14
14	I started drinking alcohol	26	4	26	86.67	4	13.33	22
	Total	264	156	234	55.71	186	44.29	-
	Mean	18.85	11.15	16.71	-	13.29	-	-

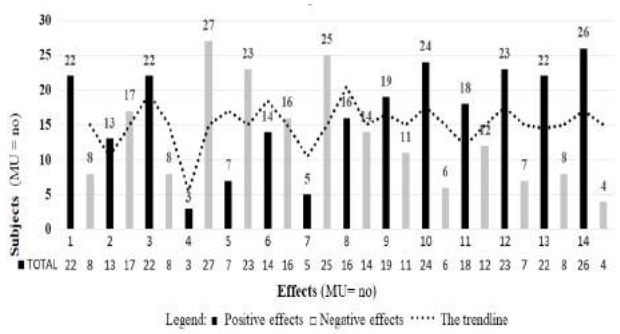


Fig. 9 – Positive and negative effects of retirement from sport on the subjects

Discussions

By interpreting the results obtained, it can be observed that some important aspects of the transition towards a different lifestyle from that of the high-performance sports practice period, such as knowledge of the progressive disengagement concept, its application and the continuation of maintenance exercise, are neglected. Also, aspects such as experiencing various health problems, the influence of the sports career on the current professional career and the impact of withdrawal from competitive sport on the body mass index were interpreted as follows:

- The absence of progressive disengagement programs developed for former athletes is confirmed by 63.33% of the subjects who recognize that they went through sudden disengagement, even if 66.67% of the subjects are familiar with the concept and the advantages of progressive disengagement;

- The frequency of maintenance physical activities decreases with age; 66.67% of subjects aged between 50 and 59 years and 20% of subjects aged between 20 and 29 years are completely sedentary;

- The influence of high performance sport on health, following retirement from sport, is perceived as positive by 80% of the inquired subjects and as negative by 13.33% of these;

- After withdrawal from high performance sports activity, 23.33% of the subjects developed various medical conditions, while 76.67% of the subjects report not suffering from any disease;

- Without exception, the body mass index during high performance sports practice ranges within the *minimum health risk* category (BMI = 18.5-24.9), while the current body mass index ranges within the *moderate health risk* category (BMI = 25-29.9);

- Regarding the influence of sport on the quality of professional life, 76.67% of the subjects included in this study consider that their current professional career was positively influenced by their sports career, 43.33% of the subjects working as coaches, referees, physical education and sport teachers, etc.

The comparative analysis of the differences between the means of *positive and negative effects* on the subjects, for the 14 items evaluating the effects of retirement from sport on quality of life shows that at a probability threshold of $P < 0.05$, a statistically *insignificant* difference can be observed, the calculated value of *"t"* being $t = 1.227$ and $R^2 = 0.05471$, with a 95% confidence interval ranging between *-9.174 and 2.316.*

Although the difference is statistically insignificant, an increased distribution of subjects who experienced negative effects on quality of life can be seen:

- Even though the psychological impact of sports career termination is a major one, 90% of the subjects received no counseling in this regard;

- Also, 76.67% of the subjects did not benefit from nutritional counseling;

- The members of the technical staff followed up the mental and physical state of former athletes in only 16.67% of the cases.

Good results were obtained for the positive effects on quality of life:

- A proportion of 73.33% of the subjects consider that after they ended their sports career, their life changed for the better;

- Regarding alcohol consumption, 86.67% of the subjects did not start drinking alcohol, while 73.33% of the subjects did not start smoking at the end of their sports career;

- Also, eating when feeling sad is found in a small proportion, only 23.33% of the subjects.

Conclusions

1. Sports career termination has a multifactorial negative impact on former athletes. This conclusion was validated by statistical analysis.

2. Although a number of negative effects of retirement from sport were observed, these were not influences with individual disturbing effects.

3. High performance sports activity had sustainable positive effects even after retirement, the majority of the subjects considering that after ending their sports career, their life changed for the better.

4. No morphofunctional alterations affecting the health index of former athletes were found.

5. None of the investigated subjects had any psychobehavioral disorders from both an affective-emotional and socio-professional perspective.

Conflicts of interest

No conflict to declare.

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Oral health related quality of life differences in a young sample

Variații ale calității vieții corelate cu sănătatea orală, într-o populație tânără

Alexandru Grațian Grecu [1], Robert Balazsi [2], Raluca Cristina Dumitru [1], Anca Ștefania Mesaroș [1], Bogdan Culic [1], Dan Lucian Dumitrașcu [3]
[1] Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania
[2] Department of Psychology, Faculty of Psychology and Educational Sciences, "Babeș-Bolyai" University, Cluj-Napoca, Romania
[3] 2nd Medical Department, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

All authors have equal contributions to this study.

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Abstract

Background. Oral health related quality of life (OHRQoL) represents a complex concept, which brings important insight into the patients' dental and oral self-perception. This field of research also targets young adult populations.

Aims. The aim of the current study was to assess the OHRQoL self-perception differences in three study programs student samples: two dental medicine student samples and an economics student sample.

Methods. After providing informed consent from the subjects, the OHIP-49 questionnaire was applied in three samples: a sample belonging to the Faculty of Dental Medicine, Romanian section, Cluj-Napoca (n = 63), a sample belonging to the English section of the same Faculty (n = 63) and a sample of students enrolled in the Faculty of Economics, Cluj-Napoca (n = 63). The dental Romanian and economics student samples completed the Romanian version of OHIP-49, while the dental English program students completed the English version of the same instrument. Mean subscale scores were calculated, followed by inferential statistical procedures: one-way and two-way analysis of variance and the t-test. The independent variables were gender and the study program.

Results. For the complete sample, the subscales presenting the highest scores were functional limitation (8.05), physical pain (10.03) and psychological discomfort (6.05). Statistically significant differences in OHRQoL self-perception, using one-way ANOVA, were obtained between: economics students and English section dental students ($p = 0.03$) for the functional limitation subscale; economics and Romanian section dental students ($p = 0.039$) for the same subscale; economics students and English section dental students ($p = 0.029$) for the handicap subscale. In respect to the complete sample, the t-test revealed statistically significant differences between male and female subjects for the scores of the following subscales: functional limitation $t(187) = -2.359$, $p = 0.019$, physical pain $t(187) = -2.172$, $p = 0.031$, and psychological disability $t(187) = -2.556$, $p = 0.11$.

Conclusions. The self-perception of OHRQoL statistically significantly varies in accordance with gender and the study program. The involved students tend to focus more on physical impacts of oral conditions.

Key words: oral health related quality of life, OHIP-49, analysis of variance, young population

Rezumat

Premize. Calitatea vieții corelată cu sănătatea orală (CVCcSO) reprezintă un concept complex, foarte util in identificarea tendințelor de autopercepție a pacienților în ceea ce privește propria lor sănătate orală.

Obiective. Scopul studiului de față constă în evaluarea autopercepției CVCcSO, la nivelul a trei eșantioane de studenți: două eșantioane de studenți de medicină dentară și un eșantion de studenți de studii economice.

Metode. Ulterior semnării consimțământului informat de către subiecți, chestionarul OHIP-49 a fost aplicat pe trei eșantioane: un eșantion de studenți ai Facultății de Medicină Dentară, Cluj-Napoca, secția română (n = 63), un eșantion de studenți ai aceleiași facultăți, secția engleză (n = 63) și un eșantion de studenți ai Facultății de Studii Economice, Cluj-Napoca

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Address for correspondence: Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania. 32 Clinicilor Street, 400006
E-mail: bogdanculic@yahoo.com
Corresponding author: Bogdan Culic; bogdanculic@yahoo.com
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(n = 63). Studenții secției române de medicină dentară, precum și cei ai facultății de studii economice au completat varianta română a OHIP-49. Studenții secției engleze de medicină dentară au completat varianta engleză a chestionarului. Au fost calculate scorurile medii, urmate de procedurile de statistică inferențială: analiza variației uni- și bivariate și testul t. Variabilele independente au fost genul și secția de studiu.

Rezultate. La nivelul întregului eșantion, cele mai înalte scoruri au fost înregistrate pentru subscalele limitare funcțională (scorul mediu 8,05), durere (scorul mediu 10,03) si disconfort psihologic (scorul mediu 6,05). Diferențe statistic semnificative în autpercepția CVCcSO, utilizând ANOVA univariată, au fost înregistrate între: studenții facultății de studii economice și studenții de medicină dentară, secția engleză (p = 0,03), pentru subscala limitare funcțională; studenții facultății de studii economice și studenții de medicină dentară, secția română, pentru aceeași subscală (p = 0,039); studenții facultății de studii economice și studenții de medicină dentară, secția engleză, pentru subscala handicap (p =0,029). La nivelul întregului eșantion, testul t a indicat diferențe statistic semnificative între subiecții de sex masculin și cei de sex feminin, pentru scorurile următoarelor subscale: limitare funcțională t (187) = -2,359, p = 0,019, durere t (187) = -2,172, p = 0,031 și dizabilitate psihologică t (187) = -2,556, p = 0,11.

Concluzii. Autopercepția CVCcSO variază în mod semnificativ statistic la nivelul ambelor variabile: gen și secție de studiu. Studenții implicați în studiu au prezentat tendința de a percepe proritar consecințele de ordin fizic ale statusului oro-dentar.

Cuvinte cheie: calitatea vieții corelată cu sănătatea orală, OHIP-49, analiza variației, populație tânără.

Introduction

Oral health related quality of life (OHRQoL) represents a complex theoretical construct, defined as a combination of the following factors: absence of disease and impairment, normal physical functionality of the dento-maxillary system, the absence of any type of pain, high satisfaction with the own oral health, normal emotional role in the society and the appropriate carrying out of the social role (Gift et al., 1997). The investigation of this construct and its composing dimensions (John et al., 2014a; John et al. 2014b) has increased in the last twenty years, enabling the focusing from objective dental al oral examination measures to more in-depth evaluations of the way the patients perceive their own oral health or the outcomes of dental treatments (Sierwald et al., 2016). The main instruments of OHRQoL assessmentn are represented by questionnaires, such as the Oral Health Impact Profile, the Geriatric Oral health Impact Profile (Kundapur et al., 2016) or the Oral Impacts on Daily Performance (Bulgareli et al., 2018). The Oral Health Impact Profile (OHIP) is one of the most complex and used questionnaires for oral health self-perceptions assessment, in both its long, OHIP-49 and short, OHIP-14 forms (Cho et al., 2016; Sánchez-Siles et al., 2015). Although presenting a very high usage in various clinical settings, the OHIP-49 instrument has rarely been applied in order to evaluate the self-perception in oral health of younger populations (Lopez & Baelum, 2006). Moreover, the results of studies assessing the dental and oral self perception in young adults, especially in respect to gender differences, generate a wide range of results (Al-Ansari & Honkala, 2007; Fukai et al., 1999).

Therefore, the purpose of the current study was to assess the differences in OHRQoL self-perception between three student study programs: a Romanian program dental medicine student sample, an English program dental medicine student sample and an economics student sample.

Hypothesis

The following null hypotheses have been formulated:

1) There are no statistically significant differences in OHRQoL self-perception, in respect to the variable gender, between the three study programs. 2) There are no statistically significant differences in OHRQoL self-perception, between the male subjects, belonging to each study program. There are no statistically significant differences in OHRQoL self-perception, between the female subjects, belonging to each study program. 3) There are no statistically significant differences in OHRQoL self-perception, between the students of the three study programs. 4) There are no statistically significant differences in OHRQoL self-perception, in respect to the variable gender, inside each study program. 5) There are no statistically significant differences in OHRQoL self-perception, in respect to the variable gender, for the complete sample.

Materials and methods

The current study has obtained the approval of the "Iuliu Hatieganu" Univeristy of Medicine and Pharmacy Ethics Committee. Each participant provided informed consent, before entering the study protocol.

Research protocol

a) Period and place of the research

The current study took place in the period of April-June 2017, within the "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca and the Faculty of Economics, "Babes Bolyai" University, Cluj-Napoca.

b) Subjects and groups

The following study was designed as a cross-sectional survey. The present study entailed a total sample of 189 students. The defined variables were gender and study program (study line). They represented the sampling criteria, together with age. The sample represented a convenience sample. The subjects voluntarily enrolled into the present study. Inclusion criteria comprised:

- subjects should be of both genders;
- the quality of 1st or 2nd year students of the Faculty of Dental Medicine, Romanian and English programs (further abbreviated as FDM Ro and FDM En), "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca and 1st or 2nd year students of the Faculty of Economics (further abbreviated as FE), "Babes Bolyai" University, Cluj-Napoca;
- an age interval of 18-35 years.

The sample was divided, as follows: 63 students from the Romanian section of the Faculty of Dental Medicine, 63 students from the English section of the same Faculty and 63 students from the Faculty of Economics. The characteristics of the three samples comprised: Complete

sample: N = 189, 57.15% F, 42.85% M; age: 18-35 years. FDM Ro, N = 63, 50.79% F, 49.21% M; age 19-35 years; FDM En, N=63, 49.21% F, 50.79% M; age: 18-30 years; FE, N=63, 71.42% F, 28.58% M; age: 19-23 years.

c) Tests applied

In the current study, the OHIP-49 questionnaire was used. In its structure, the instrument contains 49 questions, structured on seven subscales, derived from Locker conceptual dimensions of oral health (John et al., 2014c): functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. Each question assesses the report of a specific encountered problem, within the last 12 months. Answers for each question are arranged on a five-point Likert scale and present a numerical encoding: very often - 4; fairly often - 3; occasionally - 2; hardly ever - 1; never - 0. A "don't know" answering option is as well available for respondents.

In the current study, the Romanian version of the instrument, OHIP-49Ro (Grecu, 2015), was applied to the Dental Medicine Romanian section sample (n = 63) and to the Economics student sample (n = 63). Moreover, the original English version, OHIP-49, was applied to the Dental Medicine English section student sample (n = 63). The questionnaire was applied in a self-completing, pencil and paper format, by three dentists, with experience in questionnaire studies. Completion was performed during a specific class, with an average completing time of 10 minutes. The supervising dentists also answered to the participants' questions, in respect to the instrument's content.

d) Statistical processing

Data were systematized in Microsoft Excel tables. OHIP-49 mean scores for each subscale were calculated; univariate descriptive statistical analysis has been performed, by calculating: means, standard deviation and frequency distributions.

For evaluating the subscale score differences, within and between the three groups, inferential statistical procedures have been employed: T-test, one-way and two-way analysis of variance (ANOVA). All the statistical procedures respected a significance cut-off of $p < 0.05$. For the current procedure the IBM SPSS version 22 software as used.

Results

Descriptive statistics

OHIP-49 subscale score means and standard deviations for the complete samples can be observed in Table I.

OHIP-49 subscale score means and standard deviations for female and male subjects, in respect to the complete samples and the study programs, can be observed in Table II.

Two-way ANOVA

For the functional limitation subscale, the two-way ANOVA analysis indicated a statistically significant subscale score difference, between the three study program samples, in respect to the study program, $F(2, 183)=3.292$, $p=.039$ (Fig. 1). The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students $p = 0.02$.

For the social disability subscale, the two-way ANOVA analysis indicated a statistically significant subscale score difference, between the three study program samples, in respect to the study program, $F(2, 183)= 3.416$, $p=.035$ (Fig. 2). The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students $p = 0.02$ and between the FE students and the FDM Ro ones $p = 0.025$.

One-way ANOVA

For the physical pain subscale, the one-way ANOVA analysis indicated a statistically significant subscale score difference, between the male subjects, belonging to each study program $F (2)= 4.757$, $p=.011$.

The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students, $p = 0.03$ and between the FE students and the FDM Ro ones, $p = 0.039$.

Table I

Univariate descriptive statistics - overall subscale scores

Variable	Funct. Lim.	Phys. Pain	Psychol. Disc.	Phys. Disab.	Psychol. Disab.	Soc. Disab.	Hand.
Complete sample; n = 189; Mean (SD)	8.05 (4.05)	10.03 (4.64)	6.05 (4.23)	4.43 (3.99)	0.72 (0.69)	0.35 (0.49)	0.4 (0.5)
FDM Ro; n = 63 Mean (SD)	8.06 (3.57)	10.01 (4.48)	5.85 (4.33)	4.42 (3.92)	0.70 (0.55)	0.5 (0.61)	0.33 (0.44)
FDM En; n = 63 Mean (SD)	6.93 (3.55)	9.20 (4.61)	6.11 (4.15)	3.66 (3.78)	0.67 (0.76)	0.31 (0.4)	0.34 (0.51)
FE; n = 63 Mean (SD)	9.15 (4.76)	10.88 (4.57)	5.85 (4.33)	5.22 (4.17)	0.8 (0.74)	0.5 (0.61)	0.52 (0.52)

Table II

Univariate descriptive statistics - subscale scores in respect to gender

Variable	Funct. Lim.	Phys. Pain	Psychol. Disc.	Phys. Disab.	Psychol. Disab.	Soc. Disab.	Hand.
Complete sample; Mean (SD)							
M; n = 81	7.25 (3.94)	9.19 (4.23)	5.37 (3.66)	3.81 (3.9)	0.57 (0.59)	0.25 (0.43)	0.33 (0.47)
F; n = 108	8.64 (4.04)	10.66 (4.85)	6.57 (4.71)	4.9 3.(99)	0.84 (0.74)	0.42 (0.53)	0.44 (0.51)
FDM Ro; Mean (SD)							
M; n = 31	7.51 (4.02)	9.09 (3.97)	5.09 (3.73)	3.96 (3.83)	0.58 (0.55)	0.25 (0.41)	0.25 (0.45)
F; n = 32	8.59 (3.04)	10.9 (4.82)	7.28 (5.04)	4.87 (4.03	0.83 (0.53)	0.36 (0.38)	0.4 (0.43)
FDM En; Mean (SD)							
M; n =32	6.56 (3.85)	7.93 (4.06)	5.43 (3.79)	2.81 (3.53	0.44 (0.58)	0.17 (0.41)	0.27 (0.46)
F; n = 31	7.32 (3.23)	10.51 (4.84)	6.8 (4.46)	4.54 (3.88	0.9 (0.85)	0.3 (0.42)	0.42 (0.56)
FE; (SD)							
M; n = 18	8.05 (3.97)	11.61 (4.14)	5.72 (3.47)	5.33 (4.33)	0.77 (0.62)	0.4 (0.48)	0.58 (0.48)
F; n = 45	9.6 (4.9)	10.6 (4.99)	5.91 (4.67)	5.17 (4.16)	0.81 (0.79)	0.55 (0.66)	0.5 (0.53)

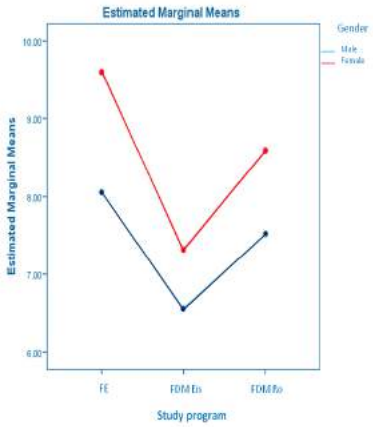

Fig. 1 – Relationship between the two independent variables for the functional limitation subscale

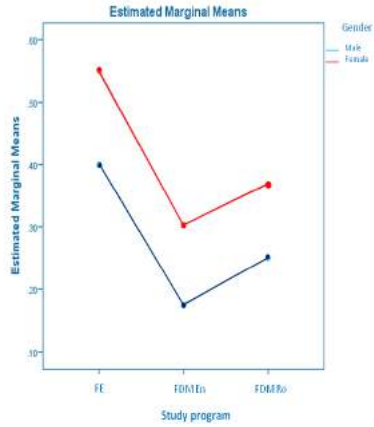

Fig. 2 – Relationship between the two independent variables for the social disability subscale

For the handicap subscale, the one-way ANOVA analysis indicated a statistically significant subscale score difference, between the male subjects, belonging to each study program F (2) = 3.212, p = .046.

The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students p = 0.029 and between the FE students and the FDM Ro ones, p = 0.021. The subscale scores differences for the other subscales did not present any significance. No statistically significant subscale score differences were indicated for the female subjects, belonging to each study program.

For the functional limitation subscale, the one-way ANOVA analysis indicated a statistically significant subscale score difference, between the three overall study program samples F (2) = 4.931, p = .008. The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students, p = 0.002.

For the social disability subscale, the one-way ANOVA analysis indicated a statistically significant subscale score difference, between the three overall study program samples F(2) = 5.128, p = .007. The post hoc least significant difference test indicated a statistically significant subscale score difference between the FE students and the FDM En students p = 0.002 and between the FE students and the FDM Ro ones, p = 0.025. No statistically significant subscale score differences were indicated for the female subjects, belonging to each study program

T-test

The T-test indicated statistically significant subscale score differences, between the male and female subjects, for the following situations:

- for the FDM En students, for the physical pain t (61) = -2.292, p=.025 and psychological disability t (61) = -2.464, p = 0.17 subscales;
- for the complete sample, for the functional limitation t (187)=-2.359, p=.019, physical pain t (187)= -2.172, p = .031, psychological disability t (187) =-2.556, p = 0.11 and social disability t (187) = -2.364, p = .019 subscales. No statistically significant subscale score differences were indicated for the other subscales and study program samples.

Discussion

The purpose of the current study was to assess the self-perception OHRQoL differences in three samples, containing students belonging to three study programs.

In respect to the complete sample (n = 189), the subscales presenting the highest scores were functional limitation, pain and psychological discomfort. For the other subscales, most of the respondents reported low scores (Table I). In respect to the male subjects (n = 81), the subscales presenting the highest scores were functional limitation, pain and psychological discomfort. The situation was the same for the female subjects (n = 108) (Table II).

At the level of the study program, the FE students reported high scores for the functional limitation and pain subscales (Table I). FDM Ro and FDM En students also reported the highest scores for these subscales, together with the psychological discomfort subscale (Table II). Although the first three subscales of the questionnaire registered the highest number of impacts for all the situations, statistically significant differences were still registered, in respect to the independent variables: gender and study program. These differences were extensively presented in the results section. The two-way ANOVA was used in order to assess the way, in which gender differences in OHRQoL self-perception, are distinct between the three study programs. The two-way ANOVA indicated statistically significant differences between the FE and the FDM En students' OHRQoL self-perception, for the functional limitation and psychological discomfort subscales; statistically significant differences were also registered between the FE and the FDM Ro students' OHRQoL self-perception. These findings led to the partial rejection of the first null hypothesis.

The one-way ANOVA was used in order to assess differences in the OHRQoL self-perception between the male subjects, belonging to the three study program samples. The one-way ANOVA indicated statistically significant differences between the students belonging to the FA and the ones belonging to the FDM En, respectively between the students belonging to the FA and the ones belonging to the FDM Ro. These findings were significant for the functional limitation and handicap subscale. These

findings led to the partial rejection of the second null hypothesis.

The one-way ANOVA was also used in order to assess differences in the OHRQoL self-perception between the students of each study program. The one-way ANOVA indicated statistically significant differences between the students belonging to the FA and the ones belonging to FDM En. These findings led to the partial rejection of the third null hypothesis.

The T-test was employed in order to assess differences in the OHRQoL self-perception between the male and female subjects, either within a specific study program sample, or belonging to the complete sample (n = 189). The T-test indicated statistically significant differences between the male and female subjects for the FDM En students, in respect to the pain and psychological disability subscales. Moreover, the T-test revealed statistically significant differences in the OHRQoL self-perception between the male and female subjects, in respect to the complete sample (n = 189), for the functional limitation, physical pain, psychological disability and social disability subscales. These findings led to the partial rejection of the fourth and fifth null hypotheses.

The registered differences suggest that female subjects tended to present a more precise and sensitive self-perception of their current oral health and OHRQoL. This is sustained by their registered higher scores, for almost all subscales. Other studies also reported higher sensitivity of the female subjects, in respect to oral health and OHRQoL self-perception (Séculi et al., 2001). Different studies suggest a more rigorous oral health behavior for the female subjects, in a student population (Mamai-Homata et al., 2016), or a lower level of knowledge, in respect to oral health, for male subjects, compared to the female subjects, also in a student population (Al-Ansari & Honkala, 2007). Similar studies, however, did not indicate any differences regarding the variable gender (Fukai et al., 1999; Tada & Hanada, 2004).

The null hypotheses were partially rejected, fact that might be due to some of the study's limitations: the sample size, the usage, in the present study, of a convenience sample or the applying modality of the questionnaire (pencil and paper), given the fact that opting for an interview format can enhance the results (Ozhayat et al., 2010; Kuo et al., 2011). The OHIP-49 short form, OHIP-14, which keeps the original subscale structure, has been used in the literature on young patients, rendering comparable results with the present study: higher scores for the functional limitation, physical pain and psychological discomfort subscales, using similar statistical procedures, to the ones employed for the current study (Masood et al., 2014; Siluvai et al., 2015). Moreover, similar to the present study's results, the subscale scores, in young or student populations, are usually at low values, in both the usage of the OHIP-14 (Lu et al., 2015; Colussi et al., 2017) and the usage of OHIP-49 (Lopez & Baelum, 2006).

The higher subscale scores of the economics student sample, compared to the dental students (both Romanian and English section), can only partially explain the influence of the dental medical education, upon one's OHRQoL self-perception. The small difference in scores, between dental medical and non-dental medical students can be explained by the fact that only first and second year dental students were involved in the current study. Expanding the study on fifth or sixth year students, while keeping the comparison format with a non-medical sample, could bring further insight.

Finally, it is interesting to notice, that this young sample presented the tendency to focus more on the physical aspects on oral health and its perception, rather than on psychological or social aspects.

Conclusions

1. OHRoL self-perception statistically significant differences, in respect to gender, were registered only between economics and dental students. No such differences were recorded between the Romanian and the English programs dental students.

2. The complex interaction between the gender and study lines variables had a statistically significant character only for the functional limitation and social disability subscales.

3. The evaluated young population tends to focus more on the physical impacts of oral health. Female subjects reported higher self-perception sensitivity.

4. The impact of the dental medical education upon the OHRQoL self-perception is debatable. The results of the current study only partially supported this hypothesis.

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Chairside CAD-CAM milling materials optical properties: feldspathic versus lithium silicate

Materiale frezabile CAD-CAM: feldspatic versus litiu silicat

Adrian Mihai Varvară [1], Ralph Boutros [2], Anca Ștefania Mesaroș [1], Elena Bianca Varvară [1], Bogdan Culic [1], Diana Dudea [1]
[1] Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania
[2] Student, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

All authors have equal contributions to this study

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Abstract

Background. Dental CAD-CAM technology has developed in the last three decades due to the evolution of dental materials and computer science.

Aims. The aim of the study was to evaluate the similarity of the color coordinates of different CAD-CAM milling materials with the corresponding tabs of the 3D Master shade guide.

Methods. Two different types of chairside CAD-CAM milling materials: feldspar ceramic (Vita Mark II - Vita) and zirconia-reinforced lithium silicate ceramic (Vita Suprinity - Vita) were used for this in vitro study. A group of 7 specimens of 1 mm thickness were cut for each type of material with a precision cutting saw. CIEL*a*b* color coordinates of each sample were determined with a dental spectrophotometer (Vita Easyshade - Vita) and compared to the color coordinates of a corresponding shade tab from a 3D Master shade guide, and the color differences CIE 76 (ΔEab) and CIE DE2000 (ΔE00), respectively, were calculated.

Results. Color differences (ΔEab and ΔE00, respectively) between the shade tab and the evaluated materials were 8.5 and 3.7 for Vita Mark II, 12.8 and 6 for Vita Suprinity High Translucent, and 33.3 and 12.7 for Vita Suprinity Translucent, respectively, way over the perceptibility and clinical acceptability thresholds.

Conclusions. In this study, a color difference above the limits of acceptability and perceptibility was found between each investigated material and the corresponding shade tab.

Key words: ceramic, feldspathic, lithium silicate, color, CAD-CAM

Rezumat

Premize. Tehnologia CAD-CAM utilizată în medicina dentară a cunoscut un progres important în ultimele trei decenii datorită evoluției materialelor dentare și a științei computerizate.

Obiective. Obiectivul studiului a fost de a evalua similaritățile dintre coordonatele cromatice ale diferitelor materiale frezabile CAD-CAM și eșantionul corespunzător din cheia de culori 3D Master.

Metode. Două tipuri diferite de materiale frezabile CAD-CAM: ceramica feldspatică (Vita Mark II - Vita) și ceramica de litiu silicat ranforsat cu zirconiu (Vita Suprinity - Vita) au fost utilizate pentru acest studiu in vitro. Un grup de 7 eșantioane de 1 mm grosime au fost tăiate pentru fiecare material în parte cu un microtom. Cu ajutorul unui spectrofotometru (Vita Easyshade - Vita) au fost determinate coordonatele cromatice CIEL*a*b* pentru fiecare material și comparate cu aceiași parametri ai eșantionului corespunzător al cheii de culori 3D Master și diferențele de culoare CIE 76 (ΔEab) și respectiv CIE DE2000 (ΔE00) au fost calculate.

Rezultate. Diferențele de culoare (ΔEab și respectiv ΔE00) dintre eșantionul din cheia de culori și Vita Mark II au fost de 8,5 respectiv 3,7, Vita Suprinity High Translucent de 12,8 respectiv 6 și Vita Suprinity Translucent de 33,3 respectiv 12,7, mult peste pragurile de perceptibilitate și acceptabilitate clinică.

Concluzii. În limita acestui studiu, între materialele investigate și eșantionul corespunzător din cheia de culori a fost găsită o diferență de culoare peste pragurile de perceptibilitate și acceptabilitate.

Cuvinte cheie: ceramică, feldspatic, litiu silicat, culoare, CAD-CAM

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Address for correspondence: Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania. 32 Clinicilor Street, 400006, Cluj-Napoca, Romania
E-mail: bogdanculic@yahoo.com
Corresponding author: Bogdan Culic; bogdanculic@yahoo.com
https://doi.org/10.26659/pm3.2018.19.4.230

Introduction

In the last 3 decades, computer aided design - computer aided manufacturing (CAD-CAM) technology has become indispensable for dental offices specialized in precise, highly aesthetic restorations, produced in a short time. The development of technology as well as modern high performance milling materials has contributed to this evolution (Davidowitz & Kotick, 2011).

Each year, new materials arise with improved properties and qualities, to resist and perform in the conditions of the oral cavity. The humidity, acidity and bacteria specific to the oral cavity have a destructive effect on restoration materials, comparable to that of masticatory forces (Egilmez et al., 2018; Skouridou et al., 2013).

Even if for a long time period only feldspar ceramic was used for the CAD-CAM technology, nowadays there are many other milling materials that can be used for this technology: glass ceramic (feldspar, reinforced with leucite, lithium silicate), oxide ceramics (magnesium, aluminum or zirconia), composite resins and hybrid ceramics (Conrad et al., 2007; Zaruba & Mehl, 2017; Tapie et al., 2015).

Initially, for highly aesthetic cases, feldspar ceramic was mainly used because of its optical characteristics. The mechanical properties of this ceramic (flexural strength of 154 MPa) (1) were considered acceptable, with a 10-year survival rate of 90% (Fasbinder, 2016; Reiss & Walther, 2000), but ceramic fracture was considered the main factor of restoration failure (Donovan, 2008; Horvath, 2016). To solve this problem, in 2006 a reinforced ceramic was developed (Emax CAD - Ivoclar Vivadent, Liechtenstein, Germany - lithium silicate glass ceramic), capable of resisting higher forces of 360-400 MPa (2). Moreover, in 2013 a zirconia reinforced lithium silicate ceramic (Vita Suprinity - Vita, Bad Säckingen, Germany), with a flexural strength of 420 MPa (3), was introduced in the medical field.

However, with the evolution of mechanical properties, the optical properties of chairside CAD-CAM milling materials changed. Introducing different components to increase the resistance of the material, such as zirconia, affected the translucency of the restorative materials, and in conjunction, the whole optical perspective.

The aim of the study was to evaluate the correspondence of the color coordinates of different CAD-CAM milling materials with the tabs of the 3D Master shade guide with the same designation.

The null hypothesis was that there were no differences between the color coordinates of chairside CAD-CAM milling materials and the correspondent shade tabs.

Material and methods

An in vitro study was conducted using two different types of chairside CAD-CAM milling materials: feldspar ceramic (Vita Mark II - Vita, Bad Säckingen, Germany) with SiO_2: 56-64%, AI_2O_3: 20-23%, Na_2O: 6-9%, K_2O: 6-8%, CaO: 0.3-0.6% and TiO_2: 0.0-0.1%, and zirconia-reinforced lithium silicate ceramic (Vita Suprinity - Vita, Bad Säckingen, Germany) with ZrO_2: 8-12%, SiO_2: 56-64%, Li_2O: 15-21% and others > 10%, high translucent (HT) and translucent (T).

a) Specimen preparation

For each material, seven 2M2 shade specimens were cut at 1 mm thickness with a precision saw (IsoMet 1000 - Buehler) using a diamond cutting blade for hard brittle materials and structured ceramics (IsoMet Diamond Wafering Blade, 5 in, 15LC - Buehler) at a speed of 100 rotations per minute.

To reach the desired thickness (±0.01mm), the samples were measured with an electronic micrometer and polished using sandpaper (Klingspor) with increasing grits (P240, followed by P400, P800, P1000 and P1200).

b) Determination of color coordinates and calculation of color differences

For each specimen, the CIEL*a*b* (L* - luminosity values, a* - chrome on the red-green scale, and b* - chrome on the yellow-blue scale) optical parameters were determined with a dental spectrophotometer (Vita Easyshade - Vita). Each measurement was repeated three times and a mean value was obtained for each optical parameter of each specimen. The same CIEL*a*b* optical parameters were determined ten times and an average value was obtained for the 2M2 shade tab of Vitapan 3D Master (Vita) shade guide.

Differences in color: DE_{ab} and DE_{00} were determined between the specimens and the shade tab using the following formulas:

$$\Delta E_{ab}{}^{*}=\sqrt{(\Delta L^{*})^{2}+(\Delta a^{*})^{2}+(\Delta b^{*})^{2}}$$

where ΔL* is the difference in lightness, Δa* is the difference in redness-greenness, and Δb* is the difference in yellowness-blueness.

$$\Delta E_{00}=\sqrt{\left(\frac{\Delta L^{'}}{K_L S_L}\right)^{2}+\left(\frac{\Delta C^{'}}{K_C S_C}\right)^{2}+\left(\frac{\Delta H^{'}}{K_H S_H}\right)^{2}+R_T\left(\frac{\Delta C^{'}}{K_C S_C}\right)\left(\frac{\Delta H^{'}}{K_H S_H}\right)}$$

The weighting functions S_L, S_C, S_H adjust the total color difference for variation in perceived magnitude with variation in the location of the color difference pair in L', a', and b' coordinates. The parametric factors K_L, K_C, K_H are correction terms for variation in experimental conditions.

The values were compared with the acceptability threshold (AT) and perceptibility threshold (PT). For ΔE_{ab}, PT 1.2, and AT 2.7 were considered, whereas for ΔE_{00}, values were 0.8 for PT and 1.8 for AT (Paravina et al., 2015).

Results

The color coordinates of the chairside CAD-CAM milling materials investigated in this study are presented in Table I.

For Vita Mark II, L* ranged from 84.9 to 87.3 with a mean value of 86.6, a* ranged from -0.6 to 0.4 with a mean value of -0.5, and b* ranged from 15.6 to 16.1 with a mean value of 15.9.

For Vita Suprinity Translucent, L* ranged from 82.7 to 83.5 with a mean value of 83, a* ranged from 3.6 to 4.3 with a mean value of 4.2, and b* ranged from 51.4 to 53.3 with a mean value of 52.7.

For Vita Suprinity High Translucent, L* ranged from 81.7 to 82.1 with a mean value of 81.9, a* ranged from -0.5

Table I
Optical parameters for Vita Suprinity Translucent (VS T), Vita Suprinity High Translucent (VS HT) and Vita Mark II (VM II)

	L*			a*			b*		
Sample number	VS T	VS HT	VM II	VS T	VS HT	VM II	VS T	VS HT	VM II
1	82.7	81.9	86.5	4.3	-0.3	-0.5	53.3	33.0	15.7
2	83.2	82.0	87.2	4.3	-0.2	-0.5	53.2	32.5	16.0
3	83.0	82.1	86.7	4.3	-0.5	-0.5	53.1	31.6	16.1
4	82.7	81.8	86.9	4.1	-0.1	-0.6	51.9	32.0	15.6
5	83.5	82.0	84.9	3.6	-0.2	-0.4	51.4	32.1	15.7
6	83.0	81.9	87.3	4.3	-0.1	-0.5	52.8	32.9	16.0
7	83.1	81.7	86.8	4.3	-0.4	-0.4	53.1	31.3	15.9
Average	83.0	81.9	86.6	4.2	-0.3	-0.5	52.7	32.2	15.9

to -0.1 with a mean value of -0.3, and b* ranged from 31.3 to 33 with a mean value of 32.2.

For the 2M2 shade tab, L* ranged from 79.1 to 79.2 with a mean value of 79.2, a* ranged from 1.1 to 1.2 with a mean value of 1.1, and b* ranged from 19.6 to 19.8 with a mean value of 19.7.

Color differences (DE_{ab} and DE_{00} respectively) between the shade tabs and the evaluated materials were 8.5 and 3.7 for Vita Mark II, 12.8 and 6 for Vita Suprinity High Translucent, and 33.3 and 12.7 for Vita Suprinity Translucent, respectively, way over the perceptibility and clinical acceptability thresholds (Fig. 1).

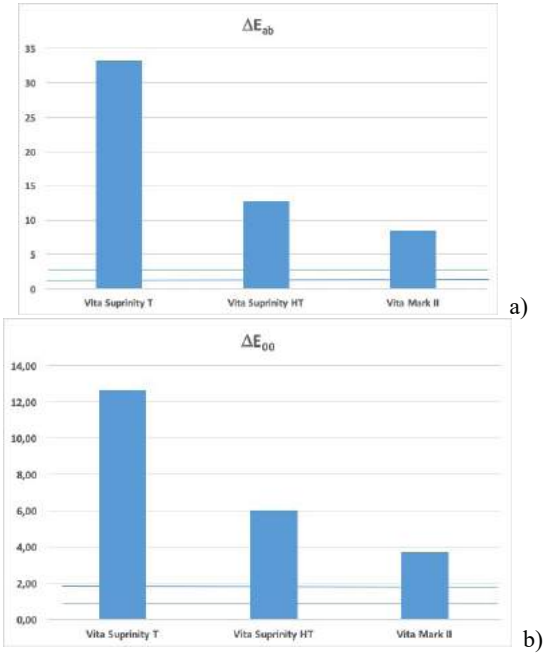

Fig. 1 – Color differences for the investigated materials: a) DE_{ab} b) DE_{00}

Discussions

The null hypothesis was rejected, since there were color differences between the shade tab and the evaluated materials.

It seems that various materials have different optical parameters, even if they have the same color designation. The color parameters of the feldspar ceramic were more similar to those of the shade tab, compared to the lithium silicate ceramic.

Vita Mark II is available in 10 shades of Vitapan Classical and 10 shades of Vitapan 3D Master, while Vita Suprinity is available in only 7 shades of Vitapan Classical and 6 shades of Vitapan 3D Master. Even so, Vita Suprinity has 2 variants of translucency: translucent (T) and high translucent (HT).

The visual determination of the dental color, using different shade tabs from a shade guide, can be challenging for clinicians. Using the Vitapan 3 D Master shade guide, the color samples feature an equidistant distribution in the color space in accordance with scientific principles, which adds superior precision to shade matching if proper handling is ensured.

After milling, a CAD-CAM restoration has to be glazed and individualized with different pigments, to mimic the natural look. For the present study, no other material (glaze or pigment) was used to alter the surface of the samples. Even so, there are studies which highlight the factors that can alter the final color of the restoration: different glazing methods and repeated firings (Yılmaz et al., 2014), finishing procedures of the surfaces of the restoration (Özarslan et al., 2016; Sarac et al., 2006a; Sarac et al., 2006b).

The samples used for this study had a flat surface to avoid the "edge loss errors". These errors occur when some of the radiation reflected by the convex buccal surface of the tooth does not reach the flat active part of the spectrophotometer. This kind of error is amplified by the translucency of the tooth or restoration material as well (Paravina et al., 2007). This could be a reason for the discrepancies between the optical parameters of the shade tabs and the materials selected for this study.

Conclusions

1. In this study, the optical parameters of chairside CAD-CAM milling materials are different from those of the corresponding shade tab.
2. Feldspar ceramic was more similar to the shade tab than lithium silicate ceramic.

Conflicts of interests

None

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Resin composite layering technique for direct anterior teeth restorations

Stratificarea materialelor pe bază de răşini compozite în restaurări directe ale dinţilor frontali

Elena-Bianca Varvară, Anca Ştefania Mesaroş, Bogdan Culic, Adrian Mihai Varvară, Diana Dudea
Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

All authors have equal contributions to this study.

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Abstract

Background. Composite resins can be successfully used to improve the patient's esthetics through minimally invasive, low cost and high clinical performance treatments. The layering techniques of composite resins in different thicknesses, with varying degrees of opacity and translucency, permit the creation of esthetic restorations with tooth structure characteristics.

Aims. The aim of the study was to evaluate the characteristics, principles and methods of stratification of resin composite materials and to exemplify these methods with clinical cases.

Methods. An electronic search of scientific articles referring to the stratification of composite materials was done using a single medical database: PubMed. The focus on the selection of keywords as well as the inclusion and exclusion criteria were the guiding elements of the research. All articles were included after the title, the abstract, and finally the full text was checked. Only relevant research was reviewed. Based on the results, several methods of stratification were used in clinical practice.

Results. The concept of natural stratification, anatomical stratification, stratification of the anterior teeth using a dentin hue and a predefined thickness of enamel, or a single layer of material and the correct placement of pigments and opacities lead to the achievement of esthetic and predictable direct nanocomposite resin restorations.

Conclusions. Within the limit of this study, it can be concluded that, to achieve aesthetic excellence, dentists should understand and apply artistic and scientific principles when layering materials, respecting the optical properties of natural dental structures.

Key words: composite resins, stratification, optical properties

Rezumat

Premize. Răşinile compozite pot fi folosite cu succes pentru a îmbunătăţi estetica pacientului prin tratamente minim invazive, cu performanţe clinice înalte şi la un preţ de cost redus. Tehnicile de stratificare a răşinilor compozite în diferite grosimi, cu diferite grade de opacitate şi transluciditate, fac posibilă obţinerea unor restaurări estetice cu aceleaşi caracteristici ca cele ale structurilor dentare.

Obiective. Scopul studiului a fost de a evalua caracteristicile, evoluţia, principiile şi metodele de stratificare a materialelor pe bază de răşini compozite.

Metode. S-a realizat o căutare electronică a articolelor ştiinţifice referitoare la stratificarea materialelor compozite, utilizând o singură bază de date medicală: PubMed. Prezenţa cuvintelor cheie, precum şi a criteriilor de includere şi excludere au fost elementele care au ghidat selectarea articolelor. Toate articolele au fost incluse în studiu în funcţie de titlu, rezumat şi în final, a fost verificat si textul complet. Doar cercetările relevante au fost selectate şi analizate.

Rezultate. Conceptul stratificării naturale, stratificarea anatomică, realizarea restaurărilor biomimetice, stratificarea dinţilor anteriori folosind o nuanţă de dentină şi o grosime predefinită de smalţ sau a unui singur strat de material şi plasarea corectă a pigmenţilor stau la baza realizării restaurărilor directe estetice din răşini compozite.

Concluzii. În limitele acestui studiu, se poate afirma că, pentru a atinge excelenţa estetică, stomatologii ar trebui să înţeleagă şi să aplice principiile artistice şi ştiinţifice atunci când realizează stratificarea materialelor de restaurare directă, respectând proprietăţile optice ale structurilor dentare naturale.

Cuvinte cheie: răşini compozite, stratificare, proprietăţi optice

Received: 2018, September 20; *Accepted for publication:* 2018, September 28
Address for correspondence: Department of Prosthetic Dentistry and Dental Materials, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania. 32 Clinicilor Street, 400006, Cluj-Napoca, Romania
E-mail: varvara.mihai@umfcluj.ro
Corresponding author: Adrian Mihai Varvară; varvara.mihai@umfcluj.ro
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Introduction

Composite resins are a well personalized class of restorative materials with specific indications in the anterior and posterior areas of the mouth. Their advantages reside in: easy to use, reduced number of treatment sessions, very good bonding to the dental structure and wide variety of materials available on the market. Also, composite resins can be effectively used to improve smile aesthetics through minimally invasive treatments at low cost and high clinical performance (Chen, 2010; Prodan et al., 2015)

The concept of resin composites layering is a real interest for practitioners because the aesthetic aspect, particularly important for patients, can be rendered by stratification techniques, directly in the dental office. However, clinical success depends on choosing the type of composite resins. This must be done taking into account both the optical properties we want to achieve and, above all, respecting certain characteristics of natural dental structures such as translucency, opalescence and fluorescence.

Artificial reproduction of all the intrinsic properties of the tooth is not always a simple task because the enamel, dentin and pulp forming the dental crown are different in thickness, composition, structure, and especially, optical properties. The dental pulp has a lesser impact upon the general optical aspect, but the dentine is characterized by an opaque and rich complex, with varying degrees of saturation and fluorescence, and has a well-defined chromatic role. It is covered with a layer of enamel, which is translucent and opalescent (Prodan et al., 2015). Dentin and enamel have different thickness distributions in the dental crown, so the chromatic and translucent optical properties vary from cervical to incisal. At the cervical level, a greater amount of dentin is visible through the transparency of the enamel, so at this level there is a higher saturation of the dental color, while at the incisal level, the predominant presence of the translucent enamel gives gray-blue, gray-white or white-yellow aspects (Prodan et al., 2015; Villarroel et al., 2011).

Achieving perfect direct restoration has been, over time, a difficult task to achieve, because of the imperfect optical properties of composite resins and unpredictable clinical procedures. Therefore, the improvement of stratification techniques in different thicknesses of composite resins, with different degrees of opacity and translucency has been attempted, with the aim of obtaining aesthetic restorations with characteristics as close as possible to those of the natural dental structures. Nevertheless, current composite resin systems are provided so that "dentin" materials reproduce the shade and fluorescence of natural dentin and "enamel" materials mimic the opalescence and translucency of natural enamel.

Objectives

The objective of the study was to evaluate the characteristics, the principles and the methods of layering the composite materials. This study wishes to assess whether the concepts of layering the resin composite materials is done respecting the optical properties of natural dental structures.

Hypothesis

This study starts from the hypothesis that the methods of layering of composite materials are designed respecting the optical properties of natural dental structures.

Material and methods

An electronic search of scientific articles with reference to dental composite layering technique was done, using a single medical database: Pub Med. A total number of 174 articles were found. The publication date range has been set from year 2000 to 2018. The articles were selected using specific keywords (layering composites resins, stratification, and direct composite resin), inclusion and exclusion criteria. Articles with topics on: dental resin composites, layering technique, shading concept, anterior region of the oral cavity were selected. Exclusion criteria were: studies analyzing mechanical properties and studies for posterior restorations. After analyzing the title, 49 articles were selected. Then, after reading the abstract and the full text articles, only relevant researches were taking into consideration, most of them being literature reviews or case reports.

Based on the results, several methods of stratifications have been used in clinical practice.

Results

According to the literature, several direct stratification methods were used: the concept of natural layering, anatomical layering, biomimetic restorations, double shade composites layering for anterior teeth, using a dentin shade and a predefined thickness of enamel shade, or a single layer of material and the correct placement of pigments and opacities. Some of these techniques may have variations (Table I), (Dietschi, 2001; Dietschi et al., 2006; Dietschi & Fahl, 2016; Blank, 2003; Beddis & Nixon, 2012; Ardu & Krejci, 2006; Manauta et al.,2014a; Manauta et al.,2014b).

Shading and layering concepts progressively evolved from a simplistic, non histo-anatomical, bilaminar

Table I

Historical perspective of various layering concepts applied to direct anterior composite restorations

Time	Layering technique	Shading concept
2000/2006/2013	Bi-laminar Natural layering shading	Universal dentin+multi tint and translucency enamels Non-Vita shading
2002/2011	Polichromatic	Dentins+body shades+chromatic enamels+incisals Vita shading
2003/2010	Bi/multi laminar	Universal dentin+value and effect enamel Non-Vita shading
2014	Histo-anatomical layering (penta laminar)	Deep dentin and superficial dentin shades+dentin-enamel jonction liner+deep and superficial enamels

technique to a multi-layering approach, using composites with shades corresponding to the Vita Classic™ system.

It has been introduced also a polychromatic layering, which consists in using a variable number of layers of resin composites with different translucencies:opaque dentin, chromatic enamel and translucent/opalescent enamel, driven by the natural tooth optical composition.

In parallel with this evolution, a simplified, non-VITA shading system was developed, with a reduced number of layers (basically dentin and enamel layer, plus effect shades if required) known as the natural layering concept. (Dietschi & Fahl, 2016)

Discussions

To ease understanding of stratification techniques, we follow the classification according to the number of layers used in the restoration: In this respect, one layer, two or three different layers of composite materials can be stratified, or even complex layering can be done, using several shades in different thicknesses and opacities, and specific pigment-based individualizations.

Clinical protocol for direct restorations in the anterior area

Restorations in the anterior area of the oral cavity involve the biomimetic reproduction of the natural teeth characteristics in order to achieve aesthetic restorations as well as integrated into the dental arcade. For this, two essential steps are needed: dental color determination and selection of composite resin materials to be layered.

a) Color evaluation in cosmetic dentistry is one of the most difficult stages in direct restoration. Color should be understood as a result of the interaction of three dimensions known as hue, saturation and brightness.

Determination of dental color can be done by direct or indirect methods. A preliminary determination of the dental color will be done with the spectrophotometer to have a reference point, followed by the visual dental color determination with shade guides, aiming at the same time to observe the individual aspects (areas of incisal or proximal translucency, increased opacities, pigments, cracks, etc.). It is recommended to use customized and individualized shade guides, layered in different color and thicknesses, made from the same material as the future filling. Determination of dental color involves the analysis of each dental area (cervical, medium and incisal third) in order to make a dental map of different colors and translucent areas (Joiner, 2004; Stevenson, 2009).

The "button try" technique was recently introduced; it consists on placing small amounts of different shades of the resin composite, on the vestibular surface of the tooth to be restored and then photo-polymerized (Lee, 2010)

b) Dental composites materials and stratification techniques will be chosen in order to create a restoration that matches and blends in the adjacent natural dental tissues. To actually imitate dental structures, restorative materials must present both similar optical properties and have a similar refractive index to that of dental tissues.

In addition to choosing the stratification technique, it is important to select properly the materials, as to obtain chromatic effects of depth, that characterize the natural teeth (Dudea & Varlan, 2013).

Layering methods used for direct anterior teeth restorations

- *One-layer layering techniques* is a common and simple layering technique,that involves a single group of materials, either dentin or enamel, to restore the defective natural tooth. It is usually used for masking the white spots on the teeth (Fig. 1).

Fig. 1 – One layer technique for treating the white spots on the anterior teeth:a) initial aspect, b) after treatment

- *Two-layer stratification techniques* requires a higher level of clinical skill , because it uses both dentin and enamel materials during the restoration. It is indicated in case of cervical lesions or for direct composite veneers (Fig. 2).

Fig. 2 (a, b) – Two layer layering technique used in case of cervical abrasion on 1.3-1.6: a) initial aspect of cervical lesion, b) final aspect immediately post-op.

- *Three layer stratification techniques*: this is the advanced level of the layering technique, when opaque dentin, body dentin and enamel materials are used in combination to block the transmission of light (Fig. 3). As opaque materials are used, a good selection of the hue and thickness of the dentin and enamel layers are essential to achieve an aesthetically successful result. It is used to mask the discoloration of teeth with dyscromies.

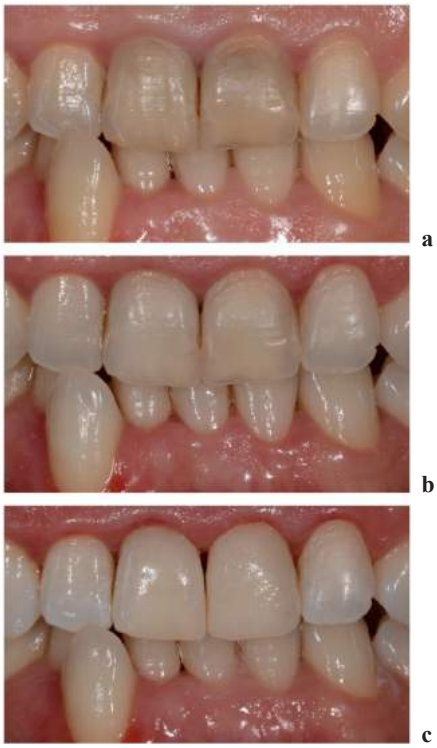

Fig. 3 – Three layer layering technique for masking teeth discoloration

- *Complex layering techniques* involves materials with special color effect (pigments) in restorations. These materials are usually placed between the dentin and enamel layers of natural teeth or of the restorative materials (Fig. 4).

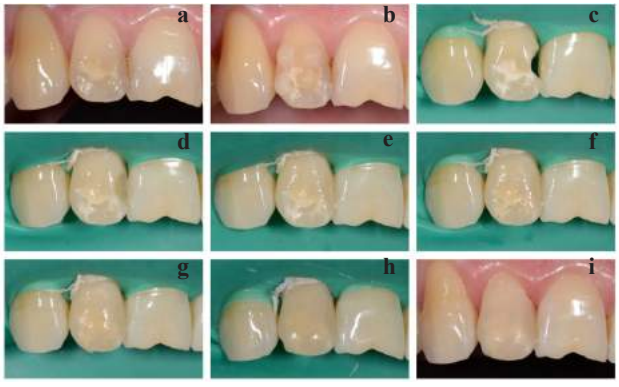

Fig. 4 – The use of special color effect pigment to mask the white spot; warm-gold material (chroma) has been selected to increase the chroma level in the medial area of dentine: a) initial aspect, b) color determination with button try composites, c) aspect of the prepared tooth, d) enamel palatal wall, e) dentin layer, f) pigment placement, g) enamel buccal layer, h), i) final aspect of the restoration

- *Anatomical layering technique* involves using successive layers of dentin, enamel and incisal composite, so that more realistic color depth could be obtained. In the same time, surface and optical characteristics that mimic nature are aimed (Fig. 5).

Fig. 5 – Anatomical layering technique: a) initial aspect of cl III restoration located on 1.2, 2.1; b) color determination with button try composites; c) aspect of prepared tooth; d) enamel palatal layer; e) dentin layer; f) final aspect with the buccal enamel layer in place

- *Blended shading technique*. This technique uses two or more shaded restoration materials to match the actual hue of a tooth in different regions. Restorative materials with different colors are used and mixed with overlapping surfaces to create the desired effect (Koirala, 2009).

- *Natural layering technique* (Fig. 6) The concept was introduced in 1995 by Dietschi. It is based on a simplified and more reliable layering technique with only two layers (dentin and enamel) to perfectly mimic the structure and appearance of the tooth. This new approach allows the combination of different enamel and dentine nuances with immediate comparison with the natural tooth (Dietschi et al., 2006). linical applications and stratification of the composites uses only one universal dentine shade (with the opacity close to that of a natural tooth) with several levels of chromacity and three types of enamel for young, adults and old patients, with different shades and levels of translucency (Dietschi et al., 2006; Dietschi, 2009). This concept is used in combination with dental materials classified only in dentin and enamel shade according to the age of natural tooth structure: Miris and Miris2 (Coltene whaledent), Ceram-X duo (Dentsply), Enamel HFO Plus (Micerium), Inspiro (Edelweiss DR), and Essentia (GC) (Dietschi, 2009).

Fig. 6 – Natural layering technique a) initial aspect of cl. III restoration located on 2.2; b) color checking with button try composites; c), d) aspect of prepared tooth; e) enamel palatal layer; e)dentin layer; f) final aspect with the buccal enamel layer in place; g) final aspect 24h post-op.

Conclusions

1. Aesthetic restorations can be provided directly and conservatively, with respecting the optical properties of natural dental structures. Nowadays, the evolution of dental resin composites, and stratification methods are based on improved reliability and clinical simplification.

2. To achieve aesthetic excellence, dentists should understand and apply the art and scientific principles when layering the composite materials. Only the understanding of multiple factors that influence the end result of aesthetic restoration guarantees results with a major positive impact on patients.

Conflicts of interests

None

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Management of the anxious patient in the dental office

Managementul pacientului anxios în cabinetul stomatologic

Bianca Nausica Petrescu [1], Anida-Maria Băbțan [1], Bianca Adina Boșca [2], Bogdan Culic [3], Marius Manole [3], Anca Ștefania Mesaroș [3], Radu Septimiu Câmpian [1], Aranka Ilea [1]
[1] Department of Oral Rehabilitation, Oral Health and Dental Office Management, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Romania
[2] Department of Histology, Faculty of Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania
[3] Department of Propaedeutics and Aesthetics, Faculty of Dental Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Romania

All authors have equal contributions to this study.

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Abstract

Background. Anxiety is widely known in dentistry. Even though it is a very recurrent issue, no protocol has yet been established that could be used for definite results.

Aims. The aim was to review the literature in order to find effective strategies employed by dentists that could help patients to overcome their anxiety.

Methods. A review of 24 articles on Pubmed platform using the terms: "dental anxiety", "physical activity", "sports" and "exercise" was conducted. We chose publications discussing the possible solutions for managing dental anxiety.

Results. The solutions proposed in the scientific literature included: cognitive-behavioral therapy, relaxation techniques, premedication with sedative drugs (benzodiazepine), music distraction, hypnosis, acupuncture, inhalation sedation, aromatherapy with essential oils, parental presence/absence for children and audiovisual distraction.

Conclusions. Cognitive-behavioral therapy seemed to be the most efficient method for patients to overcome dental anxiety. Repeated exposure to dental treatment increased the efficiency of the other strategies.

Key words: dental anxiety, physical activity, cognitive-behavioral therapy, dental treatment

Rezumat

Premize. Anxietatea este foarte des întâlnită în timpul tratamentului stomatologic. Chiar dacă mulți dintre pacienți sunt anxioși în cabinetul stomatologic, nu există un protocol specific, care să poată fi utilizat pentru rezultate sigure.

Obiective. Scopul acesui studiu a fost de a explora literatura de specialitate pentru a afla soluțiile pe care medicii dentiști le pot folosi, pentru a ajuta pacienții să își depășească anxietatea.

Metode. S-a realizat o revizuire a 24 de articole găsite cu ajutorul termenilor "anxietate dentară" pe platforma Pubmed. Au fost selectate publicații care aveau în vedere posibilele soluții care au fost studiate și au relevat rezultate pozitive în eliminarea anxietății dentare.

Rezultate. Soluțiile propuse în literatura de specialitate au fost: terapia cognitiv-comportamentală, tehnicile de relaxare, premedicația cu medicamente sedative (benzodiazepină), muzica pentru distragerea atenției, hipnoza, acupunctura, sedarea inhalatorie, aromaterapia cu uleiuri esențiale, prezența/absența părinților în cabinet pe parcursul efectuării manoperelor stomatologice la pacienții copii și distracția audiovizuală.

Concluzii. Terapia cognitiv-comportamentală este cea mai eficientă tehnică utilizată pentru a ajuta pacienții să își depășească anxietatea în cabinetul stomatologic. Toate tehnicile folosite au fost mai eficiente atunci când au fost asociate cu expunerea repetată la tratamentul stomatologic.

Cuvinte cheie: anxietate dentară, activitate fizică, terapie cognitiv-comportamentală, tratament stomatologic.

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Address for correspondence: Department of Dental Propaedeutics and Aesthetics, Faculty of Dentistry, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania, 32 Clinicilor Street, 400006, Cluj-Napoca, Romania
E-mail: mesaros.anca@umfcluj.ro
Corresponding author: Anca Ștefania Mesaros; mesaros.anca@umfcluj.ro
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Introduction

Patient anxiety is a very well known and frequent problem that dental practitioners encounter in the dental office. Although often regarded as an insignificant problem and not given very much attention, dental anxiety could have serious consequences, including aggravation of the dental problems the patient already has. This is the result of patients avoiding going to the dentist in the initial stages, when their dental problems could be treated much easier and faster, and with less financial investment. This delay of treatment usually increases the level of dental anxiety and affects the patient's quality of life, due to pain and other unpleasant repercussions of the worse dental problems.

When trying to understand anxiety, there are three terms that must be distinguished: fear, anxiety, and phobia. Fear is a basic emotion that emerges when a person perceives a present or a future danger. Anxiety is a conditioned reaction that arises in anticipation of a future threat (Gordon et al., 2013). Phobia is an irrational fear (Craske et al., 1996).

There are certain factors, different for each individual, which can amplify dental anxiety, such as: dental traumas, predisposing personality or characteristics, and exaggerated sensory and emotional reactions to pain (Locker et al., 1999a; Locker et al., 1999b). These factors are partly responsible for influencing the effectiveness of the strategies used to diminish patient anxiety during dental treatment (Gordon et al., 2013).

Numerous methods, many of them combined with cognitive-behavioral therapy, have been tested in an attempt to eliminate dental anxiety (Gordon et al., 2013).

Despite the wide range of methods that proved to help patients to overcome their dental anxiety, none of these strategies had guaranteed results and, at the present moment, there is no reliable protocol that doctors could apply to completely eliminate anxiety.

The aim of this review was to find out if there is an efficient noninvasive method for eliminating anxiety in dental patients.

Hypothesis

Is there a strategy that could eliminate patient anxiety in the dental office?

Material and methods

The search on Pubmed platform used the terms: "dental anxiety", "physical activity", "sports" and "exercise". Out of the results retrieved using these terms, only the articles from the last eight years were taken into consideration; moreover, only articles that included solutions were selected; papers that only assessed the anxiety frequency in the dental office were eliminated.

Results

The study focused on the anxiety level of patients who were informed in different manners about the dental procedure to be performed. Patients' anxiety decreased when they were explained the details of treatment. Also, helpful in reducing anxiety were images such as drawings of teeth on which the steps of treatment were explained. Additionally, the dentist's empathy toward the patient was proved to be important (Wang et al., 2017).

Other studies revealed significantly lower levels of dental anxiety after exposing the patients to music therapy or audiovisual distraction (Mejia-Rubalcava et al., 2015; Zhang et al., 2018).

Aerobic exercise was also used as a method with positive results in decreasing anxiety. A study reported lower dental anxiety in patients who performed physical activity 30 minutes prior to dental treatment. Decreased salivary cortisol and alpha amylase levels evidenced that physical activity could reduce fear of dental procedures (Lindenberg et al., 2016).

Other methods for decreasing dental fear mentioned in the literature were: cognitive-behavioral therapy, relaxation techniques, sedative premedication, hypnosis, acupuncture, inhalation sedation, aromatherapy. Among those techniques, cognitive-behavioral therapy gave the best results and it was also proven that repeated exposure to dental treatment was effective in reducing anxiety (Gordon et al., 2013).

Discussion

A very effective method for reducing dental anxiety is to inform patients about the causes that have led to their illness, to describe the therapeutic procedure and to discuss the results and risks that might occur during dental treatment. Patients' trust in doctors is enhanced by doctors' honesty regarding the risks to which patients are exposed during dental procedures. Once the patient's trust is gained, anxiety decreases because the patient feels in control of the dental treatment.

Music therapy and audiovisual distraction were proven to be beneficial for diminishing dental anxiety.

It was demonstrated that lack of physical activity was significantly associated with stress, anxiety and depression (Tajik et al., 2017; Hiles et al., 2017). Regular physical exercise was also shown to be correlated with good mental health (McMahon et al., 2017) and to reduce anxiety and depression symptoms (Carek et al., 2011; Lindwall et al., 2014). Lindenberger confirmed the above mentioned theories through his randomized controlled trial.

Conclusions

Dental practitioners must be aware of patients' anxiety and should consider one or more methods in their attempt to decrease it. So far, no definite protocol has been described in the literature that could guarantee complete elimination of dental anxiety.

Conflicts of interests

There are no conflicts of interests.

Acknowledgements

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CASE STUDIES

Hereditary breast cancer and the need for improvement of screening

Cancerul mamar ereditar: necesitatea screeningului eficient

Roxana-Flavia Ilieș [1], Andreea Cătană [1], Gabriela Bolba Morar [2], Andrada Orodan [1]
[1] Department of Medical Genetics, "Iuliu Haţieganu" University of Medicine and Pharmacy
[2] Department of Senology, "Prof. Dr. Ion Chiricuta" Oncology Institute Cluj-Napoca, Romania

All authors have equal contributions to this study.

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Abstract

While hereditary breast cancer only makes up 5% to 10% of all cases, female patients with pathogenic mutations such as BRCA1, BRCA2, CHEK2, etc., are at a higher risk of developing it. Positive family history (such as multiple family members affected by this and other forms of cancer) prompts a more rigorous approach towards the screening and early diagnosis of these patients, as well as a need for counseling for family members.

A 33-year-old female patient was diagnosed with Invasive Ductal Carcinoma NST (No Specific Type) in the left breast, confirmed by biopsy and MRI. Family history revealed early-onset pancreatic cancer (under 65 years old) and was considered as positive, suggesting genetic counseling. We performed the Cancer Risk Test: the patient's results were positive for two genes - BRCA2, which is associated with the risk of breast and pancreatic cancer, and CHEK2, associated with the risk of breast and colon cancer.

Due to the autosomal dominant inheritance model of these genes, the patient's descendants have a 50% chance of developing breast cancer. This high risk indicates early start of screening (through mammography, breast MRI, liquid biopsy) or even preventive surgery (such as postmenopausal removal of ovaries or breasts) in order to prevent or diagnose these patients in a timely manner.

Key words: breast cancer, BRCA, genetic panel, screening

Rezumat

Cancerul de sân ereditar reprezintă 5-10% din formele de cancer mamar diagnosticate. Pacientele purtătoare de mutații patogene, cum ar fi BRCA1, BRC2, CHEK2, prezintă un risc înalt pentru a dezvolta acest tip particular de neoplazie. Istoricul familial pozitiv aduce cu sine suspiciunea unui cancer ereditar, indicând clinicianului nevoia de a investiga aspectul genetic al neoplasmului.

O pacientă în vârstă de 33 de ani este diagnosticată cu carcinom invaziv ductal NST la nivelul sânului stâng, diagnostic confirmat prin biopsie și RMN. Istoricul familial relevă un carcinom pancreatic apărut înainte de vârsta de 65 de ani, fiind considerat pozitiv. Am efectuat panelul Cancer Risk Test, care a fost pozitiv în cazul mutațiilor la nivelul genelor BRCA2 și CHEK2.

Din cauza modelului autosomal dominant de transmitere a acestor gene, descendenții pacientei poartă un risc de 50% de a fi purtători ai mutațiilor, și așadar susceptibili pentru a dezvolta neoplazii asociate (cancer mamar, ovarian, pancreatic, de colon). Riscul înalt indică necesitatea screeningului precoce, atât în ceea ce privește pacienta, cât și succesorii acesteia.

Cuvinte cheie: cancer mamar, BRCA, panel genetic, screening

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Address for correspondence: Department of Medical Genetics, "Iuliu Haţieganu" University of Medicine and Pharmacy, 7 Pasteur street, 400006, Cluj-Napoca, Romania
E-mail: roxanaflaviailies@gmail.com
Corresponding author: Roxana Flavia Ilieș, roxanaflaviailies@gmail.com
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Introduction

Breast cancer is the most common form of malignancy in female patients, with a significant impact on the patients' life expectancy and quality of life. Therapeutic management has veered towards conservative measures nowadays - with localized, targeted medicine being able to spare adjacent thoracic structures and enabling the patient to return to day-to-day life and physical activity. However, hereditary breast cancer poses a different set of implications and challenges.

Up to 10% of breast cancers have a hereditary component. This particular cluster of cancers brings forth a myriad of issues for the patient and practitioner alike, regarding therapeutic management as well as screening of family members. Important representatives are the BRCA1 and BRCA2 genes (Lux et al., 2016). These play an important role in tumor supression: inducing DNA damage repair mechanisms, remodeling chromatin and apoptosis (Wu et al., 2010; Shahid et al., 2014). Due to their function, these two genes can also cause other forms of cancer – they are associated with the risk of ovarian cancer and contralateral breast cancer (Kuchenbaecker et al., 2017).

Although the BRCA1 and BRCA2 genes are the hallmark of a large number of breast cancer cases, they are not the only ones that play a role in a patient's diagnosis. Multiple genes are now associated with the risk of developing breast cancer, such as CHEK2, PTEN or TP53 (Van Der Groep et al., 2011).

The case herein presented illustrates the complex nature of hereditary breast cancer and its management. Gaining as much information as possible regarding a patient is a goal for the practitioner - however, is there a limit after which further information becomes counterproductive?

Case presentation

A 33-year-old female patient presented after self-examination revealed a lump in her left breast. She was currently under treatment for depressive disorder. Family history was negative, with the exception of a paternal grandmother, diagnosed with pancreatic cancer at 53 years of age.

The clinical exam showed no pathological elements, excepting a tumor-like formation in the left breast.

The patient was referred to breast ultrasound, which identified a 25 mm lesion in the left breast and enlarged lymph nodes with a prominent cortical area on the left side. The result prompted a biopsy, which showed the following profile: CD NST RE=80% RP=70% Her2=0 Ki67=10%. Contrast MRI was performed, showing an oval lesion with infiltrative margins, heterogeneous contrast, 28 mm in diameter. Two centers with increased contrast uptake were identified, presenting imprecise contours and a 5-6 mm diameter. Left axillary lymph nodes were inflamed.

Considering age and diagnosis, a CANCER RISK test (Gendia-Belgium) - a gene panel investigating 30 genes linked to cancer - was carried out, identifying a heterozygous mutation for BRCA2 c.6567 C>A and a heterozygous mutation for CHEK2 c.902delT.

The final diagnosis was invasive ductal carcinoma, T1N1M0, BRCA2 positive.

Therapeutic management consisted of bilateral radical mastectomy with reconstruction. Neoadjuvant chemotherapy was not performed because of the low value of the proliferation index KI67. In order to decide the next step in therapy, a molecular tumor profile was needed to establish potentially viable chemotherapy plans, potential interactions and prognosis scores. Other systemic therapies such as chemo- or hormonal therapy were not accepted by the patient.

Discussions

Hereditary breast cancer is still a challenge to patient care. For our patient, chemotherapy was proposed as a form of preventive treatment of metastasis due to her young age and her supposedly increased resistance to chemotherapeutics, in spite of clear evidence of metastasis. To motivate this choice of treatment a liquid biopsy for circulating tumor DNA (Heitzer et al., 2015) (released by dying malignant cells which have left the initial site of the neoplasm) is required – however, this method is not fully validated in the case of breast cancer. Furthermore, genetic testing of the extracted tumor, such as OncoType Dx (McVeigh et al., 2014), would also be required to establish the efficiency of chemotherapeutics.

Based on the age of onset and positive family history, a BRCA mutation was suspected. However, unveiling the mutation for CHEK2 opens a Pandora's box of potential malignancies to screen for. The extent of screening needed to cover both BRCA2 and CHEK2 associated cancers is impossible to apply in clinical practice. In this case, genetic testing gave us insight - however, this was at the cost of inducing anxiety in the patient.

Due to the presence of mutant pathogenic variants in the BRCA2 and CHEK2 genes, the patient needs to be informed about the increased risk of developing other forms of cancer – such as ovarian, pancreatic cancer and melanoma, in the case of BRCA2 (***, 1999), or colon (Cybulski et al., 2004) and thyroid cancer (Cybulski et al., 2004; Siołek et al., 2015), in the case of CHEK2. Prevention of these forms of cancer needs to be carried out as well, through early screening (where available). For ovarian cancer, which poses a high risk of developing in patients with a recent medical history of breast cancer and positive genetic testing (Siołek et al., 2015), prophylaxis can be performed through hormonal therapy - due to the presence of estrogen and progesterone receptors in the breast tissue, complete hysterectomy being a last-resort choice in the case of young women.

There is scarce information about the particular pathogenic variant of the CHEK2 gene (Cybulski et al., 2015) and the overall correlation of this gene's mutant forms with any particular form of cancer. Although this gene has been seen as an adjuvant gene in triggering the malignant growth, its sole potency is still unknown. Research has been conducted on restricted populations to show that CHEK2 pathogenic variants can induce a higher risk on their own (Cybulski et al., 2011), but their function is still unknown in the process of malignant development. Through further research, we could gain a better knowledge of this gene's particular role in the development of neoplasms, aiding

us in understanding this disease and in improving our prophylactic measures.

This case also brings awareness regarding hereditary male breast and prostate cancer. The patient's descendants have a high risk of developing these two forms (Siołek et al., 2015; Silvestri et al., 2016): this poses the problem of early screening – a domain that still needs research and the proposal of new techniques and markers, due to the controversial nature of current methods (such as PSA testing for prostate cancer) (Cuzick et al., 2014). The potential to transmit the mutation to descendants is another cause of distress in a patient diagnosed with a hereditary form of cancer.

While hereditary breast cancer only accounts for up to 10% of breast cancer cases, a screening program for it is a dire need for our society. A diagnosis of hereditary cancer brings a heavy emotional burden to the patient - accepting invasive treatment, accepting the possibility of a further cancer, as well as the potential to transmit any mutation to offspring. Although our first thought is to introduce genetic testing as a screening method for patients with positive family history, we cannot rule out *de novo* mutations that put at risk not only the patient, but also the next generations. This, alongside financial reasons, is why genetic testing may not surface as a mainstream screening technique for years to come - in spite of its dramatic effects on therapeutic management in selected cases.

Conclusions

1. The diagnosis of breast cancer in a relatively young patient with positive oncological family history brings forward the suspicion of hereditary cancer.

2. Once confirmed, a diagnosis of hereditary cancer has implications for the patients' treatment and prognosis, as well as screening relatives for carrier status.

Conflicts of interests

There are no conflicts of interests.

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REVIEWS

A new approach to the role of antagonist muscle contraction synergism in plyometric training

O nouă abordare a rolului mușchilor antagoniști în sinergismul contracțiilor, din perspectiva antrenamentului pliometric

Nicolae Neagu, Alexandra-Camelia Gliga, Tiberiu Bățagă
Department of Functional and Complementary Sciences, University of Medicine, Pharmacy, Science and Technology of Târgu Mureș, Romania

All authors have equal contributions to this study

Abstract

Plyometric training is a training method dedicated specifically to high performance athletes, involving a general effort of psycho-physical commitment, with explosive movements being executed or repeated at very short time intervals. The main goal of plyometric training, through its systematic organization, is the induction, over time, of structural and functional changes in the muscle groups of interest, with optimizing influences on individual sports performance, especially from a topokinetic perspective.

The primary requirement in plyometric training is that the time parameter between two consecutive executions must be permanently measured and controlled by the coach, with an aim for the involved duration defined as the latency time to achieve an ideal of zero seconds.

The defining feature of this training, given by an extremely short temporal relation between an overcoming movement phase (e.g. upward jump, push, extension) and a yielding movement phase (e.g. damping, flexion), implies that the duration of the two phases is of the order of fractions (tenths or hundredths) of a second. The ideal minimal pursued time is "zero" seconds, the muscle contractions in the two phases usually having the same direction but opposite senses.

Plyometric training does not specifically require the development of muscle mass or volume (muscle hypertrophy), but the development of an extremely powerful and rapid explosive force, generated through the contribution of a minimum body muscle mass and maximum physical and mental commitment from an athlete.

Key words: plyometric training; vectorial magnitudes; muscle synergism; eccentric workout.

Rezumat

Antrenamentul pliometric este o modalitate de pregătire sportivă, dedicată în mod special sportivilor de performanță consacrați, desfășurată cu un efort general de mare angajament psiho-fizic, mișcările explozive fiind executate sau repetate la intervale foarte scurte de timp. Scopul principal al antrenamentului pliometric, prin organizarea lui sistematică, este producerea, în timp, a unor modificări structurale și funcționale la nivelul grupelor musculare interesate, cu influențe optimizante asupra performanței sportive individuale, mai ales din perspectivă topocinetică.

Cerința primordială în antrenamentul pliometric este aceea că parametrul durată dintre două execuții trebuie măsurat și controlat în permanență de antrenor, durata respectivă, definită ca timp de latență, trebuind să tindă spre un ideal de zero secunde.

Caracteristica definitorie a acestui antrenament, dată de un raport temporal extrem de scurt dintre o fază a mișcării de tip învingere (ex. desprindere, împingere, extensie) și una de tip cedare (ex. amortizare, flexie), presupune ca durata dintre cele două faze să fie la nivel de fracțiuni de secundă (zecimi sau sutimi). Idealul temporal minim urmărit este „zero" secunde, contracțiile musculare din cele două faze având, de obicei, aceeași direcție, dar sensuri opuse.

Antrenamentul pliometric nu urmărește, în mod expres, dezvoltarea masei sau a volumului muscular (hipertrofia musculară), ci dezvoltarea unei forțe explozive, extrem de puternice și rapide, realizată prin contribuția unui minimum de masă musculară corporală și a unui maximum de angrenare fizică și psihică, din partea unui sportiv.

Cuvinte cheie: antrenament pliometric; mărimi vectoriale; sinergism muscular; lucru excentric.

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Address for correspondence: University of Medicine, Pharmacy, Science and Technology, Târgu Mureș, Gheorghe Marinescu Str. No. 38, PC 540139, Romania
E-mail: neagu.nicolae@umftgm.ro
Corresponding author: Nicolae Neagu, e-mail: neagu.nicolae@umftgm.ro
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Theoretical background

As it is known, *plyometric training* (PT) is a training method dedicated specifically to high performance athletes, which involves a general effort of psycho-physical commitment, with explosive movements being executed or repeated at very short time intervals. The main goal of *plyometric training,* through its systematic organization, is the induction, over time, of structural and functional changes in the muscle groups of interest, with optimizing influences on individual sports performance (Chu, 2016), especially from a topokinetic perspective (Neagu, 2010). It is mainly recommended in explosive force and speed sports (e.g. athletics – jumping and sprint).

The fundamental characteristic that defines *plyometric training* is the *extremely short duration*:

a) between *two extremely rapid and strong consecutive explosive executions*;

b) between *two phases* of a particular exercise, i.e. *the overcoming phase and the yielding phase*, and /or vice versa.

The primary requirement in *plyometric training* is that the *time* parameter between two consecutive executions must be permanently measured and controlled by the coach, the involved *duration* defined as the *latency time* having to aim for an ideal of *zero* seconds. Manual or electronic timing is an omnipresent prerequisite for the conduction of the plyometric training process.

Another important characteristic of executions in *plyometric training* is given by *extremely strong and rapid muscle contractions,* defined by us as *ballistic executions*, in the context of an athlete's jumping and take-off, during the specific physical training process.We took the concept of *ballistics* from mechanical physics, because we found similarities in the mechano-kinetic analysis of explosive movements in sports to the analysis of the two phases or components of the ballistics of objects moving at an extremely high speed, i.e. the analysis of internal phenomena – *internal ballistics* – and external phenomena – *external ballistics*, which generate and influence the trajectory of a bullet, shell or rocket (the field of ballistics), compared to the bio-mechano-kinetic analysis of body segments involved in explosive actions during jumping, take-off. Hence the name given to *plyometric training*: *jumping training*. The same ballistic situation is found in the case of throws in different sports such as javelin throw, discus throw, weight throw, baseball throw, etc.

A series of *physical magnitudes*, with important applicability to *plyometric training,* are *vectorial magnitudes* (Jalbă & Stănășilă, 2015), graphically represented by *vectors* $|\rightarrow|$, of which the most frequently used are: force $|\overrightarrow{F}|$, velocity $|\overrightarrow{V}|$ and acceleration $|\overrightarrow{a}|$. For example, the *force vector* $|\overrightarrow{F}|$ has the following components (Fig. 1):

a) the point of application or *the origin* = the point where the *force* acts*;*

b) the force module $|A|$ = the nominal value of *force*, expressed in newtons (*N*);

c) direction = the straight line on which the force acts (or a straight line parallel to it);

d) sense = in which the *force* acts, along the *straight line-direction*.

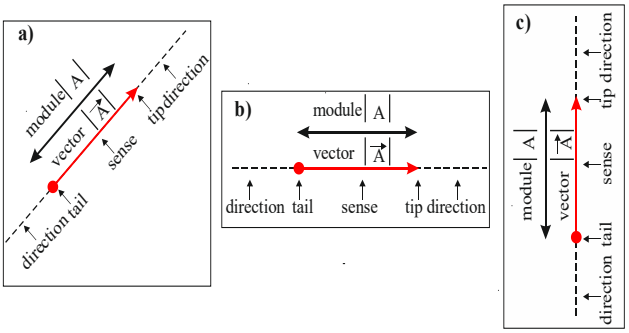

Fig. 1 – The relationship between vectorial magnitudes involved in overcoming-yielding movements. Three situations in which the movements have: a) oblique; b) horizontal; c) vertical directions

It should be mentioned that the most common *overcoming-yielding* movements in plyometric training are movements in vertical and oblique direction. These movements, termed by us *biphasic* (phase 1 – overcoming / phase 2 – yielding) and analyzed from a plyometric perspective, are unidirectional, but oriented in two opposite senses. In the context of module $|A|$, in addition to the *initial vector* $|\overrightarrow{A}|$ (generated in our case by *overcoming* muscle contractions), there is another component, the *opposite vector* $|\overrightarrow{-A}|$ (generated by *yielding* muscle contractions), which has the same *module* $|A|$ and the same *direction*, but its sense of movement is opposite to that of the first (Fig. 2, a).

When the nominal values of the vectors $|\overrightarrow{A}|$ (*initial vector*) and $|\overrightarrow{-A}|$ (*opposite vector*) are equal $|\overrightarrow{A}| = |\overrightarrow{-A}|$, a *parallel translation* finally occurs, which generates a vector $|\overrightarrow{B}|$ equal to the initial vector (Fig. 2, b).

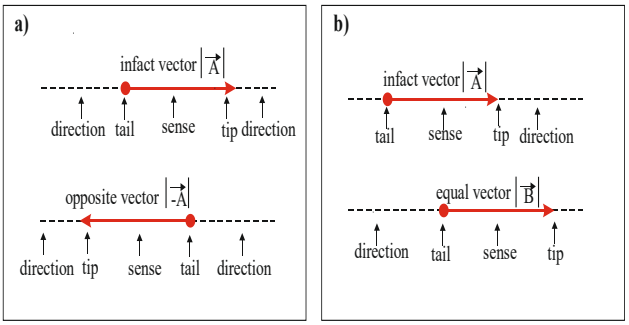

Fig. 2 – The relationship between vectorial magnitudes involved in overcoming-yielding movements. a) The situation in which movements generate the opposite vector; b) The situation in which, following parallel translation, a vector equal to the initial one is generated

Only such an analysis, based on *physical vectorial magnitudes* involved in *biphasic overcoming-yielding movements* in sport, will allow understanding the internal mechanisms that generate the *force vectors* and thus, will enable us to act effectively on the plyometric construct of maximum explosive force training, with special individual sports performance results.

The characteristics of this type of training include the *biunivocal relationship* between the *maximum explosive force* and the *minimum duration of execution*, i.e. *the speed and*

strength of contractions of the involved muscle groups (both of which are physical magnitudes, with high values) and the extremely short duration of the *latency time* (LT) between two consecutive contractions, which most frequently generate *unidirectional movements* but act, as mentioned before, in opposite senses: *overcoming* ↔ *yielding*.

In sports practice, this motor sequence – the overcoming-yielding bio-mechano-kinetic (BMC) couple is not of particular interest if considered in isolation. The major interest, as a fundamental goal in plyometric training, resides in the extremely rapid transition from the yielding phase to a new overcoming phase. This aspect becomes essential in structuring plyometric exercises with effects on the pursued performance objectives.

If, during the succession of several motor actions (cyclic or acyclic), an extremely rapid shift from one phase to another or from one couple BMC1 to another, BMC2, is not pursued, the main objective of the plyometric training concept will not be achieved (Fig. 3).

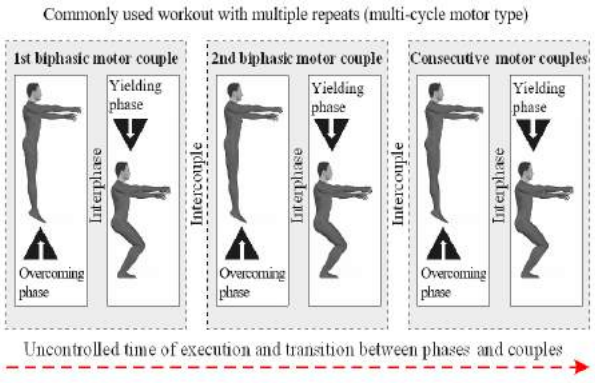

Fig. 3 – Uncontrolled time transition between two consecutive phases

This is a key element in the design and implementation of plyometric training in sports practice, which involves continuous instrumental monitoring of execution times as well as latency times (Fig. 4).

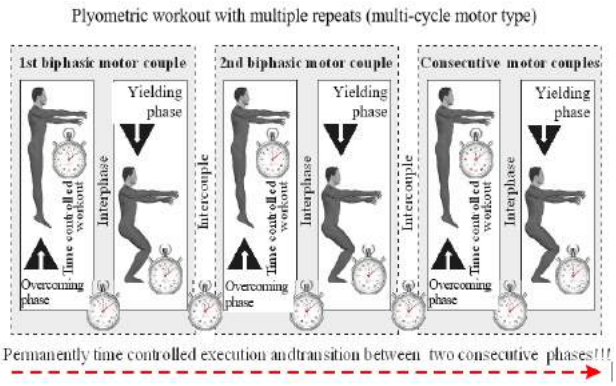

Fig. 4 –Time control execution and transition between two consecutive phases

This methodological requirement is maintained in the case of plyometric training with bars, dumbbells, sandbags or weights, elastic bands or other objects. The opposing internal forces (e.g. body weight) are complemented with resistance generated by the additional nominal weight of the objects used (e.g. weight bars or free weights, medicinal balls, etc.) or by resistive forces (e.g. elastic bands). To all these opposing elements, gravitational acceleration, omnipresent in any motor environment, is added.

This real biphasic motor repetition, yielding-overcoming or overcoming-yielding, which must tend towards zero seconds between the two phases, represents the fundamental objective of plyometric training in sports in which maximum explosive force MEF (take-off) is the predominant objective to develop the motor skill concerned and is determinant in obtaining exceptional performance in a particular sport.

In the literature, *plyometric training* is also known as *stretch-shortening cycle exercise training* (Faigenbaum, 2011; Ryoichi et al., 2016; Guex et al., 2016). In fact, this involves a short series of extremely rapid and strong successive muscle contractions (with more or fewer repeats), all of them *eccentric*, performed as single executions or series (cycles) of executions, ending with an equally rapid and strong *concentric muscle contraction* (Bullimore et al., 2007; Kosterina et al., 2008; McDaniel et al., 2010; Cadore et al., 2014; Franchi et al., 2017).

This *bio-mechano-kinetic pattern* or *couple* (BMCC), produced by *two antiparallel forces* of opposite sense and possibly, of equal intensities, can be just a sequence of several motor actions that repeat in a kinematic chain, characterized by a high *execution speed*, *maximum explosive force*, and exceptional *adrenergic engagement*. The resulting force is much greater than that produced in the absence of muscle stretching, *eccentric muscle workout* (EMW) (Herzog, 2014; Walcott & Herzog, 2008; Baroni et al., 2015; Coratella & Schena, 2016; Douglas et al., 2016), which precedes muscle shortening, through *concentric muscle workout* (CMW) (Fig. 5, Fig. 6).

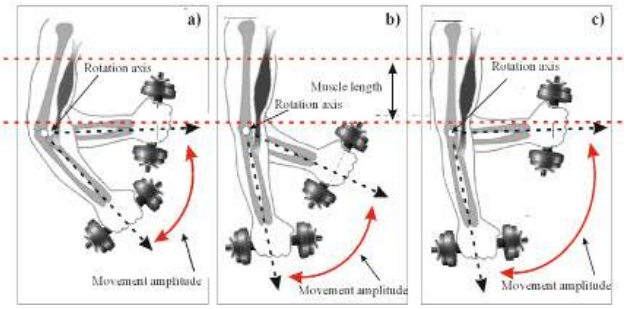

Fig. 5 – Eccentric workout procedure – three situations.

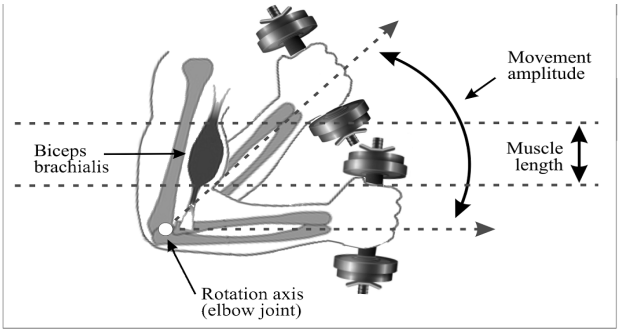

Fig. 6 – Concentric workout procedure

Referring to plyometric training, Zatsiorski stated as early as the seventh decade of the 20th century that the force produced by plyometric work is about 1.5 times higher than that produced by isometric work (Zatsiorski, 1966).

In a book on plyometric training for the development of maximum force, Gill Cometti maintained that plyometric muscle work is more important than isometric muscle work (Cometti & Cometti, 2012). In order to differentiate plyometric training from other muscle work modalities, Gille Cometti describes plyometric muscle action as occurring when a muscle in tension is first subjected to lengthening (eccentric phase) and subsequently contracts, undergoing shortening (concentric phase).

Eccentric workout (EW) is defined as considerable internal tensioning of a muscle, through voluntary contractions, with the muscle in a lengthened position, having a significantly elongated length of constituent fibers (Fig. 7).

In contrast, *concentric workout* (CW) is defined as considerable internal tensioning of a muscle, through voluntary contractions, with the muscle in a shortened position, having a length of constituent fibers below their length limit at rest.

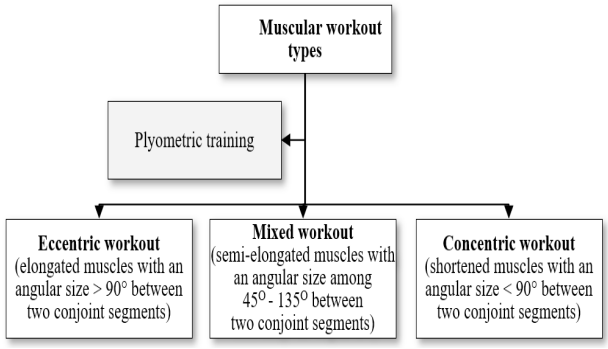

Fig. 7 – Muscle workout types in plyometric training

At the same time, in such a situation, this succession should meet at least three conditions in order to fit into the plyometric training pattern (Fig. 8).

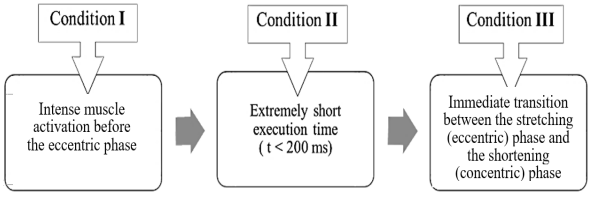

Fig. 8 – The three conditions for the succession of phases of a plyometric muscle action (Cometti, 2004)

The mechanical couple of antiparallel forces, resulting from a stretch-shortening muscle activity or, in other words, the eccentric-concentric action essentially underlies the development of the *plyometric training* concept. A sometimes overlooked particularity of plyometric execution is the fact that the involved dynamic forces are minimized or even suppressed at the end of the muscle action (Fig. 9, Fig. 10) (Gambetta, 2001).

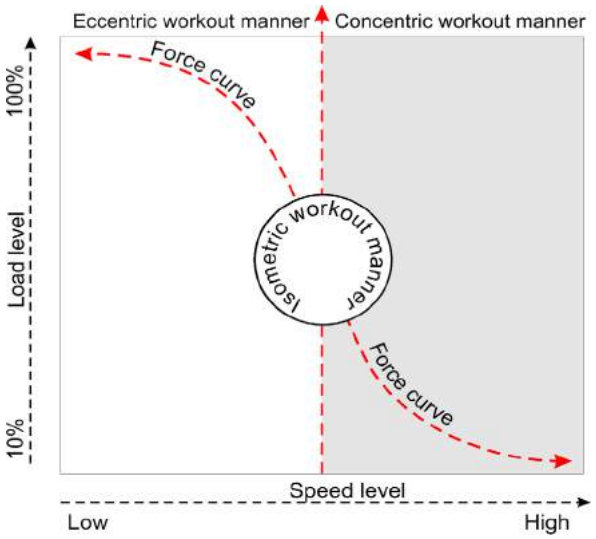

Fig. 9 – Force development in relation to the type of work, load and speed. Adapted from Edgerton's model (Edington & Edgerton, 1976), modified by Miller (Miller, 1997)

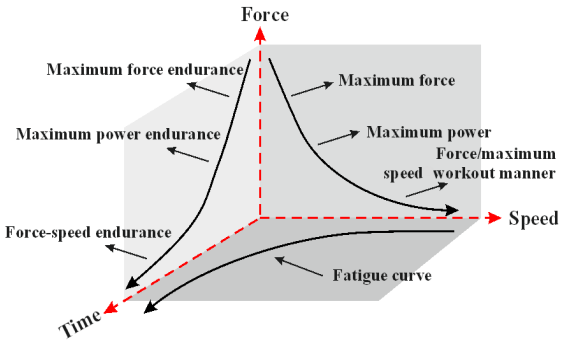

Fig. 10 – The theoretical model used by Edgerton (Edington & Edgerton, 1976)

As mentioned before, the defining feature of plyometric training, given by an extremely short temporal relation between an overcoming movement phase (e.g. upward jump, push, extension) and a yielding movement phase (e.g. damping, flexion), implies that the duration of the two phases is of the order of fractions (tenths or hundredths) of a second. The *ideal minimal pursued time* is "zero" seconds, the muscle contractions in the two phases usually having the same direction but opposite senses. In the analysis of movements, the chronological order of the two types of contractions can be reversed: overcoming ↔ yielding; yielding ↔ overcoming (Fig. 11).

In the case of exercises performed in the absence of loading (e.g. without weight bars, dumbbells, sandbags, etc.), *the opposing forces* that should be overcome in plyometric training are most frequently:

a) body weight – during take-off and landing, the impact/collision of the person who performs a plyometric exercise with the ground or the equipment used;

b) gravitational acceleration – the force of reaction of the support surface or the training track.

The obstacles to overcome are the sports equipment and devices – on which, over which and from which an athlete performs various jumps or pushes, on both legs or

on one leg (the overcoming phase) – followed by landing or impact with the ground, with an extremely short duration (Schmidtbleicher, 1992) - t < 0.25 sec - of that contact (the yielding phase).

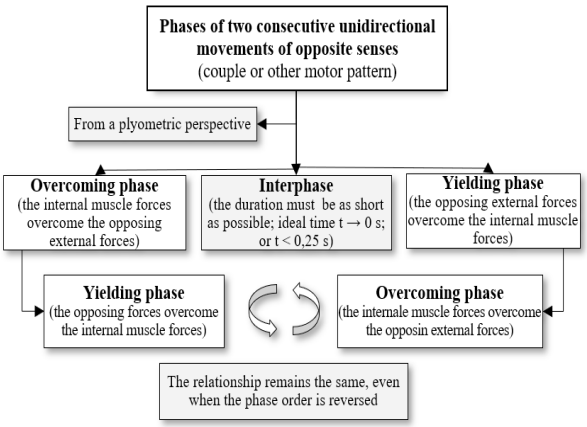

Fig. 11 – Phases of two unidirectional movements of opposite senses, from the perspective of plyometric training

Effects and objectives pursued through plyometric training

Due to the particular aspects presented above, plyometric training does not specifically require the development of muscle mass or volume (muscle hypertrophy), but the development of an extremely powerful and rapid explosive force, generated through the contribution of a minimum body muscle mass and maximum physical and mental commitment from an athlete. This force should be greater than the maximum voluntary force of that athlete. If this requirement is not met, plyometric training does not achieve the fundamental objective for which it was designed.

In chronological order, the manifest effects produced by a plyometric training system can be grouped into three moments (Gambetta, 2006; Gambetta, 2007):

- M1 – during and immediately after a training session, termed *immediate acute effects*
- M2 – after a certain training cycle – stage or period – called *cumulative late effects*
- M3 – effects maintained after the interruption of a training cycle (usually, meso- or macrocycle) – termed *residual effects* (Fig. 12)

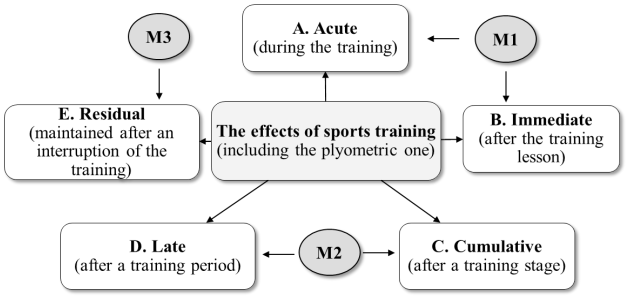

Fig. 12 – The moments and effects of sports training (adapted from Gambetta, 2010).

One of the effects of plyometric training, which is not treated from a temporal point of view, is *collision impact control* (CIC), achieved by athletes on the body and body segments of interest during plyometric exercises. Also, muscle stretching followed by muscle contraction – if correctly performed – leads to a significant increase in *dynamic forces* produced by muscles, determining the development of the vertical or oblique upward movement capacity and, extremely importantly, to a *reduction of the action of impact forces* (RAIF), which have negative effects on the joints (particularly the knee and ankle joints), as well as on the bones involved (e.g. the tibia and fibula), at the time of the contact with the track surface. The increased incidence of chronic tibial periostitis (e.g. in triple jumpers) is an example and an undesired consequence of disregarding the principles and methodological requirements of sports training in general and plyometric training in particular.

Awareness of the execution of take-off, by jumping or bouncing, takes place in a setting that is permanently controlled by the athlete – motor control and progressive interrogation (Proteau, 1992) – which will subsequently allow the athlete to automatize that execution at maximum explosive force parameters and to focus on the execution technique of muscles initiating the movement concerned (e.g. agonists and synergists), as well as on the correlation of their action with that of partner muscles (e.g. antagonists), which become *cooperating* muscles helping the execution of agonists, and not necessarily *opposing* the action of agonists (Fig. 13, Fig. 14).

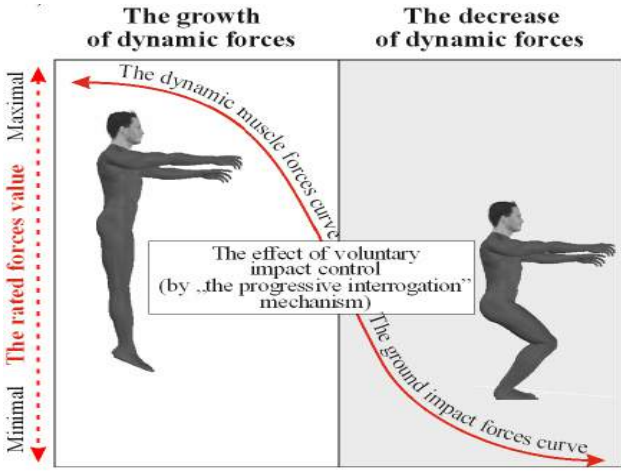

Fig. 13 – Effects of voluntary impact control by the athlete, based on the progressive interrogation mechanism

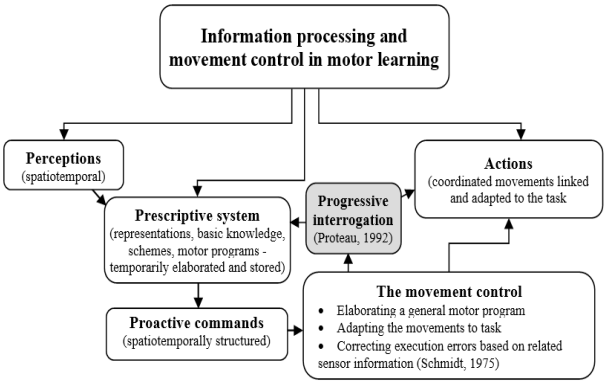

Fig. 14 – Information processing and movement control in motor learning

This effect, termed by us *mutual reinforcement* (Neagu, 2010), is particularly beneficial, especially in sports where jumping plays an important role, such as athletics, basketball, volleyball, artistic gymnastics, aerobic gymnastics, figure skating, etc. – where the lower body is involved, or in martial arts, throwing in athletics or sports games, tennis, baseball, rounders, boxing, etc. – where the upper body is involved (Fig. 15).

Plyometric training enables athletes to enhance the power of the muscles concerned (strength-speed), even at a maximum or extremely high execution speed, in which situation it is known that the "power" parameter is not at its maximum level in conventional sports training.

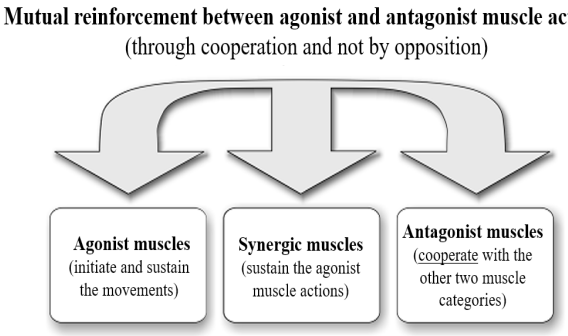

Fig. 15 – Mutual reinforcement between the three categories of cooperating muscle groups in a plyometric exercise, including antagonist muscles

It is possible that during the extremely rapid execution of a movement, the high execution speed – i.e. the muscle contraction speed – may not be accompanied by adequate power that equally manifests at maximum parameters. Hence the concept of *plyometric movement*, which is less used by Romanian trainers.

Muscle synergism in plyometric training

Any theoretical approach to muscle contractions and the actions of muscles participating in various movements discusses three basic concepts: *agonist muscles, synergistic muscles and antagonist muscles* (Fig. 16, Fig. 17).

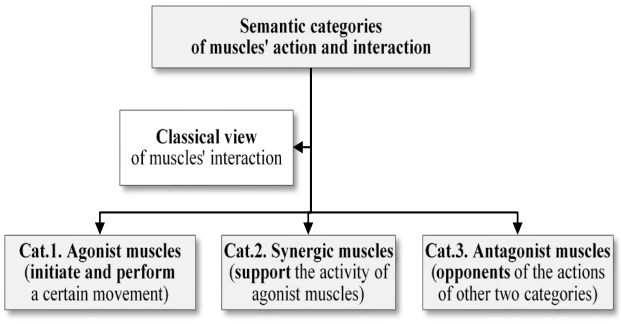

Fig. 16 – Semantic categories of muscle action and interaction, according to the classical approach

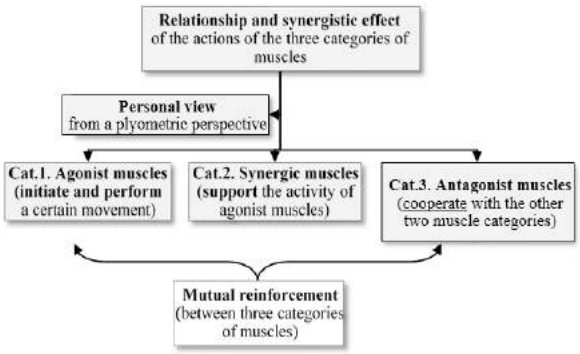

Fig. 17 – Relationship and synergistic effect of the three categories of muscles, from a plyometric perspective

In the plyometric approach, as shown by the comparison of the two figures above, antagonist muscles are not seen as *opposing muscles*, but as *buffer muscles,* which through their action become *muscles cooperating* with the other categories involved in a particular movement. Thus, a *mutual reinforcement* relationship forms between the three categories of muscles, with beneficial effects on the explosive force developed by these.

A frequently neglected aspect is the lack of knowledge or awareness or the extremely limited use of two other concepts that we wish to introduce in the terminology of plyometric training. These are *proximal muscle synergism* and *distal muscle synergism*, in the analysis and execution of movements, from the perspective of plyometric training.

When referring to the *proximal synergism* of muscles participating in a certain movement, the usual semantic interpretation, known by specialists in this area, is that of the action of *synergistic muscles*, adjacent to *agonist muscles*, which initiate and execute a movement that is immediately supported by the action of *synergistic muscles*.

In about 25 years of career as an athletics coach and professor, we observed that the concept – here defined by us as *distal synergism* – was rarely analyzed in detail as potentiating the execution of agonist and synergistic muscles. In other words, only *combined work* or *arm-leg coordination* – termed *opposite arm-leg work*, during running, or *arm work* during run-up before take-off or during flight and landing, in jumping, was and is discussed (Fig. 18).

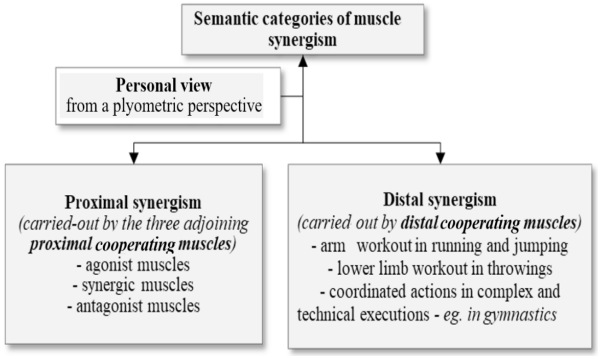

Fig. 18 – Semantic categories of muscle synergism, from a plyometric perspective

Conclusions

1. The major interest, as a fundamental goal of plyometric training, resides in the extremely rapid transition from the yielding phase to a new overcoming phase. This aspect becomes essential for structuring plyometric exercises with effects on the pursued performance objectives.

2. This is a key element in the design and implementation of plyometric training in sports practice, which involves continuous instrumental monitoring of execution times as well as latency times.

3. Plyometric training enables athletes to enhance the power of the muscles concerned (strength-speed), even at a maximum or extremely high execution speed, in which situation it is known that the "power" parameter is not at its maximum level in conventional sports training.

4. A frequently neglected aspect is the lack of knowledge or awareness or the extremely limited use of two other concepts that we wish to introduce in the terminology of plyometric training. These are proximal muscle synergism and distal muscle synergism, in the analysis and execution of movements, from the perspective of plyometric training.

Conflicts of interest

Nothing to declare.

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Arterial pathology of the upper limb in athletes

Patologia arterială a membrului superior la sportivi

Ioana Para [1], Mira Florea [2], Teodora Alexescu [1], Lorena Ciumarnean [1], Nicoleta Leach [1], Adriana Albu [3]
"Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca
[1] 4th Medical Clinic
[2] Department of Community Medicine
[3] 2nd Medical Clinic

Abstract

Sports activities, at any level, expose athletes to high physical strain. Musculoskeletal lesions are the most frequent cause of pain or functional impotence in athletes. In addition to musculoskeletal lesions, they can develop traumatic or non-traumatic vascular disease, arterial or venous.

The incidence of vascular involvement in athletes is increasing, especially in sports characterized by repetitive movements or in which high speed collision occurs. Unfortunately, vascular disease in athletes is frequently overlooked.

Delayed diagnosis may have serious consequences on both the affected limb, resulting in loss of mobility or even amputation, and subsequent sports activity, leading to withdrawal from sport.

In this paper, we focused on the non-traumatic arterial pathology of the upper limb in athletes, presenting the symptoms and red flags that should be taken into consideration by the doctor, as well as diagnostic methods. We also described the treatment and rehabilitation methods required for resumption of sports activity.

Key words: athletes, physical exercise, arterial involvement, upper limb arteries

Rezumat

Activităţile sportive, la orice nivel, supun sportivii la o mare solicitare fizică. Leziunile musculo-scheletale reprezintă cea mai frecventă cauză de durere sau impotenţă funcţională la sportivi. Pe lângă lezunile musculoscheletale, ei pot dezvolta şi o afectare vasculară (traumatică sau nontraumatică) arterială sau venoasă.

Incidenţa afectării vasculare la sportivi este în creştere, în special în sporturile caracterizate prin mişcări repetitive sau în care apar coliziuni de mare viteză. Din păcate afectarea vasculară la sportivi, este frecvent trecută cu vederea.

Întârzierea diagnosticului poate avea consecinţe grave, atât asupra membrului afectat, putând duce la pierderea mobilităţii sau chiar la amputare, cât şi asupra activităţii sportive ulterioare, putând duce la retragerea din sport.

În lucrarea de faţă ne-am oprit asupra patologiei arteriale nontraumatice a membrului superior la sportivi, cu prezentarea simptomelor şi semnelor de alarmă care trebuie luate în considerare de către medic, precum şi a metodelor de diagnostic. De asemenea, am precizat tratamentul şi mijloacele de recuperare necesare în vederea reluării activităţii sportive.

Cuvinte cheie : sportivi, exerciţiu fizic, afectarea arterială, arterele membrului superior

Introduction

Sports activities, at any level, expose athletes to high physical strain. The movements performed or positions adopted frequently test the limits of human anatomy or physiology. Musculoskeletal lesions are the most frequent cause of pain or functional impotence in athletes. In addition to musculoskeletal lesions, they can develop traumatic or non-traumatic vascular disease, arterial or venous (Mosley, 2003; Perlowski & Jaff, 2010; Para et al., 2015).

The incidence of vascular involvement in athletes is increasing, especially in sports characterized by repetitive movements or in which high speed collision occurs. Unfortunately, vascular disease in athletes is frequently overlooked. This is due, on the one hand, to the fact that these are young, otherwise healthy persons, in whom vascular disease seems unlikely, and a musculoskeletal cause explaining the symptoms (pain, muscle weakness or functional impotence) is more plausible. On the other hand, on clinical routine examination performed at rest,

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Address for correspondence: 4th Medical Clinic, 18 Republicii Street, Postal Code 400015, Cluj-Napoca
E-mail: miraflorea17@gmail.com
Corresponding author: Mira Florea, miraflorea17@gmail.com
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pathological changes may not occur, which requires the use of specific triggering procedures and imaging investigations to establish diagnosis. Delayed diagnosis may have serious consequences on both the affected limb, resulting in loss of mobility or even amputation, and subsequent sports activity, leading to withdrawal from sport (Mosley, 2003; Akuthoka & Casey, 2009; Perlowski & Jaff, 2010; Para et al., 2015).

Arterial involvement in athletes may occur post-traumatically, following open or closed trauma, which is beyond the scope of this paper. However, it may also occur in the absence of obvious trauma, through repetitive intense overstrain of a particular area, during training. Hemodynamic and mechanical stress not only affects the musculoskeletal system, but can also lead to arterial involvement by: kinking, compression, stenosis or thrombosis, the development of aneurysms or even artery dissection (Casey et al., 2009; Akuthoka & Marlowki, 2009).

Arterial pathology of the upper limb

Thoracic outlet syndrome (TOS)

TOS is a neurovascular compression syndrome of the thoracic outlet, which was first described by Peet in 1956 (Laker et al., 2009). The thoracic outlet is delimited between: the scalene triangle (formed by the anterior, middle and posterior scalene muscles), the costoclavicular space (delimited between the clavicle and the first rib), and the subcoracoid space (delimited between the pectoral muscle and the coracoid process). The brachial plexus, the subclavian artery and vein pass at this level (Akuthoka & Marlowski, 2009; Laker et al., 2009; Perlowski & Jaff, 2010; Para et al., 2015).

TOS comprises 2 distinct types: neurogenic, which is more frequent (90% of cases) and vasculogenic, which occurs more rarely (3-5% of cases). Vasculogenic TOS can be in turn venous: Paget-Schroetter syndrome, or arterial (less common) (Laker et al., 2009; Klaasen et al., 2014; Kuhn et al., 2015).

Vascular compression more frequently occurs in the scalene triangle and is due to the presence of the cervical rib (0.5-1.5%), first rib malformations or scalene muscle changes secondary to sport practice. Although rare in athletes, it may have devastating effects (Koffer & Kelly, 2002; Perlowski & Jaff, 2010; Povlsen & Povlsen, 2018; Larsen, 2018).

Subclavian artery stenosis/aneurysm

It is the rarest manifestation of TOS. It occurs in sports involving frequent elevation of the arm: baseball (pitchers), weight lifting, tennis, volleyball, basketball, handball, swimming. Artery stenosis occurs through repeated injuries due to mechanical arterial compression during the arm elevation movement, through the cervical rib, first rib malformations or scalene muscle hypertrophy. Post-stenotic dilatation can lead to arterial wall degeneration and aneurysm development (Mosley, 2003; Laker et al., 2009; Perlowski & Jaff, 2010; Thompson & Driskill, 2008).

Athletes clinically complain of: muscle weakness, pain in the shoulder or upper limb increased by elevation of the arm, paresthesia, a sensation of cold. In case of microembolism, digital ulcers or gangrene may occur (Laker et al., 2009; Akuthoka & Maslowski, 2009; Perlowski & Jaff, 2010; Kuhn et al., 2015).

Objective examination can evidence sensitivity on palpation of the scalene muscle or the supraclavicular region, or a supra- or infraclavicular pulsatile mass can be palpated in the case of aneurysm. The upper limb skin is cold, pale, and pulse (brachial, radial, ulnar) is diminished or absent. Differences in arterial pressure between the two arms can be observed, or digital ulcers or gangrene can be present (Laker et al., 2009; Perlowski & Jaff, 2010; Reeser, 2007).

The following complementary examinations are useful: chest X-ray (to evidence bone abnormalities), color Doppler ultrasound (to assess blood flow and evidence possible aneurysms), angio-CT (computed tomography arteriography) or angio-MRA (magnetic resonance arteriography) (useful for diagnosis particularly when performed with the arm in maximum abduction and external rotation, also providing information about the anatomy of adjacent muscles and bones). The gold standard for diagnosis is catheter arteriography (evidencing artery stenosis or aneurysm) (Gillard et al., 2001; Akuthoka & Casey, 2009; Gillet et al., 2018; Povlsen & Povlsen, 2018).

Treatment involves non-surgical measures: adjustment of activity with the avoidance of arm elevation movements and kinesiotherapy to stretch and strengthen the scalene and pectoralis minor muscles, and to strengthen the posterior scapular stabilizer muscles.

If these are not effective, surgical treatment can be performed: thoracic outlet decompression (scalenectomy, cervical rib or first rib resection), endarterectomy, removal of the aneurysm, bypass with vein graft. In case of microembolism, catheter thrombolysis can be conducted, and in refractory cases, thrombectomy is used (Mosley, 2003; Perlowski & Jaff, 2010; Povlsen et al., 2014).

Axillary artery stenosis/aneurysm

It is less frequent than subclavian artery stenosis and is found in baseball players (pitchers) and volleyball players. Compression occurs as the artery passes beneath the pectoralis minor muscle tendon when the humeral head shifts forward. Over time, arterial wall intimal hyperplasia occurs with: stenosis, aneurysmal degeneration with thromboembolism or even arterial dissection (Arko et al., 2001; Newton, 2006; Reeser, 2007; Thompson & Driskill, 2008; Duwayri et al., 2011).

Symptoms are the same as in subclavian artery stenosis/aneurysm, with progressive development in the case of stenosis/aneurysm or sudden onset in the case of arterial embolism. Clinical examination evidences cold, pale skin, diminished or absent pulse (brachial, radial, ulnar). Differences in arterial pressure between the two arms occur, and in severe forms, digital ulcers or gangrene are present (Mosley, 2003; Perlowski & Jaff, 2010; Duwayri et al., 2011).

Complementary examinations are the same as for subclavian artery involvement. It should be mentioned that for conclusive arteriography, this should be performed with an elevated arm in external rotation (a position in which arterial occlusion occurs) (Akuthoka & Casey,

2009; Perlowski & Jaff, 2010; Gillet et al., 2018).

Treatment should start with anticoagulant therapy, or catheter thrombolysis can be performed if a thrombus is present, before surgery. Definitive treatment is surgical. Stent angioplasty or bypass with vein graft can be carried out. Recovery after surgery lasts about 3 months (Molina et al., 2007; Reeser, 2007; Povlsen et al., 2018).

Quadrilateral space syndrome

It occurs in athletes with intense activity of the shoulder: baseball players (pitchers) and volleyball players (Mosley, 2003).

The quadrilateral space is formed by: the teres minor muscle superiorly, the teres major muscle inferiorly, the long head of the triceps medially and the humerus laterally. The posterior circumflex humeral artery arises from the distal third of the axillary artery and traverses the quadrilateral space along with the posterior axillary nerve. It may increase in diameter by 7-8 mm in baseball players and thus, it is susceptible to compression, particularly in the context of adjacent muscle hypertrophy (Mosley, 2003; Akuthoka & Maslowski, 2009; Perlowski & Jaff, 2010; Welsh et al., 2013).

The following symptoms are described: discomfort in the scapular girdle, paresthesia, numbness, muscle weakness in the arm in abduction and external rotation. Distal microembolism symptoms may occur in the case of aneurysm development (Akuthoka & Maslowski, 2009; Perlowski & Jaff, 2010).

Diagnosis is usually incidental, on the occasion of MRI examination for assessment of a discomfort in the shoulder, when atrophy and fat loading of the teres minor muscle are found. Definite diagnosis is established by arteriography (with the arm in maximum abduction and external rotation) (Dugas & Weiland, 2000; Akuthoka & Casey, 2009; Perlowski & Jaff, 2010).

Treatment consists of surgical decompression of the quadrilateral space associated with rehabilitation kinesiotherapy (Duralde, 2000; Perlowski & Jaff, 2010).

Palmar arterial arch injury

It occurs in sports involving strong blows to the palm of the hand (cricket, baseball (catchers), handball), which can lead over time to palmar arterial arch injury, with the development of arterial thrombosis or the formation of aneurysms (Mosley, 2003; Perlowski & Jaff, 2010).

Hypothenar hammer syndrome is typical, being described in baseball players – catchers, in whom the palmar branch of the ulnar artery as it passes over the hammer bone is affected (Mosley, 2003; Perlowski & Jaff, 2010).

The symptoms described include pain in the palm or fingers, paresthesia, a sensation of cold in the fingers or Raynaud-like symptoms (episodic pallor-redness) (Mosley, 2003; Akuthoka & Maslowski, 2009; Perlowski & Jaff, 2010).

Clinical examination evidences painful sensitivity on palpation of the hand or fngers, or a pulsatile mass is palpated in the case of ulnar artery aneurysm (Arko et al., 2001; Mosley, 2003; Perlowski & Jaff, 2010).

The following investigations can confirm diagnosis: angio-MRA, angio-CT or color Doppler ultrasound of the hand, which can show palmar arterial arch thrombosis or aneurysm. Definite diagnosis is established based on catheter arteriography of the upper limb (Akuthoka & Casey, 2009; Perlowski & Jaff, 2010).

Treatment is conservative and consists of avoiding the causative movements, wearing protection gloves, administering antiplatelet and vasodilator (calcium channel blocker) therapy to improve digital perfusion. Surgical treatment is indicated only if ischemia persists or if ulcers are present (Mosley, 2003; Perlowski & Jaff, 2010).

Digital ischemia

It is the final form of presentation of all forms of upper limb artery involvement. It can be due to thromboembolism (of cardiac origin, through subclavian or axillary artery stenosis/aneurysm), palmar arterial arch injury or direct injury to digital arteries with thrombosis, through repeated blows to the fingers (cricket, baseball, handball). A vasospasm in the digital arteries occurs as a result of repeated trauma associated with exposure to cold, vasoconstrictor drug use, smoking or cocaine consumption (Akuthoka & Maslowski, 2009; Perlowski & Jaff, 2010).

Paraclinical examinations useful for diagnosis are angio-CT and angio-MRA, particularly if arterial involvement is proximal, catheter arteriography being the gold standard for diagnosis (Akuthoka & Casey, 2009; Perlowski & Jaff, 2010).

Treatment depends on the cause, duration and severity of ischemia. In the case of distal embolism, anticoagulant treatment with unfractionated heparin is administered. Thrombolysis and administration of vasodilators (nitrates, Ca channel blockers) can also be used, or in refractory cases, cervical sympathetic nerve block can be performed. Surgery is indicated if there is a proximal source of thromboembolism or when thrombembolectomy or reconstruction of the brachial, radial or ulnar arteries is required (Mosley, 2003; Perlowski & Jaff, 2010).

Conclusions

1. Although arterial disease in athletes is rare, it can represent a serious handicap in young, otherwise healthy persons. It should be suspected in any athlete who has discomfort during sports activity that is refractory to conventional therapy for musculoskeletal involvement.

2. For correct diagnosis, during clinical examination and complementary investigations, the movements, positions and effort intensity specific to the sport performed should be reproduced.

3. Delayed diagnosis may have serious consequences on both the affected limb (resulting in loss of mobility or even amputation), and subsequent sports activity, leading to withdrawal from sport.

Conflicts of interest

Nothing to declare.

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Alexandru D. Rădulescu: Orthopedics and sports medicine in the middle of the twentieth century

Alexandru D. Rădulescu: Ortopedie și medicină sportivă la mijlocul secolului XX

Gheorghe Tomoaia [1, 2], Daniel Oltean Dan [2]
[1] *Academy of Romanian Scientists*
[2] *Orthopedics and Traumatology Department, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania*

Abstract
The great Romanian Union in 1918 had the effect of passing the University of Cluj-Napoca under the authority of the Romanian state. The reorganization of the University of Cluj-Napoca set in motion the whole Romanian society, especially the academic field. Representative Romanian intellectuals released a series of organizational suggestions regarding the background and content of the education system that was going to be applied in the third University of Romania. Dr. Alexandru Rădulescu was an important member of the Romanian surgery and then orthopedic society, and the founder of the Orthopedic School in Cluj. Until 1940, in this hospital, he had a rich osteoarticular traumatology activity, supported by scientific and publishing work appreciated by many specialists. The whole organization of the hospital demonstrated the advanced concepts of the young doctor Rădulescu in the field of rehabilitation of motor deficiencies. Professor Alexandru Rădulescu was an autodidact, a character and specialist trainer, an excellent teacher, an emeritus professor, an excellent clinician and author of many surgical procedures that bear his name. Nowadays, at the Great Romanian Union Centenary, Prof. Al. D. Rădulescu deserves all the honor and special recognition for his academic achievements and contributions, being a pioneer of Romanian orthopedics and sports medicine, and the founder of the Romanian Orthopedic School in Cluj-Napoca and in our country.
Key words : Alexandru Rădulescu, Romanian orthopedic history, orthopedic, traumatology

Rezumat
Desăvârșirea unității național statale românești în anul 1918 a avut ca efect și trecerea Universității din Cluj sub autoritatea statului român. Reorganizarea Universității din Cluj a pus în mișcare întreaga suflare românească, în special mediile academice. Intelectuali români de seamă au emis o serie de sugestii organizatorice privitoare la fondul și conținutul învățământului ce urma să se predea la a treia universitate din Romania. În acest context, un reprezentant de seamă al școlii de chirurgie și apoi de ortopedie a fost Dr. Alexandru Rădulescu, întemeietorul Școlii românești de ortopedie la Cluj. Profesorul Alexandru Rădulescu a înființat Spitalul de Ortopedie din Cluj pe structura unei clădiri dărăpănate, pe care o transformase într-o clădire modernă cu 60 de paturi. Până în 1940, în acest spital s a desfășurat o bogată activitate de traumatologie osteoarticulară, susținută și de o activitate publicistică apreciată de numeroși specialiști. Întreaga organizare a spitalului demonstra din plin concepțiile avansate ale tânărului medic Rădulescu în domeniul reabilitării deficienților motori. Profesorul Alexandru Rădulescu a fost un autodidact, un formator de caractere și specialiști, un pedagog excelent, profesor emerit, excelent clinician și autor al multor procedee chirurgicale care i poartă numele. A susținut o activitate impresionantă în toate planurile. Acum când se împlinesc 100 de ani de la Marea Unire, Prof. Al. D. Rădulescu merită toată cinstea și considerația pentru aportul său, fiind considerat deschizător de drum al ortopediei românești și fondator al școlii românești de ortopedie din Cluj și din țara noastră.
Cuvinte cheie: Alexandru Radulescu, Istoria ortopediei românești, ortopedie, traumatologie

The eminent Romanian scientist, Professor Alexandru D. Rădulescu, was an outstanding orthopedist and expert in sports medicine, recognized by the international scientific community. He was one of the founders of modern orthopedics and sports medicine in the middle of the twentieth century (Radulescu, 1975; Rădulescu & Baciu, 1965; Rădulescu, 1956; Rădulescu & Robănescu, 1958; Rădulescu & Dortheimer, 1957).

Professor Al. D. Rădulescu created a modern school of orthopedics and sports medicine at the "Iuliu Hatieganu" University of Medicine and Pharmacy in Cluj-Napoca. Presently, this academic school is known as Orthopedics and Traumatology, which is integrated in the Department of Orthopedics, Traumatology and Pediatric Orthopedics, under the leadership of Professor Habil. Dr. Gheorghe Tomoaia, a famous orthopedic surgeon and a well-known

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Address for correspondence: "Iuliu Hatieganu" University of Medicine and Pharmacy, Orthopedics and Traumatology Department, 47 Moșoiu Traian Str., PC 400132 Cluj-Napoca, Romania
E-mail: olteandandaniel@yahoo.com
Corresponding author: Daniel Oltean-Dan, olteandandaniel@yahoo.com
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expert in traumatology (Tomoaia, 2018; Tomoaia, 2017; Tomoaia, 2016), an associated member of the Academy of Romanian Scientists.

Alexandru D. Rădulescu (1886-1979)

Prof. Al. D. Rădulescu was the most influential orthopedist in Romania in the twentieth century, carrying out an intense activity in both clinical and academic fields, forming many personalities in the field of Romanian orthopedics. He was born in Focsani on 10 September 1886. During 1905-1911, he attended the courses of the Medical Faculty in Bucharest, having the famous surgeon Toma Ionescu as a professor. In 1920, he developed an innovative approach to a series of cases: medullary compression caused by fractures, Pott's disease, intradural lipoma. In 1923, he was appointed director of the Regina Maria Surgical Orthopedic and Tuberculosis Hospital, which was just opened in Cluj-Napoca.

Inauguration of the Orthopedic Hospital in Cluj-Napoca, in the presence of Her Majesty Queen Mary, in 1923

The Orthopedic Hospital in Cluj-Napoca was a derelict building, a former asylum for the blind, and Al. D. Rădulescu transformed it into a modern 60-bed building. Until 1940, in this hospital, he had a rich osteoarticular traumatology activity, supported by scientific and publishing work appreciated by many specialists. This hospital also included a prosthesis studio, orthosis and orthopedic footwear, physiotherapy and kinesiotherapy as well as ergotherapy sections, and a school for disabled children requiring long-term hospitalization. The whole organization of the hospital demonstrated the advanced concepts of the young doctor Rădulescu in the field of rehabilitation of motor deficiencies in children. Due to European political circumstances, in 1940 Prof. Rădulescu moved with his entire academic research team to Bucharest, where he founded the first orthopedic hospital.

In the middle of the twentieth century, Prof. Rădulescu treated the pathology of sports knee injuries according to international standards of the time. He treated knee sprains and instabilities, as well as meniscus and anterior cruciate ligament lesions. In his book "Genunchiul: Studiul clinic si terapeutic" (The knee: A clinical and therapeutic study) (Rădulescu & Baciu, 1965), he presented the means of diagnosing and managing the patient with sports knee injury, and his results. At a time when clinical examination was the only asset of physicians, Prof. Rădulescu brought forth in his book the most relevant tests for the assessment of intraarticular lesions. The systematic way of approach to the rotational instability of the knee emphasizes testing within 30 to 80 degrees range of flexion, because stabilization of the joint may hide the lesion. The academic medical research of Prof. Rădulescu represents an important basis for medical and clinical research in this millennium (Tomoaia, 2018; Tomoaia, 2017; Tomoaia, 2016; Ifrim, 2018; Iftimovici, 2015; Ursea, 2001; Ursea, 2009).

Nowadays, at the Great Romanian Union Centenary, Prof. Al. D. Rădulescu deserves all the honor and special recognition for his academic achievements and contributions, being a pioneer of Romanian orthopedics and sports medicine, and the founder of the Romanian Orthopedic School in Cluj-Napoca and in our country. He died on 11 April 1979, at the venerable age of 93 years, in Bucharest.

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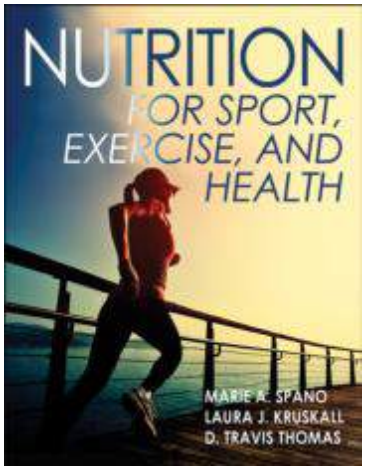
RECENT PUBLICATIONS

Book reviews

Nutrition for sport, exercise, and health
(Alimentația pentru sport, efort fizic și sănătate)
Authors: Marie A. Spano, Laura J. Kruskall, D. Travis Thomas
Human Kinetics, 2018
488 pages; Price: $75,95 (paper)/ $58,31(eTextbook)



Nowadays, there is a plethora of nutrition misinformation which is assaulting us through television, internet, magazines, etc. What is worst and most dangerous with this type of information is that besides the numerous channels of distribution, it is so accessibly formulated that it frequently becomes more attractive and persuasive than real scientific based information. It is under these circumstances that Nutrition for Sport, Exercise, and Health, the latest book in the field of Human Kinetics, brings the most recent practical information that people - whether involved in sport or not - need to know and apply for improving their everyday lives and performances.

Being organized in a logical sequence, the text covers not only the basics of nutrition for health and disease prevention, and for training and sports, but also practical information on assessing and improving body composition. All this content makes it an excellent backed-by-science source of knowledge for large categories of students and professionals involved in human health and performance.

The full-color text includes over 40 photos and more than 130 illustrations, whereas each chapter contains several very useful features - chapter objectives, key terms, review questions, and others - which facilitate and enhance the understanding and acquisition of the content.

From a structural perspective, the text is organized into four parts and 14 chapters. The first part is the shortest, being composed of only two chapters, while each of the next parts has an additional chapter compared to the previous one.

Part I provides the readers with general information on nutrients and nutrient requirements in the first chapter, and also on energy metabolism in the second chapter, within which we consider of special practical interest the section related to the measurement of energy intake and expenditure. The three chapters of the second part are dedicated to macronutrients: carbohydrates, fats, and proteins. In each case, the text addresses nutrient digestion, absorption and metabolism, as well as specific aspects of these, such as glycemic response, triglycerides and health, and the impact of protein deficiency or excess, respectively. The 5th chapter deals with protein quality and its importance, with vegetarianism and veganism. The effects of micronutrients (vitamins, minerals, and water plus electrolytes) on human health and performance are presented within the first three chapters of the third part, while the final one - the 9th chapter - provides all the necessary updated information on nutritional supplements, drugs commonly used in sports, and alcohol. Finally, the 4th part, "Application of nutrition for sport, exercise and health", contains the last five chapters. Two of these - namely the 10th and the 13th chapters - deal with different aspects of the same topic: body weight and composition. This separate distribution seems to be explained by the authors' desire to exclusively allocate the last four sections of the book to applicative aspects: "Nutrition for aerobic endurance" (chapter 11), "Nutrition for resistance training" (12), "Changing weight and body composition" (13), and "Nutrition concerns for special populations" (14).

Gheorghe Dumitru
gdumitru@seanet.ro

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Fencing in Cluj. Memorial album of the bicentenary in Cluj, 1818-2018
(Scrima din Cluj. Album memorial al bicentenarului din Cluj 1818-2018)
Authors: Collective. Asociația prietenilor scrimei din Cluj
Centrul de presă reformat Misztótfalusi Kis Miklós, 2018
219 pages; 221 photos.

The album is structured into 11 chapters, masterfully written by several authors, good connoisseurs of fencing in Cluj, some of them former high performance fencers. We mention Dr.Gurath Bela, Dr. Killyény András, Dr. Geréb Zsolt, Dr. Uray Zoltán, Dr. Habala Péter Pál, László F. Csaba. Professional consultancy was provided by the veteran fencer Dr. Iuliu Ovidiu Marian, which is acknowledged in the preface of the album by Dr. Guráth Béla.

Chapter I, entitled *Cluj fencers and their fencing masters in the period 1818-1971*, a basic chapter of the monograph, is an overview of Cluj fencers and their masters in the period 1818-1971. The first épée instructor was an Italian, Gaetano Biazini, who settled in Cluj and opened in 1918 the first fencing salle within the precincts of the Bastion (the current Ethnographic Museum of Transylvania), where only the aristocrats of the time trained, which became a public institution in 1824. Initially, the instructors were outstanding members of the local aristocracy; later, these could also be military officers. After the university was founded in 1872, in 1885 the KAC club was created, which was a Hungarian sports association mainly attended by Hungarian students. Fencing in Cluj developed until 1914, when World War I broke out. The four years of war made impossible the sports movement revival immediately after the war, starting with 1918. Sport in Cluj was subjected to a number of restrictions in the immediate post-war period, including the shut down of the KAC club. Only in 1920, under the direction of Dr. István Somody (winner of the silver medal in the London OG, 1908), was the Athletic University Club in Cluj (KAC) reopened, which also had a fencing section. Transylvanian fencing came to a new life only in the 1920's, in several centers (Sibiu, Oradea, Satu Mare, Arad, Cluj). In the 20's, three clubs in Cluj had a fencing section: Kolozsvari/Cluj Athletic Club (KAC) - a Hungarian sports association, University Club - a sports association for all students in Cluj University, and Haggibor Club - a Jewish sports association. In 1933, the first official national fencing competition was organized. After 1940, as a result of a change in the administration, fencing in Cluj experienced a quieter period. After 1944, the life of fencers in Cluj was again reorganized. The Bolyai University Athletic Club (BEAC) was created, as well as Dermata and Progresul associations. The first facility exclusively dedicated to fencing was built in the 60's at *Nicolae Bălcescu* High School. The best national and international results of Cluj fencing were obtained in the women's foil event in the period 1953-1969, by the Știința Cluj team or individually by Olga Orban-Szabo. In the 1956 Melbourne OG, 18-year-old Olga Orban won the silver medal. She participated four more times in the OG, winning bronze medals in the last two editions (Mexico City - 1968 and Munich - 1972).

Chapter II, entitled *The education of future generations in the period 1950-1962*, addresses the requirements of modern fencing in Cluj, in the four sports clubs having a fencing section (Progresul, Dinamo, Școala Sportivă, Știința), where about 100 athletes practiced this sport. The generations of the 50's benefited from advantages such as using sports equipment free of charge (a considerable advantage in the case of fencing), free travelling, accommodation and meals when participating in away competitions. Also, meal vouchers and paid training camps were provided for the best fencers. In the late 50's, the CFR Sports Association opened a pentathlon section, after that created in Bucharest, from which fencers benefited in the first place.

Chapter III, entitled *International results and decorations awarded to Cluj fencers in the first period of glory (1845-1975)*, presents the most valuable international results obtained by Cluj fencers in this period. The chapter includes multiple rankings synthesized in the form of tables, while the athletes are presented in Chapter I.

Chapter IV, entitled *History of fencing in Cluj in the period 1972-2018*, is structured into 4 periods according to the main objectives: 1972-1990; 1990-2001; 2001-2010; 2010-2018 which involves several special actions in the field of fencing in Cluj, such as founding the *Friends of Cluj Fencing Association* in 2011, reopening the fencing section of the Cluj University Sports Club in 2013, with Habala Péter as a voluntary trainer, naming the fencing salle after Orbán Olga. The main national and international results obtained by the Cluj fencers are presented. This chapter also presents the fencing trainers in Cluj in the period 1972-2018.

Chapter V comprises the *List of Cluj fencers who won medals in the period 1920-1973 – 1st, 2nd and 3rd places in National Senior and Junior Championships, World Championships and OG.* Of the multitude of winners, two fencers who were and still are great scientific personalities stand out: *Dr. Uray Zoltán* and *Prof. Dr. Nicolae Ghilezan*. Zoltan Uray was born in Cluj in 1931; he is a biologist, a researcher, a foreign member of the Hungarian Academy of Sciences. In 1948 and 1949, he was a national junior foil champion. In 1949 and 1952, he ranked second in the National Senior Championship. In 1952, he participated in the Helsinki OG. Prof. Dr. Nicolae Ghilezan was born

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in Cluj in 1938; he is a specialist in oncology-radiology, a titular member of the Romanian Academy. He won the title of national junior sabre champion three times, in 1952, 1956 and 1958, and he ranked second in the same junior sabre competition two times, in 1954 and 1955.

The following two chapters, **Chapter VI** *Guráth Béla memorial competitions* and **Chapter VII** *Memories, pleasant and unpleasant events of the past years*, reveal memories of the sports life of important fencers in Cluj.

Chapter VIII provides a list of Cluj fencers between 1818-2018, in the form of multiple nominal tables.

Chapter IX presents the training and competition facilities used by Cluj fencers over the two centuries, with their previous and current addresses, as well as their location on the street map of Cluj.

Chapters X and XI describe aspects related to the fencing competition rules, under the titles *What we should know about fencing and competitions* and *Fencing specific terminology*.

Traian Bocu
traian_bocu@yahoo.com

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EVENTS

The autumn cross country races for students continue in Răchiţele-Mărgău (8th ed.), Borșa (3rd ed.), and Frata (4th ed.)

La Răchiţele-Mărgău (ed. a 8-a), Borşa (ed. a 3-a) şi Frata (ed. a 4-a), continuă crosurile de toamnă ale elevilor

The intention to set an earlier date for the autumn cross country races, to avoid their being held in excessively cold weather, was partly realized. Thus, the competitions took place on 27 October in Răchițele, on 7 November in Borșa and on 8 November in Frata. The novelty this year was the fact that the cross country races in Borșa and Frata were held during the week, on Wednesday and Thursday afternoon, at 15:00 o'clock. The number of participants was the same as before. Also, the competition in Borșa included, in addition to the cross country race, a tug of war event.

So, the educational health prevention project in rural areas *Sport - an alternative for a healthy life* started with the autumn cross country races, and will continue with the winter skiing competitions scheduled for January-February 2019 and the cross country races in the spring of 2019. We mention that all these are rural competitions.

Results

a) Răchiţele-Mărgău (8)

Participating centers: Sâncraiu (*Ady Endre* Middle School), Mărişel (*Pelaghia Roşu* Middle School), Răchiţele-Mărgău, Izvorul Crişului (*Kos Karoly* Middle School), Beliş (*Avram Iancu* Middle School), Rogojel-Săcuieu, Râșca, Măguri Bogdănești.

General ranking: I - *Ady Endre* Middle School, Sâncraiu; II - Răchiţele-Mărgău Middle School; III - *Pelaghia Roşu* Middle School, Mărişel.

First place in all age categories: 9-10-year-old boys, grades III-IV - Lovász Balász - Sâncraiu; 9-10-year-old girls, grades III-IV - Kozma-Peti Kamilla - Sâncraiu; 11-12-year-old boys, grades V-VI - Marius Roba - Măguri Bogdănești; 11-12-year-old girls, grades V-VI - Pentek Rita - Izvoru Crișului; 13-14-year-old boys, grades VII-VIII -


The minibus park of the participating teams.


Opening ceremony in Răchițele-Mărgău.


Busy time at the competition secretariat.

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One of the veterans of cross country running and skiing competitions, Ardelean Ilea, physical education teacher at Râșca School.

On the podium, 10-11-year-old boys. First place - Lovasz Balasz. Coach Csudom Norbert.

Prizes awarded to the team leaders by the mayor of Mărgău commune, Petru Ungur.

Todoruț Paul - Răchițele; 13-14-year-old girls, grades VII-VIII - Szöcs Imola - Sâncraiu.

Team leading teachers: *Ady Endre* Middle School, Sâncraiu - Csudom Norbert; *Pelaghia Roșu* Middle School, Mărișel - Bal Ionuț; Răchițele Middle School - Roșu Claudiu; *Kos Károly* Middle School, Izvoru Crișului - Török Anamaria; *Avram Iancu* Middle School, Beliș - Crăciun Cosmin Florentin; Săcuieu/Rogojel Middle School - Crișan Aurel; Râșca Middle School - Ilea Ardelean; Măguri Bogdănești Middle School - Roba Aurel.

Local officials: Alexandra Roșu – director of Mărgău Middle School; Petru Ungur – mayor of Mărgău commune.

b) Borșa (3)

Participating centers: Borșa, Dăbâca (*Gelu Românul* Middle School), Răscruci (Professional School), Cămărașu, Așchileul Mare, Chinteni, Apahida (Ștefan Pascu Middle School).

General ranking: I - Cămărașu Middle School; II - *Gelu Românul* Middle School, Dăbâca; III - Așchileul Mare Middle School.

First place in all age categories: 11-12-year-old boys, grades V-VI - Cristian Bărăian - Cămărașu; 11-12-year-old girls, grades V-VI - Raluca Gaşpar - Cămărașu; 13-14-year-old boys, grades VII-VIII - Nelu Ferenczi - Cămărașu; 13-14-year-old girls, grades VII-VIII - Paula Doboș - Cămărașu. Tug of war: I - Borșa Middle School.

Team leading teachers: Cămărașu Middle School - Prunean Bogosi Felician; *Gelu Românul* Middle School, Dăbâca - Lăpuște Sorina; Așchileul Mare Middle School - Molocea Paula; Răscruci Professional School - Păuna Răzvan; Chinteni Middle School - Jurje Ana Maria; Ștefan Pascu Middle School, Apahida – Stupar Radu; Borșa Middle School - Dobre Silviu.

Local officials: Paul Ciprian Varga - director of Borșa Middle School; Maria Secară - mayor of Borșa commune.

The prize cups for the winners of the cross country race in Borșa.

View of one of the boys' cross country races.

Tug of war. The final was won by the Borșa school team.

The secretarial team. First from right, Prof. Sorina Pop (Soso), second from right, school inspector Prof. Drd. Laura Ionescu.

Conversation between school inspector Prof. Dr. Cristian Potora and the director of Borșa School, Paul Ciprian Varga.

Prize awarding to team leading teachers.

c) Frata (4)

Participating schools: Frata, Cămărașu, Soporu de Câmpie, Mociu, Luna, Căianu, Luncani.

General ranking: I - Frata Middle School; II - Cămărașu Middle School; III - Soporu de Câmpie Middle School.

First place in all age categories: 11-12-year-old boys, grades V-VI - Carlos Moldovan - Frata; 11-12-year-old girls, grades V-VI - Raluca Gașpar - Cămărașu; 13-14-year-old boys, grades VII-VIII - Damian Pop - Frata; 13-14-year-old girls, grades VII-VIII - Dana Moldovan - Cămărașu.

Team leading teachers: Frata Middle School - Popa Sebastian; Cămărașu Middle School - Revnic Vlad; Soporu de Cîmpie Middle School - Pașca Tușa Maria; Mociu Middle School - Donea Tudor; Luna Middle School - Olar Maria; Luncani Middle School - Cservenecz Iuliu; Căianu Middle School - Brata Valentin.

Local officials: Teodor Bara - director of Frata Middle School; Vasile Trif - mayor

Cristian Potoră, Laura Ionescu
cristipotora@gmail.com
lauraionescu2005@yahoo.com

Start to the 13-14-year-old girls' race.

View of one of the boys' races.

The category of 13-14-year-old boys at the start.

Prize awarding ceremony for 13-14-year-old girls.

Prize awarding ceremony for 13-14-year-old boys, conducted by the director of Frata School, Teodor Bara. On the podium, alongside the athletes, the physical education teacher from Frata, Sebastian Popa.

Prize awarding to team leading teachers. To the right, the mayor of Frata commune, Vasile Trif.

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