PALESTRICA OF THE THIRD MILLENNIUM - CIVILIZATION AND SPORT

A quarterly of multidisciplinary study and research

© Published by The "Iuliu Haţieganu" University of Medicine and Pharmacy of Cluj-Napoca
and
The Romanian Medical Society of Physical Education and Sports
in collaboration with
The Cluj County School Inspectorate

A journal rated B+ by CNCS (Romanian National Research Council) since 2007,
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A journal indexed in international databases:
EBSCO, Academic Search Complete, USA
Index Copernicus, Journals Master List, Poland
DOAJ (Directory of Open Access Journals), Sweden
CiteFactor, Canada/USA
CrossRef, Lynnfield, MA (US)/Oxford (UK)

1

Vol. 19, No. 1, January-March 2018

Palestrica of the third millennium – Civilization and sport
Vol. 19, no. 1, January-March 2018

Editorial Board

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pISSN 2601 - 2537
eISSN 2601 - 2545
ISSN-L 2601 - 2537
www.pm3.ro

Contents

Cuprins

Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January 2018, 5–7

EDITORIAL

The necessity of an insurance system in Romanian sport

Necesitatea unui sistem de asigurare în sportul românesc

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The definition of sport established by the Council of Europe comprises "*all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competitions at all levels*" (***, 2007).

The term *sport* includes: school and university physical education, sport for all or recreational sport, and high performance sport. All these segments of *sport* have an important sanogenic role, but at the same time, when they are practiced inappropriately or in non-compliance with deontological principles, they pose a high risk of injury or even death. Risks are derived from two sources: a) an increase of aggressiveness in the practice of sport, particularly high performance sport; b) the exceeding of a deontological threshold in the practice of some sport disciplines or events, based on a continuous increase in the degree of difficulty of technical elements with an increasingly high risk, in order to keep up with the competition. Even sports such as football, basketball or handball have become sports with a high risk of injury. Not to mention artistic gymnastics or some acrobatic winter sports. This is why some countries with advanced sport systems such as USA or Germany have launched campaigns against the escalating number of injuries, which can lead to serious consequences up to death. The campaigns against injuries are based on slogans such as: *Stop sports injuries* or *Make youth sports injury safety your priority* (***, 2017).

Despite the great number of sports injuries in Romania, there are no campaigns for their prevention. There is also no injury or life insurance system in sport, or more precisely, the proportion of the insured is very small, 1%, compared to 99% for the non-insured. In countries with advanced sport systems, the proportions are reversed. In Romania, there is no insurance in the school and university physical education system, although injuries are numerous; there have even been reports of cases of death during physical education classes. There is no insurance in sport for all, and there is no prevention against exercise overtraining, while cases of sudden death have been reported on sports grounds. But especially, there is no injury insurance in high performance sport, except for national team members but not for athletes who practice sport in sport clubs.

The subject of insurance in sport has been discussed in Romania, without concrete conclusions being drawn. One of the last conferences on this subject, organized in Bucharest on 12 December 2017, was entitled "*How do we insure sport in Romania?*" and was attended by insurance and sport professionals. According to Jura (2017), there are currently 245,626 registered athletes in Romania. Of these, only 1% are insured (have long-term sport insurance). However, sports practitioners in Romania are many more – about 1 million persons who currently practice sport in one form or another in Romanian clubs.

In the school/academic year 2016-2017, there were 3,597,300 pupils and students, of which 531.6 thousand students were enrolled in higher education. Of these, more than 170,000 were 1st and 2nd year students who practiced curricular sport (1). These are the figures of those who practice sport in an institutional form, where sport is included in the school curriculum, being aimed at health promotion. All these pupils and students practice sport without being insured. This means that all sport-related injuries as well as the medical rehabilitation of these injuries are incumbent on them and their families, with the possibility of medical rehabilitation being assumed by the public health system.

In other countries, such as Italy, school children do not enter the sports ground unless they are insured; in France, playing tennis requires membership of the Tennis Federation, which automatically requires insurance (Jura, 2017).

Currently, in Romania there are sports competitions in which athletes participate based on a self-declaration. Some athletes participate in international competitions based on mere travel insurance (Jura, 2017).

https://doi.org/10.26659/pm3.2018.19.1.5

International statistics indicate hundreds of thousands of people injured during sport practice. Athletes need to be insured for the following reasons: they are exposed to a high risk of injury; they are exposed to the risk of temporary/ permanent disability or death (Coca-Constantinescu, 2017).

In Romania, there is a need for creating a legal frame specific to sport insurance for all sports practitioners. A solution would be to allocate part of the budget of clubs, sports schools, educational institutions for insurance, so as to warrant continuity and stability in case of injury (Tecău, 2017). There is also the case of athletes who, at the end of their sports career, become unqualified (29-30 years on an average). Taking into account this aspect, in Netherlands, end career insurance was created, by which athletes retiring from sport receive a 5-year indemnity allowing them to requalify. The question of who and how to pay for this insurance should be considered (Mihai, 2017).

* * *

Definiţia sportului stabilită de Consiliul Europei cuprinde *toate formele de activităţi fizice care, printr-o participare mai mult sau mai puţin organizată, au drept obiectiv expresia sau ameliorarea condiţiei fizice şi psihice, dezvoltarea relaţiilor sociale sau dobândirea unor rezultate pozitive în competiţiile de toate nivelurile* (***, 2007).

În termenul *sport* sunt cuprinse: educaţia fizică şcolară şi universitară, sportul pentru toţi sau de loisir şi sportul de performanţă. Toate aceste segmente ale *sportului* au un mare rol sanogenetic, dar în acelaşi timp, dacă sunt practicate necorespunzător sau fără respectarea principiilor deontologice, prezintă o mare doză de risc; risc de accidente sau chiar risc de viaţă. Riscurile provin din două direcţii: a) creşterea nivelului de agresivitate în practicarea sporturilor, în special sportul de performanţă; b) depăşirea unui prag deontologic în practicarea unor ramuri sportive sau probe sportive, bazate pe ridicarea continuă a gradului de dificultate a unor elemente tehnice cu grad din ce în ce mai înalt de risc, pentru a face faţă concurenţei. Chiar şi unele ramuri sportive ca fotbalul, baschetul şi handbalul au devenit sporturi cu grad înalt de risc de accidente. Ce să mai vorbim de gimnastica artistică sau unele sporturi acrobatice de iarnă. De aceea, în unele ţări cu sport avansat ca USA, Germania au fost declanşate adevărate campanii împotriva accidentelor din ce în ce mai numeroase, care duc până la deces. Campaniile împotriva accidentelor se bazează pe sloganuri ca de exemplu: *Stop accidentelor în sport* (*Stop Sports Injuries*) sau *Asigură-te că în sportul juvenil, siguranţa este prioritatea ta* (*Make Youth Sports Injuries Safety Your Priority*) (***, 2017).

Deşi accidentele în sportul românesc sunt numeroase, campaniile de prevenire a accidentelor în sport nu există. De asemenea, lipseşte sistemul de asigurare de accidente sau de asigurări de viaţă în sport. Sau mai exact spus există, dar într-un procent infim, de 1% asiguraţi, faţă de 99% neasiguraţi. În ţările cu sport dezvoltat, procentele sunt inversate. În România nu există asigurări în sistemul de educaţie fizică şcolară şi universitară, deşi accidentele sunt numeroase, au fost şi unele cazuri de deces la orele de educaţie fizică. Nu există asigurări în sportul pentru toţi, nici prevenţie impotriva practicării în exces a activităţilor fizice, iar pe terenurile de sport au fost cazuri de moarte subită. Dar, mai cu seamă, se constată că nu există asigurări de accidente în sportul de performanţă decât pentru unii practicanţi, cei de la nivelul loturilor naţionale, nu şi pentru practicanţi sportului la nivelul cluburilor sportive.

Pe tema asigurărilor în sport, au fost organizate discuţii în România, dar fără a se ajunge la concluzii concrete. Una dintre ultimele conferinţe organizate a fost cea de la Bucureşti din data de 12 decembrie 2017, intitulată *Cum asigurăm sportul în România ?* care a reunit profesionişti din asigurări şi din domeniul sportiv. Conform Jura (2017) a reieşit faptul că în România există 245.626 de sportivi legitimaţi în momentul de faţă. Dintre aceştia, doar 1% sunt asiguraţi (au o asigurare dedicată sportivului, pe termen lung). Dar, practicanţii sportului din România sunt mult mai mulţi - aproximativ 1 milion de persoane care practică un sport într-o formă sau alta astăzi în cluburile din România.

În anul şcolar/universitar 2016-2017, numărul elevilor şi studenţilor a fost 3.597.300 din care, au fost înscrişi în învăţământul superior 531,6 mii studenţi. Dintre aceştia, studenţii din anii I şi II care au practicat sport în regim curricular, au fost peste 170.000 (1). Acestea sunt cifrele practicanţilor sportului în mod instituţionalizat unde sportul este prevăzut în curricula şcolară, având ca obiectiv promovarea sănătăţii. Toţi aceşti elevi şi studenţi pactică sportul nefiind asiguraţi. Aceasta înseamnă că toate accidentele produse în urma practicării sportului precum şi reabilitarea medicală a acestor accidente, cad în sarcina lor personală şi a familiei, eventual reabilitarea căzând în sarcina sistemului public de sănătate.

În alte state, precum Italia, copiii la ora de sport de la şcoală nu intră pe terenul de sport, dacă nu sunt asiguraţi; în Franţa, dacă vrei să joci tenis, trebuie să fii membru al Federaţiei de Tenis, iar dacă eşti membru, automat trebuie să ai şi o asigurare (Jura, 2017).

În momentul de faţă, în România există competiţii sportive unde sportivii participă pe baza unei declaraţii pe proprie răspundere. Unii sportivi participă la competiţii în străinătate pe baza unei simple asigurări de călătorie (Jura, 2017).

Statisticile din afara României indică sute de mii de oameni accidentaţi în timpul practicării sportului. Sportivii au nevoie de asigurare din următoarele motive: sunt expuşi unui risc ridicat de accidentare; sunt expuşi riscului de a fi lipsiţi temporar/definitiv de capacitatea de a practica sportul (risc de invaliditate sau de deces) (Coca-Constantinescu, 2017).

În România este nevoie de crearea unui cadru legal specific asigurărilor sportive, pentru toţi practicanţii sportului. O soluţie ar fi prevederea în bugetele cluburilor, şcolilor sportive, unităţilor de învăţământ a unor părţi care să fie dedicate asigurărilor, în aşa fel încât să existe continuitate şi stabilitate în cazul unui accident (Tecău, 2017). Mai există situaţia sportivilor care, după încetarea carierei sportive, devin nişte necalificaţi (29-30 de ani în medie). Ţinând cont de acest aspect, în Olanda s-a creat o asigurare de final de carieră care prevede ca timp de cinci ani, sportivii care s-au retras din cariera sportivă să primească o indemnizaţie ca să se poată recalifica. Ar trebui avut în vedere cine şi cum ar trebui să plătească aceste asigurări (Mihai, 2017).

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 8–12

ORIGINAL STUDIES

The role of isokinetic exercises in the rehabilitation of patients with impingement syndrome of the shoulder

Rolul izokinetismului în reabilitarea pacienților cu sindrom de conflict subacromio-deltoidian

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Abstract

Background. Scapulohumeral periarthritis is a medical condition consisting of the inflammation of tendinomuscular structures of the shoulder, causing pain, limited mobility, functional impotence and reduced quality of life.

Aims. The study aimed to demonstrate the effectiveness of active kinesiotherapy programs combined with isokinetic exercises in improving the symptoms of patients presenting with scapulohumeral periarthritis.

Methods. The study was conducted on a number of 30 patients diagnosed with simple shoulder pain, mixed shoulder pain or subacromial-deltoid impingement syndrome. The subjects were divided into two groups. The reference group, consisting of 15 patients, was subjected to an active kinesiotherapy program, as well as an active endurance one. The study group, also comprising 15 patients, was subjected to the same kinesiotherapy program, combined with isokinetic exercises. In order to objectify the results, assessment tests were performed on days 1 and 10 of treatment. These included the VAS (visual analog scale) for pain intensity, the flexion-abduction-external rotation articular test, and the Constant-Murley shoulder test.

Results. On day 1 of treatment, the symptoms and levels of pathology observed among the two groups were similar. The study was performed on groups of homogeneous sex and age, ranging between 60 and 70 years. As per the VAS, the average pain intensity was measured at 5.8 among patients in the reference group and 5.7 among patients in the study group. On day 10 of treatment, the test indicated a reduction in the pain levels of both groups, the average pain intensity being measured at 2.2 and 1.6, respectively. In terms of the Constant-Murley scores, they were similar on day 1 of treatment and registered as 57.6 and 63.1, respectively, on day 10 of treatment. The articular test revealed an improvement in the range of motion of patients in the study group by 4% on flexion, 5% on abduction and 4% on external rotation as compared to patients in the reference group. The T-test results were statistically significant as regards the VAS ($p<0.006$), the Constant-Murley test ($p<0.02$), abduction ($p<0.03$), external rotation ($p<0.005$), and at the limit in terms of flexion ($0<0.05$).

Conclusions. The active kinesiotherapy program combined with kinetic exercises ensures better outcomes in terms of pain relief, improved joint mobility, muscle rebalancing and, implicitly, improved quality of life among patients.

Keywords: scapulohumeral periarthritis, kinesiotherapy, isokinetic

Rezumat

Premize. Periartrita scapulo-humerală este o afecțiune medicală care constă din inflamația structurilor tendino-musculare ale umărului, ceea ce duce la durere, limitare de mobilitate, impotență funcțională și afectare a calității vieții.

Obiective. Obiectivul studiului a fost demonstrarea eficienței superioare a unui program de kinetoterapie activă, combinat cu exerciții izokinetice, în ameliorarea simptomatologiei pacientului cu periartrită scapulo-humerală.

Metode. Studiul a fost efectuat pe 30 de pacienți, cu diagnostic de umăr dureros simplu, umăr mixt și sindrom de conflict subacromio-deltoidian, împărțiți în două loturi. Lotul martor cu 15 pacienți a beneficiat de un program de kinetoterapie activă și activă cu rezistență; lotul de studiu tot cu 15 pacienți a beneficiat tot de același program de kinetoterapie, la care s-a mai adăugat un program de exerciții izokinetice. Pentru obiectivarea rezultatelor, în prima zi de tratament (ziua 1) și ultima zi de tratament (ziua 10) am aplicat teste de evaluare, respectiv scala analog vizuală a durerii - VAS, testing-ul articular pentru mișcarea de flexie, abducție și rotație externă și Testul Constant-Murley pentru umăr.

Received: 2017, November 22; *Accepted for publication:* 2017, December 15
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https://doi.org/10.26659/pm3.2018.19.1.8

Rezultate. În prima zi de tratament, ambele loturi au fost asemănătoare din punct de vedere al simptomatologiei şi gradului de afecţiune. Componenţa loturilor a fost omogenă din punctul de vedere al sexului, cât şi al vârstei pacienţilor, vârsta medie fiind cuprinsă între 60-70 de ani. Pe scara analog vizuală a durerii VAS, pentru lotul martor am obţinut o medie de 5,8, iar pentru cel de studiu 5,7. În ziua 10, durerea a scăzut la ambele loturi, pentru cel martor la 2,2, iar la cel de studiu la 1,6. Pentru scorul CONSTANT, loturile au avut rezultate asemănătoare în prima zi, iar în ziua 10 lotul martor a obţinut un scor de 57,6, iar cel de studiu 63,1. În urma testing-ului efectuat, lotul de studiu a obţinut o creştere a amplitudinii de mişcare cu 4% pe flexie, 5% abducţie şi 4% rotaţie externă în ziua 10, faţă de lotul martor. Rezultatele T-test-ului au fost semnificative statistic pentru VAS ($p<0,006$), CONSTANT ($p<0,02$), abducţie ($p<0,03$), rotaţie externă ($p<0,005$), iar pentru flexie ($p<0,05$) au fost la limită.

Concluzii. Programul de kinetoterapie activă în combinaţie cu exerciţiile izokinetice are rezultate mai bune în ameliorarea durerii, creşterea mobilităţii articulare, reechilibrare musculară şi implicit îmbunătăţirea calităţii vieţii pacienţilor.

Cuvinte cheie: periartrită scapulo-humerală, kinetoterapie, izokinetism

Introduction

Scapulohumeral periarthritis, or impingement syndrome, represents a frequently encountered cause of shoulder pain, disability, limited ADL (activities of daily living) performance (Sigh et al., 2017). Also, it affects the patients' sleeping habits and quality of sleep. According to one study, there is a close connection between the quality, duration and continuity of sleep in patients suffering from shoulder pain, a vicious circle which causes constant fatigue, weakness and muscle imbalance, and affects the shoulder in particular (Tekeoglu et al., 2013).

In terms of incidence rates, scapulohumeral periarthritis is the third most common cause of musculoskeletal disability, after lower and upper back pain. However, it is one of the main musculoskeletal areas where physical kinesiotherapy plays a major role (Borda et al., 2015).

Sixteen percent of patients presenting with musculoskeletal pathologies suffer from shoulder pain, the annual incidence rate being 15 new cases in 1000 patients (Burbank et al., 2008).

The human shoulder is the most mobile joint in the body. It is also one of the most complex joints. Its range of motion includes flexion/extension, abduction/adduction, internal rotation/external rotation. Its complexity lies in the increased number of tendon, ligament, muscle and bursae insertions. All these complex structures ensure an improved mobility of the shoulder, as well as its stabilization during the execution of movements and activities. Indispensable in ADL performance, the shoulder joint is subjected to highly increased wear. The most demanding movements include flexion, abduction and external rotation in particular (Irsay et al., 2015).

During flexion and abduction, the humeral head is subjected to movements of translation and rotation within the glenoid socket. Flexion is associated with an anterior translation of the humeral head. Similarly, abduction is associated with a superior translation (Chen et al., 1999). The superior translation is 1-2 mm, whereas the distance between the humeral head, muscular ligaments and acromion is approximately 1 cm. Thus, a greater translation causes an exaggerated compression and wear on the tendons, resulting in inflammation, pain, functional impotence and, in severe cases, tendon tears. According to one study, the translation of the humeral head occurs during the execution of both active and passive movements (Kedgley et al., 2008). However, this is reduced during loaded movement. As a result, compression of the adjacent structures is also reduced. Another study (Li et al., 2017) focused on the relationship between scapulohumeral periarthritis and patients presenting with morphological variations of the acromion, associating such modifications of the acromion with shoulder pain.

Hypothesis

The maximization of results obtained during rehabilitation sessions requires the application of a complete and complex rehabilitation program, adapted to patients and their pathology.

The current study aims to demonstrate the higher effectiveness of active kinesiotherapy programs combined with isokinetic exercises as a means to improve the symptoms of patients presenting with scapulohumeral periarthritis.

Materials and methods

Declaration

The study was approved by the Research Ethics Committee of UMF Cluj-Napoca. Also, all the patients who participated in the study gave their consent to the use and publication of the results obtained during their assessment for research purposes.

Research protocol

a) Duration and location

The study was conducted on inpatients in the Department of Balneology of the Rehabilitation Clinic Cluj-Napoca, who presented with simple shoulder pain, mixed shoulder pain and chronic subacromial-deltoid impingement syndrome between January 2017 and June 2017.

b) Subjects and groups

The study was conducted on a number of 30 subjects. The patients were divided into two groups consisting of 15 patients each. The first group, identified as "the reference group", consisted of 11 female patients and 4 male patients. The second group, identified as "the study group", consisted of 12 female patients and 3 male patients. In both cases, the predominant age range of the studied population was 60-70 years.

The inclusion criteria were the following: shoulder pain, particularly upon mobilization, limited range of motion, discomfort, limited ADL performance, poor quality of life.

The exclusion criteria were set as follows: acute phase of the disease, exaggerated pain intensity, limited range of motion due to capsular ligament causes, recent surgery in the shoulder, lack of cooperation.

c) Assessment methods

The patients included in the study were assessed on days 1 (first day) and 10 (last day) of treatment.

The assessment methods used were the following: the VAS, which measures the pain intensity experienced by patients on a scale between 0 and 10, where 0 indicates the absence of pain and 10 indicates the highest level of pain experienced by them at any point; the Constant-Murley test (Ban et al., 2013), which measures pain intensity, pain interference with daily activities (e.g. lifting the arm to the back of the head, lifting the arm over the vertex etc., simulating normal daily activities), and muscle strength, adding up the three individual scores into one final score - the evolution of the final scores between days 1 and 10 of treatment was monitored; the articular test using manual goniometry, which monitors the range of motion on flexion, abduction and external rotation, which is the most affected in patients suffering from scapulohumeral periarthritis - once more, the assessment was performed on days 1 and 10 of treatment to compare the evolution of the range of motion.

d) Statistical processing

Upon conducting the initial and final assessments, we calculated the average scores obtained by the patients. The results were processed using Microsoft Excel 2017. A T-test was performed in the two groups in order to compare the effectiveness of the two rehabilitation protocols. The reference value obtained was $p<0.05$. The results were introduced into a table.

Rehabilitation protocol

Kinesiotherapy

The rehabilitation protocol applied to the reference group consisted of a program based on exercises specially designed for patients presenting with simple shoulder pain, mixed shoulder pain and subacromial-deltoid impingement syndrome. The treatment program consisted of active-passive exercises, active exercises, active endurance open chain exercises, stretching exercises and shoulder stabilization exercises.

Joint warm-up

1. Flexion and extension of the upper limb using the Bobath ball
2. Combined abduction and external rotation exercises using the Bobath ball
3. Wheel exercises using a pronated grip followed by wheel exercises using a pronated-supinated grip
4. Cane exercises using a supinated grip with both hands, arms down by the side, elbows flexed at a 90° angle, cane on each side, and internal/external rotation shoulder movements
5. Skipping rope exercises over the higher footstep of the trellis, using flexion-extension, active-passive, horizontal abduction-adduction movements
6. Cane lifted along the spine using a pronated back grip and extension, abduction and internal rotation movements
7. Codman's pendulum exercises, introduced after every second exercise

Stretching

1. Arms down by the side, elbows flexed, pronated-supinated forearms, palms resting on the trellis, rotation of the body in the opposite direction
2. Orthostatic position, adduction of the arms at a 90° angle, palms resting on the trellis, rotation of the body in the opposite direction

Toning

1. Flexion of the arms – active flexion, arms and elbows in extension, sandbag/dumbbell in hands, alternating limbs
2. Abduction – sandbag/dumbbell in hands, abduction movement at a 90° angle, external rotation of the arms with completion of the movement
3. Extension – sitting position, arms down by the side, elbows flexed, weights in hands, arms behind the body plane
4. Rotations – arms down by the side, elbows flexed, supinated forearms, holding a resistance band with both hands, external rotation of the shoulder - forearms apart to produce tension in the resistance band – or internal rotation of the shoulder - resistance band attached to the trellis, lateral position, arms down by the side, elbows flexed at a 90° angle, hands removed from the trellis to produce tension in the resistance band

Stability

1. Orthostatic position, arms flexed at a 90° angle, palms pushing a ball against the wall, ball pressed, rotation in both directions, alternating; followed by the same exercise with arms abducted at a 90° angle
2. Dorsal decubitus position, flexion at a 90° angle, sandbag hanging by the wrists, against the therapist's attempts at destabilization from all angles

The exercises were performed in 3 sets, each consisting of 10-15 repetitions, with 30-45-second breaks between the sets to prevent muscular overload.

Isokinetic therapy

Isokinetic exercises are active exercises performed against resistance. Basically, they are modified isotonic contractions against resistance. Isokinetic training provides a range of advantages that cannot be obtained using traditional methods. The level of resistance can be "adjusted" depending on the range of motion, while maintaining a constant velocity. Also, it can be associated with concentric contractions, eccentric contractions or both. The speed of execution can also be adjusted. The risk of muscle lesions can be excluded as the resistance applied cannot exceed the strength developed by the muscle (Irsay et al., 2009).

Patients in the study group were subjected to the kinesiotherapy program described above, as well as to isokinetic training (Table I). The latter consisted of 4 sets of exercises. Velocity was constant over sets 1 and 2, increased in set 3, thus facilitating the execution of the exercises, and reduced to the initial value in set 4. Forty-five-second breaks were imposed between sets to prevent muscular overload.

Table I

The isokinetic program applied to patients in the study group

Indicator	Sets 1 and 2	Set 3	Set 4
IR velocity	240°/sec	270°/sec	240°/sec
ER velocity	240°/sec	RE:270°/sec	240°/sec
Repetition	2x10	2x10	1x10
Break	45 sec	45 sec	–

Results

The results are presented in diagrams from Figs. 1 to 5

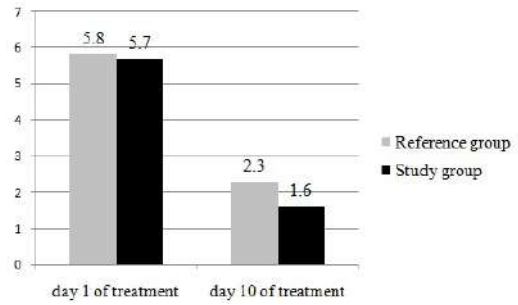

Fig. 1 – The evolution of the VAS scores in the two groups

On day 1 of treatment, the VAS scores of the two groups were similar, the pain intensity levels being average. After treatment, both groups experienced a reduced level of pain. However, the reduction was more significant in the study group, the pain intensity values being very low, almost minimum.

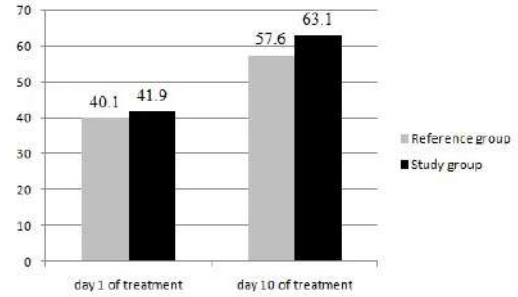

Fig. 2 – The evolution of the Constant-Murley scores in the two groups

As regards the Constant-Murley score, which reflects shoulder mobility, functionality, pain and strength, the scores obtained by the two groups after the initial assessment were similar. After treatment, the score obtained by the study group was higher compared to the reference group.

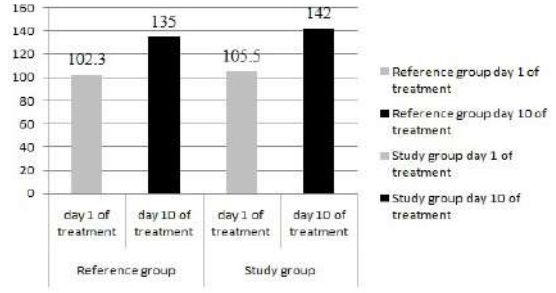

Fig. 3 – The evolution of the flexion movement in the two groups

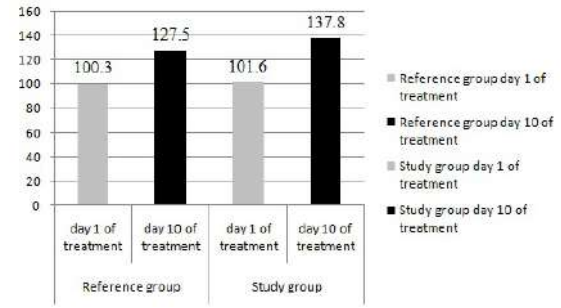

Fig. 4 – The evolution of the abduction movement in the two groups

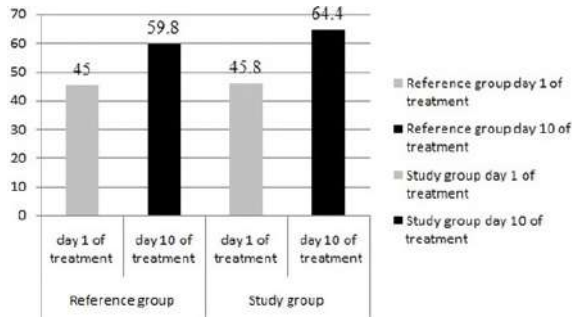

Fig. 5 – The evolution of the external rotation movement in the two groups

The initial assessment of flexion, abduction and external rotation movements in the two groups revealed similar average scores. The patients were reassessed after treatment. The reassessment revealed an extended range of motion within all targeted angles, with better results obtained among patients in the study group.

Table II

A comparison between the results obtained after treatment (%)

Indicator	Reference group (%)	Study group (%)	Comparison (%)
VAS	61	72	11
Constant-Murley	30	34	4
Flexion	24	28	4
Abduction	21	26	5
External rotation	25	29	4

After treatment, we compared the differences between the average scores obtained by the patients in their assessment. As shown in Table II, the study group obtained improved results by 4-5% in joint mobility and the areas assessed using the Constant-Murley test, and up to 11% in the area of pain intensity experienced.

Table III

The results of the T-test

VAS	Constant-Murley	Flexion	Abduction	External rotation	Reference value
0.006	0.02	0.05	0.03	0.005	$p>0.05$

The statistical relevance of the results obtained was assessed using the T-test function in Microsoft Excel 2017. The T-test function was applied to all results, generating a reference value of $p<0.05$. As indicated in Table III, all results were statistically significant, apart from those corresponding to the flexion movement.

Discussions

The study was conducted on a number of 30 patients. Therefore, it does not reveal the large-scale effectiveness of the proposed therapy method in patients presenting with scapulohumeral periarthritis. Also, in the context of it being carried out over a period of 10 days, it does not provide information about the effectiveness of the proposed therapy over longer periods of time. Therefore, we cannot know what results would have been obtained in the context of an extended period of treatment.

Also unknown remains the further evolution of patients as the research was ceased upon the completion of the

study. Therefore, there is no information regarding the evolution of symptoms over time, relapse rates or ways of maintaining the therapeutic results and determining the period of time over which they were maintained.

The rehabilitation program implemented for the aims of the study was specially designed for patients presenting with subacromial-deltoid impingement syndrome, for shoulder stretching, toning, rebalancing and stabilization purposes. According to one study, the higher effectiveness of a selected type of exercises can only be demonstrated provided that sufficient evidence is available (Shire et al., 2017).

Proprioception plays a key role in the functionality of the human shoulder. The present study did not look at proprioception, the ways in which it is affected or its absence causing major biomechanical impairments. However, research conducted has revealed that changes in proprioception occur not only in the affected shoulder, but also on the apparently asymptomatic contralateral side, which can also become pathological (Sahin et al., 2017).

Therefore, prevention of the disease requires a proprioceptive approach on both sides of the body.

The nature of the exercises (i.e. open chain, closed chain, etc.) impacts the rehabilitation process directly. A study conducted in 120 patients over a period of 6 weeks (Heron et al., 2017) indicated that open chain, closed chain and mobility exercises have similar beneficial short-term effects in improving the symptoms of patients presenting with inflammatory shoulder pain.

A study carried out in 18 patients over a period of 6 weeks (Turgut et al., 2017) focused on the impact of stretching exercises on shoulder mobility, pain and disability. The results were positive.

The rehabilitation program also included physiotherapy treatment consisting of electrotherapy and thermotherapy (heat therapy). However, in the context of each patient having their own individual indications, the outcomes might have been influenced by the additional treatment methods applied. A study performed on 181 patients presenting with shoulder pain (Gomora-Garcia et al., 2016) revealed that a treatment plan consisting of 9 physiotherapy sessions which included the application of hot packs, diadynamic current therapy and ultrasound therapy had beneficial effects in their rehabilitation, causing a 90% improvement in functionality.

Conclusions

1. The current study indicates a higher incidence of scapulohumeral periarthritis in female patients, despite literature data reporting an equal distribution of the condition between male and female patients.

2. The highest incidence of scapulohumeral periarthritis in a subacute/chronic phase is in patients within the 60-70 age range.

3. The most affected movements in patients suffering from scapulohumeral periarthritis are flexion, abduction and external rotation.

4. The rehabilitation program combining kinesio-therapy and isokinetic exercises, which was applied to the study group, provided better results in terms of pain relief, improved joint mobility, functionality and, implicitly, improved quality of life among patients.

5. The results obtained are statistically significant. Therefore, treatment protocols combining physiotherapy and isokinetic exercises are more beneficial in improving the symptoms of patients with scapulohumeral periarthritis.

Conflicts of interest

There were no conflicts of interest during the research period.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 13–16

Urinary parameters' evolution during junior male water polo microcycle training

Evoluţia unor parametri urinari pe parcursul unui microciclu de antrenament în cadrul unei echipe masculine de polo juniori

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Abstract

Background. Urinary parameters analysis in water polo players can be influenced by specific training evolution.

Aim. The aim of the study was to evaluate the main urinary parameters that can determine physical activity changes in a group of male athletes.

Methods. A cross sectional study was conducted in Tîrgu Mureş, Romania between 6th of November and 8th of January 2018, on a group consisting of 14 male water polo players, aged 13 years old, enrolled in national competitions. In order to determine urine density and urinary pH values, urinary sample collection was required, both at the beginning and at the end of the training session. Urine density and urinary pH were assessed using urinary Cybow strips.

Results. Statistically significant differences regarding urinary parameters and water polo training periodization were recorded. Thus, both urinary pH values, determined both before (p=0.0001, r=-0.7451, 95%CI =-0.8416 to -0.6023) and at the end (p=0.0467, r=-0.2557, 95%CI =-0.4827 to 0.003541) of the training session indicated low values when high urinary density was associated. Also, a decrease in urinary pH values was associated with a high urinary density determined at the end of the physical effort (p=0.0231, r=-0.2906, 95%CI =-0.5111 to -0.03418).

Conclusions. The main urinary parameters, urine density and urinary pH, recorded significant statistical changes related to the performed physical effort. An elevated urinary density value indicated a specific dehydration state, also evidenced by a low urinary pH value.

Keywords: pH, density, water polo

Rezumat

Premize. Parametrii urinari ai jucătorilor de polo ar putea fi influenţaţi de periodizarea specifică a antrenamentului sportiv.

Obiective. Ne-am propus să studiem principalii parametri urinari capabili să determine modificări ale performanţei sportive, în cadrul unei echipe masculine de polo.

Metode. A fost desfăşurat un studiu transversal observaţional, în perioada 6 noiembrie 2017 - 8 ianuarie 2018, pe un grup format din 14 jucători de polo, cu vârsta de 13 ani, care activează în cadrul competiţiilor naţionale. În vederea determinării densităţii şi pH-ului urinar a fost necesară prelevarea probelor de urină, atât pre-efort sportiv, cât şi post-efort sportiv. Analiza densităţii şi pH-ului urinar a fost realizată prin utilizarea stripurilor urinare Cybow.

Rezultate. S-au identificat diferenţe semnificativ statistice privind parametrii urinari şi periodizarea antrenamentului sportiv. Astfel, ambele valori ale pH-ului urinar, determinate atât înainte (p=0,0001, r=-0,7451, CI95%=-0,8416 la -0,6023), cât şi la sfârşitul (p=0,0467, r=-0,2557, CI95%=-0,4827 la 0,003541) şedinţei de pregătire au înregistrat valori scăzute în momentul asocierii cu valori crescute ale densităţii urinare. De asemenea, o scădere a valorilor pH-ului urinar a fost asociată cu creşterea densităţii urinare determinate după finalizarea antrenamentului sportiv (p=0,0231, r=-0,2906, CI95%=-0,5111 la -0,03418).

Concluzii. Determinarea densităţii şi pH-ului urinar a generat modificări importante în asocierea efortului sportiv. Obţinerea valorilor scăzute în cadrul pH-ului urinar a determinat creşterea densităţii urinare, indicând o stare de deshidratare a tinerilor sportivi.

Cuvinte cheie: pH, densitate, polo

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https://doi.org/10.26659/pm3.2018.19.1.13

Introduction

Water polo represents a competitive team sport which combines swimming technique with appropriate ball handling. The competition effort is intermittent, athletes' heart rate measuring 75-90% of HR_{max}. The usual distance reached during a competition varies between 1500-1800 m (Snyder, 2008).

Recovery actions between training sessions, along with rest periods, daily activity, food consumption and liquid intake are the main influencing factors of sports performance. The water distribution in the body, illustrated by Cornish BH, Ward LC, Thomas BJ et al., varies with age, gender and body composition. However, the human body has a variable amount of water, estimated at 50-80% of the total body mass (Cornish et al., 1996).

According to Baker LB, Reimel AJ, Sopeña BC et al., fluid needs are assessed based on the effort performed, its duration, and the effort conditions such as water temperature (Baker et al., 2017; Baker, 2017; Martin & Tarcea, 2914). Thereby, undertaking most of the training in water can make it difficult to estimate the amount of water lost by athletes (Cox et al., 2014).

The hydration status can be determined by weighing the athletes both before and after the effort, taking into account the fluid intake during training (Cox et al., 2014). However, a more accurate method in determining hydric status involves the use of various physical (density, color, urinary volume) and chemical urinary parameters. Thus, recent studies emphasize the use of urine density as a standard parameter in order to assess the fluid ingestion/excretion ratio. There is a link between fluid loss and urine color intensity, along with the dilution and the quantity of urine (Dumitraşcu et al., 2005). However, the chemical nature of urine is used to analyze the acid-base balance and pH homeostasis. Therefore, sustained physical activity can generate pH variations, and especially a temporary pH decrease (Welchet al., 2008). Thus, in order to have a full understanding of the acid-base balance and electrolytic deficiencies regarding fluid losses, determination of urinary parameters is required (Seifter & Chang, 2017).

Hypothesis

The aim of the study is to identify the main training parameters that can generate urinary changes (both physical and chemical) and major changes in the hydration status.

Material and method

Research protocol

A cross sectional study was conducted after obtaining a verbal acceptance from the athletes, the written consent of the subjects' legal guardians and a written approval from the administration office.

a) Period and place of the research

We conducted the study in Tîrgu Mureş, Romania, between 6th of November 2017 and 8th of January 2018, in an Olympic swimming pool sports complex.

b) Subjects and groups

The sample included 14 male subjects with a median age of 13 years (between 13 and 14 years) enrolled in a water polo team, with active participation in national competitions. Only healthy subjects were included in the study due to pH characteristics, whose values can be influenced by pathological conditions. The analyses were performed during the specific training cycle of the athletes.

c) Test applied

Urinary sample collection was performed, and urine density (kg/m^3) and urinary pH were analyzed in relation to physical activity. Urine samples were collected in sterile containers before and after the training session. The urine samples were taken within 5 minutes before the start and the end of training. The assessment of both urinary pH and urine density was performed using urinary Cybow strips (Gimhae, South Korea).

Through anthropometric measurements, we determined the height (m), weight (kg), body mass index (BMI), skeletal muscle percentage (%) and body fat percentage (%) of the study group, on 6th of November 2017, using the Omron BF511 (Kyoto, Japan) body composition scale. At the same time, within the study, the training program of the athletes was monitored, including parameters such as effort intensity (% HR_{max}), volume (meters) and total training time (minutes).

d) Statistical processing

Statistical analyses were performed using GraphPad Prism 6.0 software. The main descriptive indicators used were: mean, median, standard deviation (±SD) and coefficient of variation (CV%). The tests applied for inferential statistics were: the D'Agostino-Pearson normality test for data normalization, the Spearman rank correlation test to establish the association between two items, and the Wilcoxon matched pairs test to establish if there were differences between two measurements. The confidence interval was set at 95% (95% CI), a *p* value smaller than 0.05 being considered significant.

Results

The median age of the study group was 13 years (CV 3.78%). The anthropometric report registered a median height value of 1.70 m with values between 1.51 and 1.79 m, along with 68 kg body weight with values ranging between 36.9 and 86.5 kg.

An increased body weight was associated with elevated urinary density, recorded at the end of the training session (p=0.0019, r=0.3899, 95%CI=0.1456 to 0.5894). However, we did not identify an increase in urinary pH after training, whose value was 5, as shown in Table I.

Table I
Statistical correlations between body weight, density and urinary pH

Body weight (68 kg)		
Reported data	Post density (kg/m^3)	Post pH
Median	1.03	5
p	0.0019	0.0425
r	0.3899	-0.2606
95% Confidence Interval Lower	0.1456	-0.4867
95% Confidence Interval Upper	0.5894	-0.001725

The total fat mass percentage (20.8%) developed a significant statistical relationship with the urinary density determined at the end of the practice session (p=0.0195, r=0.2984, 95%CI =0.04269 to 0.5174). The analysis

Table II

Statistical correlations between body fat, skeletal muscle, body mass index and the analyzed parameters

Body fat (20.8%)				
Reported data	Skeletal muscle (%)	BMI	Pre density (kg/m^3)	Post density (kg/m^3)
Median	37.4	23.52	1.025	1.03
p	0.0001	0.0001	0.0836	0.0195
r	-0.7957	0.7677	0.2234	0.2984
95% Confidence Interval Lower	-0.8745	0.6350	-0.03781	0.04269
95% Confidence Interval Upper	-0.6761	0.8564	0.4560	0.5174

BMI (23.52)		
Reported data	Pre density (kg/m^3)	Post density (kg/m^3)
Median	1.025	1.03
p	0.0353	0.0014
r	0.27	0.4008
95% Confidence Interval Lower	0.01185	0.1583
95% Confidence Interval Upper	0.4944	0.5978

revealed that pre-effort urinary density (1.025 kg/m^3) was not significantly correlated with the athletes' body fat percentage (p=0.0836, r=0.2234, 95%CI =-0.03781 to 0.4560). Furthermore, an increase in the athletes' BMI was significantly associated with an increase in urinary density values, determined both before (1.025 kg/m^3) and after training (1.03 kg/m^3), according to the data presented in Table II.

The urinary parameters determined both before and at the end of the training session were significantly correlated with the training intensity and volume. Thus, an increased urinary density before training (1.025 kg/m^3) generated an elevated urinary density value at the end of the physical effort (1.03 kg/m^3). Both urinary pH values, determined before (pH=6) and after (pH=5) physical activity, indicated low values in association with high urinary density (1.025 kg/m^3) (p=0.0001). Also, an increased value of urinary density determined post-effort (1.03 kg/m^3) was related to a urinary pH decrease, before (pH=6) and after the training session (pH=5). However, an increased effort intensity was associated with a low urinary pH value (pH=5) at the end of physical activity, as shown in Table III.

Table III

Correlations between urinary parameters

Pre density (kg/m^3)			
Reported data	Post density (kg/m^3)	Pre pH	Post pH
Median	1.03 kg/m^3	6	5
p	0.0008	0.0001	0.0467
r	0.4175	-0.7451	-0.2557
95% Confidence Interval Lower	0.1777	-0.8416	-0.4827
95% Confidence Interval Upper	0.6105	-0.6023	0.003541

Post density (kg/m^3)		
Reported data	Pre pH	Post pH
Median	6	5
p	0.0001	0.0231
r	-0.5086	-0.2906
Confidence Interval 95% Lower	-0.6782	-0.5111
Confidence Interval 95% Upper	-0.2874	-0.03418

Post pH (5)	
Reported data	Effort intensity (%)
Median	50
p	0.033
r	0.2735
95% Confidence Interval Lower	0.01557
95% Confidence Interval Upper	0.4972

Discussion

Physical effort can generate variations in urinary density and pH. According to Ilyas R, Chow K, Young JG, the use of urinary strips in pH determination could have similar results to those analyzed using a pH-meter. However, the dipstick method is not reliable in making clinical decisions (Ilyas et al., 2015; Kwong et al., 2013). According to Aspevall O, Hallander H, Gant V et al., the pH test is related to color reactions such as methyl red, bromothymol blue and phenolphthalein. Thus, a pH value between 5 and 9 represented a color gradation from orange to yellow-green and blue. A urinary pH was considered to be acid at a value of 5, with the possibility to drop below 4.8 in fever conditions, diarrhea or metabolic acidosis. An alkaline urinary pH was considered when its value was above 7.4. The urine density test compares urine density with distilled water density, which has a value of 1.000[2]. The tests related to urinary ionic concentrations, whereas the cationic establishment generated color changes in the urinary strips. The reference value used was between 1.000 and 1.040 kg/m^3 (Aspevall et al., 2001).

Urine density depends on the fluid that was consumed before the evaluation (Aspevall et al., 2001). Thus, under physiological conditions, the excreted urine quantity is inversely proportional to urine density (Dumitrașcu et al., 2005). In the study group, there were differences between the urine density values determined at the beginning of training (1.025 kg/m^3) and the results obtained at the end of the session (1.03 kg/m^3). An increased urinary density value can confirm the dehydration state of the athletes. Furthermore, the hypothesis advanced by Reale R, Slater G, Dunican IC et al. confirms similar results, where the dehydration process determines variations in urinary density, fluid and electrolyte losses (Reale et al., 2017). The study conducted by Judelson DA, Maresh CM, Anderson JM et al. suggests a negative change in the athletes' performance by a reduction of muscular power and strength due to insufficient fluid intake, along with urine density and pH changes (Reale et al., 2017; Judelson et al., 2007). Thereby, based on similar findings, we can confirm that fluid intake will have an impact on the athletes' evolution, regardless of the training sessions and competitions.

Water and electrolyte balance is a representative element as it must be maintained due to the fact that blood and urine pH is modified according to physical

activities. Thus, the body pH reduction can be influenced by developing a mixed anaerobic effort (pH post-physical effort=5), which confirms current results that describe a urinary pH response related to effort intensity (Petrushova & Mikulyak, 2014).

Conclusions

1. In the study group, we reported significant statistical variations in urinary pH and density related to anthropometric evolution and the physical activity performed.

2. According to anthropometric data, subjects with an increased body weight, BMI and body fat mass had significant changes in post-effort urine density. Thereby, we believe that these subjects are likely to have a higher dehydration rate than athletes with lower anthropometric values.

3. An inadequate fluid intake was highlighted by obtaining an acid urinary pH due to an increased value of pre-effort urine density. A certain dehydration state of athletes at the beginning of the training session was justified by a high pre-effort urinary density value.

4. The intensity of the physical effort performed was able to generate changes in urinary pH.

Conflicts of interest

There are no conflicts of interest regarding the study group, methodology, results and conclusions drawn.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 17–22

Rhodiola rosea's relationship with stress, physical fatigue and endurance; a PubMed evaluation

Relaţia Rhodiolei rosea cu stresul, oboseala fizică şi anduranţa; o evaluare PubMed

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Abstract

Background. Rhodiola rosea is a well-known adaptogen, and among its actions are those of antistress and anti-fatigue protection.

Aims. The aim of the present research is the evaluation of the number of PubMed publications regarding Rhodiola rosea's (RR) relationship with stress (S), physical fatigue (F) and endurance (E).

Methods. Analysis was performed: a) for specific selected keyword combinations (KWC): "RR" (RR), "RR and stress" (R+S), "RR and cortisol" (R+C), "RR and anxiety" (R+A),"RR and physical fatigue" (R+F),"RR and endurance" (R+E); and for some filter and subfilters provided by the PubMed site.

Results. A) *Analysis of the number of publications* (N). For RR, we found the largest: period of publication (54 years), N (743), average number of publications per publication period (13.76). Relative to RR, the highest % was for R+S (23.28%). B) *Analysis of filters.* a) *Text availability*. The percentage of the number of abstracts (A) was high and close to the coresponding N (NC). The highest % of RR was for R+S in A (23.52%), full text (FT) (27.8%) and free full text (FFT) (27.23%). b) *Species.* The highest number was for RR, both in animals (An) (322) and humans (H) (211). The highest % of RR was for R+S, both in An (24.53%) and H (32.7%). c) *Sex.* The highest number was for RR in H males (HM) (60), H females (HF) (45) and H males+females (HM+F) (74). The highest % of RR was for R+S in HM (28.33%), HF (31.11%) and HM+F (29.73%).

Conclusions. 1) The number of publications for the KWC differed; it was the largest for RR and R+S, smaller for R+F and R+E, and the smallest for R+A and R+C. 2) For all KWC, the number of FFT publications was reduced compared to the total number of publications, the number of A and FT, with a predominance of FFT for R+C as a percentage of NC. 3) Apart from RR and R+S, in which animal research predominated, for all the other chosen KWC, research on human subjects was preferred. 4) Apart from R+F, in which research on females predominated, for all the other chosen KWC, research on subjects of both genders was preferred.

Keywords: Rhodiola rosea, stress, cortisol, anxiety, physical fatigue, endurance, adaptogen, PubMed filters

Rezumat

Premize. Rhodiola rosea este un binecunoscut adaptogen şi printre acţiunile sale se numără şi cele de protecţie antistress şi anti-oboseală.

Obiective. Scopul prezentei cercetări este evaluarea numărului de publicaţii PubMed privind relaţia dintre Rhodiola rosea (RR) şi stresul (S), oboseala fizică (F) şi rezistenţa (E).

Metode. Analiza a fost efectuată: a) pentru combinaţii specifice de cuvinte cheie selectate (CCC): "RR" (RR), "RR şi stres" (R+S), "RR şi cortizol" (R+C) "RR şi anxietate" (R+A), "RR şi oboseală fizică" (R+O), "RR şi anduranţă" (R+D); şi pentru unele filtre şi sub-filtre furnizate de site-ul PubMed.

Rezultate. A) *Analiza numărului de publicaţii* (N). Pentru RR, s-a constatat: cea mai mare perioadă de publicare (54 ani), cel mai mare N (743), număr mediu de publicaţii pe perioadă de publicare (13,76). În raport cu RR, cel mai mare procent a fost pentru R+S (23,28%). B) *Analiza filtrelor.* a) *Filtrul Disponibilitatea textului.* Procentul pentru numărul de rezumate (A) a fost ridicat şi aproape de N corespunzător (NC). Cel mai mare % din RR a fost pentru R+S, la A (23,52%), text integral (FT) (27,8%) şi text complet gratuit (FFT) (27,23%). b) *Filtrul Specii.* Cel mai mare număr a fost pentru RR, atât la animale (An) (322), cât şi la oameni (H) (211). Cel mai mare % din RR a fost pentru R+S, atât la An (24,53%), cât şi la H (32,7%). c) *Filtrul Sex.* Cel mai mare număr a fost pentru RR, la bărbaţi (HM) (60), femei (HF) (45) şi bărbaţi+femei (HM+F) (74). Cel mai mare % din RR a fost pentru R+S, la HM (28,33%), HF (31,11%) şi HM+F (29,73%).

Received: 2017, December 20; *Accepted for publication:* 2018, January 6
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https://doi.org/10.26659/pm3.2018.19.1.17

Concluzii. 1) Numărul publicațiilor pentru CCC a diferit, fiind cele mai numeroase pentru RR și R+S, fiind mai puține pentru R+F și R+E, și cele mai reduse pentru R+A și R+C. 2) Pentru toate CCC, numărul de publicații cu text integral gratuit a fost redus comparativ cu totalul publicațiilor, cu numărul de abstracte și de texte integrale, predominând procentual față de NC publicațiile gratuite pentru R+C. 3) Cu excepția RR și R+S, la care au predominat studiile pe animale, pentru toate celelalte CCC alese au fost preferate studiile cu subiecți umani. 4) Cu excepția R+F, la care au predominat cercetările pentru genul feminin, pentru toate celelalte CCC alese au fost preferate cercetarile cu subiecți de ambele genuri.

Cuvinte cheie: Rhodiola rosea, stres, cortizol, anxietate, oboseala fizică, anduranță, adaptogen, filtre PubMed

Introduction

Rhodiola rosea (RR), also known as golden root, is an adaptogenic plant, which is capable of increasing the body's resistance to a variety of physical, chemical, biological and psychological stress factors, in a non-specific way (Amsterdam & Panossian, 2016).

Stress (S). S affects multiple brain regions (Shields et al., 2016), and the response to S determines an appropriate release of S-related hormones (Lupien et al., 2007). The uncertainty about an uncontrollable negative event tends to provoke S responses, anxiety behavior and neuronal activity (Herry et al., 2007). Anxiety is a response to S, which involves physiological, emotional and cognitive changes (Robinson et al., 2013).

Rhodiola rosea for stress, physical fatigue and endurance. Due to its central nervous system stimulation action (Baker et al., 2014), RR reduces anxiety (Cropley et al., 2015). The anxiolytic effect of RR extracts was demonstrated both in animals (Perfumi & Mattioli, 2007) and humans (Spasov et al., 2000). RR also reduces S-related fatigue (Walker & Robergs, 2006), which incorporates physical, emotional and mental exhaustion (Olsson et al.2009). In this sense, it is known that in Siberia, RR was used, among others, to increase physical strength and to treat fatigue (Khanum et al., 2005). As an example of its practical use, Rhodaxon, a preparation containing RR, decreases situational anxiety and mental fatigue (Spasov et al., 2000), and a 400 mg daily dose of RR ethanol extract may be an effective treatment in subjects suffering from prolonged or chronic fatigue (Lekomtseva et al., 2017). An explanation for the anxiolytic and anti-fatigue effects would be the presence of salidroside, a major active ingredient of RR, well known for its actions on psychological stress and fatigue (Zhang et al., 2017). RR intake can also improve endurance in humans and rats (Walker & Robergs, 2006). These effects can be explained by the fact that RR activates synthesis or resynthesis of ATP in mitochondria, and stimulates repairing energy processes after intense exercise (Abidov et al., 2003). Modulation of endurance can be achieved with RR extract, not just in chronic RR administration, as was the case in swimming exercise (Lee et al., 2009), but also in acute RR administration, for example in healthy young volunteers (De Bock et al., 2004). Acute RR ingestion "decreases heart rate response to submaximal exercise and appears to improve endurance exercise performance by decreasing the perception of effort" (Noreen et al., 2013).

The present article is the continuation of previous research of the authors concerning adaptogens - Ginseng (Jurcău et al., 2013a), Schisandra chinensis (Jurcău et al., 2013b) and Rhodiola rosea (Jurcău et al., 2012a) and also, the relationship between stress and physical effort (Jurcău et al., 2012b; Jurcău & Jurcău, 2013c; Jurcău & Jurcău, 2017).

Hypothesis

Rhodiola rosea is a well-known adaptogen, and among its actions are those of antistress and anti-fatigue protection.

Objectives

The aim of the present research is the evaluation of the number of PubMed publications regarding Rhodiola rosea's (RR) relationship with stress (S), physical fatigue (F) and endurance (E).

Material and methods

The relationship between RR and S, F and E was analyzed for the following specific selected keyword combinations (KWC): "Rhodiola rosea" (RR), "Rhodiola rosea and stress" (R+S), "Rhodiola rosea and cortisol" (R+C), "Rhodiola rosea and anxiety" (R+A), "Rhodiola rosea and physical fatigue" (R+F), "Rhodiola rosea and endurance" (R+E).

In order to perform the analysis, the following filters and subfilters provided by the PubMed site were used: a) For the *text availability* filter, the chosen subfilters were: abstract (A), full text (FT) and free full text (FFT); b) For the *species* filter, the chosen subfilters were: other animals (AN) and humans (H); c) For the *sex* filter, the chosen subfilters (selecting at the same time the human subfilter) were: male (human+male = HM), female (human+female = HF), male and female (MF) (human+male+female = HMF); d) For the *age* filter, the chosen subfilters were: 0-18, 19-44, 45-64, >65, >80.

Evaluation was performed for a period of 54 years, from 1963 to 2017, and had the following elements of analysis: A) *Analysis of the total number of publications (N)*. The total number of publications corresponding to all chosen KWC (NC) was taken into account: N-RR, N-RS, N-RC, N-RA, N-RF, N-RE. B) *Analysis of the filters*. For all analyzed subfilters, for all selected KWC, the percentage (%) of the number of RR publications corresponding to each subfilter was taken into account.

Results

Data were collected in January 2018. For all groups, data distribution was normal, according to the Kolmogorov-Smirnov test. The analysis was made over the chosen time periods.

A. Analysis of the total number of publications (Table I, Fig. 1).

The longest period of publication (Table I) was 54

years (for RR), followed by 31 years (for R+S) and 28 years (for R+C), and the shortest period was 17 years (for R+A, R+F and R+E). The largest NC (Table I) was for RR (743), followed by R+S (173), and the lowest NC was for R+C (10). In the same numerical order (Table I), the average number of publications per publishing period was the largest for RR (13.76), followed by R+S (5.28), and the lowest for R+C (0.36). Relative to RR (Fig. 1), the highest % was represented by R+S (23.28%), followed by almost equal % for R+F and R+E (3.23%, 3.1%), and the smallest % was found for R+C (1.34%).

Table I

Total number of publications (N) for KWC and the corresponding publication period

KWC	Period	Years of publication	NC	Average N per year
RR	1963-2017	54	743	13.76
R+S	1986-2017	31	173	5.58
R+C	1987-2015	28	10	0.36
R+A	2000-2017	17	15	0.83
R+F	2000-2017	17	24	1.41
R+E	2000-2017	17	23	1.35

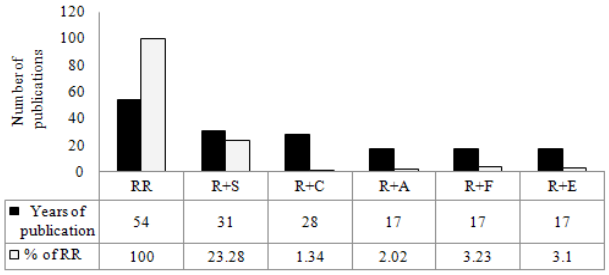


Fig. 1 - Analysis by years of publication of the% of RR, for each of the selected KWC

B. Analysis of the filters.

a) The text availability filter (Table II, Fig. 2). For all selected KWC (Table II), the percentage of the number of abstracts (A) was high and close to NC: for R+C, R+F and R+E, A was equal to NC (100%), and for R+A, it was the lowest (93.3% of N-RA). The number of publications for FT was lower than for A: the highest percentage was recorded for R+C (90% of N-RC) and the lowest percentage was found for RR (74.6% of N-RR). The fewest publications were for FFT, with a maximum for R+C (40% of N-RC) and a minimum for R+A (none). Compared to RR (Fig. 2): the highest % of RR was for R+S in A (23.52%), FT (27.8%) and FFT (27.23%); the lowest % of RR was in A and FT for R+C (1.4% and 1.62% respectively), and in FFT for R+A (0%).

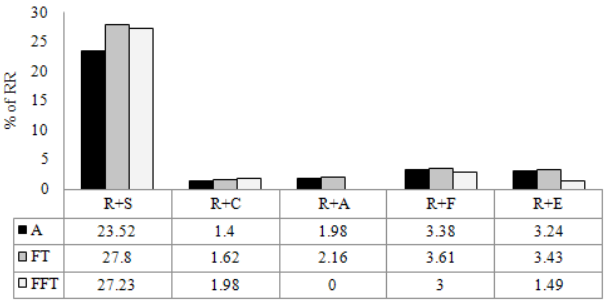


Fig. 2 - The percentage of RR for each of the selected KWC, for the subfilters of the *text availability* filter

b) The species filter (Table III, Fig. 3). For all selected KWC (Table III): the greatest number was for RR, both in An (322) and H (211), and the smallest number was for R+C, both in An (3) and H (7). For all selected KWC, the percentage of NC (Fig. 3): was the highest for R+A, both in An (46.7% of N-RA) and H (73.33% of N-RA), and the lowest in An for R+C (30% for N-RC) and in H for RR (28.4% of N-RR). Compared to RR (Fig. 3): the highest % of RR was found for R+S, both in An (24.53%) and H (32.7%); the lowest % of RR was recorded for R+C, both in An (0.93%) and H (3.23%).

Table III

The percentage of N for each of the chosen KWC, for the subfilters of the *species* filter

Period	KWC	NC	An	% An of N	H	% H of N
1963-2017	RR	743	322	43.3	211	28.4
1986-2017	R+S	173	79	45.6	69	39.9
1987-2015	R+C	10	3	30	7	70
2000-2017	R+A	15	7	46.7	11	73.3
2000-2017	R+F	24	10	41.7	16	66.7
2000-2017	R+E	23	9	39.1	14	60.9

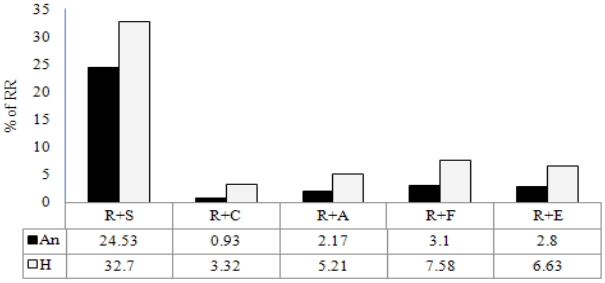


Fig. 3 - The percentage of RR for each of the selected KWC, for the subfilters of the *species* filter

Table II

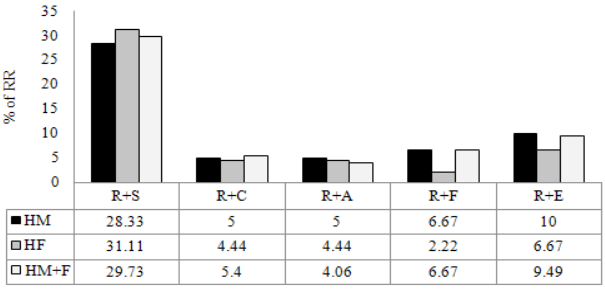
The percentage of N for each of the chosen KWC, for the subfilters of the *text availability* filter

Period	KWC	NC	A	% A of N	FT	% FT of N	FFT	% FFT of N
1963-2017	RR	743	710	95.56	554	74.56	202	27.19
1986-2017	R+S	173	167	96.53	154	89	55	31.8
1987-2015	R+C	10	10	100	9	90	4	40
2000-2017	R+A	15	14	93.33	12	80	0	0
2000-2017	R+F	24	24	100	20	83.3	6	25
2000-2017	R+E	23	23	100	19	82,6	3	13

Table IV
The percentage of N for each of the chosen KWC, for the subfilters of the *sex* filter

Period	KWC	NC	HM	% HM of N	HF	% HF of N	HM+F	% HM+F of N
1963-2017	RR	743	60	8.08	45	6.06	74	9.9
1986-2017	R+S	173	17	9.8	14	8.09	22	12.7
1987-2015	R+C	10	3	30	2	20	4	40
2000-2017	R+A	15	3	20	2	13.33	3	20
2000-2017	R+F	24	4	1.67	1	4.14	4	1.7
2000-2017	R+E	23	6	23.1	3	13.04	7	30.4

c) The sex filter (Table IV, Fig. 4). For all selected KWC (Table IV): the highest number was for RR in HM (60), HF (45) and HM+F (74), and the smallest number was for R+C and R+A in HM (3 for each), for R+F in HF (1), and for R+A in HM+F (3). For all selected KWC, the percentage of NC (Figure 3): was the highest for R+C in HM (30% of N-RC), HF (20% of N-RC) and HM+F (40% of N-RC), and the lowest for R+F in HM (1.67% of N-RF), HF (4.14% of N-RF) and HM+F (1.7% of N-RF). Compared to RR (Fig. 4): the highest % of RR was recorded for R+S in HM (28.33%), HF (31.11%) and HM+F (29.73%); the smallest % of RR was found for R+C and R+A in An (5% for each), for R+F in HF (2.22%), and for R+A in HM+F (4.06%).



	R+S	R+C	R+A	R+F	R+E
HM	28.33	5	5	6.67	10
HF	31.11	4.44	4.44	2.22	6.67
HM+F	29.73	5.4	4.06	6.67	9.49

Fig. 4 - The percentage of RR for each of the selected KWC, for the subfilters of the *sex* filter.

Discussion

Justification for choosing subfilters

The *text availability* group filter. A provides extremely useful information in order to have a brief idea about the content of the article concerned. There are publications without an A, especially in the early years of the PubMed website. Free full-text publications are a real help, but most publications offer full-text access by purchase, which poses difficulties for those who would like to be informed but have modest financial possibilities.

The *species* group filter. Studies that refer to RR, RR and stress, and RR and physical effort and endurance are both clinical and experimental. The choice of either one of these subfilters is useful in selecting studies.

The *sex* group filter. Depending on gender, there may be differences in the results of studies on RR, RR and stress, and RR and physical effort and endurance. Some of these studies include only one gender in the analyzed groups, while other studies include both males and females.

Analysis of the total number of publications

The total number of publications (Fig.1) proves that studies on RR, R+S and R+C began before 2000 (1963, 1986 and 1987, respectively) and continued until 2017 inclusive (except for R+C, until 2015 inclusive), and during these periods (54, 31, 59 and 28 years respectively), 743, 173 and 10 studies, respectively, were published; for R+A, R+F and R+E, publications started in 2000 and continued throughout 2017, and over these 17 years, 15, 24 and 23 studies were published. It should be noted that studies on R+C, although mentioned before 2000, are fewer (10) compared to R+A (15), R+F (24) and R+E (23) mentioned after 2000.

Considering the average per annum of publications, it can be seen that the highest interest was in RR (13.76/year), followed by R+S (5.58/year) and the lowest interest was in R+A (0.83/year) and R+C (0.36/year). Considering the % of N-RR, research interest was the highest in R+S (23.28%), followed by R+F (3.23%) and R+E (3.1%) at a distance. The lowest interest was in R+A (2.02%) and R+C (1.34%).

From the above, it can be observed that research on the Rhodiola rosea plant is generally predominant. This is understandable, given that all the other studies could be considered as integral parts of a whole, represented by RR. Of all RR studies, stress research was predominant, which is in agreement with the interest, from the beginning of RR use, in the increase of stress response. Cortisol and anxiety, considered markers of the body's response to stress (especially mental stress) are the least found in the PubMed search for RR presented in this article. The larger number of studies on RR and physical and endurance fatigue, twice the number of studies on cortisol and anxiety, can be justified by two hypotheses: a) RR has been used since its inception to reduce fatigue in general and increase the body's resistance to effort b) RR may be more useful in situations of physical effort and for modulating endurance than in modulating mental stress.

Analysis of filters

The text availability filter. It was shown that: A is present in the vast majority of publications, being 100% of NC for three combinations (R+C, R+F and R+E); the number of FT is lower compared to A, but higher than FFT; the number of FFT is lower compared to A and FFT. Therefore, the PubMed site displayed A for the vast majority of KWC publications. The most available publications that can be read for free are the ones related to RR, and among them, those related to R+C. It should be noted that although R+C publications are the lowest in number, they show the highest percentage of NC for FFT (40% of N-RC). For those who wish to read the full text, only a small part of the selected KWC publications are available free of charge on PubMed.

The species filter. Considering the percentage of NC, we found that research predominantly included: animals

for RR (43.3% of N-RR) and R+S (45.6% of N-RS); human subjects for the other KWC, in numerical order R+A (73.3% of N-RA), R+C (70% of N-RC), R+E (60.9% of N-RE). Animal studies were predominant for two KWC (RR, R+S), with publication periods starting before 2000, while publication of human studies started in 2000. Also, studies on humans were more related to topics involving psychological characteristics that can be predominantly assessed in human subjects - anxiety, physical fatigue, endurance. The tendency of the last 17 years to conduct RR research on the selected topics mainly in human subjects could be explained by the fact that the main purpose of RR use is for the benefit of people.

The sex filter. Considering the percentage of NC, we found a preference of research for subjects: HF for R+F only (4.14% of N-RF); HM+F for all other KWC, in numerical order: R+C (40% of N-RC), R+E (30.4% of N-RE), R+A (9.9% of N-RR). Both genders were studied in most of the RR research selected in this article. This may be a possible indication of the usefulness of this plant for both men and women, as well as of the interest in using RR for both sexes in stress situations, physical fatigue and modulation of endurance.

Conclusions

1. The number of publications for the searched KWC differed; it was the largest for RR and R+S, smaller for R+F and R+E, and the smallest for R+A and R+C.

2. For all KWC, the number of FFT publications was reduced compared to the total number of publications, the number of A and FT, with a predominance of FFT for R+C as a percentage of NC.

3. Except for RR and R+S, which evidenced a preponderance of animal research, for all the other chosen KWC, studies on human subjects were preferred.

4. Apart from R+F, which showed a predominance of the female sex, for all the other chosen KWC, research on subjects of both sexes was preferred.

Conflicts of interest

Nothing to declare.

Acknowledgement

We wish to thank Dr. Nicolae-Alexandru Colceriu at USAMV Cluj-Napoca for his advice on the characteristics of the Rhodiola rosea plant.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 23–27

The role of emotions in the enhancement of performance in football for the 7 to 10 age group

Rolul emoţiilor în creşterea performanţei sportive în jocul de fotbal la 7-10 ani

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Abstract

Background. The concept of a unified training practice for both children and juniors in the game of football is a requirement that has been increasingly emphasized by numerous technicians. Emotional training plays an important role in enhancing sport performance.

Aims. This experimental study aims to discuss the relationship between functional emotions and sport performance.

Methods. The study was conducted on a number of 15 male subjects aged 9 years old, members of the ACS Best Junior football club in Cluj-Napoca. The research took place between 1 November 2014 and 4 January 2015 by applying the Profile of Mood States test.

Results. The tests conducted emphasized the fact that the children's performance in sport was significantly enhanced after the training program.

Conclusions. Following the intervention program that we proposed, we must conclude that sport performance was significantly influenced. Thus, it became clear that emotions play an important role in enhancing the performance in football for the 7 to 10 years old age group.

Keywords: football, sport performance, emotions, sport, emotional control, emotional regulation

Rezumat

Premize. Concepţia de pregătire unitară a copiilor şi juniorilor în fotbal este o cerinţă tot mai des exprimată de numeroşi tehnicieni. Pregătirea emoţională are un rol important în creşterea performanţei sportive.

Obiective. Studiul îşi propune să urmărească relaţia dintre emoţiile funcţionale şi performanţa sportivă.

Metode. Studiul a fost efectuat pe un număr de 15 subiecți de gen masculin cu vârsta de 9 ani de la clubul de fotbal ACS Best Junior, din Cluj-Napoca. Cercetarea a avut loc în perioada 1 Noiembrie 2014 și 4 Ianuarie 2015, prin aplicarea testului Profilul dispoziţiilor afective.

Rezultate. În urma testărilor aplicate, s-a constatat că performanţa sportivilor în fotbal a crescut după programul de antrenament efectuat.

Concluzii. În urma aplicării programului de antrenament propus s-a constatat că performanţa sportivă este semnificativ influenţată, astfel putem conchide că emoţiile joacă un rol important în creşterea performanţei în jocul de fotbal la vârsta de 7-10 ani.

Cuvinte cheie: fotbal, performanţă sportivă, emoţii, sport, control emoţional, reglare emoţională

Received: 2017, June 3; *Accepted for publication:* 2017, July 10
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Introduction

Over time, psychological knowledge has been used to meet the requirements in the field of sport, which has led to an increased interest of coaches as well as athletes in the psychological component of their activities. An increasing number of athletes and sports organizations have recourse to the help of a psychologist in order to obtain sport performance, being aware that improving physical training and coming close to the functional limits of the human body will allow them to achieve their goals. Attention has started to focus on the mental parameter of performance (Ciucurel, 2006).

According to Lan (2012), modern sport influences the psychological development of children. Sport can favor children's cognitive development, leads to emotional regulation and may encourage a positive feeling. Sport promotes psychological development directly, by improving the nervous system, and indirectly, by regulating emotions.

Emotions are necessary to maintain relationships and to understand other people's feelings. They are encoded in the human body and brain (Siden, 2014).

Emotions can be accompanied by physiological changes such as irregular breathing, accelerated heartbeat; they can be betrayed by facial pallor or redness, cascades of laughter or tears.

We all experience feelings of happiness, sadness, admiration, contempt, hope, despair, satisfaction, indignation, etc. We can be moved by a situation, an object, but especially by the people around us. Thus, emotions are the result of our evaluation of the exterior world or events around us.

Man has the capacity to experience several conflicting or concordant emotions simultaneously. When emotional ambiguity occurs, tension states develop.

Over the past 40 years, emotions have been very carefully studied in sport psychology. Even if for many decades after World War II, negative emotions were placed ahead of positive emotions, now positive emotions are extensively studied due to their influence on sport performance. The benefits of these emotions have not yet been completely understood; they have the capacity to generate higher self-efficacy, attention, motivation, better problem solving and coping skills (McCarthy, 2011).

McCarthy et al. (2013) demonstrated in their study that emotions are important for cognitive interference, concentration disturbance, and provided some initial evidence that cognitive interference is important for performance in youth sport.

Stenseng et al. (2015) consider that athletes who are very passionate about sport have a higher level of positive emotions.

The reason for all negative emotions is closely related to the energetic system of the body. Negative emotions such as anger, fear, anxiety, worry, depression, as well as all emotions that reduce sport performance occur as a result of a disruption of the energetic system of the body (Craig, 2004).

Anxiety may occur especially in more sensitive individuals, being an effect of stress which is ubiquitous among the population (Mihăilescu et al., 2011).

Stress, a term used to characterize all that is physically and psychologically unpleasant, is what the mind and the body feel when the exigencies of life exceed what people think they can or should endure (Moare, 2016).

The term stress refers to the way in which athletes understand and respond to various events that they consider motivating or dangerous (Lane, 2008).

According to Mapfumo & Muchena (2014), stress can be viewed as a stimulus, as an intermediate variable, but also as a response.

Gilbert (2007) believes that sport is an environment that generates stress through its nature and characteristics.

Objectives

We aimed to study the relationship between functional emotions and sport performance, more precisely, to show the fact that functional emotions are an important predictor of sport performance in football starting with the age of 7-10 years.

Hypothesis

Following the psychological training program proposed for implementation, we hypothesized that players might have a significantly higher level of functional emotions and sport performance in the post-test compared to the pre-test.

Material and methods

Before initiation of the study, the approval of the Ethics Committee of the Faculty of Physical Education and Sport at the "Babeş Bolyai" University Cluj-Napoca was obtained, as well as the subjects' informal consent and their parents' written consent.

Research protocol

a) Period and place of the research

The research started on 1 November 2014, and the intervention program was applied until 1 February 2015. The research was conducted at the training facilities of the Best Junior club in Cluj-Napoca.

Subjects and groups

The study included 15 male subjects aged 9 years, members of the Best Junior football club.

b) Tests applied

The *Profile of Mood States* test was applied. The Profile of Mood States (Crăciun, 2012) is a scale that includes 8 mood states of the subjects in a specific situation. Each subject receives a list of adjectives that describe emotional states. The subjects are asked to encircle the answer that best describes the way they feel during the football game.

For emotional regulation and the increase in the level of functional emotions, the following methods were used:

- *Autogenic training*

One of the best known relaxation techniques is autogenic training. This is a scientifically based, experimentally and clinically validated method, which is easy to learn and takes a relatively short time. This relaxation technique is based on a global approach of the subject's personality, being a psychotherapeutic technique (Holdevici & Crăciun, 2013).

- *Focusing on the task*

Ask the athlete to imagine that he walks on a 15 cm

wide and 8 m long beam suspended at 20 centimeters above the ground. Walking will be very easy and he will not be afraid of falling. Then change the requirements of the task: the athlete should imagine that he walks on the same beam, but suspended at a height of 20 meters. The sensation of fear will occur even if physical skills have not been affected or changed. In order to succeed, the athlete will have to block out the thought about the risk of falling and to focus exclusively on the task. Even if in sport risks are much lower, psychological reactions can inhibit performance (Crăciun, 2012).

- *Control of the game against a very good competitor*

The athlete should imagine an effective strategy by which he can overcome all obstacles that a stronger and perhaps more experienced opponent can raise. For example, in the football game, how a forward player can overcome a taller and stronger back player. The forward should control all his movements and decisions in order to be better than his opponent (Crăciun, 2012).

- *Emotional control*

The athlete should imagine a situation in which he gets nervous because of a failure or following a wrong decision of the referee, and he obviously loses his concentration or self-confidence. In this case, emphasis will be placed on the emotions that are triggered. For example, the athlete will try to feel anxiety experienced at the beginning of an important match. Anxiety-reducing strategies will be used, which will allow the athlete to feel all the tension leaving his body and to regain control of what he sees, feels, hears, etc. (Crăciun, 2012).

The methods were applied by direct indications, autogenic training was recorded on a CD by a specialist and was played in the locker room twice a week before training.

c) Statistical processing

The results were statistically processed using the SPSS (version V23) and Microsoft Office 2010, Word and Excel software. Data were statistically processed using the Student t test.

Effect size

The tests for the verification of statistical hypotheses indicate through the threshold *p* value whether there are statistically significant differences between the means of the two tests, but not the size of the difference. The effect size is evaluated by terms such as small, medium, large, small to large, etc. The size of the difference between the means of the results in the two dependent tests (same sample) is assessed using Cohen's effect size index.

Results

a) Tension

Table I

Results of the Profile of Mood States, tension

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	47.78	43.37	Mean		-4.41
Median	46	43	Progress		9.2%
Standard deviation	8.72	6.63	Lower normal limit		35
Minimum	36	36	Upper normal limit		50
Maximum	79	72	Two-tailed dependent t test	t	P
Amplitude	43	36		9.87	< 0.001
Variability coeff.	18.2%	15.3%	Effect size		1.04

b) Depression

Table II

Results of the Profile of Mood States, depression

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	58.58	53.26	Mean		-5.32
Median	58	52	Progress		9.1%
Standard deviation	9.24	6.50	Lower normal limit		47
Minimum	42	42	Upper normal limit		50
Maximum	90	77	Two-tailed dependent t test	t	P
Amplitude	48	35		12.19	< 0.001
Variability coeff.	15.8%	12.2%	Effect size		1.29

c) Anger

Table III

Results of the Profile of Mood States, anger

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	56.07	51.08	Mean		-4.99
Median	56	47	Progress		8.9%
Standard deviation	10.25	7.53	Lower normal limit		47
Minimum	40	43	Upper normal limit		50
Maximum	86	81	Two-tailed dependent t test	t	P
Amplitude	46	38		10.35	< 0.001
Variability coeff.	18.3%	14.7%	Effect size		1.09

d) Vigor

Table IV
Results of the Profile of Mood States, vigor

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	67.36	70.99	Mean		3.63
Median	72	72	Progress		5.4%
Standard deviation	10.61	7.19	Lower normal limit		50
Minimum	30	42	Upper normal limit		76
Maximum	76	76	Two-tailed dependent	t	P
Amplitude	46	34	t test	7.68	0.000
Variability coeff.	15.8%	10.1%	Effect size		0.81

e) Fatigue

Table V
Results of the Profile of Mood States, fatigue

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	53.27	48.69	Mean		-4.58
Median	52	44	Progress		8.6%
Standard deviation	11.61	8.12	Lower normal limit		41
Minimum	41	41	Upper normal limit		50
Maximum	86	74	Two-tailed dependent	t	P
Amplitude	45	33	t test	9.16	< 0.001
Variability coeff.	21.8%	16.7%	Effect size		0.97

f) Confusion

Table VI
Results of the Profile of Mood States, confusion

Statistical indicators	Pre-test	Post-test	Statistical indicators	Post-test–pre-test differences	
Mean	51.71	48.20	Mean		-3.51
Median	49	46	Progress		6.8%
Standard deviation	8.49	5.97	Lower normal limit		42
Minimum	42	42	Upper normal limit		50
Maximum	72	68	Two-tailed dependent	t	P
Amplitude	30	26	t test	7.97	0.000
Variability coeff.	16.4%	12.4%	Effect size		0.84

Discussions

Curran et al. (2013) consider that the physical, psychological and social health of children is well defined in team sports, in our case the football game. An extremely important role is played by coaches, because their behavior may cause children to manifest both psychological and social disorders. The results obtained in this study evidenced the positive effect of the coach's behavior on young football players, which was reflected in their psychological satisfaction. The conclusion of the study highlights the influence of coaches on children, compliance with unilateral decisions and the positive guidance of children.

Table I shows a decrease in the *tension* score by 4.41 units, from 47.78 in the pre-test to 43.37 in the post-test. Score dispersion was relatively homogeneous both in the pre-test and the post-test. At the end of the training period, a progress value of 9.2% was obtained for tension.

In the case of *depression*, as shown in Table II, the score decreased by 5.32 units, from 58.58 in the pre-test to 53.26 in the post-test. Score dispersion around the mean was relatively homogeneous in the pre-test and homogeneous in the post-test. At the end of the training period, a progress value of 9.1% was obtained for depression.

The mean score for *anger* decreased by 4.99 units, from 56.07 in the pre-test to 51.08 in the post-test. Score dispersion around the mean had a relatively homogeneous structure in the pre-test and a homogeneous structure in the post-test. At the end of the training period, a progress value of 8.9 was obtained for anger (Table III).

The mean score for the *vigor* factor increased by 3.63 units, from 67.36 in the pre-test to 70.99 in the post-test. Score dispersion around the mean had a relatively homogeneous structure in the pre-test and a homogeneous structure in the post-test. At the end of the training period, a progress value of 5.4% was obtained for vigor (Table IV).

The mean score for *fatigue* decreased by 4.58 units, from 53.27 in the pre-test to 48.69 in the post-test. Both in the pre-test and the post-test, score dispersion was relatively homogeneous. At the end of the training period, a progress value of 8.6% was obtained for fatigue (Table V).

For *confusion*, the mean score decreased by 3.51 units, from 51.71 in the pre-test to 48.20 in the post-test. Score dispersion was relatively homogeneous in the pre-test and homogeneous in the post-test. At the end of the training period, a progress value of 6.8% was obtained for confusion (Table VI).

Conclusions

1. Following the psychological training program applied, the children had a significant improvement in sport performance compared to their level of performance before the program.

2. After the application of the psychological training program, significantly better scores were obtained for both the tested psychological factors and sport performance.

Conflicts of interests

Nothing to declare.

Acknowledgments

The article uses results from the first author's doctoral thesis, which is in progress at the Faculty of Physical Education and Sport of the "Babeş-Bolyai" University in Cluj-Napoca.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 28–36

REVIEWS

Sport-related concussion

Comoția cerebrală în sport

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Abstract

Sport-related concussion is a complex brain injury, manifesting through a very large variety of brain dysfunction signs and symptoms (physical and cognitive deficit, abnormal behavior). The symptoms are transient, most often without loss of consciousness and evidence of injury typically absent on standard neuroimaging methods. Some sports and individual playing styles have a greater risk of concussion. The initial assessment of a concussion should include combined visual and postural tests and the clinical follow-up must evaluate the long-term effects (deterioration of the physical or mental status). A rigorous education of coaches and athletes and implementation of certain training strategies can reduce the incidence of sport-related concussion. More studies regarding injury mechanisms will bring valuable information for safety equipment manufacturers and for designing safer competitions.

Keywords: sport-related concussion, signs, symptoms, assessment, neurodegenerative effects.

Rezumat

Comoția cerebrală din disciplinele sportive este o leziune complexă a creierului, care se manifestă printr-o mare varietate de semne și simptome de disfuncție cerebrală (deficit fizic și cognitiv, comportament anormal). Simptomele sunt tranzitorii, cel mai adesea fără pierderea conștienței și dovezile morfologice ale traumatismului sunt de obicei absente la examinarea prin metodele standard neuroimagistice. Unele discipline sportive și stiluri de joc individuale prezintă un risc mai mare de comoție cerebrală. Evaluarea inițială a unei comoții ar trebui să includă teste combinate vizuale și posturale, iar monitorizarea clinică trebuie să evalueze efectele pe termen lung (deteriorarea stării fizice sau mentale). O educație riguroasă a antrenorilor și sportivilor și punerea în aplicare a anumitor strategii de antrenament poate reduce incidența comoției cerebrale din sport. Mai multe studii privind mecanismele lezionale pot aduce informații valoroase producătorilor de echipamente de siguranță și pentru proiectarea unor competiții sportive mai sigure.

Cuvinte cheie: comoția cerebrală din sport, semne, simptome, evaluare, efecte neurodegenerative.

Received: 2017, December 8; *Accepted for publication:* 2017, December 28

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https://doi.org/10.26659/pm3.2018.19.1.28

Definitions

The Sport Concussion Assessment Tool - 3rd and 5th editions (SCAT3 and SCAT5) define sport-related concussion (SRC) as an impairment in brain function caused by a direct or indirect traumatic brain injury (TBI), with immediate and transient symptoms, most often without loss of consciousness (1),(2). SRC represents a frequent injury and a serious concern for a lot of sports worldwide.

The term mild traumatic brain injury (mTBI) is utilized very often as an equivalent term to concussion; practically, SRC represents a subset of mTBI, with particular onset and clinical manifestations in the context of sport (King et al., 2014); (2).

Athletes and trainers should be aware of the possible presence and consequences of a concussion, which must be rapidly identified and correctly managed.

Epidemiology

In the USA, it is estimated that approximately 2% of the population suffered a certain degree of disability as a result of a TBI; and that approximately 80% of TBIs are of mild severity (Ruff et al., 2009). Also in the USA, it is estimated that 5-9 % of all sport-related injuries are SRCs (King et al., 2014).

The majority of adult patients with sport-related concussion are not hospitalized (Vavilala et al., 2017), but alarmingly high percentages (30-70%) of concussions occur in pediatric sports (Hobbs et al., 2016; Yue et al., 2016).

The number of SRCs has increased in the last years. Epidemiological studies largely underestimate the incidence of SRC, because of several factors: athletes do not recognize and do not report a SRC that may stop them from returning to play; clinicians in emergency department units report variable results because of the very complex symptomatology, which can be influenced by other conditions, such as the hydration level, fatigue or depression, or because data are not available (Iverson, 2006; Register-Mihalik & Kay, 2017). It is estimated that 1/3 of concussions remain undiagnosed (Meehan et al., 2013).

Pathophysiology of concussion

SRC may be caused either by a direct mechanism (coup injuries or a direct blow to the moving head) or by an indirect mechanism (contrecoup injuries or an indirect blow elsewhere on the body with an impulsive force transmitted to the head, or a moving head hitting a stationary object) (2); (Register-Mihalik & Kay, 2017). It is reported that indirect concussive injury is more severe (Guskiewicz et al., 2004).

Concussion is a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. What most contributes to its complexity is the fact that there is no known threshold for the hitting force inducing this injury and there is no correlation between the intensity or location of the impact and the severity of the injury (Register-Mihalik & Kay, 2017).

Cellular physiology is affected in the acute phase of concussion: a neuronal depolarization and an abrupt release of excitatory neurotransmitters occur. The depolarization process causes an energy crisis for rebalancing the ionic shift, which leads to a high increase of glucose metabolism and a decrease of cerebral blood flow (Giza & Hovda, 2001; Laskowski et al., 2015; Register-Mihalik & Kay, 2017). The axonal function and structure are also affected: there is an alteration of axolemmal permeability, cytoskeleton and both anterograde and retrograde transport (Laskowski et al., 2015), and axons can undergo progressive degeneration (Morley & Seneff, 2014). The autoregulation of cerebral blood flow (CBF) is impaired or abolished (for example, an abnormal middle cerebral artery flow velocity was reported), which makes the brain vulnerable to ischemia or hyperemia (Vavilala et al., 2017). The expression of dopaminergic receptors is also altered (increased in the prefrontal cortex or initially decreased and then increasing in the striatum, which can explain working memory deficits) (Kobori & Dash, 2006; Wagner et al., 2009).

Cerebral physiology can be impaired for weeks following the acute phase of injury: the brain may be less responsive to physiological neural activation; the ionic imbalance, the energy crisis and the depressed metabolic activity continue, impair cellular function and create a post-concussion vulnerability which may also lead to cell death (Giza & Hovda, 2001; Laskowski et al., 2015; Register-Mihalik & Kay, 2017). Also, the altered cerebral vascular reactivity persist: it was reported that patients with concussion presented reduced CBF at one week, which recovered at one month (Meier et al., 2015).

Clinical diagnosis

SRC is one of the most complex sport-related injuries, and variations in its reporting, diagnosis and management are determined by its extremely varied clinical presentation and by the differences between many available published guidelines for recognition, assessment and management of concussion (King et al., 2014).

SRC causes multiple and non-specific signs and/or symptoms, usually with rapid onset and spontaneous resolution in a sequential course (2). SRC has a wide range of potential effects, manifesting by an impairment of neurological functions, which may consist of:

- symptoms (e.g., headache, dizziness, nausea/emesis, pain localized to eye)
- physical signs (e.g., balance impairment, drowsiness, blurry vision, sensitivity to light or noise, impaired reaction time, fatigue or lethargy, changes in the sleep pattern, or other neurological deficits)
- impaired brain function (e.g., confusion, cognitive deficit, word finding difficulties, memory deficits, difficulty concentrating, post-traumatic amnesia)
- abnormal behavior (e.g., change in personality, depressive symptoms) (1), (Morley & Seneff, 2014; King et al., 2014; Laskowski et al., 2015; Register-Mihalik & Kay, 2017).

Individual cerebral physiological characteristics are responsible for the diversity of the symptoms. An underlying cerebral neurovascular abnormality in SRC (Vavilala et al., 2017) is linked to the intensity of post-concussive headache and to the cognitive symptom burden:

Table I
Concussion grading system

Grade 1	Grade 2	Grade 3
No LOC Transient confusion Symptoms and mental status changes resolve in less than 15 min	No LOC Transient confusion Symptoms or mental status changes last more than 15 min	LOC (seconds or minutes)

a higher vasoreactivity was strongly associated with more severe headaches (Albalawi et al., 2017). Therefore, a detailed history of injury is an important part of evaluation.

Usually, the loss of consciousness (LOC) is not present. The American Academy of Neurology (Ruff et al., 2009; Giza et al., 2013) classified concussions into 3 grades (Table I).

Even if according to the definition of concussion, recovery statistically takes around 15 minutes, there are cases when signs and symptoms may be prolonged and evolve over minutes to hours (2). The majority of concussion symptoms (80-90%) disappear in a short time (7-10 days), but for children and adolescents, recovery may be longer (McCrory et al., 2005; Morley & Seneff, 2014).

For the clinical assessment of concussion, SCAT indicates the Glasgow Coma Scale (GCS) (Table II), a primary, non-invasive clinical tool which calculates a score evaluating the level of consciousness (eye opening, verbal and motor responses) (1); (2). The score indicates a mild (13-15), moderate (9-12), or severe (< 8) brain injury and, through repeated recording for all athletes, may be utilized to determine the course of care and to predict outcome in case of subsequent deterioration (Zollman, 2016).

Table II
The Glasgow coma scale (GCS)

Parameter	Response	Score
Best eye response (E)	no eye opening	1
	eye opening in response to pain	2
	eye opening to speech	3
	eyes opening spontaneously	4
Best verbal response (V)	no verbal response	1
	incomprehensible sounds	2
	inappropriate words	3
	confused	4
	oriented	5
Best motor response (M)	no motor response	1
	extension to pain	2
	abnormal flexion to pain	3
	flexion/withdrawal to pain	4
	localizes to pain	5
	obeys commands	6
	GCS = E + V + M = maximum 15	

Athletes with SRC very frequently report dizziness and visual problems, which requires a more comprehensive assessment of vestibulo-oculo-motor impairments (Mucha et al., 2014). Multidimensional oculomotor and vestibular tests are very sensitive in the detection of subtle neurological signs, and could be used as a combined aid in the detection of deficits following a concussion. These tests can quantify functional impairment, monitor deterioration or recovery, and evaluate treatment efficacy, therefore representing valuable assessment tools in SRC (Mucha et al., 2014; Cheever et al., 2017).

Following a SRC, several oculometric parameters are significantly affected, including pursuit acceleration, latency and gain, saccade amplitude, and speed responsiveness (Liston et al., 2017), and there are several oculomotor tests for assessment. The King-Devick test investigates oculomotor function using a series of charts of numbers that progressively become more difficult to read in a flowing manner (Galetta et al., 2011; King et al., 2014). This test assesses saccadic eye movements and is very useful for a better identification of SRC without reported signs/symptoms, but it does not evaluate other ocular motor functions, which can be important indicators of SRC brain dysfunction, such as pursuit, convergence, or accommodation (Cheever et al., 2017). The King-Devick test was even able to identify unwitnessed SRC on field when SCAT2 components were negative (King et al., 2013).

Additionally, other optometric tests such as near point convergence (NPC) distance, Gaze Stabilization (GST), Rapid Eye Horizontal (REH), Smooth Pursuit - Slow (SPS) and Fast (SPF), Optokinetic Stimulation (OKS) can provide useful information about the evolution and recovery process in SRC and may be useful in deciding to return to sport (Cheever et al., 2017). These tests have different dynamics during the evolution of SRC, they have significantly higher values at the initial assessment of the injury, the King-Devick test improves across time, REH and SPF tests improve after the acute phase, and the OKS test improves even if symptoms are prolonged (Cheever et al., 2017).

The vestibular system is a complex network which shows impairments within the first few days after a concussion. The commonly used tests for the vestibular system are the Balance Error Scoring System (BESS) and the Sensory Organization Test (SOT) (Guskiewicz, 2001; McDevit et al., 2016). Both SOT and BESS tend to be most sensitive in the very acute stage of recovery, but while SOT requires advanced postural analysis equipment, BESS is more subjective, the investigator measures postural stability by counting errors during a series of six balancing stances (Wright et al., 2017; Cheever et al., 2017).

The Vestibular/Ocular Motor Screening (VOMS) is a brief on-field test, which evaluates through symptom provocation and measurement of near-point convergence 5 domains (smooth pursuit, horizontal and vertical saccades, convergence, horizontal vestibular ocular reflex, and visual motion sensitivity), and which also demonstrated high sensitivity in identifying athletes who experienced a SRC (Mucha et al., 2014; Kontos et al., 2017).

Testing the combination of visual and postural tasks is the most sensitive and had the greatest discriminatory outcomes for athletes with SRC (Wright et al., 2017).

From a psychiatric point of view, a concussion can be

immediately followed by depressive symptoms that seem to be associated with the symptoms of concussion itself (Yrondi et al., 2017).

Differential diagnosis is extremely exhaustive, due to the fact that a positive identification of SRC requires the exclusion of other conditions with similar clinical signs and symptoms: the use of toxics (drug, alcohol) or medication; other injuries (cervical) or other comorbidities (vestibular dysfunction, psychological factors) (2).

Neuroimaging evaluation and biomarkers

The diagnosis of SRC is clinical and often very challenging (Wright, 2014). Clinical signs and symptoms are acute, have a rapid resolution and reflect a functional disturbance, not a structural injury.

In emergency departments, a computed tomography (CT) scan is quickly performed, but objective evidence of injury is typically absent on standard neuroimaging investigations (2).

The transcranial Doppler ultrasound (TCD) investigation is a non-invasive bedside tool which can be used for assessing cerebral blood flow and altered neurophysiology, and for monitoring cerebrovascular reactivity and the recovery of SRC (Gardner et al., 2015; Vavilala et al., 2017). Also, at a functional level, in brain research, the effect of injury on brain functions (such as perception and memory) can be investigated by functional magnetic resonance imaging (fMRI) (Toth, 2015).

A recent study (Amyot et al., 2015) compared the effectiveness of seven neuroimaging modalities (CT, MRI, TCD, positron emission tomography (PET), single photon emission computed tomography (SPECT), electrophysiological techniques - magnetoencephalography and electroencephalography, and functional near-infrared spectroscopy). CT, MRI and TCD proved to be the most useful in clinical diagnosis. CT and MRI are not routinely performed and it is a challenge for the physician to decide whether neuroimaging is needed (Table III), but TCD is non-invasive, inexpensive, and can be used in the daily management of TBI. The other modalities have the potential to be diagnostic tools, but are expensive and their clinical utility remains to be confirmed in larger studies; for example, SPECT perfusion imaging has some advantages compared to PET: radiopharmaceuticals are widely available and approved and provide quantitative data both for screening and post-injury monitoring. However, due to the heterogeneity of signs/symptoms in SRC, there is no single imaging modality that is sufficient for all patients (Kutcher et al., 2013).

Currently, serum biomarkers have a limited role in the evaluation and management of SRC (O'Connell et al., 2017). More objective biomarkers of neuronal, axonal and glial injury are clinically needed in order to diagnose, prognosticate the recovery and determine the risk of cumulative impairments after SRC in athletes (2). Recently, for determining potential biomarkers, new perfusion neuroimaging techniques have been explored, which can assess cerebral blood flow dynamics (Douglas et al., 2017).

Table III
Recommendation for CT scan in concussion

Patients with a LOC or posttraumatic amnesia - only if one or more of the following is present	1. Headache 2. Vomiting 3. Age > 60 years 4. Drug or alcohol intoxication 5. Deficits in short-term memory 6. Physical evidence of trauma above the clavicle 7. Post-traumatic seizure 8. GCS score < 15 9. Focal neurologic deficit 10. Coagulopathy
Patients without a LOC or posttraumatic amnesia - if one or more of the following is present	1. Focal neurologic deficit 2. Vomiting 3. Severe headache 4. Age >65 years 5. Physical signs of a basilar skull fracture 6. GCS score < 15 7. Coagulopathy 8. Dangerous mechanism of injury (e.g., ejection from a motor vehicle, a pedestrian struck by a vehicle, or a fall from a height of more than 3 feet or 5 stairs)

Axonal injury in SRC is the primary determinant of outcome following TBI and is reflected in the remodeling of cytoskeletal neurofilament proteins; it was demonstrated that serum axonal protein neurofilament light (NFL) is a highly sensitive biomarker for concussion (Shahim et al., 2017). Another promising diagnostic marker which also has a certain utility in predicting mortality is S100B, a protein mainly found in astroglia and Schwann cells; it increases in cerebrospinal fluid and serum after injury and can distinguish injured from non-injured patients. Other research markers, such as neuron-specific enolase - highly expressed in neuronal cytoplasm, tau proteins - associated with neuronal microtubules, glial fibrillary acidic protein - from astroglial cytoskeleton, and alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptor - a glutamate receptor involved in fast synaptic transmission from the central nervous system have not yet confirmed their value as serum markers of SRC (O'Connell et al., 2017).

Treatment

There is a lack of consensus regarding the treatment of SRC, as individual variations in signs/symptoms make it challenging for clinicians to approach the management of concussion from all sides, including daily activities and return to school, work, and sport.

Exercise and cognitive activity increase the brain's metabolic activity; therefore the treatment basis for SRC is cognitive and physical rest, allowing for normalization of metabolism and correction of energy deficit (Wright, 2014). This assertion is supported by some studies (Majerske et al., 2008; Brown et al, 2014) in which subjects engaged in the highest amount of activity (cognitive and sportive) scored worse in successive concussion evaluations.

Currently, studies do not support complete rest, but the exact amount and duration of rest is not yet well defined; there is also limited evidence of the use of pharmacotherapy. Individual specific prescriptions for the type and intensity of rest and allowable activity may be more beneficial (2).

As a general principle, drugs that can mask the symptoms of concussion must be avoided. In the acute phase (0-10 h post-injury), acetaminophen can be used for headache (nonsteroidal anti-inflammatory drugs are not recommended), and drugs that alter mental status (benzodiazepines) must be avoided; after this phase, drugs for symptomatic relief may be used, excepting those that affect the central nervous system (stimulants, anti-nausea drugs and antidepressants). Sleep problems in the first few days should be managed conservatively, without medications (Harmon et al., 2013).

Multiple therapeutic interventions, including physical, vestibular, pharmacological and cognitive behavioral therapy, become necessary in case of complications.

Evolution and complications

The evolution of SRC can complicate with prolonged symptom recovery, post-concussion syndrome and second impact syndrome. Repeat concussions may lead to long-term effects, such as depression, mild cognitive impairment and chronic neurodegeneration (Guskiewicz et al., 2005; Guskiewicz et al., 2007; King et al., 2014; Morley & Seneff, 2014). Rarely, SRCs are associated with skull fractures, epidural or subdural hematomas, and edema requiring neurosurgical evaluation (Hobbs et al., 2016).

Several *risk factors* for complications, including young age (Freeman et al., 2008) and gender (female sex can be a predictor of symptom reporting), initial symptom severity, loss of consciousness (Fehr et al., 2017), a history of learning and attention deficit disorders, migraines or mood disorders (Harmon et al., 2013), may influence a prolonged evolution of SRC (King et al., 2014). More probably, certain individual features, a particular natural state, favor an increased susceptibility of the brain to injury: microglia can have a hyperreactive response which can persist for a long time (strongly linked to other neurological disorders), or the normal physiological response to brain injury can be disrupted (a reaction to deficiencies in key micronutrients which leads to impaired antioxidant capacity and associated pathologies), or alterations in cerebral neurovascular response develop (failure of cerebral blood flow autoregulation) (Wright et al., 2017). As a result of the increased metabolic dysfunction, the brain may have impaired ability to recycle cellular debris and, consecutively, increased vulnerability if a subsequent insult (even minor) were to occur (King et al., 2014). Repeated insults can induce a chronic state of slowly progressive secondary neurodegeneration (it can be a tauopathy or a pathological aggregation of tau protein) (Morley & Seneff, 2014; Safinia et al., 2016). Neuroimaging methods showed that the most common abnormalities in chronic traumatic encephalopathy include cerebral volume loss, enlargement of the cavum of the septum pellucidum, cerebral microhemorrhages, and white matter signal abnormalities, all of which have poor sensitivity and specificity (Bonfante et al., 2017). For an accurate correlation between the number of suffered concussions and the prevalence of chronic traumatic encephalopathy, further longitudinal studies are needed (Safinia et al., 2016).

The majority of SRCs recover in one week to 10 days (Len & Neary, 2011). Persistent symptoms and prolonged recovery can be defined as longer than normally expected (>10–14 days in adults and >4 weeks in children) (Makdissi et al., 2017). Persistence for more than 7 days is considered to be post-concussion syndrome (PCS) (Satz et al., 1999; Maroon & Bost, 2011; Morley & Seneff, 2014). Most individuals with PCS report resolution of symptoms by 3 months, but some studies have shown that up to 33% of patients have some persistent symptoms for >6 months, and 15% of patients complain of symptoms >12 months post-injury (Bazarian et al., 1999; Maroon & Bost, 2011; Daroff et al., 2015). PCS is often associated with prior concussion (Guskiewicz et al., 2004).

Multiple therapeutic interventions may be required for SRC complications: an individualized aerobic exercise program in patients with persistent symptoms, targeted physical therapy in patients with cervical spine or vestibular dysfunction, and a collaborative approach including cognitive behavioral therapy to deal with any behavioral issues (2).

Second impact syndrome is a feared complication, a condition in which a second concussion occurs during a "vulnerable period", while an individual is still symptomatic from an earlier concussive event; the second trauma causes a loss of cerebral autoregulation leading to diffuse cerebral edema and increased intracranial pressure within minutes of the impact, and can ultimately cause brain herniation, resulting in coma and death (Laskowski et al., 2015).This syndrome has a 100% morbidity and 50% mortality; it is important to note that all reported cases occurred in athletes younger than 20 years of age (McCrory, 2001).

It is always essential to accurately evaluate concussions; from a psychiatric point of view, the presence of a prior mood disorder can contribute to the later onset of a major depressive disorder. Even practicing a sport can protect against depressive disorders. It was demonstrated that especially after several concussions, a depressive disorder, linked to their frequency and number, can appear (Yrondi et al., 2017). This link will be more clearly explained by further studies regarding the role of gender, preexisting mental health disorders and sport types and competition levels (Hutchison et al., 2017).

Incidence of SRC in various sport disciplines

Athletes practicing several sports risk suffering severe injuries.

Cycling accidents (Amadori et al., 2017) can induce traumatic brain injury or dental and facial lesions; the helmet's design protects against certain head injuries by 65%, but it does not protect the lower third of the face and the teeth, and does not significantly reduce the risk of dental traumas (Amoros et al., 2012). Wearing a helmet was demonstrated to be protective against skull fractures and subdural hematoma, but not against other injuries such as contusions and subarachnoid hemorrhage (Forbes et al., 2017). Against dental injuries, custom made mouthguards offer the greatest comfort and protection (Bemelmanns & Pfeiffer, 2000).

Rugby is one of the sports where concussions are the most common and represent a major threat to players; the use of the headgear is not mandatory and it is not always effective in preventing concussion (Barnes et al.,

2017). Concussion most frequently occurs during the tackle and interventions on the playing manner (reducing speed and acceleration, increasing duration and distance before contact in tackle), and maintaining a correct head position will reduce the risk of concussion (Cross et al., 2017; Sobue et al., 2017). Prevention strategies should be different for each position in the game (Sobue et al., 2017). Also, Attwood et al. (2017) demonstrated that completing a specifically designed exercise program (for example, isometric neck exercises that can increase neck strength) prior to training and match play can reduce concussion incidence by 60%.

The vast majority of confirmed chronic traumatic encephalopathy (CTE) cases have been reported in athletes competing in high-impact sports involving repeated head trauma, such as boxing, American football, ice hockey, and rugby (Safinia et al., 2016; Pearce et al., 2015). Boxing for a long period can cause through a particular kinetic mechanism (angular acceleration/ torsional injury to midbrain and cerebellum) CTE, which was formerly known as dementia pugilistica (DP). This was reported in approximately 17% of professional boxers with long careers and a large number of bouts, who progressively developed after multiple concussions a disease with behavioral, mood and cognitive abnormalities (emotional lability, memory loss), and motor impairments (mild Parkinsonism, dysarthria and mild imbalance) (Tarazi et al., 2016). Olympic-style boxing has a less violent history with serious injuries being rare, and there is no strong evidence supporting a relationship with chronic brain injury (Howell et al., 2017). Nowadays, dementia pugilistica is rare, but even a single bout can produce permanent deficits; therefore boxing is never devoid of risk for permanent brain injury (Castellani & Perry, 2017). As differences between sports are notable (regarding athletes, injury kinematics), CTE in sports should be considered specifically. More research is needed for developing sport-specific exposure animal models to illustrate neurological illness and disease management (Erlanger, 2015). The problem is much broader. Also, the psychological factor cannot be neglected; in football teams, even a correlation between a head coach's leadership style and the incidence of severe injuries was demonstrated (Ekstrand et al., 2017).

Many skiers have experienced two or more head impacts, the magnitude of speed being of particular importance, but concussions are under-reported to a large extent. In all skiing disciplines, backward falls cause impact to the rear of the helmet; facial bone fractures and dental injuries are also reported (Steenstrup et al., 2017).

Other sports that can involve head impact and can be related to TBI's are: ball games - basketball (Covassin et al., 2017), volleyball (Baugh et al., 2017), baseball and softball (Cusimano, Zhu, 2017), floorball (Pasanen et al., 2017), lacrosse (Barber Foss et al., 2017), hurling (O'Sullivan et al., 2017); contact sports - judo (Čierna et al., 2017), wrestling (Kroshus et al., 2017); others - gymnastics (Edouard et al., 2017), horse racing (O'Connor et al., 2017).

Strategies for returning to normal activity

Several guidelines and peer reviewed articles on concussion management recommend a gradual return to usual school or sport activities. However, due to the extremely varied symptoms, there is no guide for the proper management of every concussion. The general principle is that the patient must be free of any symptoms, but individual cases must be treated based on clinical experience.

Regarding the return to school/cognitive activities, it is recommended as a stepwise, gradual process to: 1) start daily activities at home with 5-15 min at a time and gradually build up without having symptoms; 2) training in cognitive activities at home, outside the work environment, for increasing tolerance to cognitive work; 3) return to work activity part-time, with increased breaks during the day; 4) return full time, gradually increasing activities until a full day can be tolerated without symptoms; 5) return to full activities (2); (King et al., 2014). A coordinated effort must be made by all the people involved in recuperation (patient, family, health care providers, teachers) in order to ensure that the patient has the necessary conditions to transit back successfully (rest periods, program flexibility, avoidance of physical exertion) (Wright, 2014).

For sport activities, after the initial 24-48 hours of rest, once an athlete is asymptomatic, the next gradual strategy can be recommended (Wright, 2014; King et al., 2014): 1) gradual reintroduction of activities that do not provoke symptoms; 2) light aerobic exercise, no resistance training, for increasing tolerance without provoking symptoms; 3) specific exercise or running, no head impact activities; 4) non-contact training exercise drills, progressive coordination and resistance; 5) in normal training activities, full contact practice following medical clearance; 6) return to sport, normal game play. There should be at least 1 day or longer for each step. If any symptoms reappear and worsen during exercise, the athlete should go back to the previous step; if asymptomatic, exertion is increased 24 hours later.

Conclusions

1. Concussion is a complex injury that requires a multimodal assessment and treatment process.

2. More studies about injury mechanisms will bring valuable information for safety equipment manufacturers and for designing safer competitions.

3. The initial assessment of a concussion should include combined visual and postural tests.

4. CT, MRI, and TCD are the most useful modalities for the initial evaluation and clinical follow-up of concussion.

5. Sports medicine practitioners should be aware of the extent and nature of concussion and should work with coaches, athletes and trainers to identify and manage concussions.

6. Training strategies for reducing the incidence of head and neck injuries should be included in the education of all coaches and athletes.

7. Rigorous education, continuous modeling of the rules and legislative efforts by coaches and officials reinforce the importance of fair play as the mainstay of sports.

Conflicts of interests

There are no conflicts of interest.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 37–44

Problematic exercise – a new behavioral addiction

Problematica exerciţiului fizic excesiv – o nouă adicţie comportamentală

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Abstract

The benefits of regular physical activity on health and quality of life are undeniable. Currently, many researchers draw attention to the fact that this healthy behavior might become under certain circumstances a behavior at risk for the development of dependence. Once the problem of excessive physical exercise was raised, different authors proposed a number of terms to define it: addiction, dependence, compulsive physical exercise. Today, the term exercise addiction is mainly used by researchers in this area. The lack of consensus in the literature regarding the definition of excessive physical exercise has led to its staged approach along a four-phase continuum (Freimuth et al., 2011). The results of this evaluation suggest that passing from a normal to a problematic style of physical training occurs through a gradual increase of the daily exercise routine, in the context of an enhanced need to use physical activity as a coping mechanism. Regarding the possible etiology of excessive physical exercise, neurobiological and psychosocial hypotheses are considered. Data on the epidemiology of sport addiction have estimated a 3% prevalence in the general population. There are scales for the evaluation of excessive physical exercise, as well as studies that show which sports predispose more to sport dependence. Literature data suggest that 15-20% of sport-dependent persons have comorbidities such as other addictions or anorexia nervosa. In the literature, cognitive behavioral therapy is reported to have a success potential in these cases.

Keywords: problematic exercise, behavioral addiction, sport dependence, endogenous opioids, anorexia nervosa, compulsivity, impulsivity

Rezumat

Beneficiile activităţii fizice regulate asupra sănătăţii şi calităţii vieţii sunt incontestabile. În prezent, un grup numeros de cercetători atrag atenţia asupra potenţialului ca acest comportament sănătos să devină, în anumite contexte, un comportament la risc pentru dezvoltarea unei dependenţe. Odată ridicată problematica exerciţiului fizic excesiv, autorii au propus o serie de termeni care să îl definească, fiind denumit adicţie, dependenţă, exerciţiu fizic compulsiv. Astăzi, termenul de adicţie la exerciţii fizice este principalul utilizat de către cercetatorii din domeniu. Lipsa de consens în literatura de specialitate în ceea ce priveşte definirea exerciţiului fizic excesiv a condus la abordarea acestuia în trepte pe un continuum în 4 faze (Freimuth et al., 2011). Rezultatele acestei evaluări sugerează că trecerea de la un stil de antrenament fizic normal la unul problematic se face printr-un proces gradual de augmentare a rutinei zilnice de efort fizic, în contextul unei nevoi crescute de a utiliza activitatea fizică ca mecanism de coping. În ceea ce priveşte posibila etiologie a exerciţiului fizic excesiv, ipotezele neurobiologice şi cele psihosociale sunt luate în calcul. Datele referitoare la epidemiologia adicţiei la sport au estimat o prevalenţă de 3% în populaţia generală. Există scale de evaluare a exerciţiului fizic excesiv, precum şi studii care atestă care sporturi predipun într-o măsură mai ridicată la dependenţa de sport. Datele din literatură sugerează că 15-20% dintre persoanele dependente de sport prezintă patologie comorbidă, precum alte adicţii sau anorexia nervoasă. În literatura de specialitate, terapia cognitiv comportamentală este citată cu potenţial de reuşită la aceste cazuri.

Cuvinte cheie: exerciţiu fizic la risc, adicţia, dependenţa de sport, opioide endogene, anorexie nervoasă, compulsivitate, impulsivitate

Received: 2017, December 3 ; *Accepted for publication:* 2017, December 26
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Introduction

Regular physical exercise of moderate intensity is a central pillar of efforts for the promotion and maintenance of health worldwide (Pate et al., 1995). Many studies confirm the beneficial role, both physical and mental, of physical training on the human body in all age groups, with the increase in quality of life and functionality (Peluso & Guerra de Andrade, 2005). In addition, the symptoms of a number of diseases are significantly improved (Morgan, 1985) by adopting a lifestyle that includes sustained moderate physical exercise.

However, a series of studies (Freimuth et al., 2011; Adams & Kirkby, 2002; Adams, 2009) draw attention to the possible negative effects of excessive physical exercise, while researchers and theorists in the field focus on its conceptualization, definition and possible subsequent nosology.

This study aims to synthesize the currently available literature related to excessive physical exercise.

Background

Regular physical exercise can be described as a repeated and planned structured set of activities that involve movement, with a sufficient frequency, duration and intensity, for health promotion purpose (Berczik et al., 2012).

In 1976, Glasser used for the first time the term "positive addiction" in the literature, emphasized the beneficial effects of sport and described a positive correlation between the intensification of physical training and the improvement of health status (Berczik et al., 2012). Subsequently, Morgan questioned this fact, based on a number of psychiatric clinical cases in which engagement in excessive physical exercise led not only to injuries, but also to neglect of daily duties (Morgan, 1979). Thus, excessive physical exercise might be understood as an inability to reduce or stop physical exercise, despite its harmful effects on health (Naylor et al., 2011).

Once the problem of excessive physical exercise was raised, different theorists in the field proposed a number of terms to define it: addiction (Berczik et al., 2012), dependence (de Veale, 1995), obligatory exercise (Pasman & Thompson, 1988), compulsive exercise (Yates, 1991) or "driven exercise" (Fairbum, 2008), each proposed term being based on distinct etiopathogenic theories.

Currently, the term "exercise addiction" seems to be mainly used by researchers in the field. A literature review (Berczik et al., 2012) maintains that this term most accurately expresses the characteristics of this type of behavior, because it incorporates both the idea of dependence (evidenced by the presence of tolerance and the development of withdrawal syndrome on cessation of activity) and compulsion.

From excess to addiction

A study conducted in 2011 (Freimuth et al.) highlights the need to make a differential diagnosis between addictive, excessive and high performance physical exercise. In the first place, the authors emphasize the need to differentiate between dependence, compulsion and an impulse control disorder regarding excessive training.

Increased impulsivity is considered a component of addictive behavior (Brewer, Potenza, 2008), being defined as a rapid response to internal or external stimuli, without taking into consideration the possible negative consequences motivated by a positive reward (Grant & Potenza, 2006).

In the case of dependence, in addition to the development of tolerance and withdrawal, the person concerned becomes aware of the negative consequences of excessive physical exercise, but chooses to ignore them (Cook et al., 2011).

Stephen Stahl reports that from a behavioral, neurobiological and neuronal circuit point of view, dependence develops in the context of increased impulsivity, which gradually turns into compulsion through repeated action (Stahl, 2008).

Addiction is defined as a behavioral process that leads to either pleasure or the improvement of inner discomfort, being characterized by repeated failure to control behavior and, at the same time, by its maintenance despite the appearance of negative consequences (Berczik et al., 2012). A number of researchers have found that in the case of excessive exercisers, the presence of other symptoms characteristic of addiction is described: tolerance, withdrawal, perseverance, mood changes, personal conflict and relapse (Berczik et al., 2012; Griffiths, 2005; Szabo, 2010).

Adams and Kirkby, in a literature review published in 2002, concluded that empirical and anecdotal evidence supports the presence of withdrawal syndrome on discontinuation of physical activity in the case of persons who practice an intensive sport (Adams & Kirkby, 2002).

The description of these symptoms represented an important pillar in the identification of sport dependence, but recent studies have shown that a certain degree of discomfort may also occur in the case of persons who practice sport under normal conditions and suddenly discontinue its practice; thus, emphasis should be rather placed on the type, frequency and intensity of withdrawal symptoms, not just on the presence or absence of withdrawal (Berczik et al., 2012; Szabo et al., 1996).

In the case of sport dependence, a compulsive component was also described, defined as the need to take action in order to suppress upsetting thoughts or emotions (Freimuth et al., 2011). In addition to diminishing anxiety, sport practice induces a decrease of anger, depression and boredom (Rosa et al., 2004; Zmijewski & Howard, 2003), as well as an overall improvement of well-being and self-esteem (Scully et al., 1998).

De Coverley Veale, in a study published in 1987, differentiated between primary and secondary exercise dependence. Secondary exercise dependence occurs following another mental disorder, more frequently in the context of an eating disorder. On the other hand, in primary sport dependence, motivation is rather exercise itself than weight loss. Some researchers question the existence of primary sport dependence (Bamber et al., 2000), but Szabo and Griffiths (Griffiths, 2005; Szabo, 2010) described a number of cases in which excessive exe rcise was not associated with eating disorders.

When does frequent exercise become addiction?

Freimuth shows in an article published in 2011 that the distinction between a regular, sustained exercise program and addiction is difficult to make because in order to obtain beneficial effects on health, physical exercise should be performed relatively frequently and over long time periods, as well as because exercise tolerance naturally increases in time and the practice of a sport does not exclude the possibility of negative consequences (e.g. injuries), these characteristics also being common to addiction (Freimuth et al., 2011).

Furthermore, research in this area postulated the theory according to which the capacity for affective modulation intrinsic to physical activity and implicitly mood improvement represent one of the mechanisms by which a person can become sport dependent (Adams & Kirkby, 2002). On the other hand, affective regulation by sport is a feature common to all humans, and not all those who perform physical exercise at an increasing intensity and frequency become dependent (Freimuth et al., 2011).

In fact, a cross-sectional study conducted in 2002 evidenced that the frequency of physical training is not significantly correlated with the level of physical or mental health, with self-esteem or affective disorders (Ackard et al., 2002).

From a psychological point of view, recreational exercise can be differentiated from risk exercise by evaluating the motivation that underlies the practice of a sport (Freimuth et al., 2011). Thornton and Scott (1995) demonstrated that the possibility of developing sport dependence increases in the case of persons who perform exercise in order to avoid unpleasant emotions or to change their physical appearance with the aim of increasing their self-esteem compared to those who train in order to improve their physical performance and fitness.

Johnston et al. (2011) mention in an article published in 2011 the lack of consensus in the literature regarding the definition of excessive physical exercise and propose its approach from a qualitative point of view, in stages along a continuum. The authors assessed a group of 32 women aged between 16-77 years, who practiced regular, sustained exercise. The results of this evaluation suggest that passing from a normal to a problematic style of physical training occurs through a gradual increase of daily exercise routine, in the context of an enhanced need to use physical activity as a coping mechanism.

Elaboration of diagnostic criteria for exercise dependence

Considering that DSM 5 (***, 2013; ***, 2016) reserves a separate chapter for non-substance related addictive behavior starting with gambling disorder, but with insufficient evidence for other groups of repetitive behaviors, called *behavioral addictions*, with subcategories such as “sex addiction”, “exercise addiction”, or “shopping addiction”, this new nomenclature opens the way to new research directions concerning the definition of behaviors with addictogenic potential (Freimuth et al., 2011; Freimuth, 2008). In this regard, Downs et Hausenblas (Downs et al., 2004 ; Hausenblas et al., 2002) identified a series of possible diagnostic criteria for sport dependence, according to the model of DSM IV TR criteria for substance dependence (***, 2000; ***, 2003):

- Tolerance: increasing the amount of physical exercise in order to obtain the desired effect (excitement or the feeling of fulfillment).
- Withdrawal: in the absence of training, experiencing negative effects such as anxiety, irritability, concern or sleep disorders.
- Lack of control: unsuccessful attempts to diminish physical exercise or to stop it for a certain time period.
- Intentional effects: an inability to maintain the proposed routine, evidenced by consistent exceeding of the time allocated to training.
- Time: a considerable length of time is allocated to training or recovery after exercise.
- Limitation of activities: social, occupational and/or recreational activities are diminished or stopped as a direct consequence of excessive training.
- Perseverance: continuing training despite the awareness that this activity creates or exacerbates a series of physical, psychological and/or interpersonal problems.

It should be mentioned that other theorists, such as Elbourne and Chen, propose delaying the establishment of diagnostic criteria and emphasize the need for a phenomenological and etiopathological understanding of excessive physical exercise in a first stage (Elbourne & Chen, 2007).

Furthermore, there is currently no clear delineation between the practice of an intensive sport within normal limits and a possible disorder. In this context, Freimuth et al. (2011) proposed 4 stages of behavior associated with physical exercise:

- Stage 1: Recreational exercise, motivated by an increase in quality of life and the sensation of well-being secondary to the practice of a sport.
- Stage 2: Risk exercise, associated with the affective modulation capacity of physical exercise through an increase of positive affects and a diminution of negative affects such as depression and anxiety, which allows for deviation from normal healthy behavior to compensatory behavior.
- Stage 3: Problematic exercise. At this stage, a differentiation is made between subjects who perform recreational physical exercise, integrating it into their daily program, and problematic subjects, who tend to organize their daily activities depending on their exercise program, which becomes increasingly rigid (Johnston et al., 2011). Also, at this stage, secondary negative consequences become predominant, manifesting at individual level (e.g. continuation of exercise beyond the limit of exhaustion, self-criticism) and at social level (activity becomes solitary, close persons feel they are abandoned in favor of sport), as well as by the development of withdrawal symptoms (e.g. irritability) on cessation or diminution of the imposed regimen. The author also describes the development of non-discriminatory behavior (e.g. if a person injures their leg while practicing their favorite exercise, they take up another sport, for example weightlifting) (Freimuth et al., 2011).
- Stage 4: Sport dependence. The frequency and

intensity of exercise increase until this becomes the central point of life, interferes with daily routine, and is mainly motivated by the diminution of withdrawal symptoms, with the presence of negative social, professional and self-image consequences.

Possible etiologies described in the literature

A). Neurobiological perspectives

1. The endogenous opioid hypothesis

Wagemaker and Goldstein suggested in 1980 that the sensation of euphoria felt by many people during exercise is the result of physiological changes in the brain (Wagemaker & Goldstein, 1980). Thoren et al. (1990) reported that intense physical exercise activates the endogenous opioid system, with a significant increase in the concentration of B-endorphins (Thoren et al., 1990). Moreover, the release of endorphins would lead to a rise in insulin secretion, an essential process in the restoration of energy reserves after sustained exercise, suggesting that endorphins might reinforce post-exercise behavior. Thus, persons who perform intense, sustained exercise might become dependent on endogenous endorphins secreted in the brain (Adams & Kirkby, 2002).

Steinber et al. (1995) studied the relationship between endogenous endorphins and the well-being reported after exercise, with contradictory results, and despite the proposed theories and parallels drawn between well-being after exercise and after exogenous opioid consumption, no direct relationship between withdrawal symptoms following discontinuation of exercise (Adams & Kirkby, 2002) and the variations of endogenous opioids has been so far established.

2. The catecholaminergic hypothesis

Thompson & Blanton (1987) proposed the hypothesis of sympathetic hormonal excitation, which maintains that an increase in physical exercise tolerance leads to an increase in the metabolic rate and through it, to a reduction of adrenaline and noradrenaline secretion. This results in an enhancement of lethargy and fatigue. According to the authors, in order to fight this state, an intensification of exercise is required to induce excitation levels similar to those before exercise. Also, in accordance with the literature data, the authors state that regular physical exercise can diminish depressive symptoms by raising circulating catecholamine levels (Adams & Kirkby, 2002). Thus, they conclude that withdrawal symptoms occurring after sustained exercise (lethargy, fatigue) are similar to depressive symptoms that occur in the context of catecholamine (NA, A) depletion. On the other hand, other researchers evidence that the dynamics of brain catecholamine levels during exercise in humans is unknown, because no direct measurements of catecholamine concentrations in the brain can be performed (Berczik et al., 2012).

3. The thermogenic hypothesis

Exercise causes an increase in the body temperature, followed by a secondary diminution of somatic anxiety, which is closely related to an increase in temperature in certain brain regions (Craft & Perna, 2004). Thus, it can be postulated that increased levels of anxiety may be associated with an enhanced need for physical exercise (Berczik et al., 2012).

4. The dopaminergic hypothesis

A study carried out in mice by De Castro & Duncan (1985) suggests that chronic exercise leads to enhanced dopaminergic secretion, which results in a compensatory drop in dopaminergic receptors, explaining the diminution of depressive symptoms in the context of physical exercise; at the same time, given that an individual requires an increase of dopaminergic levels by exercise to compensate the receptor reduction, this mechanism might explain exercise dependence.

Adams suggests that in the case of a decrease in hedonic pleasure from other activities, an individual may need to maintain a more intense exercise regimen for an optimal activation of the dopaminergic mediated reward circuit (Adams & Kirkby, 2002).

Gapin et al. (1985) correlated the elevation in the risk of exercise dependence with a frontal lobe asymmetry that occurs in the presence of addictive disease.

B). Psychosocial perspectives

In 1995, Szabo proposed the cognitive evaluation theory to better understand the etiology of sport addiction. According to this theory, once individuals have started using physical exercise as a method of coping with stress, they learn to depend on physical activity as a mode of relaxation. Subsequently, rationalization is used to explain the excess. When physical activity is stopped, negative feelings such as irritability, guilt, anxiety occur, which are withdrawal symptoms. Given that sport is the main coping mechanism, increasingly intense training is performed to suppress unpleasant sensations, and a vicious circle is formed (Berczik et al., 2012).

The affect regulation hypothesis states that physical exercise has a dual effect on mood, causing an enhancement of positive affects and a diminution of negative affects. When the motivation for practicing a sport consists of reducing the negative affects, in the context of a more prolonged discontinuation of exercise, their intensity increases and the individual must increase the intensity and duration of exercise to cope with these (Berczik et al., 2012).

In 2017, Bircher et al. published a systematic literature review on the correlation of some personality traits with exercise dependence. Thus, concerning the Big Five system, the results of a number of studies are contradictory: some studies describe a positive correlation between sport dependence and extraversion, high levels of neuroticism and openness and low levels of agreeableness and conscientiousness, but other studies refute these hypotheses.

Regarding Cloninger's personality dimensions, sport dependence was associated with high persistence and harm avoidance and low self-directedness and maturity levels. A high level of perfectionism, especially self-oriented and maladaptive perfectionism, was correlated with sport addiction. Low self-esteem and high self-criticism, as well as a high degree of narcissism were also correlated with excessive training (Bircher et al., 2017).

In a 2001 study, Spano revealed the implication of obsessive tendencies in the development of exercise dependence, and another study conducted in 2014 (Miller & Mesagno) showed that a combination of narcissism, perfectionism and obsessive compulsion can be a good predictor for the development and progression of sport

dependence.

A study carried out in 586 women aged between 17 and 55 years identified a number of variables that differentiate subjects who perform physical activities in a healthy way from those with a pathological behavior. Subjects who perform frequent exercise, have strong emotional investment in physical exercise and are highly committed to it show significant correlations with the associated psychopathology, unlike another category, who also practice sport frequently, with some degree of commitment, but have no psychological fixation on physical activity and are adaptable. Thus, the psychological fixation factor is the most correlated with mental disorders, independently of the frequency of exercise (Ackard et al., 2002).

In 2011, Taranis et al. proposed a multidimensional personality model of an excessive exerciser, the described traits being: compulsivity, affect regulation, behavioral rigidity, perfectionism and concerns related to weight and physical appearance.

A study carried out by Naylor et al. in 2011 women evidenced that the presence of high exercise belief is statistically significantly associated with a set of obsessive beliefs, with the presence of obsessive-compulsive symptoms and eating disorders. At the same time, the presence of obsessive beliefs and behaviors in a person predisposes that person to the development of an exercise regimen aimed at a significant weight loss and to the development of safety behaviors (Naylor et al., 2011). Obsessive beliefs may occur in relation to physical training and they can lead to rigid behaviors.

A study conducted in 2010 in a group of 421 adolescents of both sexes analyzed the implications of sociocultural pressure on the development of excessive training behavior.

Sociocultural pressure involves the feedback that a subject receives from the media, parents and friends. This study found that the relationship between sociocultural pressure and the need for intense physical exercise is mediated by the subjects' level of investment in their physical appearance and image, i.e. their need to lose weight or increase their muscle mass. The study revealed the fact that boys are more focused on exercise as a means to change their physical appearance compared to girls. In the case of girls, the impact of social pressure on the body image is higher (White & Halliwell, 2010).

Epidemiology

Literature data on the epidemiology of sport addiction are preliminary and inconsistent. A literature review conducted by Sussman et al. (2011) estimated a prevalence of about 3% in the general population. Among participants in ultramarathons and physical education students, the prevalence is even higher (Freimuth et al., 2011).

A study on triathlonists reported a 52% prevalence of sport addiction in the group. Other researchers showed that 26% of the men and 25% of the women who practiced running as a sport were dependent on it (Berczik et al., 2012). According to Lejoyeux et al. (2008), 42% of the members of a Parisian fitness room had sport dependence symptoms.

Significant variations between different studies regarding the prevalence of sport dependence are more probably present because of the unclear definition of dependence, as well as because of the use of ineffective evaluation tools (Berczik et al., 2012).

Two studies conducted in USA and UK, respectively, which used the EDS and EAI scales, two psychometrically valid assessment tools, showed that 2.5% and 3%, respectively, of the population that performed regular exercise met the criteria for addiction (Berczik et al., 2012).

Exercise dependence assessment scales

- The *Exercise Dependence Scale* (EDS-R) (Downs et al., 2004) and the *Exercise Addiction Inventory* (EAI) (Terry et al., 2004) are two easy-to-use, highly valid and reliable scales, developed with the aim of identifying excessive exercisers, which differentiate between asymptomatic, symptomatic and dependent subjects (Freimuth et al., 2011).

- The EDS scale contains 7 subscales: tolerance, withdrawal, intentional effect, lack of control, time, diminution of other activities and perseverance (Berczik et al., 2012).

- The *Exercise Dependence Questionnaire* scale measures the compulsivity of exercise and includes 8 subscales: interference with social life/family life/work; positive reward; withdrawal symptoms; exercise as a weight control method; insight; exercise for social, health and stereotyped behavior reasons (Ogden et al., 1997).

- The *Exercise Beliefs Questionnaire* scale is a more rarely used general assessment tool, which evaluates distinct thoughts and beliefs related to physical exercise, based on the following factors: social desirability; physical appearance; mental and emotional functionality; vulnerability to aging (Loumidis & Wells, 1998).

- The *Commitment to Exercise Scale* examines the pathological aspects of physical training and associated compulsive activities (Davis et al., 1993).

- The *Exercise Orientation Questionnaire* scale comprises 6 factors: self-control, exercise orientation, self-deprecation, weight loss, competitiveness and identity. It measures attitudes toward exercise and additional behaviors (Yates et al., 2001).

- The CET *Compulsive Exercise Test* scale is a 24-item self-report scale developed to assess the central components of exercise in the case of eating disorders. It includes 5 subscales: avoidance of withdrawal and behavior motivated by strict rules, exercise as a weight control strategy, mood improvement, lack of pleasure in the context of exercise, and program rigidity, with high scores indicating more severe pathology (Berczik et al., 2012).

- The *Obligatory Exercise Questionnaire* scale comprises 20 items that identify a series of attitudes and activities related to physical exercise, with high scores on this scale suggesting high levels of feeling obligated to exercise (Freimuth et al., 2011).

Which sports predispose more to excessive physical training?

The review conducted by Berczik et al. (2012) reports that so far, research on different forms of excessive exercise, with the description of specific characteristics or the comparison of dysfunctionality levels, has been inconsistent. This article highlights the fact that most of

the knowledge of sport addiction is derived from studies performed on long-distance runners, aerobic exercisers and bodybuilders. There are fewer empirical data on dancers, martial arts fighters, weightlifters and triathlonists.

Comorbidities

Despite the limited number of available studies, the literature data suggest that 15-20% of sport dependent persons have other associated addictions (Aidman & Woollard, 2003). Of these, the most common are the abuse of psychostimulants such as caffeine, cocaine and amphetamines (George, 2000), anabolic steroids (Peluso, 2005), sexual behaviors, eating behaviors and compulsive shopping, as well as work dependence (Freimuth et al., 2011).

A study published in 2018 (Szabo et al.) shows that sport addiction is not correlated with alcohol dependence and that there is a negative correlation between nicotine consumption and excessive exercise.

Sport dependence is frequently associated with eating disorders, the literature data suggesting a 39-48% incidence of these comorbidities (Freimuth et al., 2011; Klein et al., 2004).

Excessive exercise is very common in patients with anorexia nervosa, with a lifelong prevalence of up to 80% of cases. Anorexia nervosa cases in which intensive exercise is associated have a higher incidence of obsessive-compulsive symptoms (Young et al., 2013), a poorer prognosis and a higher rate of relapse (Dalle Grave et al., 2008; Carter et al., 2004).

The negative consequences of excessive physical training

An article published in 2001 (Adams & Kirkby), aiming to evaluate the literature data related to the physiological and psychological consequences of excessive training, reports that excessive physical training induces changes in the neuroendocrine balance, with a decrease in the body's capacity to repair tissue destruction, a reduction of muscle mass progressing to muscle atrophy, circulatory alterations, and fertility and reproductive disorders in both sexes. Other reported changes are adrenergic dysfunction, a decrease in plasma beta-endorphin concentrations, and a reduction of gonadal steroid levels.

This review also mentions a possible immunological dysfunction, with decreased replication of the cells involved in immunity and diminished body resistance to infections.

Regarding the impact of excessive training on the cardiovascular system, in addition to potential effects on blood pressure values (Adams & Kirkby, 2001), a study carried out in 2017 (Müssigbrodt et al.) draws attention to the risk of developing atrial fibrillation following excessive exercise.

Furthermore, a study conducted in 2016 (Sun et al.) on mice subjected to high-intensity exercise showed a decrease in their cognitive capacity (decreased learning and memory capacity), through immunological changes in the hippocampus.

Treatment

In the case of sport dependence, abstinence is not a desideratum, moderate exercise being an important part of a healthy lifestyle. Although the literature provides few recommendations regarding specific treatment for this problem, cognitive behavioral therapy might be successful in these cases, focusing on increasing awareness about the adverse effects of excessive training, identifying dysfunctional automatic cognition, and associating behavioral strategies (Johnston et al., 2011).

Weinstein & Weinstein (2014) suggests that excessive exercisers should be evaluated and treated depending on the degree of symptom severity, as well as depending on comorbidities or other possible associated addictions.

In terms of methods for the prevention of excessive exercise, Adams proposes the periodization of training in order to maintain a balanced regimen of regular physical activities, as well as dietary antioxidant supplementation (vitamins A, C, E) to prevent the harmful effects on immunity (Adams & Kirkby, 2001; Adams, 2009).

On the other hand, De Coverly Vale (1987) highlights the fact that in the case of persons who have developed sport addiction, the suggested prevention methods are ineffective, because these individuals either do not know or do not wish to implement the described prevention methods.

In the context of an increasing prevalence of body image disorders, eating disorders and excessive exercise in the young population, Australian researchers (Yager & O'Dea, 2010) conducted a study in which they proposed a set of educational interventions based on self-esteem improvement, media education and the development of cognitive dissonance related to these aspects, in a cohort of 170 male and female subjects. Following the program, an improvement of self-esteem, body image and the need for muscle mass gain was observed, as well as an amelioration of eating disorders and excessive physical training, which suggests the possibility of curricular health education interventions.

Landolfi proposes the implementation of recommendations for healthy physical training at national level, as proposed by the Canadian Society for Exercise Physiology (Landolfi, 2013).

Conclusions

1. The benefits of regular physical activity on health, functionality and quality of life are undeniable. However, an increasing number of researchers draw attention to the fact that this healthy behavior might become under certain circumstances a behavior at risk for the development of dependence.
2. The factors that the literature suggests to be involved in the development of exercise dependence are biological, psychological, psychosocial; further studies are required to establish a causal relationship between these.
3. Some researchers propose to stage the risk of sport dependence and advocate a different therapeutic approach from case to case, depending on the severity of symptoms. Diagnostic criteria for exercise dependence according to international classifications in force have been proposed.

4. A number of instruments have been developed to quantify excessive exercise.

5. The negative consequences of excessive training are both psychological and somatic, with an unfavorable impact on the circulatory, musculoskeletal and immune systems.

6. Empirical data on a possible treatment of excessive exercisers are limited; cognitive behavioral therapy has been proposed as a possible therapeutic approach.

7. In our opinion, rigorous studies on a greater number of subjects, with clear inclusion and exclusion criteria are required in order to get a wider perspective on this issue. Otherwise, there is a risk for trivializing this subject, with the possibility of either over- or underdiagnosis, which might lead to an undesired stigma, on the one hand, and to failure to recognize the symptoms, with negative consequences on health, on the other hand.

Conflicts of interest

There are no conflicts of interest.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 45–52

Soy and soy-based products in the athlete's diet

Soia şi produsele pe bază de soia în alimentaţia sportivilor

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Abstract

Proteins in the athlete's diet are used for muscle growth and repair; cell regulation; immune and neurological functions; nutrient transport and structural support. Protein needs depend on many variables: energy intake, exercise type (1.2 to 1.5 g/kg/day for endurance, and 1.2 to 1.7 g/kg/day for strength athletes), duration and intensity of exercise, and the training phase (novice vs. trained). The best sources of proteins preferred by athletes are whey, egg white and soy derivative products. Soy has many virtues, as well as a long record of unhealthy compounds (also called antinutrients): endocrine disruptors, saponins, enzyme inhibitors, goitrogens, phytates, pesticides, etc. Athletes prefer their convenience and ease of use, so they consume protein supplements such as protein concentrates and isolates, which are highly refined and processed forms of soy.

Beside the negative effects of soy antinutrients, high ingestion of soy protein supplements has detrimental results: dehydration and calcium loss (due to high protein intake); presence of toxic substances (aluminum, nitrites, lysinoalanine) in processed soy-based products.

During the last 3-4 decades, soy has become a very controversial and complicated topic. For every study showing the nutritional value of soy, another one claims the detrimental effects on health, so, reviewing the data on soy is very confusing. Moreover, in order to clarify the truth, many other confounding dietary factors should be taken into consideration.

For soy to be a healthy food, it is recommended to be organic, used in a properly fermented form, occasionally, and in moderate amounts.

Keywords: athletes, soy, soy-based products, proteins, antinutrients

Rezumat

Proteinele din dieta sportivilor sunt folosite pentru creşterea şi repararea musculară, reglarea celulară, în funcţiile imune şi neurologice, în transportul nutrienţilor şi ca suport structural. Nevoia de proteine depinde de multe variabile: aportul energetic, tipul de efort (1,2-1,5 g/kg/zi în sporturile de anduranţă şi 1,2-1,7 g/kg/zi în sporturile de forţă), durata şi intensitatea exerciţiului, şi faza de pregătire (novice vs. antrenat). Cele mai bune surse de proteine, preferate de sportivi, sunt zerul de lapte, albuşul de ou şi produsele pe bază de soia. Soia prezintă o pletoră de virtuţi, dar şi o listă lungă de compuşi nesănătoşi (antinutrienţi): perturbatori endocrini, saponine, inhibitori enzimatici, goitrogeni, fitaţi, pesticide etc. Sportivii preferă uşurinţa şi convenabilitatea, astfel că ei consumă suplimente proteice cum ar fi concentratele şi izolatele proteice, care sunt derivate de soia înalt rafinate şi procesate.

Pe lângă consecinţele negative ale antinutrienţilor din soia, ingestia crescută de suplimente proteice din soia are şi alte consecinţe: deshidratare şi pierderi de calciu (datorită ingestiei crescute de proteine); prezenţa de substanţe toxice în produsele procesate (aluminiu, nitriţi, lizinoalanină).

În ultimele 3-4 decade, soia a devenit un subiect extrem de controversat şi complicat. Pentru fiecare studiu care-i demonstrează valoarea nutritivă, un alt studiu vine să-i dovedească efectele dezastruoase asupra sănătăţii, astfel că literatura de specialitate privitoare la soia este foarte contradictorie, reflectând cacofonia alimentară şi nutriţională din zilele noastre. Mai mult, pentru a clarifica adevărul, ar trebui luaţi în calcul mulţi alţi factori dietetici care pot interveni.

Pentru a fi un aliment sănătos, soia este recomandată să fie organică şi să fie folosită sub o formă fermentată, în mod ocazional şi în cantităţi moderate.

Cuvinte cheie: sportivi, soia, produse pe bază de soia, proteine, antinutrienţi

Received: 2018, January 12; *Accepted for publication:* 2018, January 26
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https://doi.org/10.26659/pm3.2018.19.1.45

Nutritional value of soy

Soy has been present in the food chain for over 5,000 years. Since many years, soy has been an everyday food safely consumed in Asia (China, Japan), mostly in a fermented form (Saljoughian, 2007). Basically, soy has invaded the entire food chain, hiding in a great number of industrial products: hamburgers, bread, almost all margarines, ice creams, most groceries (mainly in the form of lecithin, E322, supposed to be allergenic).

During the 80's and the early 90', soy bean represented a real culinary revolution for vegetarians, vegans and lactose-intolerant people. This "new miracle food" was promoted as a healthy protein substitute for meat, and was incorporated into nutritious meals.

Since 1999, the FDA (Food and Drug Administration) has stated that a daily use of 25 grams of soy protein may reduce the risk of heart disease (***, 1999).

In 2000, the American Heart Association recommended the inclusion of soy protein in heart-healthy diets (Erdman, 2000).

Soy is a protein-rich plant (containing arginine that facilitates the work of blood vessels) as much as meat (34-40%); it is full of fiber, potassium, magnesium and vitamins; it has vegetable fats (with no cholesterol); and contains phytoestrogens like other foods such as whole grains, leafy greens, beans, and garlic (Laza, 2004).

Among the ways of assessing **protein** quality (i.e. the protein efficiency ratio - PER, the net protein utilization - NPU, and the biological value - BV), PER is an outdated measure and is not longer used, and NPU is not much used, either. The most accurate indicator of biological activity is BV, which measures the amount of protein deposited per gram of protein absorbed. Proteins with high BV are better for nitrogen retention and IGF-1 (insulin-like growth factor) stimulation, and superior in reducing lean tissue loss during wasting states (anti-catabolic).

The BV of soy protein (74) is lower than the BV of other protein sources (especially animal ones): whey (104), whole egg (100), egg white (88), and casein (77), one reason being the lack in sulfur-containing amino-acid methionine. Besides cysteine, methionine is important for protein synthesis and growth, immune system function, and the body's production of glutathione (GSH), an antioxidant protecting cells by detoxifying some harmful compounds (hydrogen peroxide, carcinogens, reactive oxygen species), and partly preventing the negative effect of low density lipoproteins (Misner, 2001).

Soy proteins are inferior to animal proteins not only in terms of efficacy, but also in terms of assimilation (90% for milk vs. <80% for soy), and digestion speed (soy is between whey protein and casein).

Phytoestrogens (part of a larger group of plant compounds called polyphenols, which have an antioxidant effect) contain four families: isoflavones, the best-known; lignans; coumestans, and stilbenes (resveratrol from nuts and red wine). Because of many contradictory results, to date, phytoestrogens are one of the most controversial foods in women's nutrition (Saljoughian, 2007).

Phytoestrogens are endocrine disruptors which, having a structural similarity to 17-beta-estradiol (E2,), can mimic the action of estrogen (estrogen-like) and therefore may protect against bone loss and alleviate hot flashes, vaginal dryness, and mood swings in menopausal women; or they can block the effects of estrogen, by binding to estrogen receptors. Unfortunately, we still have a limited understanding of the physiological effects of soy phytoestrogens (Wei et al., 2012).

Isoflavones (genistein and daidzein) found in soy, along with soy proteins (1 to 2 servings daily) lower the bad cholesterol (a 10% decrease in LDL-cholesterol concentration) and improve the arterial dilatation of postmenopausal women but worsen that of men (Anderson & Bush, 2011; Clarkson, 2002; Zhang et al., 2003). According to studies, LDL levels dropped by approximately 1-2%, but this required about 50 g soy per day. The reduction of cholesterol is significant in individuals with cholesterol levels over 250 mg/dl, but insignificant in those with values under 250 mg/dl.

Studies on the health effects of phytoestrogens have yielded mixed results, some of them (Rietjens et al., 2017) suggesting that isoflavones do not significantly reduce cardiovascular risk, but lignans may do so in smokers.

In men, these two isoflavones mimic estrogen so well that they have also been linked to side effects in men, including breast enlargement (gynecomastia), decreased facial and body hair growth, mood swings and frequent crying jags, erectile dysfunction, decreased libido, and lowered sperm count (Tse & Eslick, 2016).

The amount of phytoestrogens in different soy products varies from 8.5 mg per 3½ ounces (dry soy noodles), to 15 mg per 3½ ounces (soy hot dog), 16 mg per 3½ ounces (tofu yogurt), 25 mg per ¼ cup (soy flour), 30 mg per ¼ cup (miso), 40 mg per ½ cup (soybeans, tempeh, and tofu), 40 mg per 1 cup (soy milk), 135 mg per 3½ ounces (green soybeans), 138 mg per 3½ ounces (TVP), and 162 mg per 3½ ounces (roasted soybeans) (Franke et al., 1994).

In the traditional Japanese diet, intake of isoflavones is between 15 and 200 mg/day, while approximately one million American infants ingest large doses of phytoestrogens in soy-based formulas every year. American infants have a plasma phytoestrogen concentration of up to 7,000 nm/L, compared to an average of 744 nm/L in adult Japanese women (Saljoughian, 2007). The daily exposure to phytoestrogens from baby formulas is 10 to 11 times higher than a hormonally active dose in adults (Setchell et al., 1998). However, scientific data on human exposure to higher doses are difficult to find.

Regarding hormone-dependent breast cancer, the effects of soy products are different in pre- and post-menopausal women, and "depend on age, health status, and the presence or absence of specific gut microflora (microbiota) in the population of concern" (Rietjens et al., 2017). Most of the studies suggest that soy consumption is inversely related to breast cancer incidence, recurrence, and mortality before menopause (Hooper et al., 2010; Liu et al., 2012), and has an increased risk of breast cancer after menopause. The European Food Safety Authority (EFSA) concluded that observational human data do not suggest an increased risk overall, but that isoflavone-based food supplements may pose a risk to postmenopausal women (Cohen et al., 2000; Ferris-Tortajada et al., 2012; Messina, 2016; Zhang et al., 2015).

There are some studies indicating that isoflavones could negate the inhibitory effect of some treatments (tamoxifen, an anti-estrogen) on tumor growth (Kang et al., 2010; Helferich et al., 2008; Shu et al., 2009).

In men, a study published in International Journal of Cancer suggests that foods high in soy compounds might raise by 91% the risk of aggressive prostate cancer (Mori et al., 2009).

Among prostate cancer survivors, soy foods might lower PSA (prostate-specific antigen) levels, but the effects are very different from one man to another, allowing for the influence of other factors in decreasing PSA concentrations (Anderson & Bush, 2011).

Prostate cancer is the second leading cause of cancer among men worldwide, after lung or bronchial cancer (CDC, USA). Prostate cancer could be inherited (5-10%); the rest of the cases occur due to environmental factors (hormones). Some endocrine-disrupting compounds (lead, mercury, arsenic, DDT, dioxin, bisphenol), known as "hormone mimickers", increase hormone levels and generate or facilitate the progression of prostate cancer. While prostate cancer rates are higher in developed countries, some experts suggest that the Western diet and lifestyle could be a factor. According to data published in the medical journal *Cancer Epidemiology, Biomarkers & Prevention*, foods rich in lycopene (tomatoes, and tomato juice, baked beans) could reduce by 18% the risk of prostate cancer (Kolonel et al., 2000; Kristal, 2010; Laza, 2004; Laza, 2015; Thomas et al., 2012; Zuniga et al., 2013).

Soybeans, soy nuts and edamame all contain fiber. And a diet high in fiber may lower the risks for several cancers, including colorectal cancer (Vucenik & Shamsuddin, 2006; Cheng et al., 2010; Schlemmer et al., 2009; Urbano et al., 2000; Yi et al., 2016).

Negative effects of soy and soy products (tofu, soy milk, soy powder)

The Food and Drug Administration (FDA) has promoted soy as a healthy food by allowing the soybean industry a health claim indicating on labels that "diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease" (***, 1999). As a result, for decades, sales of soybeans have skyrocketed, and soy has been added to many products for marketing purposes (it is inexpensive) and to boost protein content, earning a stellar reputation. This could be correlated with the misconception that Asian people, great consumers of soy, live longer than Americans. In truth, a Japanese man eats about 8 grams of soy a day, while in USA, one soy burger alone contains 9 grams of soy, and soy is present in some form in most processed foods. Besides, the Japanese eat traditionally fermented soy (natto, tempeh, miso), while the Americans eat unfermented soy. Fermented soy is a form of digestion-friendly soy that contains probiotics (friendly bacteria) which nourish the gut flora (microbiota), and help digestion, the absorption of nutrients and immune function. Fermented soy is lower in phytonutrients and high in vitamin K2 or menaquinone (MK), produced by the microbiota. Unfortunately, most Western consumers eat unfermented soy: tofu, soy protein isolates in bars and shake powders, soy milk, fresh soybeans (raw or cooked), soy chips, soy flour, and many other soy derivatives/soy oil foods.

In unfermented soy there are many compounds which may have negative effects on human health, such as toxic phytonutrients. Many of these phytonutrients nourish the plants, and most of them fight against predators (bacteria, parasites, pests and insects). The human GI tract does not have the ability (the enzymes) to digest them, so they enter the blood unchanged and become antinutrients. They have many undesirable effects on human health.

1. Antinutrients (phytonutrients) may have a toxic effect in excessive amounts, more than 35 grams of soy per day (20 grams of soy in a single serving of soy food).

a) Lectins (phytoagglutinins) are abundant glycoproteins that protect the plant against predators. Lectins (i.e. soybean agglutinin - SBA) pass through the gut wall, enter the blood unchanged and have agglutinating properties on blood cells in the area of target organs. These substances diminish the activity of enzymes (e.g. amino peptidase or enterokinase) and alter intestinal absorption.

Some of them (insulin mimicking lectins) bind to the insulin receptors of the body's fat cells, and so, they signal the fat cells to stop burning fat and accumulate extra calories as fat, and therefore will promote insulin resistance.

The good news is that some lectins inhibit the growth of tumor cells and the development of some viruses (preliminary studies), and, most importantly, hydration, germination, fermentation and cooking (boiling, autoclaving, and microwave cooking) could significantly (not entirely) deactivate the amount and the agglutinant power of hemagglutinin (Rasha et al., 2011).

b) Saponins are steroid alkaloids found in soybeans (2-5 g saponins per 100 g), but also in other plants such as tomatoes, eggplants, asparagus, potatoes, quinoa, agave, yucca, alfalfa, aloe, olives, grapes, garlic, red onions, paprika, ginseng. They are natural biopesticides, of two types: group A saponins (in soybean germs), which have an unpleasant astringent taste, and group B saponins (in soybean germs and cotyledons), with health properties (Kamo et al., 2014).

Soy saponins have many health properties:

- *Antioxidative* (Ishii & Tanizawa, 2006)
- *Cholesterol reduction* (Lee et al., 2005), a property discovered in 1979 by Potter; saponins form emulsions (micelles) with bile salts in the GI tract, and bile salts form micelles with cholesterol, facilitating its absorption; bile salt binding by soy reduces the absorption of cholesterol. Some saponins inhibit cholesterol absorption by forming insoluble complexes with cholesterol.
- *Anticancer*. Cancer cells need cholesterol to grow, and saponins bind cholesterol from the membrane of cancer cells and so, limit their growth (Kerwin, 2004; Zhang & Popovich, 2010), or they may be effective in preventing colon cancer by affecting cell morphology, cell proliferation enzymes, and cell growth (Tsai et al., 2010; Roa & Sung, 1995).
- *Inhibition of HIV* – Soy saponin B1 may have an inhibitory effect on HIV infection. This is a Japanese in vitro study; consumption of soy saponin is not a medicine to cure HIV (Nakashima et al., 1989).
- *Reduction of blood glucose levels* (Tanaka et al., 2006)
- *Anti-kidney disease progression* (Philbrick et al., 2003)

- *Anti-inflammatory* (Lee et al., 2010)
- *Renin inhibition* (Takahashi et al., 2008)
- *Hepatoprotection* (Kinjo et al., 1998)

Washing and soaking soybeans only partially remove saponins, while fermentation and dehulling considerably reduce the saponin content (Hu et al., 2004).

c) Enzyme inhibitors: protease inhibitor (Bowman-Birk soy protease inhibitor or BBI), amylase inhibitor, trypsin inhibitor

Raw soybeans (unfermented) contain enzyme inhibitors, which inhibit the pancreatic enzymes designed to facilitate protein digestion, and make carbohydrates and proteins incompletely digested. The bacteria in the large intestine try to do the job, and this can cause discomfort and bloating. Trypsin is needed in protein digestion and allows vitamin B12 to be assimilated. By blocking trypsin activity, soy increases vitamin B12 requirements and causes vitamin B12 deficiency. It is noteworthy that thorough cooking can destroy up to 90% of the trypsin activity. The overall content of raw soybean trypsin inhibitor is 1509 units per gram (Wan et al., 2000). Trypsin inhibitors aggravate the shortage of amino acids occurring in the plant kingdom, and delay growth.

d) Phytates (or phytic acid)

Phytic acid is the main reserve of phosphorus in plants (in the hulls of all seeds and in the bran). Because of its negative charge, phytic acid can bind the positively charged essential minerals (calcium, magnesium, zinc, iron, copper) and form insoluble complexes, preventing their absorption. Unfermented soy (soy milk, soy chips, soy protein bars, soy flour, soy protein isolates) contains many phytates that work in the GI tract to bind minerals and lead to a malabsorption of minerals and to a mineral deficiency, especially in vegetarians and in third world countries. As a result of zinc elimination (zinc is needed in more than 50 enzymatic reactions, especially in those of the nervous system), the child's development is affected and the immune system is more fragile. Hydration, germination or fermentation might reduce the content of phytates.

Phytates could somewhat be reduced by proper slow cooking, but the only satisfactory method is traditional, ancient fermentation, which transforms these anti-nutrients into more available and digestible products.

When soy products (such as tofu) are associated with meat, the effect of phytic acid is diminished, so there is only a risk for vegetarians.

The phytates from raw soybeans have been an item of academic interest for many years and studies are sometimes controversial.

Some papers assert that there is no intestinal adaptation to a high-phytate diet (Brune et al, 1989), while other studies have demonstrated that humans adapt to high intake of phytates by degradation of phytates (70-86%) in the intestinal tract (gut), as a result of an increase in phytase production in the small intestine (Joung et al., 2007). Other papers report that 50 grams of vitamin C can cancel the effects of 175 grams phytates on mineral absorption (Siegenberg et al., 1991).

Phytase (an enzyme that neutralizes phytic acid, releasing phosphorus) co-exists in plant foods that contain phytic acid. On a regular basis, humans do not synthesize enough enzymes, but the endogenous gut microflora (probiotic lactobacilli) could produce phytase (Famularo et al., 2005). Phytase can be activated by sprouting, while the nutritional value is not reduced.

There are papers supporting the powerful anti-cancer potential of phytates. As an antioxidant, phytic acid protects the body from cancer (by binding to iron and reducing oxidative damage to colon cells) and other every day stressors, being used in treatments for colon and rectal cancers (Admassu, 2009; Lonnerdal et al., 1989), or may help prevent colon cancer (Vucenik & Shamsuddin, 2003; Jenab & Thompson, 2000).

In animal studies, dietary phytates prevent the growth of tumor cells in the liver and pre-tumor cells in pancreas (Admassu, 2009); other studies have shown that phytates stop the growth of human leukemia cells, melanoma, muscle cancer and cervical cancer (Arnarson, 2015), but additional research is needed to assess the beneficial health effects of phytic acid.

Binding to proteins and starches, phytic acid can decrease the availability of these nutrients (Admassu, 2009), which can benefit people with kidney diseases who have to limit calcium and magnesium intake, thereby reducing the risk of kidney stone formation. On the other hand, phytic acid can act as a chelator, bind to lead (and other toxic minerals), and promotes detoxification, being used in the treatment of acute lead poisoning (Admassu, 2009). Phytic acid is also used as one of the few chelating therapies for uranium removal (Cebrian et al., 2007).

2. Soybeans can block (interfere with) the function of the thyroid gland

Because of the high content of goitrogens (substances that can block the synthesis of thyroid hormone and interfere with iodine metabolism), soy consumption could impact thyroid function, and cause goiter formation, with all its symptoms: low level of energy, reduced heart activity (oxygenation), anxiety, mood swings, insomnia, weight gain, food allergies, and digestive problems. This is rather a problem with isolated soy protein, because when soy protein is processed, goitrogenic isoflavones (daidzein, genistein) are concentrated and preserved. These isolated soy proteins are added to many functional processed foods such as energy bars, health drinks, protein powders, breakfast cereals, and pill supplements. So, persons with thyroid problems should avoid soy consumption (Ikeda et al., 2000). Isoflavones inhibit the function of thyroid peroxidase, an enzyme essential for the synthesis of thyroid hormones (Divi et al., 1997), and can induce goiter and thyroid neoplasia in rodents. A study in Japanese adults concluded that 30 grams of soybeans for 3 months raised the TSH (thyroid stimulating hormone) level (Ishizuki et al., 1991).

Other studies revealed that soy has either no effect or only a very mild effect on thyroid function in humans (Messina & Redmond, 2006; Dillingham et al., 2007; Teas et al., 2007). So, to date, there is not enough conclusive data to support that isoflavones could contribute to hypothyroidism in humans.

3. Soy is allergenic

Soy is one of the eight most allergenic foods in the world besides dairy, peanuts, wheat, eggs, fish, tree nuts (e.g. cashews or walnuts), and shellfish. These few foods

are responsible for 90% of all allergies. The symptoms can cover reactions from mild to severe (Sicherer et al., 2009; Cordle, 2004). At least 16 soy protein allergens are responsible for this kind of allergy (e.g. soy hydrophobic protein, soy hull protein, soy profilin, soy vacuolar protein, glycinin, β-conglycinin, Kunitz trypsin inhibitor, etc.) and could affect even infants presenting an intolerance or allergy to cow's milk-based formula. The daily 25 mg of soy protein allowed (considered healthy) by FDA could reduce the levels of low-density lipoproteins (LDLs), but increase the risk for soy allergenicity.

4. Soy is genetically modified

Most of the soybeans consumed all over the globe (more than 90% of those grown in USA) are *genetically modified* (GM), leading to hormonal disruption and miscarriages, infertility and low birth weight, allergies and digestive problems, birth defects, and a 5 times higher offspring death rate, and are used to create soy protein isolates (Goda et al., 2002).

5. Soy contains pesticides. Soy contains a great dose of glyphosate (herbicide), an endocrine buster that interferes with aromatase which produces estrogen, and disrupts the female hormonal balance. Glyphosate is toxic to the placenta (responsible for delivering vital nutrients to the child and eliminating waste products). If the placenta is damaged/ destroyed, miscarriage is possible. Children whose mothers were exposed to glyphosate (even in small amounts) could present severe birth defects (Bøhn et al., 2014), or carcinogenic effects (Thongprakaisang et al., 2013).

Fermented soy vs. unfermented soy

Japanese people, heavy soy consumers, enjoy a long, healthy life span. At the same time, they also consume green tea, smaller portions of food, and take regular exercise. Not to mention the fact that the Japanese use healthful fermented soy (tofu, miso, natto and soy sauces), very different from the unfermented soy found in the American or European diet. Tempeh is a fermented soybean cake with a firm texture and nutty, mushroom-like flavor. Miso is a paste with a salty, buttery texture. Natto has a sticky texture and strong, cheese-like flavor. Soy sauce is traditionally made by fermenting soybeans, salt and enzymes. Fermented soy has many beneficial effects: fermentation makes soy nutrients more available, enzyme inhibitors are reduced, and blood lipids are positively influenced. Unfermented soy products are loaded with toxins (enzyme inhibitors) and deficient in isoflavones. Fermented soy (especially natto) may be safe in small amounts, and contains great doses of vitamin K2, important for heart and bone health (Thingom & Chhetry, 2011).

Supplemental forms of soy protein:

a) SPC - soy protein concentrate (a moisture-free form that is left at the end of the defatting process), which contains over 65% protein and most of carbohydrates from soybeans.

b) SPI - soy protein isolate (the most refined and pure form, with almost all carbohydrates removed), which contains over 90% protein. This form is used in different meal-replacement drinks such as baby formulas and some brands of soy milk (Torum, 1979). The high temperature process used to obtain the isolates denatures the protein and diminishes its nutritional value, while increasing the likelihood of forming carcinogenic compounds (Constantinou, 2000; Dees et al., 1997), but does not reduce phytates, thyroid-depressing phytoestrogens, and enzyme inhibitors (Stob, 1966).

c) TSP - textured soy protein (made from protein concentrates), present in different soy products, imitating pork, chicken, and steak.

SPI is a dry powder food isolated from soybean, containing 90-95% proteins (with all essential amino acids needed for growth, similarly to animal products), with almost no fat (less than 1%) or carbohydrate.

SPI is used to increase protein content or enhance texture and may be found in a lot of foods sold in the health food section: liquid soymilk, power bars, soups and sauces, bottled fruit drinks, meat analogs, breads, breakfast cereals, and many muscle gain products.

SPI are obtained as a result of a high heat process which damages the proteins, keeps the phytates, phytoestrogens and enzyme inhibitors at high levels (Stob, 1966), and increases the likelihood of generating carcinogenic products (Constantinou, 2000; Dees et al, 1997).

The processing of SPI first needs an alkaline solution to remove fiber, then acid washing for precipitation and separation and, finally an alkaline solution for neutralization. Acid washing takes place in aluminum tanks, leaching high levels of aluminum (Al) into the final product. The high temperature used to obtain the different forms of soy protein could denature the protein (lysine 23), leaving a large part of antinutrients (trypsin inhibitors) which reduce weight gain (Stob, 1966; Torum, 1979). Potent carcinogens (nitrites) are formed during drying, and a toxin (lysinoalanine) is formed during the alkaline process. A plethora of artificial flavors (MSG) is added to SPI to mask the beany taste in favor of a meat taste, and phytic acid inhibits zinc and iron absorption, leading to the development of enlarged pancreas and thyroid gland (Wang et al., 2004).

Unfortunately, SPI and textured vegetable proteins are still used in many school lunch programs, diet beverages, fast food products and commercial baked goods, being promoted in third world countries, and in many giveaway programs.

Effects of SPI in sport and exercise

Some athletes who work on the weight machines or bodybuilders consume protein shakes as a nutritional supplement, drinks made from protein powders (from whey, soy, and milk). The proteins give them a special ability to help muscle protein synthesis, provide the fuel, and stimulate faster muscle recovery, especially if they are consumed after exercise. The daily recommended intake of proteins is 1.2 to 1.7 g/kg (Rosenbloom, 2009).

These protein powders could be used even by an average everyday athlete, in order to grow, build muscle, train for a marathon, or pursue a vegan/vegetarian lifestyle. As a result of the high content in phytoestrogens (genistein and daidzein), they change the testosterone-estrogen ratio, leading to an increase in body fat, and modify (enhance) the athlete's performance (Dwyer et al., 1994).

In experiments on swimming-trained mice, Elia et al. (2006) found that consuming soy and whey protein isolates

allows athletes to train at a higher exercise intensity, as a result of the antioxidant effect of the two proteins.

Athletes who ingest both soy and whey protein in their nutritional regimens may benefit from their different rates of digestion and amino acid absorption. Whey protein (high in branched-chain amino acids) digests more quickly, while soy protein (high in arginine and glutamine) digests more gradually. Arginine is a stimulant of anabolic hormones that promotes muscle formation. Together, whey and soy may provide a more prolonged, deliberate release of amino acids to key muscle groups. The soy protein can combat free radical generation during exercise, which might help speed muscle recovery after a workout and reduce muscle soreness and inflammation following exercise (Köhne et al., 2016).

Soy protein may improve the antioxidant status of an athlete and supplies all amino acids for the muscles, making them larger and stronger. In terms of its ability to promote gains in lean muscle mass, soy is as effective as whey (gold standard in protein supplementation), if no more so. The post-workout use of an isonitrogenous and isoenergetic soy drink is statistically significant in accelerating mass, fat-bone free mass gain, and increases in strength, when compared to other post-workout formulations such as skim milk and maltodextrin beverage (Hartman, 2004).

Tara et al. (2013) showed that supplementation with whey protein decreased lipid peroxidation in female endurance athletes, suggesting a potential antioxidative action, while soy protein did not improve biomarkers of oxidative damage and inflammation.

High amounts of proteins ("Western"-type diet) could have a concerning effect on athletes: they form acids and slightly increase calcium loss in the urine. Calcium comes from bone to buffer the acid, and over time, bone loss and fractures are possible. A diet high in fruits and vegetables seems an effective strategy to inhibit these negative effects (Heaney & Layman, 2008).

Another negative effect on health is dehydration; intake of over 2.5 g proteins/kg results in the production of urea from deamination (Dunford & Smith, 2006), which is osmotically active and draws water into the renal tubules, decreasing total body water.

In aerobic and endurance exercises and in strength training, carbohydrates are critical. They diminish in muscle after a weight training and weight-lifting session, and sufficient carbohydrate and fluid intake should accompany the protein intake in order to improve performance (Phillips et al., 2007).

Conclusions

1. There is no other food with so many opponents and so many lobbyists as soy. For every study showing the nutritional value of soy, another one claims its detrimental effects on health, so, reviewing the data on soy is extremely confusing. Sometimes, information is manipulated in order to discredit one or another; sometimes information is false.

2. There are two contradictory messages regarding soy (pro and con), generated by groups driven by ideology, profit, or both. Most of the studies on the beneficial effects of soy were sponsored or supported by the major producers of chemically processed soybean products (soy industry), and by pharmaceutical companies who hold the patents for genetically engineered soybeans. However, this does not invalidate the researches. Others have an ecological/health oriented agenda: they promote the vegetarian or vegan lifestyle.

3. Anti-soy people are motivated by a pro-meat and dairy ideology.

4. In this context, whom to believe, who is right, where is the truth? The interests of food and pharmaceutical industries are not convergent, and the interests of consumers and food industry are seldom and partially convergent.

5. Anyhow, respecting the precautionary principle, for women who are pregnant or plan to become pregnant, or are breastfeeding, as well as for infants, it is important to avoid soy products. However, evidence is currently inconsistent, inconclusive and too weak to support that moderate doses of soy have negative effects on human health. Greater amounts of soy or soy protein isolates used by sportsmen could affect their health due to toxic compounds.

6. To summarize, for soy to be a healthy food, it is recommended to be organic, used in a properly fermented form, occasionally, and in moderate amounts.

7. Nowadays, soy is threatened by a new food revolution: mycoprotein, produced in the laboratory, a single cell protein derived from bacteria, yeast, or fungi, a very cheap alternative to meat, with many nutritional, functional, and chemical benefits.

Conflicts of interest

There are no conflicts of interest

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 53–57

Post-stroke recovery updates

Actualităţi în recuperarea accidentului vascular

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Abstract

We aim to highlight the stages of cerebrovascular accident recovery. Stroke is defined as a circulatory disorder of ischemic or hemorrhagic type with the persistence of symptoms for more than 24 hours. It has a clinical expression of hemiplegia which in the first stage (day-weeks) is flaccid, followed by the spasticity phase that may last for weeks or months, and the last phase, the chronic one, during which reducing motor deficit and recovering abilities can be continued.

Motor recovery recognizes these stages of cerebrovascular accident and applies different techniques depending on the presence of spasticity and its degree. If in the flaccid phase, passive kinetic elements and the restoration of kinesthetic memory are predominant, in the spastic stage and the chronic stage, the techniques of initiating the active movement predominate.

Recovery of a stroke patient is difficult and goes through several stages. These involve a longer or shorter period of time, depending on when the recovery starts. The sooner the recovery program starts, the higher the benefits, and the less the functional deficit.

Keywords: stroke, neurological rehabilitation, kinetotherapy

Rezumat

Ne propunem punerea în evidenţă a etapelor de recuperare a accidentului vascular. Accidentul vascular cerebral (stroke) se defineşte ca o afectare circulatorie de tip ischemic sau hemoragic, cu persistenţa simptomatologiei mai mult de 24 de ore. Are ca expresie clinică hemiplegia, care în prima etapă (zile-săptămâni) este flască, urmată de etapa de instalare a spasticităţii, care poate dura săptămâni, luni, iar ultima etapă, cea cronică, de continuare a reducerii deficitului motor şi refacerea abilităţilor.

Recuperarea motorie recunoaşte aceste etape ale accidentului vascular şi aplică tehnici diferite în funcţie de prezenţa spasticităţii şi gradul acesteia. Dacă în etapa flască predomină elementele kinetice pasive şi de refacere a memoriei kinestezice, în etapa spastică şi etapa cronică, predomină tehnicile de iniţiere a mişcării active.

Recuperarea unui pacient cu accident vascular cerebral este anevoioasă şi parcurge mai multe etape. Acestea presupun o perioadă mai mare sau mai scurtă de timp, în funcție de momentul începerii recuperării. Cu cât programul de recuperare debutează precoce, cu atât beneficiile sunt mai mari, iar deficitul funcțional restant este mai mic.

Cuvinte cheie: accident vascular, recuperare neuromotorie, kinetoterapie

Introduction

Stroke may be ischemic or hemorrhagic. In the case of ischemic stroke, there is a decrease in blood flow in a brain territory with the sudden onset of a neurological deficit. This decrease may be transient (transient ischemic attack), when the duration of the motor deficit does not exceed 24 hours. It may last up to 24 hours to induce brain tissue necrosis (cerebral infarction) (Popescu & Băjenaru, 2009). Etiology: Most ischemic strokes are caused by thromboembolic mechanisms through the separation of thrombi formed at carotid level or in large cerebral vessels with atheromatous lesions, or by cardiac/paracardiac embolism (atrial fibrillation, atrial myxoma, valvular heart disease).

The term hemorrhagic stroke includes intraparenchymal, intraventricular and subarachnoid spontaneous cerebral hemorrhages (Popescu & Băjenaru, 2009).

Risk factors: interaction between environmental/ modifiable factors (arterial hypertension, diabetes mellitus, atrial fibrillation, carotid atheromatosis, hypercholesterolemia, ischemic heart disease) and genetic/

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https://doi.org/10.26659/pm3.2018.19.1.53

unmodifiable factors: predisposition (age, family history, race, gender). In terms of frequency, ischemic stroke ranks first in Europe and the US, accounting for 80%, while bleeding stroke represents about 10-15%, but in Romania this proportion is significantly changed in favor of hemorrhagic stroke (35-40%), probably due to less effective primary prevention (Kiss, 2012).

Morbidity and mortality of hemorrhagic stroke are higher than for ischemic stroke within the first 3 months of onset. The risk of mortality is 4-fold initially, reaching 1.5 after 3 weeks for hemorrhagic stroke compared to ischemic stroke. It was found that after 3 months, mortality is random among subjects with hemorrhagic or ischemic lesions (Andersen et al., 2009).

The main objective of medical rehabilitation is to gain functional independence and improve quality of life. Even if rehabilitation does not "heal" the effects of a stroke, it can substantially help achieve the best long-term outcome (1). At any time after stroke, cognitive functions, language and motor skills can be altered through the brain processes involved in ordinary learning. This exercise-induced neuroplasticity includes an excitability and a higher recruitment of neurons in both brain hemispheres that contribute to the strengthening of synaptic connections and, implicitly, motor performance. Patients who survive a stroke always recover some of the motor deficit by the end of the first three months (Dobkin & Dorsch, 2013). Functional evaluation systems, such as the Barthel Index and the National Institutes of Health Stroke Scale, the modified Rankin Scale (which measures physical care or supervision for self-care, including toilet use, personal hygiene, nutrition and mobility), tend to show a plateau of gains for the first three to four months after stroke (Harrison et al., 2013).

Flaccid stage

In the case of hemiplegia (clinical expression of stroke), there is initially a slight control of voluntary movement associated with low resting muscle tone. Voluntary active movement is absent, normal reflexes disappear and pathological reflexes appear. Rehabilitation therapy begins after the general condition of the patient has stabilized, often within 24 to 48 hours after stroke. Motor gain, especially in the first few weeks after a stroke, reflects the recovery of neurotransmission in spared tissue near and remote from infarction or hemorrhage (Andersen et al., 2009).

The objectives of this stage are:

- Preventing eschars, mobilizing the patient at a pre-established pace, and using the anti-eschar mattress.

- Corrective post-treatment of the patient in order to prevent vicious postures.

- The paretic side must be positioned at the edge of the bed; the patient will become aware of the motor deficit, losing the memory of the movement.

Passive mobilization and massotherapy are the only techniques used in the first stage to maintain joint and muscle integrity (Kiss, 2012).

Stroke recovery depends on the integrity of ipsilateral motor circuits and interactions between the ipsilesional and contralateral brain hemispheres (Liu et al., 2015).

Spastic stage

Three weeks after the onset of stroke, an increase in muscle tone occurs. There are also situations in which it does not occur or situations where it occurs early or only partially in the lower limb. Osteotendinous reflexes are enhanced and resistance to muscle stretch occurs across the range of motion so that spasticity is increased and the patient has tonic flexion postures of the upper limb and extension of the lower limb with the development of equinus foot. As voluntary motor control is restored, a reduction in tone and reflex response can be observed. At this stage, muscle spasticity is used to initiate kinetic rehabilitation programs. Therapeutic strategies used to induce cortical reorganization and promote the recovery of motor function are needed to acquire new skills or to regain lost skills. The traditional treatment methods still used, with no convincing evidence, are sensory motor techniques, namely exercises for muscle growth, increased range of motion, balance training, and postural control (de Man-van Ginkel et al., 2010). As voluntary motor control is recovered, a reduction in tone and reflex response can be observed.

Kinetic techniques and conventional electrotherapy are used (Kiss, 2012; Sbenghe, 1987):

- Bobath's technique inhibits abnormal movements and postures, facilitating motor control.

- Kabat technique maximizes proprioceptive information input through rapid stretches and diagonal and spiral motion patterns.

- Rood technique promotes skin stimulation to facilitate motor recovery.

- The Brunnstrom technique encourages movement initiated as early as possible based on predefined patterns.

- Mirror therapy, whereby the movement of the affected limb is superimposed on the affected limb (Yavuzer et al., 2008), creating the illusion of movement in the affected limb, or virtual reality which offers a massive practice of skills through many repetitions. Therapy involves the use of computer-based programs designed to simulate objects and events in real life. Virtual reality and interactive video games can have some advantages over traditional therapy approaches as they can offer people the ability to practice day-to-day activities that cannot be used in the hospital environment. In addition, patients spend more time in therapy and their activity becomes more motivating (Laver et al., 2017). Evidence has been found that using virtual reality and interactive video games has not benefited from conventional therapeutic approaches in improving upper limb function, which is why they are only used as an adjunct to therapy (to increase overall therapy time). There was not enough evidence to come to conclusions about the effect of virtual reality and interactive video games on speed, balance, participation, or quality of life (Laver et al., 2017).

- Electrostimulation of flaccid muscles using rectangular currents to restore muscular imbalance between agonists and antagonists. A recent systematic review by Langhammer and Stanghelle has evaluated the efficacy of traditional physiotherapeutic approaches. Although improvements in motor function have been demonstrated, no study has demonstrated that these approaches were

superior to the comparator therapies (Langhammer & Stanghelle, 2011).

In addition, a variety of experimental rehabilitation approaches have been tested against the established means of facilitating stroke recovery, such as physical therapy and kinetotherapy. Recent developments include non-invasive brain stimulation techniques such as repeat transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS). The use of these tools is based on neurophysiological studies demonstrating an imbalance of inter-ischemic interactions that appear to interfere with the recovery process (Lindenberg et al., 2010). Lindenberg et al. studied whether the non-invasive modulation of the bilateral motor cortex in combination with physical and occupational therapy improves motor outcome after stroke. Thus, the combination of bihemispheric tDCS and peripheral sensorimotor activities improved motor functions in patients with chronic stroke who had exceeded the recovery period. This new approach can potentiate adaptive brain processes that facilitate motor recovery (Lindenberg et al., 2010). Functional neuroimaging studies have also highlighted the evolution of brain activity in both hemispheres as patient skills improve (Seitz et al., 2010).

- Neurotrophic stimulation and antiallergic electrotherapy as required using low frequency current and continuous downstream current (Rădulescu, 2016).

Sometimes, at this stage, spasticity can be severe, difficult to treat and generating disability; the methods used will be based on clinical needs and the likelihood of achieving functional goals. Stretch techniques are used to reduce resting and dynamic muscular tone, hand and ankle-foot orthoses are aimed at preventing muscle contraction and soft tissue retrieval, or local botulinum toxin injection with a dose-proportional effect can be used (Braddom, 2015).

Chronic stage

The last stage is the stage in which spasticity no longer evolves, the residual motor deficit is already stabilized and difficult to recover. Facilitation techniques are used to track the progress of motor skills, balance and walking, social and family integration. It is the stage in which occupational therapy programs are the most important and can be applied individually or in groups, accompanied by specific adaptations at home. Thus, the last two stages are superposable in terms of physical-kinetic and occupational therapy, to which the benefits of current robotic-assisted and electronic technology, functional electrical stimulation (FES) therapy can be added.

At present, robotic-assisted therapy is no longer in the testing stage, with many centers using it for regaining both gait and balance. A walking training system intended for neuromotor recovery is the body weight-supported treadmill training (BWSTT) system. Robotic therapy promotes movement while the patient acquires a skill by repeating movements without the need for the therapist's continued involvement (Mayr et al., 2007). One study shows that in the case of chronic survivors of cerebrovascular accidents, kinetotherapy by a therapist is superior to robotic-assisted therapy. Given the cost and continuous development of rehabilitation devices, it is imperative to identify patients who can benefit from robotic-assisted rehabilitation. In view of the present results, patients with chronic hemiparesis that can move independently, even at a very slow pace, can be better served by kinetic therapy. As such, larger clinical trials evaluating the effects of robotic-assisted therapy may be justified in this patient population. In conclusion, robotic-assisted therapy may be indicated for non-ambulatory or subacute disease patients (Mayr et al., 2007; Husemann et al., 2007). Kinetics therapy facilitates and increases ambulation capacity in stroke patients compared to a similar dose of robotic-assisted therapy. Robotic devices only provide assistance for locomotor therapy, and their effectiveness in improving ambulation capacity is not well established (Hornby et al., 2008).

In terms of cognitive, language and communication disorders, the most important strategy applied in our country remains encouragement in any form of vocalization. These communication disorders after a stroke include aphasia, dysarthria, apraxia of speech and cognitive impairment. They can affect speech, listening, reading, writing, gestures and pragmatism. Dysarthria is a collective term for a group of speech disorders resulting from paralysis, weakness or non-coordination of speech muscles after neurological injury. Dysarthria may affect, individually or in combination, any of the subsystems underlying speech production: respiratory, laryngeal, velopharyngeal and oral subsystems (1).

Assisted communication media may range from low-tech strategies: paper and pencil, books to advanced smart-phone technologies or language-generating devices. Studies show that therapy initiated immediately (3 days after stroke) for aphasia improves the communication of patients with moderate/ severe aphasia (Godecke et al., 2012). Another study shows that treatment of patients with aphasia continues to be effective 6 months after stroke (Allen et al., 2012), pointing out that there is insufficient evidence to know exactly when to initiate treatment and for how long this should last (2). Dysphagia is common after stroke, affecting between 42% and 67% of patients within 3 days of stroke. Of these, a third develop aspiration pneumonia, dysphagia, malnutrition, dehydration, weight loss, and decreased quality of life. Early identification through screening can reduce the risk of developing the above mentioned disorders. Once the risk of dysphagia or aspiration pneumonia has been identified, bedside clinical assessment can provide information about the swallow mechanism and patient management (2). The compensatory treatments for swallowing dysfunction include changing posture and positioning for swallowing, learning new swallowing maneuvers, changing the amount and texture of foods (Geeganage et al., 2012; Ashford et al., 2009).

The frequency of micturition and defecation disorders in patients with hemiplegia is known. In a positive note, the recovery of a neurogenic bladder is possible in stroke, but insufficient awareness, the need for medical care for at least 3 months after stroke (Dorsher & McIntosh, 2012), the difficulty in communicating due to aphasia or the difficulty or impossibility of going to the bathroom are factors with a negative impact on the patient and his/her family.

In the case of patients with neurogenic bladder, the first strategy is timed evacuation which, depending on the residual volume, requires the administration of pharmacological substances for complete evacuation (α-blockers) or anticholinergic substances which allow an increase in the bladder volume. Other strategies include ensuring a correct water intake, using specific techniques according to a well-established timetable, medical assistance, possibly intermittent catheterization, condom catheters, only in the case of non-responders, permanent intravesical Foley catheters (Dorsher & McIntosh, 2012). Fecal incontinence can be prevented by using standard fixed-hour planning techniques for early gastric emptying, rectal stimulation with the fingers and suppositories (Mayr et al., 2007). Depression and anxiety are common after stroke and are associated with poor functional outcomes and increased mortality (Wulsin et al., 2011). Signs of clinical depression include sleep disturbances, a radical change in dietary patterns, which can lead to sudden weight loss or gain, lethargy, social withdrawal, irritability, fatigue, self-rejection, and suicidal thoughts. There is evidence that the severity of depression increases after stroke (de Man-van Ginkel et al., 2010). Anxiety, in particular, is found to coexist with depression in patients with cerebrovascular accidents, but is frequently undiagnosed (Vuletić et al., 2012). Unfortunately, little has been done to address the treatment and recovery of post-stroke generalized anxiety disorder (Campbell Burton et al., 2011). There is no evidence of the benefits of treating depression through psychotherapy, but additional practices such as motivational interviews, programs and exercises as well as health care have a positive impact on the reduction of depression symptoms (Hackett & Pickles, 2014).

Rehabilitation services are the primary mechanism by which functional recovery and independence are promoted in stroke patients. The current trend in stroke units to start recovery from the first day of stroke is the chance for an independent life offered to these patients. The main goal underlying all rehabilitation interventions is to maximize the quality of life of patients with cerebrovascular accidents, and not only to improve motor control, functional independence and social reintegration (Braddom, 2015). In well-designed rehabilitation studies, the magnitude of improvement by physical or occupational therapy tends to be modest but clinically useful, such as an increase in the Barthel Index score by about 20 points (range 0-20) in 6 months compared to the first few weeks (a score below 40), with a larger number indicating greater independence (Nakao et al., 2010). Rehabilitation after stroke undergoes constant change, and work over the last decades has shown it. The current effort is to develop new research methods and to use emerging technologies to study the physiology of the brain, with emphasis on recovery and response to recovery methods (Carter et al., 2016).

Conclusions

1. Stroke is one of the most common causes of disability, which requires sustained medical rehabilitation programs.

2. The new technological advancements have led to various methods and techniques based on robotics and virtual reality, which can be used in neurological rehabilitation. Using these methods, stroke recovery can be spectacular, minimizing motor deficit and greatly improving quality of life.

3. In order to limit disability after stroke, rehabilitation should be started from the outset, with objectives specific to the patient's stage of evolution.

Conflicts of interest

There are no conflicts of interest.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 58–62

Less known aspects of the Olympic Games

Aspecte mai puțin cunoscute despre Jocurile Olimpice

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Abstract

Much has been written about the Olympic Games because it is a worldwide event that makes us empathize with a whole world, but especially reminds us to be patriotic, reminding us that we have to fight for high achievements in sport. The beginning of 2018 has been marked by the Winter Olympic Games, the supreme level sporting event, held every four years. This year's host, PyeongChang City of South Korea was voted in after its third candidacy (first in 2010, second in 2014), making a collective effort to be ready in time. Athletes from 92 countries (absolute record) attended 15 sports disciplines and 102 events. Sport is and will be a messenger of twinning among nations, of respecting global values and the progress of athlete achievements. The history of these games is impressive both through its events and its continuity.

In this article, our intention is to contribute with additional information on some less known aspects of the Olympic Games and to highlight the contribution of personalities to the continuation and progress of sporting performances.

Keywords: Olympic Games, antiquity, modern age

Rezumat

Despre Jocurile Olimpice s-a scris și se va mai scrie foarte mult, deoarece este evenimentul care ne face să empatizăm cu o lume întreagă, dar mai ales ne aduce aminte să fim patrioți, ne aduce aminte că pentru lucruri măreţe trebuie să luptăm. Începutul anului 2018 este marcat de Jocurile Olimpice de Iarnă, manifestare sportivă de cel mai înalt nivel, organizată odată la patru ani. Gazda de anul acesta, orașul Pyeongchang din Coreea de Sud, a fost votată după a treia candidatură (prima în 2010, a doua în 2014), depunând un efort colectiv pentru a fi gata la timp. Participă sportivi din 92 de țări (record absolut) la 15 discipline sportive și 102 probe. Sportul este și va fi un mesager al înfrățirii între națiuni, al respectării valorilor globale, al progresului oamenilor de pe această planetă. Istoria acestor jocuri este impresionantă atât prin evenimente, cât și prin continuitate.

În acest articol, intenția noastră este de a contribui cu un plus de informație privind unele aspecte mai puțin cunoscute despre Jocurile Olimpice și să subliniem contribuția unor personalități, la continuarea și progresul performanțelor sportive.

Cuvinte cheie: Jocuri Olimpice, antichitate, epoca modernă

From antiquity

During the Olympics (the time elapsed between two successive games), many activities, games were held to prepare the athletes for the shows, the battles, the wars to come. The name "athlete" was attributed to all participants.

The consecration of actors and athletes was made within festivities organized locally and throughout Greece.

The most popular national athletic festivities/events were: the Olympic Games from Olympia (*Olympiakoi Agones*), Delphi Pythic Games, Corinthian Isthmic Games and German Games in Nemea, each with its own features. Of these, celebrations and games were held every four years in Olympia, in the northwest of the Peloponnese, becoming the center of interest of the entire Greece.

The games started on the first day of the summer solstice and lasted for five days.

The admitted athletes were prepared/trained for 10 months for body strengthening, resistance to hunger, thirst, high temperatures, and all kinds of fatigue (Kiriţescu, 1964).

We point out that over the course of time there have been 293 Olympiads in 1172 years, spanning 12 centuries, and the regularity with which these games were continuously played impresses even nowadays. Unbelievably, no matter what events occurred: wars, revolutions, political events or natural disasters, they could not disturb the regularity of the Games or the Olympics.

Received: 2017, December 5; *Accepted for publication:* 2017, December 15
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https://doi.org/10.26659/pm3.2018.19.1.58

These games also had a political dimension because during their duration, all political and military conflicts between the Greek cities ceased, and the so-called "Olympic Peace" was established (Sofronie, 2016).

The important events of this historical period were memorized by the Olympiad's order number. (e.g.: the Battle of Thermopylae, 480 BC, the first year of the 75th Olympiad) (8).

The games started with a solemn procession, sacrifices were made to the gods, the competitors were present, and the oath was taken. Only free Greeks were allowed to participate in the Ancient Olympics. Women were excluded. It is reported that a woman disguised herself as a man and entered the arena. She was caught and convicted, but because it was found out that her son was attending the games, she was exempted from punishment.

The Olympionics (*Olimpionike)* were crowned in front of the temple of Zeus by the supreme magistrates (*Helladonike*), who placed a crown of olive on their head. The olive branches were cut with a golden sickle from a tree that was said to have been planted by Hercules, the son of Zeus (Sofronie, 2016).

Then followed the procession of winners, who walked under the acclamations of the audience. The honors were complemented by substantial material gifts consisting of copper pots and cups, horses and slaves, money, tax exemptions, life rewards, free lifetime meals, honorable places at shows, sculptures depicting the athletes as gods, poems written in their honor (the famous poet Pindar composed more than a hundred odes to ensure their immortality).

Those who retained the title of champion in several successive editions or were winners of several games held on the territory of Greece were called *periodonikes* (2).

Along with athletes, the OG hosted talented poets, philosophers, historians and scientists who even participated in the sports competitions.

After the adoption of the Olympic Games by the Romans, of all Greek athletic events, the most appreciated by them were boxing, wrestling and pankration. These were also attended by emperors such as Tiberius and Nero. Emperor Nero added music and poetry contests to traditional competitions. He participated in the music and poetry contests, winning seven times. Nero also participated in a race and was eventually declared victorious, while during the race he was about to die. Other famous winners of the games included Varastades, Armenian king, Olympic boxing champion, and Philip II of Macedonia, winner of the horse races (Șofronie, 2016).

On their return to Rome, Tiberius and Nero wore the olive crown on their heads, a sign of their victory.

The first Olympic medal was won by a cook named Koroibos of Elis, in the stade race (about 192 m), in 776 BC, a fact recorded in Olympia (Kiriţescu, 1964).

The prizes included life and tax relief for all the cities that had an Olympic champion (Kiriţescu, 1964).

The most titled athlete of the ancient world is considered to be Milton of Crotona, who won the Olympic Games' pancratium event six times in a row. The doping problem is as old as the OG. Athletes used various methods to become better by eating excess meat, raw animal testicles, hallucinogenic plants as analgesic treatments. If caught, at the foot of Mount Kronion there were bronze statues representing Zeus, and on their sockets were written the reasons why the athletes and the judges who tricked the results were punished. All these statues were paid by cheaters, and they were an example for those who tried to win unmerited glory (Sofronie, 2016).

In 708 BC, the pentathlon was introduced, which consisted of: discus throw, long jump, javelin throw, the 192-meter race, and wrestling. In 720 BC, the following were added to the unique test of the first places: the event called diaulos (double stade), the 24-stade race called *dolichos* (about 4800 m) and a 7-day program of games which was dedicated to closing ceremonies (Kiriţescu, 1964).

The Ancient Olympic Games began in 776 BC and were held until 394 AD, when they were suppressed by Roman emperor Theodosius the Great (Flavius Theodosius I), who was a Christian and wanted to remove all traces of pagan culture (Kiriţescu, 1964).

From the modern age

Only 1500 years later, people of great value thought to revive the Olympic Games following the model of antiquity. Among them was a Romanian, Evanghelie Zappa (at his request, he became a Romanian citizen in 1844).

Evanghelie Zappa (1800-1865) was declared a founder of the Olympics, which he organized in 1859, 1870, 1875, 1888-1889, and all the editions were financially supported by him (3).

As Horia Alexandrescu (2016) writes in his book, "this man is a true parent of the modern Olympics, a name erroneously erased from Olympic history".

"The wonderful story of Evanghelie Zappa" (Alexandrescu, 2016) is an important page in the history of the OG, which clearly demonstrates that this tycoon who loved the Bărăgan region was concerned with the revival of the Modern Olympic Games almost half a century before Baron Pierre de Coubertin. Evanghelie Zappa was a Romanian businessman and entrepreneur of Greek origin, famous in the mid-19th century in both Romania and Greece (1).

Fig. 1 – Evanghelie Zappa's portrait from the Zappeion (Șontică, 2018)

"He is rightly the promoter of the Modern Olympic Games", according to the Ialomitean history professor Ioan Man, a native of the Broşteni commune, Ialomiţa region, who traced the landowner's biographical thread and presented the remarkable events of his life as they happened (Șofronie, 2015).

Zappa's desire to revive the Olympic competition came to fruition in 1856, when in a letter to the king of Greece, Otto of Bavaria, he proposed to re-establish the OG under the name of "Olympii" (Manolache, 2013), in Athens. There was an intense correspondence between the Greek authorities of that time and Zappa, after which the nobleman promised to donate half of his fortune for the organization of sports competitions (Șofronie, 2015).

"French historian and pedagogue Pierre de Coubertin set up the first International Olympic Committee in Paris in 1894. Two years later, in 1896, the first edition of the Modern Olympic Games took place. The competition, with 241 contestants from 14 countries participating in 43 events in nine sports, took place in Evanghelie Zappa's Zappeion. The *Zappeion* building is still preserved in Athens, and next to it a statue is built in the memory of Evanghelie Zappa" (Șofronie, 2015).

Zappa was honored by the Romanian Academy in a scientific session in 2000. The monumental ensemble he built in Broşteni (Ialomiţa) began to be restored and repaired, and his name was reconsidered and mentioned in numerous scientific papers, symposiums, etc. in both Romania and Greece (2). Honor to Evanghelie Zappa! (Moţoc, 2014).

Fig. 2 – Athens, the Zappeion (Alexandrescu, 2016)

Romania's rugby team won a bronze medal at the second edition of the modern Olympic Games held in Paris in 1900. Our team was defeated by France 61-3 and USA 37-0 (Chiş, 2003).

Until 1992, the Winter Olympic Games were held in the same year as the Summer Olympic Games. Since 1994, they have been placed on a separate four-year cycle, two years away from the Summer Olympic Games.

The "International Week of Winter Sports" in Chamonix, France in 1924 is considered the first edition of the Winter Olympic Games.

Romania first participated in the Winter OG in 1928, with 10 athletes competing in bobsleigh. The first team ranked 7th and the second one finished 19th. In this edition, Romania did not obtain points in the ranking of nations.

On 9-25 February 2018, the 23rd Winter Olympic Games took place in Pyeongchang, South Korea.

The Olympic flame was lit on 24 October 2017 in the ancient site of Olympia, and the torch relay ended after a long journey on February 9, 2018 with the lighting of the Olympic cauldron during the opening ceremony of the Winter OG (Fig. 3 a & b).

Athletes from 92 countries participated in 15 sports disciplines and 102 events (Uricec, 2018).

Olympic symbols

Fire is a symbol with divine connotations of the ancient OG. It was stolen from gods and brought to mortals by Prometheus. Fire was present in Olympia throughout the OG that were held in honor of Zeus.

The Olympic flame lighting ceremony took place for the first time at the 9th edition of the Summer Olympic Games in Amsterdam, Netherlands, 17 May - 12 August 1928.

a

b

Fig. 3 – Images of the Olympic flame lighting ceremony, 2018 Winter OG, on 24 October 2017. The ancient site of Olympia, Greece (2017, TVR HD)

Another important symbol of OG is the Olympic flag, which was adopted in 1914, and was first raised at the OG in Antwerp, Belgium, in 1920. It is anchored and maintained throughout the Games, and represents all nations under the idea of global unity. On a white background, the flag has five interlocking rings colored black, blue, red, yellow and green. All the flags of the participating countries are composed of one or more of these colors (Fig. 4).

Fig. 4 – The flag of the Olympic Games (10)

The first Olympic mascot was born at the Grenoble Olympic Games in 1968. Subsequently, Olympic mascots acquired an increasingly greater significance; at the Moscow OG in 1980, bear Misha was highly publicized and loved by competitors and viewers (8).

The motto: "Citius, altius, fortius" in latin, which means "faster, higher, stronger", was first pronounced by the Dominican priest Henri Didon during the opening ceremony of a school sports event in 1881. Pierre de Coubertin, who attended that speech, borrowed these words and made them famous by turning them into the motto of Olympism. It expresses the aspirations of the athletic and educational movement (Cazan, 2016).

The first OG broadcast in cinemas were the 11th edition held in Berlin, Germany, between August 1 and August 16, 1936. The games were declared open by Adolf Hitler himself, and were intended to amaze the whole world, for the exclusive benefit of Nazi propaganda. Hitler's ambition to prove the majesty of the Third Reich materialized in the construction of an unprecedented Olympic complex. Even today, Olympiastadion and Deutschland Halle, which have undergone some changes, arouse the admiration of sports enthusiasts. It was the first edition to be broadcast on television. Interviews were broadcast in 25 cinemas in Berlin, as well as throughout Germany (Sima, 2008).

During the Olympics, participants made stunning breakthroughs, so the rules were changed according to their performance.

At the first edition of the Modern OG in Athens in 1896, the 100 m event appeared only in the men's program and was won by the American TE Burke with the result of 12 seconds. The athlete put one knee down for the start, but the starter thought he was praying. The athlete was asked if he had finished, and he answered that he was starting from that position. The skeptical referee considered the position inconvenient. Burke's success led to the copying of his position by the other athletes. He was the first athlete who used a crouch start (4).

Johnny Weissmüller, born Peter Johann Weissmüller in 1904, in Timisoara, who emigrated to the United States of America, was the first man to swim 100 m under one minute. He held records in 100 yards, half a mile and 100 m freestyle. At the OG in 1924 and 1928, he collected five Olympic titles (5).

Named the "Montreal goddess", "Perfect Nadia" (Mircea, 2016), the gymnast of Romanian origin Nadia Comăneci, born in Onesti, Bacău region, made history after she scored the first ever perfect 10 in the history of artistic gymnastics, on the uneven bars at the Montreal OG in 1976 (9).

This edition of the OG has since been known as the "Nadia Comăneci Olympics" after Nadia scored seven perfect 10s and set a new *absolute record* of 20 points on the uneven bars according to the scoring code of that time (Mircea, 2016).

Abebe Bikila, an athlete born in Jato, near Addis Abeba, Ethiopia, was the first Olympic champion from an African country. In Rome, in 1960, he won the Olympic gold medal by running the marathon barefoot and set a new world record of 2:15:16 h. In Tokyo, in 1964, he won again the gold medal in the marathon with a new world record (2:12:11 h), but this time he wore shoes (7).

In 1956, at the Tokyo Summer OG in Japan, American Harold V. Connolly won the hammer throw test with the result of 207 feet and 3½ inches (6). He had an arm shorter by 8 cm.

And the examples of athletes who contributed to the wonderful history of OG could continue.

Conclusions

1. Ancient Greece meant the opening of new roads in politics, philosophy, arts and last but not least, in sports. The Ancient Olympic Games provided the most important rules and principles of the Modern Olympic Games.

2. The Modern Olympic Games grew in size after the emergence of cinemas and televisions, being watched around the world.

3. It is important to keep alive the memory of those who have moved us to tears, made us proud that we are Romanians and have excelled in sports, transforming competition into an amazing spectacle.

Conflicts of interests

There were no conflicts of interests.

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Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 63–65

PORTRAITS – Personalities of Romanian science and culture

The anniversary of the renowned pediatrician Prof. Dr. Nicolae Miu

Aniversarea remarcabilului pediatru Prof. Dr. Nicolae Miu

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Abstract

Our paper is dedicated to the anniversary of Prof. Dr. Nicolae Miu, at the age of 75 years. He is appreciated as a prestigious pediatrician, a professor of vocation and a man of vast culture. Prof. Dr. Nicolae Miu contributed in promoting physical education in children and adolescents. He also ulheld the organisation of the First National Conference entitled "Medicine Applied to Physical Education and Sport" (2013). Since 1995, he initiated and organized the National Congress of Social Pediatrics, where he included topics on the physical education therapy.

Keywords: Prof. Dr. Nicolae Miu, anniversary, pediatry, physical education.

Rezumat

Articolul nostru este dedicat aniversării Prof. Dr. Nicolae Miu, la împlinirea vârstei de 75 de ani. Este apreciat ca pediatru de prestigiu, profesor universitar de vocaţie şi om de vastă cultură. Prof. Dr. Nicolae Miu a contribuit la promovarea educaţiei fizice la copii şi adolescenţi. A sprijinit organizarea primei Conferinţe Naţionale intitulate „Medicina aplicată la Educaţie fizică şi Sport" (2013). De asemenea, a iniţiat şi organizat, începând din 1995, Congresele Naţionale de Pediatrie Socială, unde a inclus subiecte despre terapia prin educaţie fizică.

Cuvinte cheie: Prof. Dr. Nicolae Miu, aniversare, pediatrie, educaţie fizică.

Nicolae Miu speaking at the opening of the First National Conference entitled *Medicine Applied to Physical Education and Sport*

The anniversary of a personality who has significantly contributed to the benefit of society is a sign of admiration and a source of joy. It is also a moral duty. This debt is even more obvious if the personality has reached a certain age. Unfortunately, quite frequently, such festive occasions are insufficiently publicized in different journals or on various radio and television channels.

Nicolae Miu is well known as an eminent pediatrician, a very charismatic professor, a man of profound humanity and integrity, a great soul and an intellectual having a vast culture.

Many readers of this journal know that over the

Received: 2018, January 7; *Accepted for publication:* 2018, January 23
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decades, Prof. Dr. Nicolae Miu has participated in various medical and social activities, but his involvement in promoting physical education in children and adolescents is less known. His interest in this area was influenced by the model of Prof. Dr. Iuliu Haţieganu (1885-1959), who was the first dean and organizer of the Romanian Faculty of Medicine in Cluj.

In addition, the readers of this journal know that Nicolae Miu was a member of the presidium and also a moderator of the First National Conference entitled "Medicine Applied to Physical Education and Sport". This event was initiated by Prof. Dr. Traian Bocu - who ran the Physical Education Department of the Faculty of Medicine in Cluj-Napoca. The conference was held in Cluj-Napoca, on 30-31 May 2013.

Another proof of Professor Miu's interest in physical education is that he included physical education therapy in the topics of the National Congresses of Social Pediatrics, which were initiated by Prof. Miu himself in 1995 and developed in the following years.

The support given by Prof. Miu - as a Dean of the Faculty of Medicine of the University of Medicine and Pharmacy Cluj-Napoca (between 2000 and 2008) - to the Physical Education Department of the Faculty should not be forgotten.

In this context, some significant data from Prof. Dr. Nicolae Miu's biography are necessary in order to outline his personality and his prestige.

He was born in Turda, on 23 October 1942. After the end of the Second World War, he and his mother - Elena - settled in Cluj. Unfortunately, at that time his father - Nicolae - was a prisoner of war. His father returned to Cluj only in 1949, after being released from a camp situated in the former Soviet Union.

After this episode, the child Nicolae developed in a particularly favorable family environment for his later training, because his father was a librarian and his mother was a teacher. Nicolae Miu was a pupil at the "Emil Racoviţă" High School in Cluj. This was an institution of great value, being the continuation of the Cluj University Pedagogical Seminar (during the interwar period).

He completed his medical training at the Section of Pediatrics of the Faculty of Medicine in Cluj. Throughout this period (1960-1966), he had prestigious professors such as: Ion Manta (1900-1979) in biochemistry, Gheorghe Badenski (1901-1979) in microbiology, Octavian Fodor (1913-1976) in internal medicine and Iuliana Ţârlea (1901-1978) in pediatrics (***, 2002). The most important contribution to Miu's formation as a remarkable pediatrician was that of Prof. Octavia Mărgineanu.

Nicolae Miu graduated from the faculty in 1966, obtaining the "Degree of Merit". He followed all the steps of the academic career at the same clinic in Cluj - the Second Pediatric Clinic. He was a resident between 1968 and 1971. Then, in 1971, he was appointed university assistant lecturer. He became doctor in medicine in 1974.

In 1974 and 1975 he was a French government scholar and worked at L'Hôpital des Enfants Malades in Paris (Moldovan, 2016).

From 1980 to 1988 he was lecturer. In 1988 he was promoted to associate professor. In 1992 he was advanced to full professor.

In the health care field, Prof. Nicolae Miu managed to become a consultant doctor in three specialties: pediatrics - in 1980, gastroenterology - in 1994 and diabetes, nutrition and metabolic diseases - in 1999.

Throughout his career, he had different leading positions: vice-dean of the Faculty of Medicine in Cluj (1990-1992), vice-rector of "Iuliu Haţieganu" University of Medicine and Pharmacy (1992-1996) and, subsequently, dean of the Faculty of Medicine (2000-2008) at the same University. He was also president of the Cluj College of Physicians (1997-2001), president of the National (Romanian) Society of Pediatric Gastroenterology and Hepatology, president of the National (Romanian) Society of Social Pediatrics, vice-president of the National (Romanian) Society of Pediatrics, etc. It should be added that he is a member of the French Society of Pediatrics and a member of the Francophone Group of Pediatric Gastroenterology.

Prof. Dr. Miu's scientific activity is vast and complex, consisting of numerous books and papers. Among his books, the following should be mentioned: "Oligoelements in Biology and Pathology" (co-author Octavia Mărgineanu, 1984), "Liver Pathology of the Child" (in collaboration with Georgeta Fărcaş, 1992), "Bronchial Asthma of the Child - Actualities and Perspectives" (in collaboration with G. Sur, 1996), "Von Willebrandt Disease" (co-author G. Sur, 1996), "Juvenile Rheumatoid Arthritis" (having the same co-author, 1996), "Therapeutic Strategies in some Metabolic and Digestive Diseases in Children" (co-author Antonia Popescu), "Digestive Tract Malformations in Children" (co-workers H. Gocan and L. Marţi), "Chronic Hepatitis of the Child" (1999), "Chronic Hepatitis of the Child: progresses in diagnosis and treatment" (co-authors R. Badea and Luiza Burac, 1999), etc. A culmination of the scientific activity elaborated by Prof. Miu in the 20th century was the "Adolescent Medicine Treatise" (1999), of which he is an editor and author. It was a premiere in the Romanian medical literature.

Nicolae Miu had the merit of extending the facilities of the Second Pediatric Clinic, by constructing a new and modern building. Another achievement was the foundation of the Department of Children's Kidney Dialysis (1994), which was a premiere in Romania. He also created the Medical Center for Adolescents.

As a dean, he had many significant achievements. An example is the introduction of a new subject - Behavioral Sciences. For this purpose, in 2004, the homonymous course was published under his editorship. It was the first textbook in this specialty published in Romania.

To complete Nicolae Miu's portrait, it would be necessary to recall his high cultural level, evidenced by his frequent participation in the "Medicine, Art and Culture" Galleries (Bocu, 2017). Having an intense passion and respect for opera, he wrote the book entitled "Memories from the hall of the Cluj Opera House".

Prof. Dr. Nicolae Miu was decorated by the President of Romania with the "Sanitary Merit" Order in the rank of Grand Officer in 2004. The same year, the President of France – Jacques Chirac – decorated Prof. Miu with the National Order of Merit of France in the rank of Knight, for reinforcing Franco-Romanian relations in medicine (Damian, 2008).

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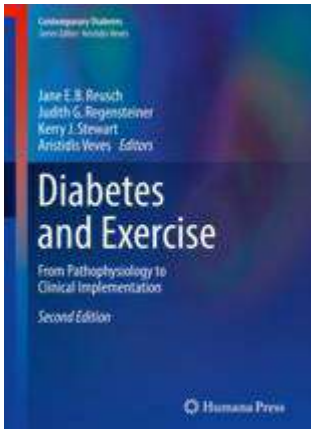
RECENT PUBLICATIONS

Book reviews

Diabetes and Exercise. From Pathophysiology to Clinical Implementation. Second Edition
(Diabetul şi efortul fizic. De la fiziopatologie la implementarea în clinică. Ediția a doua)
Editors: Jane E.B. Reusch, Judith G. Regensteiner, Kerry J. Stewart, Aristidis Veves
Publishing House: Springer International Publishing, 2018
357 pages; price: $129.00



The book we have decided to call attention to this time is the fully revised and updated second edition of a work whose first edition was published about nine years ago. Obviously, the main explanation for this new edition of the book is the topicality of the health problem it is dedicated to, if we realize that worldwide there are already about 415 million people with diabetes, and an astronomical growth - up to a total of 642 million - in the number of this population is predicted for the next 20 years. The other reason for the publication of a new edition is the finding that even if the leading authorities in the field consider the pandemic of diabetes to be preventable on the condition that meaningful changes in diet and physical activity are made, most people still ignore these recommendations and continue to be physically inactive.

The fact that people with diabetes are confronted with physiological and socioeconomic barriers in their potential intention to become more physically active is an accepted reality, and at the same time it is obvious that currently, an alternative for safe and effective exercise programs for all these persons does not exist. Or, taking into consideration that this book is the result of the collaboration of experts and researchers in diabetes, diabetes prevention, integrative physiology, exercise physiology, and exercise implementation, it could prove an invaluable and irreplaceable tool for practitioners attempting to implement modern programs of this type.

The concerted efforts of 53 collaborators resulted in more than 350 pages of concentrated text, distributed in 4 parts and 22 chapters. Formally speaking, all the chapters are important and necessary to acquire a complex and scientifically based image on how physical activity may be involved and would operate in the life of people with diabetes. However, in our opinion, some chapters seem to be of crucial interest for exercise and sport professionals directly involved in physical activity interventions. These chapters can be found within the 3rd and 4th parts: "Management and treatment" and "Special considerations for exercise in people with diabetes", respectively.

So, if in the 12th chapter, readers learn about the conclusions of two very important studies, which proved the benefits of a lifestyle intervention in persons at risk for or with type 2 diabetes, the following chapters provide them with state of the art information on exercise and nutrition (chapter 13), strategies to be used for increasing exercise and decreasing sedentary behaviors (14), and how quality of life is improved and has to be assessed for evidencing the beneficial effects of an active lifestyle (15). The final sequence of this part is dedicated to the medical evaluation and exercise testing of those intending to participate in an exercise program.

The last part of the book contains six chapters and starts with that about some conditions - cardiovascular disease, neuropathy and retinopathy - which may negatively interfere with exercise and need additional attention and monitoring, especially during the initiation period. Chapter 18 presents the problems raised by the presence of other comorbidities, such as hypertension, arterial stiffness, systolic and diastolic dysfunction, pulmonary disease, fatty liver, obstructive sleep apnea, which are frequently present in type 2 diabetes and further worsen exercise capacity, whereas the next chapter is dedicated to exercise in children and adults with type 1 diabetes; the authors emphasize the particularities of exercise management in these cases, taking into consideration the great differences in the pathophysiology of the two types of diabetes. How professionally designed exercise programs improve quality of life and reduce fall incidence, as well as what these programs must contain and focus on can be learned from the 20th chapter, while the next chapter deals with the features, the benefits and the risks of cardiac rehabilitation work with patients suffering from diabetes. Finally, the last chapter consists of a really comprehensive material about what can and must be done for patients with both peripheral artery disease and diabetes.

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https://doi.org/10.26659/pm3.2018.19.1.66

Palestrica of the third millennium – Civilization and Sport
Vol. 19, no. 1, January-March 2018, 67–69

EVENTS

MINISTRY OF NATIONAL EDUCATION

CLUJ COUNTY SCHOOL INSPECTORATE

Annual cross-country skiing competitions of mountain centers in Cluj County - 2018

Concursurile anuale de schi-fond ale centrelor montane din judeţul Cluj - 2018

In the winter of 2018, snow arrived only a few days before the start of the competitions and lasted for a longer time period than last season. The traditional cross-country skiing events took place between 20 January and 18 February 2018. The last competition was the *Little Mountain Hunters* Cup, held in Muntele Băişorii. Some new aspects compared to the previous editions were a greater number of participants, due to open participation and to the fact that some centers were represented by two teams, as well as the declared intention of new centers to enter this competition circuit. This year, snow was better preserved than last year, because of the lower temperatures at the end of the season. Like in the last year's event, an increased commitment of local authorities and the management of the organizing schools to the organization of the cross-country skiing competitions was seen.

The winners of this year's events are as follows:

1. Rogojel Center - The *Vlădeasa* Cup, 6th edition, 27 January 2018

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomuş Estera-Râşca	Todoruţ Paul-Răchiţele	Mariş Larisa-Mărişel	Mariş Sebastian- Măguri	Râşca	Rogojel
2	Tomoş Ioana-Râşca	Pleş Cosmin- Rogojel	Giurgiu Carmen-Beliş	Forţ Radu-Rogojel	Măguri	Măguri
3	Abrudan Mihaela-Mărişel	Roba Darius-Măguri	Berindei Andreea- Măguri	Potra Valentin-Rogojel	Răchiţele	Râşca

Physical education teacher: Aurel Dan Crişan; Director: Prof. Mariana Paşcalău; Mayor: Gheorghe Cuc
Cluj-Napoca mountain rescue - organization and assistance

2. Sâncraiu Center - The *Tomordok* Cup, 13th edition, 28 January 2018

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Todoruţ Paul-Răchiţele	Giurgiu Carmen-Beliş	Mariş Sebasti an- Măguri	Măguri	Măguri
2	Lovasz Ester-Sâncraiu	Tomoş Daniel-Râşca	Mariş Larisa-Mărişel	Forţ Radu-Rogojel	Sâncraiu	Râşca
3	Nicula Carla-Beliş	Pleş Cosmin-Rogojel	Szöcs Imola-Sâncraiu	Potra Valentin-Rogojel	Beliş	Sâncraiu

Physical education teacher: Csudom Norbert; Director: Prof. Lakatos András; Mayor: Póka Andrei Gheorghe
Cluj-Napoca mountain rescue - organization and assistance

3. Beliş Center - The *Scoruşet* Cup, 23rd edition, 20 January 2018

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Tomoş Daniel-Râşca	Giurgiu Carmen-Beliş	Mariş Sebastian- Măguri	Beliş	Râşca
2	Nicula Carla-Beliş	Todoruţ Paul-Răchiţele	Mariş Larisa-Mărişel	Vâtcă Claudiu-Râşca	Râşca	Rogojel
3	Tomoş Ioana-Râşca	Dobra Flaviu-Beliş	Berindei Andreea- Măguri	Forţ Radu-Rogojel	Rogojel	Beliş

Physical education teacher: Anghel Todea; Director: Mihaela Mocean; Mayor: Matiş Viorel
Cluj-Napoca mountain rescue - organization and assistance

4. Râşca Center - The *Sălănducu* Cup, 20th edition, 21 January 2017

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomuş Estera-Râşca	Tomoş Daniel-Râşca	Mariş Larisa-Mărişel	Mariş Sebastian- Măguri	Râşca	Râşca
2	Tomoş Ioana-Râşca	Todoruţ Paul-Răchiţele	Giurgiu Carmen-Beliş	Iancu Andrei- Măguri	Beliş	Măguri
3	Nicula Carla-Beliş	Roba Darius-Măguri	Berindei Andreea- Măguri	Vâtcă Claudiu-Râşca	Rogojel	Rogojel

Physical education teacher: Ardelean Ilea; Director: Florin Cotiş; Mayor: Teodor Petre
Cluj-Napoca mountain rescue - organization and assistance

https://doi.org/10.26659/pm3.2018.19.1.67

5. Măguri Bogdănești Center - The *Avram Iancu* Cup, 2nd edition, 4 February 2018

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Lovasz Ester-Sâncraiu	Tomoş Daniel-Râşca	Mariş Larisa-Mărişel	Vâtcă Claudiu-Râşca	Mărişel	Râşca
2	Tomoş Estera-Râşca	Todoruţ Paul-Răchiţele	Berindei Andreea- Măguri I	Mariş Sebastian- Măguri I	Râşca	Măguri I
3	Tomoş Ioana-Râşca	Roba Darius-Măguri I	Giurgiu Carmen-Beliş	Zirbo Beniamin- Râşca	Măguri I	Mărişel

Physical education teacher: Aurel Roba; Director: Prof. Carmen Prigoană; Mayor: Petru Prigoană
Cluj-Napoca mountain rescue - organization and assistance

6. Mărişel Center - The *Pelaghia Roşu* Cup, 32nd edition, 3 February 2018

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Tomoş Daniel-Râşca	Mariş Larisa-Mărişel	Mariş Sebastian- Măguri	Măguri	Râşca
2	Abrudan Mihaela- Mărişel	Todoruţ Paul-Răchiţele	Giurgiu Carmen-Beliş	Vâtcă Claudiu-Râşca	Râşca	Măguri
3	Tomoş Ioana-Râşca	Mariş Sorin- Mărişel	Abrudan Alina-Mărişel	Forţ Radu-Rogojel	Mărişel	Mărişel

Physical education teacher: Ionuţ Bal; Director: Prof. Dana Mirela Feneşan; Mayor: Viorel Ghic; Mountain rescue: Dorin Potra

7. Băişoara Center - The *Little Mountain Hunters* Cup, 39th edition, 19 February 2017

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Ioana-Râşca	Roba Darius-Măguri	Berindei Andreea- Măguri	Forţ Radu-Rogojel	Măguri	Măguri
2	Tomoş Estera-Râşca	Todoruţ Paul-Răchiţele	Mariş Larisa-Mărişel	Iancu Andrei- Măguri	Râşca	Rogojel
3	Ianc Denisa- Măguri	Tomoş Daniel-Râşca	Giurgiu Carmen-Beliş	Mariş Sebastian- Măguri	Mărişel	Râşca

Organizers: ISJ Cluj, Prof. Cristian Potora - School Inspector - physical education; Director: Prof. Lenuţa Chiş - Children's Palace Cluj

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Laura Ionescu
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Beliş

Racing against the clock towards the finish line

View of the start and finish place of the competition in Beliş

The rally point for the award ceremony

Râşca

Before the beginning of the award ceremony in Râşca

Teacher Ilea Ardelean conducting the award ceremony for one of the girls' events

Teacher Mircea Eleches at the award ceremony for one of the boys' events

School inspector Laura Ionescu alongside the winning girls

Rogojel

Technical meeting in Rogojel, presided by school inspector Prof. Drd. Cristian Potoră

Preparations before the competition

At the award ceremony, together with the mayor Gheorghe Cuc

Sâncraiu

Getting together at the start point

Award ceremony at the school in Sâncraiu, in the presence of school director Prof. Lakatos András and mayor Póka Andrei Gheorghe

Competitor halfway the distance

Mărișel

Award ceremony for 10-11-year-old girls, conducted by school director Dana Feneşan

Award ceremony for the relay event

On the award podium, the team leading teachers

Măguri-Bogdăneşti

The group of participants in the presence of mayor Petru Prigoană

Award ceremony conducted by teacher Aurel Roba

Gathering of participants before the award ceremony

Băişoara

Competitors inspecting the course

The competition is on!

Waiting for the award ceremony

FOR THE ATTENTION OF CONTRIBUTORS

The subject of the Journal

The journal has a multidisciplinary nature oriented toward biomedical, health, exercise, social sciences fields, applicable in activities of physical training and sport, so that the dealt subjects and the authors belong to several disciplines in these fields. The main rubrics are: "Original studies" and "Reviews".

Regarding "Reviews" the main subjects that are presented are: oxidative stress in physical effort; mental training; psychoneuroendocrinology of sport effort; physical culture in the practice of the family doctor; extreme sports and risks; emotional determinatives of performance; the recovery of patients with spinal column disorders; stress syndromes and psychosomatics; olympic education, legal aspects of sport; physical effort in the elderly; psychomotricity disorders; high altitude sportive training; fitness; biomechanics of movements; EUROFIT tests and other evaluation methods of physical effort; adverse reactions of physical effort; sport endocrinology; depression in sportsmen/women; classical and genetic drug usage; Olympic Games etc.

Among articles devoted to original studies and researches we are particularly interested in the following: the methodology in physical education and sport; influence of some ions on effort capacity; psychological profiles of students regarding physical education; methodology in sport gymnastics; the selection of performance sportsmen.

Other articles approach particular subjects regarding different sports: swimming, rhythmic and artistic gymnastics, handball, volleyball, basketball, athletics, ski, football, field and table tennis, wrestling, sumo.

The authors of the two rubrics are doctors, professors and educators, from universities and preuniversity education, trainers, scientific researchers etc.

Other rubrics of the journal are: the editorial, editorial news, reviews of the latest books in the field and others that are presented rarely (inventions and innovations, universitaria, preuniversitaria, forum, memories, competition calendar, portraits, scientific events).

We highlight the rubric "The memory of the photographic eye", where photos, some very rare, of sportsmen in the past and present are presented.

Articles signed by authors from the Republic of Moldova regarding the organization of sport education, variability of the cardiac rhythm, the stages of effort adaptability and articles by some authors from France, Portugal, Canada must also be mentioned.

The main objective of the journal is highlighting the results of research activities as well as the permanent and actual dissemination of information for specialists in the field. The journal assumes an important role regarding the achievement of necessary scores of the teaching staff in the university and preuniversity education as well as of doctors in the medical network (by recognizing the journal by the Romanian College of Physicians), regarding didactic and professional promotion.

Another merit of the journal is the obligatory publication of the table of contents and an English summary for all articles. Frequently articles are published in extenso in a language with international circulation (English, French).

The journal is published quarterly and the works are accepted for publication in the Romanian and English language. The journal is sent by e-mail or on a floppy disk (or CD-ROM) and printed, by mail at the address of the editorial staff. The works of contributors that are resident abroad and of Romanian authors must be mailed to the Editorial staff at the following address:

„Palestrica of the third millennium – Civilization and sport"
Chief Editor: Prof. dr. Traian Bocu
Contact address: palestrica@gmail.com or traian_bocu@yahoo.com
Mail address: Clinicilor street no. 1 postal code 400006, Cluj-Napoca, România
Telephone:0264-598575
Website: www.pm3.ro

Objectives

Our intention is that the journal continues to be a route to highlight the research results of its contributors, especially by stimulating their participation in project competitions. Articles that are published in this journal are considered as part of the process of promotion in one's university career (accreditation that is obtained after consultation with the National Council for Attestation of Universitary Titles and Diplomas).

We also intend to encourage the publication of studies and research, that include original relevant elements especially from young people. All articles must bring a minimum of personal contribution (theoretical or practical), that will be highlighted in the article.

In the future we propose to accomplish criteria that would allow the promotion of the journal to superior levels according international recognition.

THE STRUCTURE AND SUBMISSION OF ARTICLES

The manuscript must be prepared according to the stipulations of the International Committee of Medical Journal Editors (http://www.icmjee.org).

The number of words for the electronic format:

– 4000 words for original articles;

– 2000 words for case studies;
– 5000-6000 words for review articles.

Format of the page: edited in WORD format, A4. Printed pages of the article will be numbered successively from 1 to the final page.

Font: Times New Roman, size 11 pt.; it should be edited on a full page, with diacritical marks, double spaced, respecting equal margins of 2 cm.

Illustrations:

The images (graphics, photos etc.) should be numbered consecutively in the text, with arabic numbers. They should be edited with EXCEL or SPSS programs, and sent as distinct files: „figure 1.tif", „figure 2. jpg", and at the editors demanding in original also. Every graphic should have a legend, written **under** the image.

The tables should be numbered consecutively in the text, with roman numbers, and sent as distinct files, accompanied by a legend that will be put **above** the table.

PREPARATION OF THE ARTICLES

1. Title page: – includes the title of article (maximum 45 characters), the name of authors followed by surname, work place, mail address of the institute and mail adress and e-mail address of the first author. It will follow the name of article in the English language.

2. Summary: For original articles a summary structured like this is necessary: (Premize-Background, Obiective-Aims, Metode-Methods, Resultate-Results, Concluzii-Conclusions), in the Romanian language, of maximum 250 words, followed by 3-8 key words (if its possible from the list of established terms). All articles will have a summary in the English language. Within the summary (abstract) abbreviations, footnotes or bibliographic references should not be used.

Premises and objectives. Description of the importance of the study and explanation of premises and research objectives.

Methods. Include the following aspects of the study:

Description of the basic category of the study: of orientation and applicative.

Localization and the period of study. Description and size of groups, sex (gender), age and other socio-demographic variables should be given.

Methods and instruments of investigation that are used.

Results. The descriptive and inferential statistical data (with specification of the used statistical tests): the differences between the initial and the final measurement, for the investigated parameters, the significance of correlation coefficients are necessary. The specification of the level of significance (the value ***p*** or the dimension of effect ***d***) and the type of the used statistical test etc are obligatory.

Conclusions. Conclusions that have a direct link with the presented study should be given.

Orientation articles and case studies should have an unstructured summary (without respecting the structure of experimental articles) to a limit of 150 words.

3. Text

Original articles should include the following chapters which will not be identical with the summary titles: Introduction (General considerations), Hypothesis, Materials and methods (including ethical and statistical informations), Results, Discussing results, Conclusions and suggestions. Other type of articles, as orientation articles, case studies, Editorials, do not have an obligatory format. Excessive abbreviations are not recommended. The first abbreviation in the text is represented first *in extenso*, having its abbreviation in parenthesis, and thereafter the short form should be used.

Authors must undertake the responsibility for the correctness of published materials.

4. Bibliography

The bibliography should include the following data:

For articles from journals or other periodical publications the international Vancouver Reference Style should be used: the name of all authors as initials and the surname, the year of publication, the title of the article in its original language, the title of the journal in its international abbreviation (italic characters), number of volume, pages.

Articles: Pop M, Albu VR, Vişan D et al. Probleme de pedagogie în sport. Educaţie Fizică şi Sport 2000; 25(4):2-8.

Books: Drăgan I (coord.). Medicina sportivă, Editura Medicală, 2002, Bucureşti, 2002, 272-275.

Chapters from books: Hăulică I, Bălţatu O. Fiziologia senescenţei. In: Hăulică I. (sub red.) Fiziologia umană, Ed. Medicală, Bucureşti, 1996, 931-947.

Starting with issue 4/2010, every article should include a minimum of 15 bibliographic references and a maximum of 100, mostly journals articles published in the last 10 years. Only a limited number of references (1-3) older than 10 years will be allowed. At least 20% of the cited resources should be from recent international literature (not older than 10 years).

Peer-review process

In the final stage all materials will be closely reviewed by at least two competent referees in the field (Professors, and Docent doctors) so as to correspond in content and form with the requirements of an international journal. After this stage, the materials will be sent to the journal's referees, according to their profiles. After receiving the observations from the referees, the editorial staff shall inform the authors of necessary corrections and the publishing requirements of the journal. This process (from receiving the article to transmitting the observations) should last about 4 weeks. The author will be informed if the article was accepted for publication or not. If it is accepted, the period of correction by the author will follow in order to correspond to the publishing requirements.

Conflict of interest

The authors must mention all possible conflicts of interest including financial and other types. If you are sure that there is no conflict of interest we ask you to mention this. The financing sources should be mentioned in your work too.

Specifications

The specifications must be made only linked to the people outside the study but which have had a substantial contribution, such as some statistical processing or review of the text in the English language. The authors have the responsibility to obtain the written permission from the mentioned persons with the name written within the respective chapter, in case the readers refer to the interpretation of results and conclusions of these persons. Also it should be specified if the article uses some partial results from certain projects or if these are based on master or doctoral theses sustained by the author.

Ethical criteria

The Editors will notify authors in due time, whether their article is accepted or not or whether there is a need to modify texts. Also the Editors reserve the right to edit articles accordingly. Papers that have been printed or sent for publication to other journals will not be accepted. All authors should send a separate letter containing a written statement proposing the article for submission, pledging to observe the ethics of citation of sources used (bibliographic references, figures, tables, questionnaires).

For original papers, according to the requirements of the Helsinki Declaration, the Amsterdam Protocol, Directive 86/609/EEC, and the regulations of the Bioethical Committees from the locations where the studies were performed, the authors must provide the following:

- the informed consent of the family, for studies in children and juniors;
- the informed consent of adult subjects, patients and athletes, for their participation;
- malpractice insurance certificate for doctors, for studies in human subjects;
- certificate from the Bioethical Committees, for human study protocols;
- certificate from the Bioethical Committees, for animal study protocols.

The data will be mentioned in the paper, in the section Materials and Methods. The documents will be obtained before the beginning of the study. Will be mentioned also the registration number of the certificate from the Bioethical Committees.

Editorial submissions will be not returned to authors, whether published or not.

FOR THE ATTENTION OF THE SPONSORS

Requests for advertising space should be sent to the Editors of the "Palestrica of the Third Millennium" journal, 1, Clinicilor St., 400006, Cluj-Napoca, Romania. The price of an A4 full colour page of advertising for 2012 will be EUR 250 and EUR 800 for an advert in all 4 issues. The costs of publication of a logo on the cover will be determined according to its size. Payment should be made to the Romanian Medical Society of Physical Education and Sports, CIF 26198743. Banca Transilvania, Cluj branch, IBAN: RO32 BTRL 0130 1205 S623 12XX (RON).

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Please note that in 2010 a tax for each article submitted was introduced. Consequently, all authors of articles will pay the sum of 150 RON to the Romanian Medical Society of Physical Education and Sport published above. Authors who have paid the subscription fee will be exempt from this tax. Other information can be obtained online at www.pm3.ro "Instructions for Authors", at our e-mail address palestrica@gmail.com or at the postal address: 1, Clinicilor St., 400006, Cluj-Napoca, Romania, phone: +40264-598575.

INDEXING

Title of the journal: Palestrica of the third millennium – Civilization and sport

pISSN: 1582-1943; eISSN: 2247-7322; ISSN-L: 1582-1943

Profile: a Journal of Study and interdisciplinary research

Editor: "Iuliu Haţieganu" University of Medicine and Pharmacy of Cluj-Napoca and The Romanian Medical Society of Physical Education and Sports in collaboration with the Cluj County School Inspectorate

The level and attestation of the journal: a journal rated B+ by CNCSIS in the period 2007-2011 and certified by CMR since 2003

Journal indexed into International Data Bases (IDB): EBSCO, Academic Search Complete, USA and Index Copernicus, Journals Master List, Poland; DOAJ (Directory of Open Access Journals), Sweden.

Year of first publication: 2000

Issue: quarterly

The table of contents, the summaries and the instructions for authors can be found on the internet page: http://www.pm3.ro. Access to the table of contents and full text articles (in .pdf format) is free.

ÎN ATENŢIA COLABORATORILOR

Tematica revistei

Ca tematică, revista are un caracter multidisciplinar orientat pe domeniile biomedical, sănătate, efort fizic, ştiinţe sociale, aplicate la activităţile de educaţie fizică şi sport, astfel încât subiectele tratate şi autorii aparţin mai multor specialităţi din aceste domenii. Principalele rubrici sunt: „Articole originale" şi „Articole de sinteză".

Exemplificăm rubrica „Articole de sinteză" prin temele importante expuse: stresul oxidativ în efortul fizic; antrenamentul mintal; psihoneuroendocrinologia efortului sportiv; cultura fizică în practica medicului de familie; sporturi extreme şi riscuri; determinanţi emoţionali ai performanţei; recuperarea pacienţilor cu suferinţe ale coloanei vertebrale; sindroame de stres şi psihosomatică; educaţia olimpică, aspecte juridice ale sportului; efortul fizic la vârstnici; tulburări ale psihomotricităţii; pregătirea sportivă la altitudine; fitness; biomecanica mişcărilor; testele EUROFIT şi alte metode de evaluare a efortului fizic; reacţii adverse ale eforturilor; endocrinologie sportivă; depresia la sportivi; dopajul clasic şi genetic; Jocurile Olimpice etc.

Dintre articolele consacrate studiilor şi cercetărilor experimentale notăm pe cele care vizează: metodica educaţiei fizice şi sportului; influenţa unor ioni asupra capacităţii de efort; profilul psihologic al studentului la educaţie fizică; metodica în gimnastica sportivă; selecţia sportivilor de performanţă.

Alte articole tratează teme particulare vizând diferite sporturi: înotul, gimnastica ritmică şi artistică, handbalul, voleiul, baschetul, atletismul, schiul, fotbalul, tenisul de masă şi câmp, luptele libere, sumo.

Autorii celor două rubrici de mai sus sunt medici, profesori şi educatori din învăţământul universitar şi preuniversitar, antrenori, cercetători ştiinţifici etc.

Alte rubrici ale revistei sunt: editorialul, actualităţile editoriale, recenziile unor cărţi - ultimele publicate în domeniu, la care se adaugă şi altele prezentate mai rar (invenţii şi inovaţii, universitaria, preuniversitaria, forum, remember, calendar competiţional, portrete, evenimente ştiinţifice).

Subliniem rubrica "Memoria ochiului fotografic", unde se prezintă fotografii, unele foarte rare, ale sportivilor din trecut şi prezent.

De menţionat articolele semnate de autori din Republica Moldova privind organizarea învăţământului sportiv, variabilitatea ritmului cardiac, etapele adaptării la efort, articole ale unor autori din Franţa, Portugalia, Canada.

Scopul principal al revistei îl constituie valorificarea rezultatelor activităţilor de cercetare precum şi informarea permanentă şi actuală a specialiştilor din domeniile amintite. Revista îşi asumă şi un rol important în îndeplinirea punctajelor necesare cadrelor didactice din învăţământul universitar şi preuniversitar precum şi medicilor din reţeaua medicală (prin recunoaşterea revistei de către Colegiul Medicilor din România), în avansarea didactică şi profesională.

Un alt merit al revistei este publicarea obligatorie a cuprinsului şi a câte unui rezumat în limba engleză, pentru toate articolele. Frecvent sunt publicate articole în extenso într-o limbă de circulaţie internaţională (engleză, franceză).

Revista este publicată trimestrial iar lucrările sunt acceptate pentru publicare în limba română şi engleză. Articolele vor fi redactate în format WORD (nu se acceptă articole în format PDF). Expedierea se face prin e-mail sau pe dischetă (sau CD-ROM) şi listate, prin poştă pe adresa redacţiei. Lucrările colaboratorilor rezidenţi în străinătate şi ale autorilor români trebuie expediate pe adresa redacţiei:

Revista «Palestrica Mileniului III»
Redactor şef: Prof. dr. Traian Bocu
Adresa de contact: palestrica@gmail.com sau traian_bocu@yahoo.com
Adresa poştală: Str. Clinicilor nr.1 cod 400006, Cluj-Napoca, România
Telefon:0264-598575
Website: www.pm3.ro

Obiective

Ne propunem ca revista să continue a fi o formă de valorificare a rezultatelor activităţii de cercetare a colaboratorilor săi, în special prin stimularea participării acestora la competiţii de proiecte. Menţionăm că articolele publicate în cadrul revistei sunt luate în considerare în procesul de promovare în cariera universitară (acreditare obţinută în urma consultării Consiliului Naţional de Atestare a Titlurilor şi Diplomelor Universitare).

Ne propunem de asemenea să încurajăm publicarea de studii şi cercetări, care să cuprindă elemente originale relevante mai ales de către tineri. Toate articolele vor trebui să aducă un minimum de contribuţie personală (teoretică sau practică), care să fie evidenţiată în cadrul articolului.

În perspectivă ne propunem îndeplinirea criteriilor care să permită promovarea revistei la niveluri superioare cu recunoaştere internaţională.

STRUCTURA ŞI TRIMITEREA ARTICOLELOR

Manuscrisul trebuie pregătit în acord cu prevederile Comitetului Internaţional al Editurilor Revistelor Medicale (http://www.icmjee.org).

Numărul cuvintelor pentru formatul electronic:

– 4000 cuvinte pentru articolele originale,
– 2000 de cuvinte pentru studiile de caz,
– 5000–6000 cuvinte pentru articolele de sinteză.

Format pagină: redactarea va fi realizată în format A4. Paginile listate ale articolului vor fi numerotate succesiv de la 1 până la pagina finală.

Font: Times New Roman, mărime 11 pt.; redactarea se va face pe pagina întreagă, cu diacritice, la două rânduri, respectând margini egale de 2 cm pe toate laturile.

Ilustraţiile:

Figurile (grafice, fotografii etc.) vor fi numerotate consecutiv în text, cu cifre arabe. Vor fi editate cu programul EXCEL sau SPSS, şi vor fi trimise ca fişiere separate: „figura 1.tif", „figura 2. jpg", iar la solicitarea redacţiei şi în original. Fiecare grafic va avea o legendă care se trece **sub** figura respectivă.

Tabelele vor fi numerotate consecutiv în text, cu cifre romane, şi vor fi trimise ca fişiere separate, însoţite de o legendă ce se plasează **deasupra** tabelului.

PREGĂTIREA ARTICOLELOR

1. Pagina de titlu: – cuprinde titlul articolului (maxim 45 caractere), numele autorilor urmat de prenume, locul de muncă, adresa postală a instituţiei, adresa poştală şi adresa e-mail a primului autor. Va fi urmat de titlul articolului în limba engleză.

2. Rezumatul: Pentru articolele experimentale este necesar un rezumat structurat (Premize-Background, Obiective-Aims, Metode-Methods, Rezultate-Results, Concluzii-Conclusions), în limba română, de maxim 250 cuvinte (20 de rânduri, font Times New Roman, font size 11), urmat de 3–5 cuvinte cheie (dacă este posibil din lista de termeni consacraţi). Toate articolele vor avea un rezumat în limba engleză. Nu se vor folosi prescurtări, note de subsol sau referinţe.

Premize şi obiective: descrierea importanţei studiului şi precizarea premizelor şi obiectivelor cercetării.

Metodele: includ următoarele aspecte ale studiului:

Descrierea categoriei de bază a studiului: de orientare sau aplicativ.

Localizarea şi perioada de desfăşurare a studiului. Colaboratorii vor prezenta descrierea şi mărimea loturilor, sexul (genul), vârsta şi alte variabile socio-demografice.

Metodele şi instrumentele de investigaţie folosite.

Rezultatele vor prezenta datele statistice descriptive şi inferenţiale obţinute (cu precizarea testelor statistice folosite): diferenţele dintre măsurătoarea iniţială şi cea finală, pentru parametri investigaţi, semnificaţia coeficienţilor de corelaţie. Este obligatorie precizarea nivelului de semnificaţie (valoarea ***p*** sau mărimea efectului ***d***) şi a testului statistic folosit etc.

Concluziile care au directă legătură cu studiul prezentat.

Articolele de orientare şi studiile de caz vor avea un rezumat nestructurat (fără a respecta structura articolelor experimentale) în limita a 150 cuvinte (maxim 12 rânduri, font Times New Roman, font size 11).

3. Textul

Articolele experimentale vor cuprinde următoarele capitole: Introducere, Ipoteză, Materiale şi Metode (inclusiv informaţiile etice şi statistice), Rezultate, Discutarea rezultatelor, Concluzii (şi propuneri). Celelalte tipuri de articole, cum ar fi articolele de orientare, studiile de caz, editorialele, nu au un format impus.

Răspunderea pentru corectitudinea materialelor publicate revine în întregime autorilor.

4. Bibliografia

Bibliografia va cuprinde:

Pentru articole din reviste sau alte periodice se va menţiona: numele tuturor autorilor şi iniţialele prenumelui, anul apariţiei, titlul articolului în limba originală, titlul revistei în prescurtare internaţională (caractere italice), numărul volumului, paginile

Articole: Pop M, Albu VR, Vişan D et al. Probleme de pedagogie în sport. Educaţia Fizică şi Sportul 2000; 25(4):2-8.

Cărţi: Drăgan I (coord.). Medicina sportivă aplicată. Ed. Editis, Bucureşti 1994, 372-375.

Capitole din cărţi: Hăulică I, Bălţatu O. Fiziologia senescenţei. În: Hăulică I. (sub red.) Fiziologia umană. Ed. Medicală, Bucureşti 1996, 931-947.

Începând cu revista 4/2010, fiecare articol va trebui să se bazeze pe un minimum de 15 şi un maximum de 100 referinţe bibliografice, în majoritate articole nu mai vechi de 10 ani. Sunt admise un număr limitat de cărţi şi articole de referinţă (1-3), cu o vechime mai mare de 10 ani. Un procent de 20% din referinţele bibliografice citate trebuie să menţioneze literatură străină studiată, cu respectarea criteriului actualităţii acesteia (nu mai vechi de 10 ani).

Procesul de recenzare (peer-review)

Într-o primă etapă toate materialele sunt revizuite riguros de cel puţin doi referenţi competenţi în domeniu respectiv (profesori universitari doctori şi doctori docenţi) pentru ca textele să corespundă ca fond şi formă de prezentare cerinţelor unei reviste serioase. După această etapă materialele sunt expediate referenţilor revistei, în funcţie de profilul materialelor. În urma observaţiilor primite din partea referenţilor, redacţia comunică observaţiile autorilor în vederea corectării acestora şi încadrării în cerinţele de publicare impuse de revistă. Acest proces (de la primirea articolului până la transmiterea observaţiilor) durează aproximativ 4 săptămâni. Cu această ocazie se comunică autorului daca articolul a fost acceptat spre publicare sau nu. În situaţia acceptării, urmează perioada de corectare a articolului de către autor în vederea încadrării în criteriile de publicare.

Conflicte de interese

Se cere autorilor să menţioneze toate posibilele conflicte de interese incluzând relaţiile financiare şi de alte tipuri. Dacă sunteţi siguri că nu există nici un conflict de interese vă rugăm să menţionaţi acest lucru. Sursele de finanţare ar trebui să

fie menţionate în lucrarea dumneavoastră.

Precizări

Precizările trebuie făcute doar în legătură cu persoanele din afara studiului, care au avut o contribuţie substanţială la studiul respectiv, cum ar fi anumite prelucrări statistice sau revizuirea textului în limba engleză. Autorii au responsabilitatea de a obţine permisiunea scrisă din partea persoanelor menţionate cu numele în cadrul acestui capitol, în caz că cititorii se referă la interpretarea rezultatelor şi concluziilor acestor persoane. De asemenea, la acest capitol se vor face precizări în cazul în care articolul valorifică rezultate parţiale din anumite proiecte sau dacă acesta se bazează pe teze de masterat sau doctorat susţinute de autor, alte precizări.

Criterii deontologice

Redacţia va răspunde în timp util autorilor privind acceptarea, neacceptarea sau necesitatea modificării textului şi îşi rezervă dreptul de a opera modificări care vizează forma lucrărilor.

Nu se acceptă lucrări care au mai fost tipărite sau trimise spre publicare la alte reviste. Autorii vor trimite redacţiei odată cu articolul propus spre publicare, într-un fişier word separat, o declaraţie scrisă în acest sens, cu angajamentul respectării normelor deontologice referitoare la citarea surselor pentru materialele folosite (referinţe bibliografice, figuri, tabele, chestionare).

Pentru articolele originale, în conformitate cu îndeplinirea condiţiilor Declaraţiei de la Helsinki, a Protocolului de la Amsterdam, a Directivei 86/609/EEC şi a reglementărilor Comisiilor de Bioetică din locaţiile unde s-au efectuat studiile, autorii trebuie să prezinte:

- acordul informat din partea familiei, pentru studiile pe copii şi juniori;
- acordul informat din partea subiecţilor adulţi, pacienţi şi sportivi, pentru participare;
- adeverinţă de Malpraxis pentru medici, pentru cercetările/studiile pe subiecţi umani;
- adeverinţă din partea Comisiilor de Etică, pentru protocolul de studiu pe subiecţi umani;
- adeverinţă din partea Comisiilor de Bioetică, pentru protocolul de studiu pe animale.

Datele vor fi menţionate în articol la secţiunea Material şi metodă. Documentele vot fi obţinute înainte de începerea studiului. Se va menţiona şi numărul de înregistrare al adeverinţei din partea Comisiilor de Etică.

Materialele trimise la redacţie nu se restituie autorilor, indiferent dacă sunt publicate sau nu.

ÎN ATENŢIA SPONSORILOR

Solicitările pentru spaţiile de reclamă, vor fi adresate redacţiei revistei "Palestrica Mileniului III", Str. Clinicilor nr. 1, cod 400006 Cluj-Napoca, România. Preţul unei pagini de reclamă full color A4 pentru anul 2012 va fi de 250 EURO pentru o apariţie şi 800 EURO pentru 4 apariţii. Costurile publicării unui Logo pe coperţile revistei, vor fi stabilite în funcţie de spaţiul ocupat. Plata se va face în contul Societăţii Medicale Române de Educaţie Fizică şi Sport, CIF 26198743. Banca Transilvania, sucursala Cluj Cod IBAN: RO32 BTRL 0130 1205 S623 12XX (LEI).

ÎN ATENŢIA ABONAŢILOR

Revista "Palestrica Mileniului III" este tipărită trimestrial, preţul unui abonament fiind pentru străinătate de 100 Euro pentru instituţii, şi 50 Euro individual. Pentru intern, preţul unui abonament instituţional este de 120 lei, al unui abonament individual de 100 lei. Menţionăm că taxele de difuzare poştală sunt incluse în costuri.

Plata abonamentelor se va face prin mandat poştal în contul Societăţii Medicale Române de Educaţie Fizică şi Sport, CIF 26198743. Banca Transilvania, sucursala Cluj Cod IBAN: RO32 BTRL 0130 1205 S623 12XX (LEI); RO07 BTRL 01304205 S623 12XX (EURO); RO56 BTRL 01302205 S623 12XX (USD). SWIFT: BTRLRO 22

Precizăm că începând cu anul 2010 a fost introdusă taxa de articol. Ca urmare, toţi autorii semnatari ai unui articol vor achita împreună suma de 150 Lei, în contul Societăţii Medicale Române de Educaţie Fizică şi Sport publicat mai sus.

Autorii care au abonament vor fi scutiţi de această taxă de articol.

Alte informaţii se pot obţine online de pe www.pm3.ro „Pentru autori" sau pe adresa de mail a redacţiei palestrica@gmail.com sau pe adresa poştală: Str. Clinicilor nr.1 cod 400006, Cluj-Napoca, România, Telefon:0264-598575.

INDEXAREA

Titlul revistei: Palestrica Mileniului III – Civilizaţie şi sport

pISSN: 1582-1943; eISSN: 2247-7322; ISSN-L: 1582-1943

Profil: revistă de studii şi cercetări interdisciplinare

Editor: Universitatea de Medicină şi Farmacie „Iuliu Haţieganu" din Cluj-Napoca şi Societatea Medicală Română de Educaţie Fizică şi Sport, în colaborare cu Inspectoratul Şcolar al Judeţului Cluj

Nivelul de atestare al revistei: revistă acreditată în categoria B+ de CNCS în perioadele 2007-2011 şi atestată CMR din anul 2003 şi în prezent

Revistă indexată în Bazele de Date Internaţionale (BDI): EBSCO, Academic Search Complete, USA şi Index Copernicus, Journals Master List, Polonia, DOAJ (Directory of Open Access Journals), Sweden

Anul primei apariţii: 2000

Periodicitate: trimestrială

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