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EDITORIAL

From *Palestrica of the third millennium - Civilization and Sport,* to *Health, Sports & Rehabilitation Medicine*

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Dear Readers,

We have the pleasure to inform you that the *"Palestrica of the Third Millennium - Civilization and Sport" Journal*, founded in 2000 as a journal of medicine applied to sport, civilization, health and medical rehabilitation, will change its name to *"Health, Sports & Rehabilitation Medicine"*, starting with issue 1/1919.

The name was changed at the suggestion of prestigious international databases in which the journal is indexed, considering that the term Palestrica, derived from palestrae – cultural, scientif c and sports amphitheaters in ancient Greece, is relatively little known. The new name is aimed at adapting the prof le of the journal to scientif c contemporaneity in the f eld of medical and pharmaceutical sciences and interdisciplinary integration with health, physical activity and biopsychosocial rehabilitation.

The change of the title will allow an increased visibility of the journal, with a view to its inclusion in the ISI Thomson Reuters database.

The journal will have the same contents: editorials, original articles, review articles, case reports, recent publications, events.

The journal is open for publication to all members of the national and international scientif c community and of ers the possibility to promote young people involved in research, along with top researchers in the above mentioned f elds.

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ORIGINAL STUDIES

Rehabilitation in elderly females with osteoporosis

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Abstract

Background. Osteoporosis, the most common type of metabolic bone disease, is a public health problem worldwide, af ecting more than 200 million people. It is estimated that 30 to 50% of postmenopausal women suf er from it. Prevention and treatment of osteoporosis involves more than simply taking medication. Physical training (weight-bearing, f exibility and balance exercises) and adequate intake of calcium and vitamin D are essential to bone health and vital to avoiding falls and fractures.

Aims. We evaluated in our study the ef cacy of a complex rehabilitation program, based on 12 weeks aerobic training, for reducing symptoms and improving the quality of life in elderly females with osteoporosis.

Methods. The study was a randomized controlled trial including two groups of patients (E - study group and C - control group), homogeneous in terms of biographical, clinical and functional features. All patients underwent complete assessment - clinical, imaging and functional.

Results. Clinical and functional parameters had a signif cant modif cation (VAS, Up and Go test, and MiniOQLQ - Physical function) in females who performed the rehabilitation program.

Conclusions. The rehabilitation program, based on kinetic measures, mainly aimed at maximizing functional ability and quality of life in females with osteoporosis. Our study is an initiation for the development of an evidence-based practice in the correct rehabilitation of females with osteoporosis.

Key words: osteoporosis, physical training, rehabilitation program

Introduction

The International Osteoporosis Foundation (IOF) def ned osteoporosis as a disease characterized by a decrease in the density and quality of bones. This disorder is a public health problem worldwide, af ecting more than 200 million people and is characterized by an increased risk of fragility fractures (Barrios-Moyano & De la Peña-García, 2018). According to the statistics released by the World Health Organization (WHO), it is estimated that 30 to 50% of postmenopausal women suf er from osteoporosis. It mostly af ects women after the age of 50, the women/men ratio being 3:1, 4:1. Because the tendency of aging in the population was noticed in relation to the increase of life expectancy (the number of persons over 60 years old will reach 1 billion in 2020) (Kamide et al., 2009), the number of osteoporosis people is estimated to increase.

The most common generalized bone disease in humans, osteoporosis, is characterized by low bone mass, deterioration of bone tissue and disruption of bone microarchitecture, compromised bone strength and an increase in the risk of fracture (Kerr et al., 2009). Primary or idiopathic osteoporosis accounts for more than 75% of all osteoporosis cases and represents involution osteoporosis (Kamide et al., 2009). The bone loss rate depends on the type of bone: trabecular or cortical. The loss of cortical bone starts after the age of 40 and is linear, registering an annual loss of 0.5-1% in both genders. The reduction of trabecular bone starts between 30-35 years and is linear in men and women before menopause (1-4% per year). After menopause, an acceleration of bone loss occurs, reaching up to 10% per year (Kamide et al., 2009). Despite the fact that fragility fractures cause many problems, bone fractures are a signif cant social and economic health problem and are associated with signif cant morbidity and mortality (Figliomeni et al., 2018), osteoporosis is still underdiagnosed and undertreated (Kerschan-Schindl, 2016). The clinical diagnosis combines evidence of fragility fractures with measurement of bone mineral density (BMD) that is correlated with bone strength, skeletal load-bearing capacity, and fracture risk. BMD can be measured in dif erent projections and locations. Dual-energy X-ray absorptiometry (DXA) is the method that is most often used to measure BMD (Bergh et al., 2018). The widely used WHO def nitions compare patient BMD to norms expressed as a gender and ethnic group-matched T-score, the number of standard deviations from the mean BMD. Osteoporosis is def ned as a T-score at any site of

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-2.5 or lower, while osteopenia is def ned as a T-score between -1 and -2.5 (Ram Hong & Wan Kim, 2018).

Another frequently used method for indirect evaluation of bone quality is the WHO fracture risk assessment tool (FRAX), which focuses on the prediction of future fracture risk (Bergh et al., 2018). The FRAX questionnaire is created for predicting the risk of fractures, such as clinical spine, wrist, proximal humerus, and hip fractures, during the coming 10 years (Kanis, 2002).

Peak bone mass is determined largely by genetic factors, with contributions from nutrition, endocrine status, physical activity and health during growth (Khosla & Riggs, 2018). The induction of osteoporosis is due to a number of factors, the most important being age and sex (especially after menopause). Several other factors may interfere either as helping factors as it happens in primitive osteoporosis, or as prevailing factors like in secondary osteoporosis. Lack of exercise or inadequate physical activity (sedentary life, prolonged immobilizations) is mentioned as one of the many factors that reduce bone resistance (Kamide et al., 2009).

Osteoporosis is a potentially debilitating disease in which bones that were once strong become thin, fragile and prone to breaking. So, the risk of fractures is increased, causing various degrees of disability, pain, immobility, and reducing quality of life (Rizzoli, 2018). If some bone loss is inevitable, osteoporosis and further bone loss can be prevented, controlled, slowed and managed. All medication in association with regular physical exercises (weight-bearing exercises, posture, f exibility and balance support exercises) is the cornerstone of fracture prevention. Physical exercise may be an ef cient option for autonomous fracture prevention during increasing age (Kemmler et al., 2015).

Appropriate rehabilitation programs are essential for all patients with osteoporosis and can be based on home environment and activities of daily living to obtain and maintain patient's independence and to reduce the personal and socioeconomic impact of the disease (Bonner et al., 2003).

Hypothesis

Taking into consideration the previous recommendations for osteoporosis management, we evaluated in our study the ef cacy of a complex rehabilitation program, based on 12 weeks of aerobic training, for reducing symptoms and improving the quality of life in female patients with primary osteoporosis.

Material and methods

We mention that we obtained the approval of the Ethics Committee of the University of Medicine and Pharmacy of Craiova No. 131/16.05.2017 and a signed informed consent from all the subjects participating in the study. Our research was performed on 38 randomized female patients, median age 70.5 years, range 62–77 years (C - control group, 17 females; E - study group, 21 females), all diagnosed with primary osteoporosis without severe osteoporosis or a recent history of fragility fracture.

Research protocol

a) Period and place of the research

We conducted our study during the period June 2017 - November 2018 in the Rehabilitation Department of the "Filantropia" Hospital Craiova.

b) Subjects and groups.

The study was a randomized controlled trial including two groups of patients (E - study group and C - control group), homogeneous in terms of biographical, clinical and functional features (Table I).

All patients underwent complete assessment – clinical, imaging and functional.

Clinical evaluation of the studied patients was carefully performed. Diagnosis was established clinically based on patient's history and physical examination, and was supported by imaging assessment (X-ray examination of the vertebral dorsal spine, lumbar vertebral dual-energy X-ray absorptiometry – DXA).

c) Tests applied

Functional assessment was performed with the following scales and tests:

- VAS (Visual Analog Scale) for pain is a one-dimensional measure of pain intensity, which has been widely used in clinical trials; it is a continuous scale formed by a horizontal or vertical line, usually 10 centimeters (100 mm) in length, anchored by 2 verbal descriptors, one for each symptom extreme. Using a ruler, the score is determined by measuring the distance (mm) on the 10-cm line between the "no pain" anchor and the patient's mark, providing a range of scores from 0–100. A higher score indicates greater pain intensity (Jensen et al., 2003).

- Timed Up and Go test - it was used to determine how quickly (seconds) some daily activities can be performed at a comfortable speed: rise from a chair; walk as quickly as possible at a comfortable and safe pace to a line on the f oor three meters; turn round; walk back to the chair and sit down. In the starting position the patient is sitting in a chair (seat height approximately 45 centimeters) with his feet resting on the f oor. The arms of the patient rest on the arms of the chair. If necessary the patient may use a walking aid. The patient has to be able to walk without the help of others. Two test trials were performed with a 1-min interval between trials and we used the shortest time in the study. The normative reference values are 8.1 seconds for 60–69 years, 9.2 seconds for 70–79 years and 11.3 seconds for 80–89 years. All these aspects are mentioned in the medical literature (Bohannon, 2006).

- 6 MWD (six minute walking distance). This test assesses the walking capacity during a 6-minute period; the patient is instructed to walk back and forth along a 20-m corridor and to cover the maximum distance possible in 6 minutes, taking rests as needed. The maximum distance covered is recorded. Examiners provide standardized encouragement every 30 seconds, by telling individuals "you're doing well, keep up the good work." Two trials should be performed at baseline, approximately 20 minutes apart. During the rest interval, participants can sit down. If an assistive device is used, the type of device is recorded.

This test is used in clinical trials because it provides useful information of functional capacity in patients with various disorders (Casanova et al., 2011).

- MiniOQLQ (Mini-Osteoporosis Quality of Life Questionnaire) - we used this scale as a single assessment of independence and to review the progress of a patient

over time; it contains 10 items and measures f ve important domains: symptoms, physical function, activities of daily living, emotional function, leisure activities. The mini-OQLQ includes the two items with the highest impact scores in each of the f ve domains from the original OQLQ instrument. Each item is associated with a 7-point scale in which a rating of 7 represents the best possible function and a rating of 1 represents the worst possible function (Madureira et al., 2012).

After complete evaluation, all females were trained for 12 weeks (inpatient – 2 weeks and outpatient – 10 weeks). We applied a *complex rehabilitation program* that covered the following compartments: hygienic-dietetic and educational (for risk factors – avoidance of tobacco use and excessive alcohol intake, adequate intake of milk derived food and healthy diet), medication (calcium, vitamin D and bisphosphonate medications), electric measure (only one procedure of electrotherapy – TENS for pain management), kinetic, massage adapted for each patient at all times.

We designed a *kinetic program*, def ning the following:

- assistance rehabilitation constituent;
- optimal exercises in the kinetic program applied in relation to the prevention of bone loss and the global clinical-functional status;
- optimal number of rehabilitation meetings and also the rhythm for as much as complete recovery of the patient.

The *objectives of the kinetic program* applied to our patients were:

- body posture correction and postural control;
- muscle strengthening and preservation of skeletal muscles;
- improvement of functional abilities (especially gait) and decrease in the risk of falling;
- improvement of quality of life.

Patients were trained 3 days a week, for 12 weeks. Every day, each patient attended two kinetic sessions (*a.m.* - strength and physical conditioning training programs and *p.m.* - coordination and balance exercises). Both trainings were performed as individual treatment in an outpatient setting with the same duration and frequency, as follows: 36 treatment sessions of 60 minutes each, 3 days a week, for 12 consecutive weeks. On the other days of the week, all studied females performed regular brisk walking for 20 minutes and stair climbing – 2 or 3 f oors, daily.

A.m. exercises. In the f rst week, all patients performed a.m. lower limb and upper limb joint mobilization, 2 sets of 10 repetitions, then conventional resistance exercises 2 sets of 12 repetitions at 50% of the one-repetition maximum (1 RM) (for plantar-/dorsi-f exion, knee extension and f exion, hip abduction, trunk extension, in this order). A rest interval of three minutes was allowed between exercises and sets. After two weeks, patients performed the same exercises, but 3 sets of 10 repetitions, for joint mobilization and 2 sets of 12 repetitions at 60% of 1RM, and in the last 2 months patients performed resistance exercises at 75% of 1 RM. There was a linear progression of exercise intensity, and 1 RM was determined very cautiously to avoid vertebral fractures in our studied patients. We used exercises based on isotonic resistance and progressive resistance training (belt exercises, dumbbells and weighted vest). Before and after the strength training session, each patient performed stretching exercises for all main muscle groups. The heart rate was monitored.

P.m. exercises. The coordination exercises applied p.m. were represented by the following sequences of exercises:

1. exercises for axial mobility (head extension, shoulder f exion, trunk extension, in this order) associated with muscle relaxation and diaphragmatic breathing to increase the range of motion of the neck and trunk. The exercises for active mobilization were represented by Kabat diagonals (f exion and extension f rst diagonals, f exion and extension second diagonals for each side and both sides); each patient performed 10 exercises without resistance; breathing was synchronized with the Kabat diagonal. In the sitting position, the patient performed exercises for the scapulohumeral joint and the elbow joint, for the trunk and upper limbs, and f nally, for the trunk and lower limbs.

2. exercises to improve balance and coordination – heel raises and toe pulls, compensatory strategies such as hip strategy and step strategy, including corrective and tandem walks and obstacle course;

3. gait training, using appropriate assistive devices for ambulation and walking on dif erent surfaces for all studied patients.

In the kinetic hall, soft music was played for relaxation.

d) Statistical processing.

Statistical analysis was performed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA), together with the XLSTAT add-on for MS Excel (Addinsoft SARL, Paris, France) and IBM SPSS Statistics 20.0 (IBM Corporation, Armonk, NY, USA) for data processing. To describe the numerical data used in the present study, we used the following statistical indicators: arithmetic mean and standard deviation, and spread indicators - minimum, maximum, median, quartiles (percentiles).

Because the study involved a numerical comparison between 2 groups of patients that did not have a normal (Gaussian) distribution, verif ed with the Anderson-Darling normality, the nonparametric Mann-Whitney test was primarily used, alongside Student's t test, to detect signif cant dif erences between the values in the compared data series.

Results

The two groups (C - control and E - study) were compatible in terms of structure. The percentage dif erences were not statistically signif cant when comparing the distribution for residence **(**$p\ \chi^2 = 0.148$**)** (Table I).

Table I

Patients' demographic data

Group	Urban	Rural	Age (years)	
C Control group 17 females	10 (58.82%)	7 (41.17%)	Minimum	62
			1st quartile	66
			Median	70
			3rd quartile	74
			Maximum	77
E Study group 21 females	13 (61.90%)	8 (38.09%)	Minimum	62
			1st quartile	67
			Median	70
			3rd quartile	73
			Maximum	77

Comparing the age distributions for the two patient groups with the Mann-Whitney test did not result in statistically signif cant dif erences (pMW=0.953).

The mean values and standard deviations of the studied paramaters for the two studied groups at the initial and f nal assessment are presented in Table II.

For each parameter, the Mann-Whitney and Student t test for means were used in order to compare initial and f nal p values for the study and the control group.

VAS

Performing the Mann-Whitney and Student t test for means, to compare initial and f nal VAS for the study and the control group, we found no statistically signif cant dif erence between the two groups, for the initial evaluation, the result being $p = 0.43 > 0.5$; for the f nal evaluation we found a statistically signif cant dif erence between the two groups, the result being $p = 0.015 < 0.5$. When performing the Student t test for means, to compare VAS dif erences for the study and control groups, we found a statistically signif cant dif erence between the two groups, the result being $p = 0.011 < 0.5$, meaning the decrease was greater for the study group.

The Timed Up and Go test

Performing the Mann-Whitney and Student t test for means, to compare initial and f nal TUG for the study group and the control group, we found no statistically signif cant dif erence between the two groups, for the initial evaluation, the result being $p = 0.287 > 0.5$; for the f nal evaluation we found a statistically signif cant dif erence between the two groups, $p = 0.010 < 0.5$. When performing the Student t test for means, to compare TUG dif erences for the study and control patients, we found a statistically signif cant dif erence between the two groups, the result being $p = 0.048 < 0.5$, meaning the decrease was greater for the study group.

The 6 MWD

Performing the Mann-Whitney and Student t test for means, to compare initial and f nal 6MWD for the study group and the control group, we found no statistically signif cant dif erence between the two groups for the initial evaluation, the result being $p = 0.775 > 0.5$, or for the f nal evaluation, $p = 0.302 > 0.5$. When performing the Student t test for means, to compare miniOQLQ dif erences for the study and control patients, we found no statistically signif cant dif erence between the two groups, the result being $p = 0.256 > 0.5$.

MiniOQLQ

Performing the Mann-Whitney and Student t test for means, to compare initial and f nal TUG for the study group and the control group, we found no statistically signif cant dif erence between the two groups, for the initial evaluation, the result being $p = 0.340 > 0.5$; for the f nal evaluation we found a statistically signif cant dif erence between the two groups, $p = 0.048 < 0.5$. When performing the Student t test for means, to compare miniOQLQ dif erences for the study and control patients, we found a statistically signif cant dif erence between the two groups, the result being $p = 0.007 < 0.5$, meaning the decrease was greater for the study group.

Discussions

Rehabilitation of our patients was performed by a multidisciplinary team, as it is mentioned in the medical literature (Kerschan-Schindl, 2016) and included adequate pain management, daily mobilization, specif c training of muscles and coordination, instruction on how to avoid falls, nutrition and lifestyle modif cations, and psychosocial assessment.

We recommended as part of patient rehabilitation the TENS procedure for control of low back pain, because ef ective pain management is a cornerstone for subsequent physical training. Pain relief can be obtained by the use of a variety of physical methods, like in our study, pharmacological and behavioral techniques (Gillespie et al., 2010).

Our studied patients were diagnosed with primary osteoporosis before we started our work, so we had the value of lumbar BMD previously established in the endocrinology department. So, we did not perform the FRAX scores, as we usually did in postmenopausal women. FRAX scores were signif cantly higher in patients with fragility fractures and can be useful in choosing the right patients for bone density testing, thus using an expensive test judiciously (Bansal et al., 2018). Seeing that the FRAX tool showed low sensitivity and specif city in identifying reduced bone quality in the lumbar spine (Bergh et al., 2018), we understood why it is important to evaluate lumbar BMD in order to optimize treatment strategies. The value of lumbar spine BMD was not reevaluated because the length of our study was 3 months

Table II

The studied parameter values

Studied parameter	Study (E) Group		p	Control (C) Group		p
	Initial (M ± SD)	Final (M ± SD)		Initial (M ± SD)	Final (M ± SD)	
VAS	8.19 ± 0.60	4.19 ± 0.60	<0.001	8.00 ± 0.87	4.24 ± 0.44	<0.001
TUG (seconds)	12.67 ± 1.49	8.95 ± 1.20	<0.001	13.18 ± 1.38	9.59 ± 1.12	<0.001
6MWD (meters)	393.57 ± 18.92	430.51 ± 20.11	<0.001	395.84 ± 17.54	427.62 ± 20..95	<0.001
miniOQLQ	3.28 ± 0.44	4.49 ± 0.15	<0.001	3.42 ± 0.43	4.40 ± 0.13	<0.001
S	0.99 ± 0.18	1.21 ± 0.06	<0.001	1.05 ± 0.17	1.23 ± 0.07	<0.001
PF	0.43 ± 0.10	0.63 ± 0.05	<0.001	0.41 ± 0.14	0.65 ± 0.06	<0.001
EF	0.86 ± 0.28	1.19 ± 0.03	<0.001	0.99 ± 0.15	1.19 ± 0.02	<0.001
ADL	0.47 ± 0.07	0.76 ± 0.14	<0.001	0.44 ± 0.05	0.71 ± 0.13	<0.001
L	0.53 ± 0.06	0.64 ± 0.07	<0.001	0.52 ± 0.04	0.62 ± 0.04	<0.001

VAS = Visual Analog Scale, for pain; TUG = Timed Up and Go test; 6MWD = 6-minute walking distance; MiniOQLQ = Mini-Osteoporosis Quality of Life Questionnaire; S = symptom items, PF = physical function items, ADL = activities of daily living items, EF = emotional function items, L = leisure activity items

and previous medical data, a meta-analysis of randomized controlled trials, reported that physical training based on resistance exercises three times a week for 1 year proved to maintain or increase BMD in postmenopausal women (Ram Hong & Wan Kim, 2018; Gomez-Cabello et al., 2012). In the last f ve years, the lumbar spine trabecular bone score has been mentioned – a novel texture parameter for the assessment of trabecular bone microarchitecture based on spinal DXA images through the measurement of pixel gray-level variations (Silva et al., 2014). This novel parameter permits to study the impact of physical training on the trabecular bone compartment, such as volumetric BMD. It is recognized that DXA does not capture the bone quality (Ram Hong & Wan Kim, 2018).

The length of our study will not allow determining the physical training ef ect in preventing some loss of BMD, particularly in the lumbar spine. The benef ts of aerobics, weight-bearing, and resistance exercises have been explored extensively over the past two decades and are generally less than 2% (Hamilton et al., 2010).

We performed in our patient conventional radiographs of dorsal and lumbar spine segments, for the dif erential diagnosis of low back pain. This imaging detail is used in clinical trials and represents a useful means for the assessment of bone-specif c treatment ef ects in postmenopausal women with osteoporosis (Dimai et al., 2018).

The evolution of the studied parameters is in accordance with other studies, but the changes were statistically signif cant only for VAS and TUG tests, which suggested the ef ciency of the rehabilitation program for the functional status of gait and balance (Behrens et al., 2017).

The miniOQLQ improved in both groups, but the physical function item signif cantly improved in females that performed the kinetic program. This result conf rms the complex impact of kinetic measures in osteoporosis management. A Cochrane review evaluating the benef ts of physical therapy interventions for improving quality of life in patients with osteoporotic vertebral fractures found inconsistent results and stated that the quality of evidence was very low (Dohrn et al., 2017).

Musculoskeletal system health represents an important aspect for people with chronic diseases worldwide, especially in elderly persons and particularly in females with osteoporosis (Ram Hong & Wan Kim, 2018). The two components of the musculoskeletal system – bone and muscle – are strongly interconnected by anatomic, metabolic and chemical aspects, so correct osteoporosis diagnosis is made in accordance with sarcopenia (Curtis et al., 2015). Age-related loss of bone and muscle mass occurs almost simultaneously, and the loss of muscle mass is predominantly detected in type II f bers (the entire bone-muscle unit is reduced to 50% in elderly adults as compared with young adults) (Ji et al., 2015). These chronic diseases – osteoporosis and sarcopenia – are widely considered public health problems and are associated with physical disability because the quality and f ne structures of the bones are deteriorated. Exercise training has been indicated as an optimal strategy for conservation of musculoskeletal health and function in all persons, because it is a low-cost and safe non-pharmacological measure (Ram Hong & Wan Kim, 2018; Beck et al., 2017).

In the last decades, a lot of clinical trials have been conducted regarding the importance of physical training and exercises in the management of osteoporosis patients. When establishing the kinetic program in our studied patients, we took into consideration the following aspects:

1. Mechanical load induced by exercise training increases the muscle mass, produces mechanical stress in the skeleton and enhances osteoblast activity, with dif erent osteogenic ef ects (Fleg, 2012; Palombaro et al., 2013) and may be an ef cient option for autonomous fracture prevention during increasing age (Kemmler et al., 2015).

2. Regular walking has little or no ef ect on prevention of bone loss; despite the benef ts of regular walking on aerobic f tness, adiposity and cardiometabolic factors, walking alone is insuf cient to optimize musculoskeletal health (Ma et al., 2013). We took walking as a means for reducing and breaking up the sitting time; this aspect may also help attenuate muscle loss.

3. The resistance exercises performed target the major muscle groups attached to the hip and spine; the intensity and type of resistance exercises should be individualized depending on the functional status and ability of patients (Stewart et al., 2014). Traditional progressive resistance training is ef ective for improving muscle mass, size and strength, but it has mixed ef ects on muscle function and falls, which may be due to the common prescription of slow and controlled movement patterns (Daly, 2017). In our study we recommended an exercise session based on two sets of one exercise for each major muscle group of the lower limbs and extensor spine at a target intensity of 12 repetition maximum (RM), 3 days a week, as it was indicated in other studies and in the WHO global recommendation for older patients aged over 65 years (***, 2010). We respected the current exercise guidelines for osteoporosis (moderate-intensity exercises - 70% to 80% one RM, eight to 15 repetitions; our patients performed 75% one RM, 12 repetitions), albeit this type of exercise is insuf cient to generate mechanical strain to promote an osteogenic response, but it is safe, without increasing the risk of injury or pain (Giangregorio et al., 2014). We paid great attention to the spine muscles, because the back extensor strength was the most signif cant contributor to spinal mobility, which had a strong ef ect on quality of life in patients with osteoporosis. Twelve years ago, it was demonstrated that low-intensity back-strengthening exercise was ef ective in improving the quality of life and back extensor strength in patients with osteoporosis (Hongo et al., 2007). Over and above, stronger back extensor muscles have been shown to decrease the risk of vertebral fractures independently of pharmacotherapy (Hourigan et al., 2008). Therefore, we included in the physical program this type of exercise - strengthening exercises for back extensors – with good results for our patients.

4. Multidirectional training is essential in physical training in osteoporosis patients because bone adapts to unidirectional movement, so diversif cation of loading is required. So, we combined aerobic physical training with brisk walking, to provide our patients with an optimal musculoskeletal status and to prevent fractures (Ram Hong

& Wan Kim, 2018). Balance and coordination exercises are fundamental for the reduction of fall and fracture risk in older patients with or without chronic disorders. Today, targeted multimodal programs incorporating traditional and high-velocity resistance exercises, weight-bearing impact exercises and challenging balance/mobility activities appear to be most ef ective for optimizing musculoskeletal health and function (Daly, 2017). In post-menopausal women with osteopenia and osteoporosis, neuromuscular power is a more important determinant of postural control than muscle strength or size, so the integration of power or speed training into fall prevention and balance training programs in post-menopausal women with low bone mass is promoted (Stolzenberg et al., 2018). Since most osteoporotic fractures occur during a fall, fall risk reduction is an important measure to inhibit a new fracture. This important objective in the management of osteoporotic patients is mentioned in the guidelines for the diagnosis and management of osteoporosis in 2013 (Kanis et al., 2018).

The complex rehabilitation program performed is substantiated not only by physical training but also by educational aspects, nutrition and medication prescribed. An interaction was evidenced between exercise and various nutritional factors, particularly protein and some multinutrient supplements, on muscle and bone health in the elderly (Daly, 2017).

In our study, the number of patients who had exercise adherence in osteoporosis management was greater compared to those without compliance to physical training. In most clinical trials it is mentioned that adherence to exercise is poor and the main facilitator and barrier to exercise is still unclear; also, methods to promote and measure exercise adherence were unsatisfactory (Rodrigues et al., 2017). Maybe the future can change this negative aspect for quality of life in osteoporosis females. The mean values of subscales in MiniOQLQ proved that a complex rehabilitation program, based on physical training – a multipurpose exercise program, improved self-care maintenance behaviors and quality of life in osteoporosis females. Our results were similar to those of other studies (Basilici Zannetti et al., 2017; Kemmler et al., 2015; Wen et al., 2017).

We recommended a home training program and several interventions for all studied patients to preserve bone strength, improve physical function and lower the risk of subsequent falls, as mentioned in the medical literature (Larsen et al., 2004). These include: prescription for assistive devices for improved balance with mobility, training for the performance of safe movement and safe activities of daily living, including posture, transfers, lifting and ambulation, an adequate intake of calcium and vitamin D, lifelong participation in regular weight-bearing and muscle-strengthening exercise, cessation of tobacco use, identif cation and treatment of alcoholism, and treatment of risk factors for falling.

Conclusions

1. The anatomic, biomechanical and functional connections between bone and muscle have a complex implementation in the pathology aspect - osteoporosis and sarcopenia often coexist and have similar health consequences with regard to disability, falls, frailty and fractures.

2. All management programs in osteoporosis females should include exercise and adequate nutrition, particularly with regard to vitamin D, calcium and protein, individually tailored and using the adequate type and dose of the prescribed forms.

3. Regular physical activities are well known for their many benef ts, both in the short and long term. A multimodal kinetic program is an important component of the rehabilitation program; proper exercises improve physical performance/function, bone mass, muscle strength and balance, and they reduce the risk of falling.

4. A signif cant and complex impact of osteoporosis is counteracted by physical and kinetic measures that can reduce disability, improve physical function, self-care, and lower the risk of subsequent falls in patients with osteoporosis.

Conf icts of interest

No conf icts of interests.

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Eleutherococcus, Schisandra, Rhodiola and Ginseng, for stress and fatigue - a review

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Abstract

Introduction. Eleutherococcus senticosus (ES), Schisandra chinensis (SC), Rhodiola rosea (RR) and Panax ginseng GSG are well known for their adaptive role.

Objectives. The objective was to highlight the interest for the research of ES, SC, RR and GSG adaptogens in relation to stress, mental stress, oxidative stress, fatigue, mental fatigue.

Results. Of the four adaptogens, the greatest interest in research was for GSG and the lowest for ES. For each adaptogen, relative to N, the interest in research related to keyword combinations was reduced. For all four adaptogens, keyword combinations were most studied for S. For all keyword combinations, the greatest interest in research was shown for RR and GSG respectively. For all keyword combinations, the greatest interest in research was for studies: a) on animals, in the case of S, OS and GSG+MS; on human subjects, for MS (except GSG+MS), F and MF; b) with subjects of both genders; c) with subjects aged between 19-44 years, excepting GSG+S, GSG+OS and GSG+F.

Instead of conclusions. ES, SC, RR and GSG are described as adaptogens, having important ef ects in stress modulation and in reducing oxidative stress and fatigue, including mental fatigue.

Key words: Eleutherococcus senticosus, Schisandra chinensis, Rhodiola Rosea, Ginseng, adaptogens, stress, oxidative stress, fatigue

Introduction

The adaptogen concept is examined from a historical, biological, chemical, pharmacological and medical perspective using a wide variety of primary and secondary literature (Davydov & Krikorian, 2000). The term adaptogen was introduced into scientif c literature in 1958 to denote substances that increase the "state of non-specif c resistance" during stress, based on Hans Selye's theory of stress and the general adaptation syndrome (Panossian, 2013). An adaptogen increases body resistance to physically, chemically or biologically noxious factors, thereby having a normalizing ef ect on body functions and inf icting no harm (Levin, 2015). The plants with adaptogenic properties cited in the literature include Eleutherococcus senticosus, Schisandra chinensis, Rhodiola rosea and Panax ginseng (Panossian, 2017).

The root of Acanthopanax senticosus (also called Eleutherococcus senticosus or Siberian ginseng) has been used extensively in China, Russia and Japan as an adaptogen to f ght stress and fatigue (Huang et al., 2011).

Schisandra chinensis is often referred to as an example of medicinal plant used in modern Chinese medicine; it f rst gained recognition as an adaptogen in the of cial medicine of the USSR in the early 1960s, principally as a result of the large number of pharmacological and clinical studies carried out by Russian scientists in the preceding two decades; it increases the physical working capacity and confers a stress-protective ef ect against a broad spectrum of harmful factors (Panossian & Wikman, 2008).

Rhodiola is a genus of medicinal plants that originated in Asia and Europe and are used traditionally as adaptogens, antidepressants, and anti-inf ammatory remedies; these

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plants are rich in polyphenols, and salidroside and tyrosol are the primary bioactive marker compounds in the standardized extracts of Rhodiola rosea (Chiang et al., 2015).

Panax ginseng (also known as ginseng and Korean ginseng) is one of the best known and most studied adaptogens; it is the most studied among plants belonging to the *Panax* genus; it is grown in China, Korea, Japan, and Russia while having a long-time (some thousands years) history of administration in oriental medicine and is available in many forms (Oliynyk & Oh, 2013).

Hypothesis

Eleutherococcus senticosus (ES), Schisandra chinensis (SC), Rhodiola rosea (RR) and Panax ginseng GSG are well known for their adaptive role. Less has been explored their comparative inf uence on some features related to stress, mental stress, oxidative stress, fatigue, mental fatigue, by referring to PubMed publications.

Objectives

The objective was to highlight the interest of research in ES, SC, RR and GSG adaptogens in relation to stress, mental stress, oxidative stress, fatigue, mental fatigue.

Material and methods

Analysis of PubMed publications was made for the four selected adaptogens: ES, SC, RR, GSG.

To evaluate the relationship of the four chosen adaptogens with sport, we selected the following areas of analysis, which are frequently approached in relation to stress and fatigue: stress (S), mental stress (MS), oxidative stress (OS), fatigue (F), mental fatigue (MF).

The adaptogens - stress and fatigue relationship was analyzed in two types of investigations:

A. Analysis for the keyword combinations. The same keyword combinations were selected for the four adaptogens. They are presented with their abbreviations (Abb) in Table I.

B. Analysis for all keyword combinations, for some f lters, with their corresponding subf lters:

- *Species:* other animals (A), humans (H)
- *Sex:* human male (HM), human female (HF), human male and female (HM+HF)
- *Age:* birth-18 years (0-18), 19-44 years (19-44), 45-64 years (45-64), 65+ years (>65), 80+ years (>80)

Results

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

A. Analysis for the keyword combinations

In Tables II, III, IV and V, the following are presented: periods of time during which articles containing these keyword combinations were published on PubMed site; duration of these periods (No years); total number of publications for the entire period (N); and number of publications per year (N/year). The presentation compares the total number of publications for the four chosen adaptogens.

Table II
Analysis for the chosen keywords, regarding ES

Keyword combinations	Period	No years	N	N/year
ES	1965-2018	**53**	586	11.06
ES+S	1967-2018	51	**74**	**1.45**
ES+MS	1990-2015	25	16	0.64
ES+OS	2001-2018	17	19	1.12
ES+F	1969-2016	47	30	0.64
ES+MF	2004-2014	*10*	*4*	*0.4*

Table III
Analysis for the chosen keywords, regarding SC

Keyword combinations	Period	No years	N	N/year
SC	1945-2018	**73**	989	13.55
SC+S	1995-2018	23	**110**	**4.7**
SC+MS	2005-2016	11	14	1.3
SC+OS	1995-2018	23	79	3.43
SC+F	1956-2016	60	15	0.25
SC+MF	1956-2014	58	4	*0.07*

Table IV
Analysis for the chosen keywords, regarding RR

Keyword combinations	Period	No years	N	N/year
RR	1963-2018	**55**	814	14.8
RR+S	1986-2018	32	**191**	5.94
RR+MS	1986-2016	30	46	1.53
RR+OS	2000-2008	*8*	95	**11.9**
RR+F	2000-2018	18	66	3.67
RR+MF	2000-2018	18	20	1.12

Table V
Analysis for the chosen keywords, regarding GSG

Keyword combinations	Period	No years	N	N/year
GSG	1940-2018	**78**	8823	113.1
GSG+S	1964-2018	54	**810**	15
GSG+MS	1979-2016	37	76	2.06
GSG+OS	1998-2017	*19*	465	**24.4**
GSG+F	1964-2018	54	174	3.23
GSG+MF	1992-2017	25	15	*0.6*

Table I
Keyword combinations for the four adaptogens

Keyword combinations	Abb	Keyword combinations	Abb	Keyword combinations	Abb	Keyword combinations	Abb
ES	ES	SC	SC	RR	RR	GSG	GSG
ES and stress	ES+S	SC and stress	SC+S	RR and stress	RR+S	GSG and stress	GSG+S
ES and mental stress	ES+MS	SC and mental stress	SC+MS	RR and mental stress	RR+MS	GSG and mental stress	GSG+MS
ES and oxidative stress	ES+OS	SC and oxidative stress	SC+OS	RR and oxidative stress	RR+OS	GSG and oxidative stress	GSG+OS
ES and fatigue	ES+F	SC and fatigue	SC+F	RR and fatigue	RR+F	GSG and fatigue	GSG+F
ES and mental fatigue	ES+MF	SC and mental fatigue	SC+MF	RR and mental fatigue	RR+MF	GSG and mental fatigue	GSG+MF

The comparison for ES, SC, RR and GSG shows that: the longest period of publication (78), the highest N (8823) and the highest N/years (113.1) were all for GSG.

The publication periods for the keyword combinations were the longest (in bold) for ES+S (53), SC+S (73), RR+S (55), GSG+S (78), and the shortest (*in italics*) for ES+MF (10), RR+OS (9\8), GSG+OS (19).

N for the keyword combinations was the highest (in bold) for ES+S (74), SC+S (110), RR+S (191), GSG+S (810), and the lowest (*in italics*) for ES+MF (4).

N/year for the keyword combinations was the highest (in bold) for ES+S (1.45), SC+S (4.7), RR+OS (11.9), GSG+OS (24.4), and the lowest (*in italics*) for SC+MF (0.07), GSG+MF (0.6).

B. Analysis for all keyword combinations, for some f lters, with their corresponding subf lters (Figs. 6, 7, 8, 9)

a. Analysis for ES

Regarding *f lters*, the number of publications for the keyword combinations was: a) the highest (in bold) for subf lters: A, for ES+S (50); HM+HF, for ES+S (12); 19-44, for ES+SP (11), and b) zero (*in italics*) regarding A, for ES+AT; 0-18, for ES+OS; 45-64 and >65, for ES+AT; >80, for ES+OS, ES+SP, ES+AT.

b. Analysis for SC (Fig. 7)

Regarding *f lters*, the number of publications for the keyword combinations was: a) the highest (in bold) for subf lters: A, for SC+S (76); HM+HF, for SC+S (13); 19-44, for SC+S (6), and b) zero (*in italics*) for subf lters: all subf lters, for SC+AT; regarding sex and age subf lters, for SC+SP; regarding HM, for SC+PF and SC+E; regarding HF, for SC+MF, SC+PF and SC+E.

c. Analysis for RR (Fig. 8)

Regarding *f lters*, the number of publications for the keyword combinations was: a) the highest (in bold) for subf lters: A, for RR+S (84); HM+HF, for RR+S (24); 19-44, for RR+S (18), and b) zero (*in italics*) for subf lters: A, HF, 0-18, 45-64, >65 and >80, for RR+AT; for 0-18 and >80, for RR+OS.

d. Analysis for SC (Fig. 9)

Regarding *f lters*, the number of publications for the keyword combinations was: a) the highest (in bold) for subf lters: A, for GSG+S (457); HM+HF, for GSG+S (71); 45-64, for GSG+S (24), and b) zero (*in italics*) for subf lters: 0-18, for GSG+MF; for >65, for GSG+AT; >80, for GSG+MS; GSG+PS; GSG+AT; GSG+MF; GSG+PF.

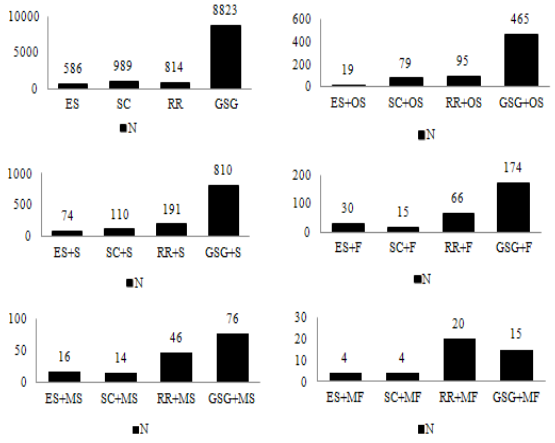

Fig. 6 – Analysis for ES, SC, RR and GSG, regarding N

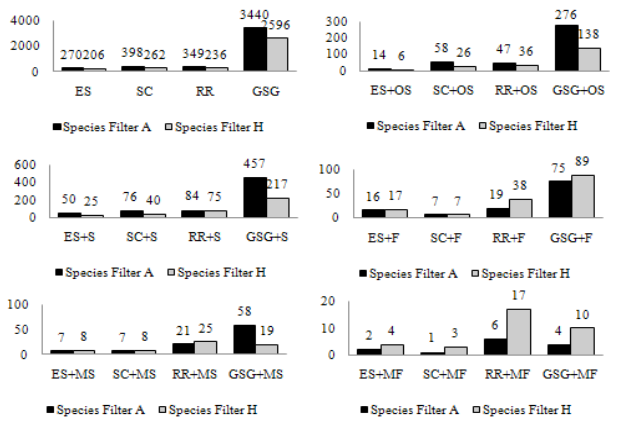

Fig. 7 – Analysis for ES, SC, RR and GSG, regarding the species f lter

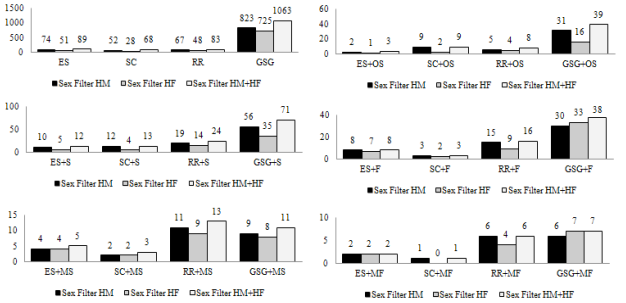

Fig. 8 – Analysis for ES, SC, RR and GSG, regarding the sex f lter

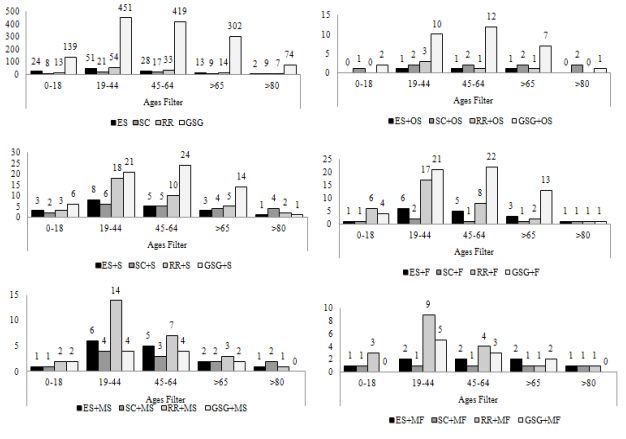

Fig. 9 – Analysis for ES, SC, RR and GSG, regarding the age f lter

Discussion

1) Specif cations

This article is a continuation of previous research of the authors, regarding the topic of adaptogens (Jurcău et al., 2018a): Schizandra chinensis (Jurcău et al., 2013), Rhodiola Rosea (Jurcău et al., 2017), Ginseng (Jurcău et al., 2018b).

2) Analysis of the results of the present study

Of the four adaptogens, the greatest interest of research was in GSG (8823), with an average of 113.1 publications per year, while the lowest interest was in ES (586), with an average of 11.06 publications per year. For each adaptogen, relatively to N, the interest of research

in keyword combinations was reduced. For all four adaptogens, keyword combinations were most studied for S and least studied for MF (for ES). Regarding all keyword combinations, the greatest interest of research was in N for RR and GSG, respectively: S - RR=191 and GSG=810; MS - RR=46 and GSG=76; OS - RR=93 and GSG=465; F - RR=66 and GSG=174; MF - RR=20 and GSG=15. For all keyword combinations, the greatest interest of research was in studies: on animals, in the case of S, OS and GSG+MS; on human subjects, for MS (except GSG+MS), F and MF. For all keyword combinations, the greatest interest of research was in studies with subjects of both genders; and the lowest interest of research was in studies with female subjects. For all keyword combinations, the greatest interest of research was in subjects aged between 19-44 years, excepting GSG+S, GSG+OS and GSG+F, where most of the publications were conducted on subjects aged 45-64 years; and the lowest interest of research was in studies with subjects aged >80 years.

Exemplif cation of actions of the selected adaptogens. Pubmed quote evidence

It concerned four areas related to sports, namely: stress (S), mental stress (MS), oxidative stress (OS), mental fatigue (MF). For the authenticity of the information, we preserved the original form, in the quotations made.

Eleutherococcus senticosus (ES)

"ES is often referred to as 'Siberian ginseng' and its extensive use probably dates back only to the mid-1950s and early 1960s" (Davydov & Krikorian, 2000). "It has been used as a tonic and anti-fatigue agent in northeastern Asia and eastern Russia from ancient time" (Zhu et al., 2011).

"ES exhibits anti-fatigue, anti-stress, immuno-enhancing ef ect, CNS activity, and anti-depressive ef ect; its pharmacological activities were mainly due to lignans and iridoid glycosides" (Deyama et al., 2001).

"The content of eleutheroside E of ES root cortex may partly contribute to the anti-fatigue action, the recovery of the reduction of NK activity and the inhibition of corticosterone elevation induced by swimming stress" (Kimura & Sumiyoshi, 2004). For example, "fatigue among subjects with chronic fatigue syndrome assigned to ES was substantially reduced during the study" (Hartz et al., 2004). "ES may enhance recovery from physical fatigue induced by forced swimming by accelerating energy changes through fatty acid β-oxidation in skeletal muscle" (Sumiyoshi & Kimura, 2016).

Schisandra chinensis (SC)

"SC fruits are a famous traditional Chinese medicine to treat all kinds of fatigue" (Chi et al., 2016). "SC and ES increased endurance and mental performance in patients with mild fatigue and weakness" (Panossian & Wikman, 2009).

"Schisandrin A, a class of active lignans of SC, has protective ef ects on DNA damage and apoptosis induced by hydrogen peroxide (H_2O_2) in C2C12 cells, ef ectively attenuates H_2O_2-induced cytotoxicity and DNA damage; so, it maintains energy metabolism through the preservation of mitochondrial function while eliminating reactive oxygen species generated by H_2O_2 in C2C12 cells; therefore, it may have a benef cial ef ect on the prevention and treatment of diseases associated with apoptosis induced by oxidative stress" (Choi, 2018). "α-cubebenoate isolated from an extract of SC fruits inhibited lipopolysaccharide (LPS)-induced expression of inducible nitric oxide synthase (iNOS) and cyclooxygenase 2 (COX-2) in a concentration-dependent manner, thereby suppressing productions of nitric oxide (NO) and prostaglandin E2 (PGE2) in vitro in peritoneal macrophages; α-cubebenoate also inhibited LPS-induced accumulation of polymorphonuclear lymphocytes in LPS-induced peritonitis model in vivo; so, α-cubebenoate may act as an anti-fatigue constituent of SC through anti-inf ammation and could be of therapeutic use as a treatment for inf ammatory diseases" (Chen et al., 2008).

"SC polysaccharide (SCP) composition consisted of 12 amino acids, of which alanine, aspartate and glutamate were identif ed as involved; the growth and the behaviors of the rats in the chronic fatigue syndrome model group improved after SCP treatment, and the therapeutic mechanism was partially due to the restoration of the disturbed pathways" (Chi et al., 2016). "Extracts of SC fruits and seeds have been used to reduce symptoms of stress such as fatigue and weakness, to enhance physical performance, and to promote endurance; they produced central nervous system (CNS) stimulation, increased energy, improved mood, remission of fatigue, and normalization of sleep" (Panossian, 2013).

Rhodiola Rosea (RR)

"RR, also known as "golden root" or "roseroot", has been used in the traditional medicine of Russia, Scandinavia and other countries, and has been extensively studied as an adaptogen with various health-promoting ef ects" (Brown et al., 2002). "RR is a plant that lives at high altitude in Europe and Asia, widely used for its high capacity to increase the organism resistance to dif erent stress conditions. RR extract has a signif cant protection in presence of the oxidative agent" (Battistelli et al., 2005).

"RR exhibited excellent potential in singlet oxygen and hypochlorite scavenging as well as FRAP potential, iron chelating ability and protection of protein thiol groups due to the high percentage of polyphenols, capable of neutralizing oxidative and chain reactions induced by free radicals because they are excellent donors of protons (Frei et al., 2003) and electrons" (Chen et al., 2008). "RR extract administration for 4 weeks could reduce swimming-enhanced oxidative stress possibly via the reactive oxygen species scavenging capability and the enhancement of the antioxidant defense mechanisms" (Huang et al., 2009).

"Treatment with RR standardized extract of rhizome signif cantly improved the perceptive and cognitive cerebral functions in young, healthy physicians, during night duty, so RR can reduce general fatigue under certain stressful conditions" (Darbinyan et al., 2000). "Approximately 140 compounds were isolated from roots and rhizome of RR and a number of clinical trials demonstrate that repeated administration of RR extract SHR-5 exerts an anti-fatigue ef ect that increases mental performance (particularly the ability to concentrate in healthy subjects), and reduces burnout in patients with fatigue syndrome; several mechanisms of action are possible contributors: interactions with HPA-system

(cortisol-reducing), protein kinases p-JNK, nitric oxide, and defense mechanism proteins" (Panossian et al., 2010).

Ginseng (GSG)

"GSG has been traditionally used for several millennia in Asian countries, including Korea, China, and Japan, not only as a nourishing and tonifying agent but also as a therapeutic agent for a variety of diseases, immunity improvement, fatigue relief, memory improvement, antioxidation" (So et al., 2018).

"GSG exhibits antioxidant properties with increasing concentrations: a very good ability to scavenge superoxide and hydroxyl radicals" (Vaško et al., 2014). "The underlying molecular mechanisms in the hepatoprotection of ginsenoside Rk1 in APAP-induced hepatotoxicity may be due to its antioxidation, antiapoptosis, anti-inf ammation, and antinitrative ef ects" (Hu et al., 2019). "Ginsenoside Rg1 reduced the excessive ROS and the occurrence of cell apoptosis" (Gao et al., 2019).

"Panax GSG administration, compared to placebo: decreased the total self-rating numeric scale score (NRS); improved mental NRS score; reduced the visual analogue scale (VAS) score; lowered the reactive oxygen species (ROS) and malondialdehyde (MDA) levels; increased total glutathione (GSH) concentration and glutathione reductase (GSH-Rd) activity; so, PGSG has antifatigue ef ects in patients with ICF, and the changes in antioxidant properties contribute in part to its mechanism" (Kim et al., 2013). "Ginsenoside Rg3 (Rg3) is one of the key components of a frequently used herbal tonic panax ginseng for fatigue treatment that could improve exercise performance and resist fatigue possibly through elevating silent information regulator of transcription 1 deacetylase activity" (Yang et al., 2018). "Panax GSG, consumed by healthy young adults, enhanced performance of a mental arithmetic task and ameliorated the increase in subjective feelings of mental fatigue experienced by participants during the later stages of the sustained, cognitively demanding task performance" (Reay et al., 2006). "GSG is one of the most widely used in fatigue, because it is believed to improve energy, physical and emotional health, and well-being; both American and Asian ginseng may be viable treatments for fatigue in people with chronic illness" (Arring et al., 2018).

Instead of conclusions

ES, SC, RR and GSG are described as adaptogens, having important ef ects in stress modulation and in reducing oxidative stress and fatigue, including mental fatigue.

Conf icts of interest

Nothing to declare.

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Study on the development of spatial orientation and segmental coordination through judo-specif c means in children

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Abstract

Background. Optimizing sporting performance in children depends on developing psychomotor ability. Spatial orientation and coordination are essential components in judo technique optimization, and that is why their early development is an objective of major importance.

Aims. The purpose of the present study is to identify the level of progress in developing children's spatial orientation and segmental coordination by applying programs specif c of judo.

Methods. This pilot study was conducted in the period September-December 2018 in the Galati Sports Club, and involved a group of 24 male children, aged on average 10.68±0.59 years, practicing judo. The study used 3 assessment tests for spatial orientation and segmental coordination.

Results. Statistical analysis evidenced signif cant dif erences in all the 3 tests between the results of the initial and f nal assessment, when $p<0.05$. The widest gap was recorded in test 3 – Asymmetrical arm movements, i.e. 2.666±.277 points, and the smallest gap in test 1 – Symmetrical arm movements, i.e. .875±.173 points.

Conclusions. 1) All the results of the present research conf rmed the hypothesis, i.e. the level of development of spatial orientation and segmental coordination may be improved by practicing certain action means specif c to judo for children aged 9-12 years. 2) Data analysis proves that all children reached a superior level in the f nal stage as compared to the initial stage of the experiment, showing statistically signif cant progress.

Key words: spatial orientation, segmental coordination, judo, children

Introduction

Investigating aspects related to spatial orientation and segmental coordination in space are key concepts in understanding children's motor development, which may f nd extensive applicability in physical exercise and relaxation activities (De Landtsheer et al., 2016; Wawrzyniak et al., 2015).

The development of psychomotor ability in children is a crucial objective in physical exercise, and in judo the development level of spatial orientation and segmental coordination are important components that may decisively inf uence the optimization of sporting performance.

Psychomotor ability is complex in structure, and its components are interconditional, aiming at: balance, laterality, motor dissociation, corporal scheme, visual-motor coordination, spatial orientation, temporal structure, motor execution, tonic-postural control, respiratory control (Bădău & Paraschiv, 2007; Bădău, 2006).

The ability of spatial orientation is the result of a cognitive process resulting from a prolonged maturation process manifested predominantly in childhood by accumulating motor skills and experiences (Macik, 2018; Liu et al., 2011; Palermo et al., 2008). Achieving notable sporting performance requires a good spatial orientation and segmental coordination in most sports as early as initiation (Wada, 2017; Stoyanova & Ivantchev, 2016).

The concept of spatial orientation includes an estimate of the relation body – objects, distances, sizes, shapes and positions of the body as related to the environment (Ching-Shu, 2016).

Developing corporal coordination depends on the level of the human biological potential, being mainly determined

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by the predisposition degree which is genetically transmitted and the variety of motor skills acquired by complex sporting experiences (Bădău, 2006; Ion Ene et al., 2014), as well as the value of these acquisitions. An increase in the dif culty of coordinative ability may be obtained by increasing the requirements of accuracy, complexity, training in various conditions that would require continuous adaptation of movements to the environment, objects, practice partners, adding supplementary conditional and mental tasks, etc. (Manolachi et al., 2010; Moldovan et al., 2012).

Segmental coordination is based on the correlation of the nervous and the muscular systems, involving the kinesthetic, visual, auditory and balance analyzers (Bădău, 2011; Ion Ene et al., 2016).

Psychomotor abilities provide the comprehension of the human being from the perspective of the interaction between the mental and motor aspects, with a signif cant role in the athletes' psycho-behavioral system. From this point of view it is considered that the present study is up-to-date and will contribute to highlighting the importance of diversifying the sports training programs during childhood.

Objectives

The purpose of the study is to identify the progress made in developing children's spatial orientation and segmental coordination by applying programs specif c to and adapted from judo.

Hypothesis

The hypothesis of the study is that the level of development that children possess regarding spatial orientation and segmental coordination may be considerably improved by practicing certain action means specif c to judo.

Material and methods

Research protocol

The current study obtained the approval of the "Dunarea de jos" University of Galati Ethics Committee. All participants provided an informed consent before entering the study protocol. All subjects agreed to participate and the principles of research ethics were observed.

a) Period and place of the research

This pilot study took place in September - December 2018 at the Galati Sports Club. The research included two assessments, an initial one, which took place on 20-25 September 2018, and a f nal one, which was scheduled on 10-15 December 2018. In between the two tests, we applied a training program based on means from judo technique and ludic games adapted from judo, aimed at developing spatial orientation and segmental coordination. The program was performed during each training session for 10-15 minutes. Examples of judo-adapted dynamic games used during training: catch judoka, cockroaches, mirror, protector defender, cat and mouse game, rope jump, crawf sh and shrimp, asymmetrical movement game, etc.

b) Subjects and groups

The research group included 24 male children aged between 9-12 years, the arithmetic mean ± SD being 10.68±0.59 years. The inclusion criteria were the following: all children had been practicing judo for at least one year and had not sustained any injury in the previous 3 months. The exclusion criteria were: not scoring at least 3 points in the tests, auditory def ciencies, and incomplete attendance to the training program.

c) Tests applied

The present study resorted to three tests in order to evaluate spatial orientation and segmental coordination in children practicing judo. The tests were designed by us to assess spatial orientation and segmental coordination. The tests were aimed at applying the segments on dif erent directions and planes.

The order of test application is described below. Each child was individually assessed, and the best execution out of 2 attempts was recorded. Preparing for the tests, the children visualized the tests, and the testing proper involved executing movements based on the auditory orders of the specialized teacher.

Test 1 - Symmetrical arm movements - with the back against a screen situated at 0.5 m, the following 8 arm movements are performed: laterally down (45°), laterally (90°), laterally up (135°) and up (180°); the same movements, lowering the arms. Each movement is executed in 4 stages. One point is awarded for each accurately performed movement. The exercise is performed against a screen or a graded wall, to which the child's back is turned.

Test 2 - Arm-leg movements – with the back against the screen, the following 8 arm and leg movements are performed: leg laterally at 45°, arms laterally down (45°); leg laterally at 90°, arms laterally (90°); leg laterally at 45°, arms laterally up (135°); leg down, arms up (180°), and the next four steps are executed while the arms are being lowered, and the movement is executed with the other leg. One point is awarded for each accurately performed movement. The exercise is executed against a screen or a graded wall, the child facing the opposite direction.

Test 3 - Asymmetrical arm movements - Ten arm movements are executed against the graded screen in the frontal and sagittal planes, as follows: the right arm laterally down at 45° and the left arm laterally at 90°; the left arm laterally down at 45° and the right arm laterally at 90°; the right arm laterally down at 45° and the left arm laterally up at 135°; the left arm laterally down at 45° and the right arm laterally up at 135°; the right arm laterally down at 90° and the left arm laterally up at 135°; the left arm laterally down at 90° and the right arm laterally up at 135°; the right arm laterally at 90° and the left arm laterally up at 180°; the left arm laterally at 90° and the right arm laterally up at 180°; the right arm laterally up at 135° and the left arm laterally at 180°; the left arm laterally up at 135° and the right arm laterally at 180°. One point is awarded for each accurately performed movement. The exercise is executed against a screen or a graded wall, the child facing the opposite direction.

d) Statistical analysis

The SPSS 24 program was used to process the results of the study, calculating the following: arithmetic mean (X), standard deviation (SD), independent Student test (t), skewness index, the signif cance level being set at $p<0.05$ for all analyses. Skewness values for the distribution to be considered normal had to be less than ± 1.0.

Table I

Test frequency and percentage function of assessment score

Tests	Evaluation	4 p. n (%)	5 p. n (%)	6 p. n (%)	7 p . n (%)	8 p. n (%)	9 p. n (%)	10 p. n (%)
Test 1	Ti	-	3(12.5)	15(62.5)	6(25)	-	-	-
Symmetrical arm movements	Tf	-	-	4(16.7)	16(66.7)	4(16.7)	-	-
Test 2	Ti	2(8.3)	10(41.7)	9(37.5)	3(12.5)	-	-	-
Arm-leg movements	Tf	-	-	6(25)	13(54.2)	5(20.8)	-	-
Test 3	Ti	4(16.7)	6(25)	9(37.5)	5(20.8)	-	-	-
Asymmetrical arm movements	Tf	-	-	-	6(25)	6(25)	11(45.8)	1(4.2)

n - frequency, % - valid percent

Table II

Descriptive statistics in assessment tests for spatial orientation and segmental coordination

Tests	Evaluation	Min.	Max.	X	SD	Kurtosis	
						Statistic	Std. error
Test 1	Ti	5.00	7.00	6.125	.612	-.092	.918
Symmetrical arm movements	Tf	6.00	8.00	7.000	.589	.299	.918
Test 2	Ti	4.00	7.00	5.541	.832	-.371	.918
Arm-leg movements	Tf	6.00	8.00	6.958	.690	-.712	.918
Test 3	Ti	4.00	7.00	5.625	1.013	-.927	.918
Asymmetrical arm movements	Tf	7.00	10.00	8.291	.907	-1.105	.918

Max – maximum statistic, Min – minimum statistic, X – mean, SD – standard deviation, Ti – initial test, Tf – f nal test

Table III

Descriptive statistics of dif erences between initial and f nal tests in assessing spatial orientation and segmental coordination

Tests	t	p	X Dif erence	SD Dif erence	95% CI	
					Lower	Lower
Test 1 Symmetrical arm movements	-5.042	.000	-.875	.173	-1.224	-.525
Test 2 Arm-leg movements	-6.415	.000	-1.416	.220	-1.861	-.972
Test 3 Asymmetrical arm movements	-9.601	.000	-2.666	.277	-3.225	-2.107

X - mean, SD - standard deviation, t - value of Student test, p - Sig. (2-tailed), CI - conf dence interval of the dif erence

Results

The main descriptive results of the study are shown in Tables I, II and III.

Discussions

According to Table I, in test 1 - Symmetrical arm movements, it can be seen that in the initial testing children scored between 5-7 points, and after the application of the independent variable the results improved, the score being 4-8 points. In test 2 - Arm-leg movements, it can be seen that initially the children scored between 4-7 points, while after the introduction of the independent variable the results improved to a score between 6-8 points. The same phenomenon occurred in test 3 - Asymmetrical arm movements, where the initial score was 4-7 points, and the f nal score was 7-10 points (Table I), which means visible progress.

Upon analyzing the results shown in Table II, the values of the Kurtosis statistic index were below 1, with only one exception at the f nal test 3 - Asymmetrical arm movements, which evidences a normal distribution of values. The lowest initial values were found in test 2 - Arm-leg movements, and the best values were recorded in the f nal assessment of test 3 - Asymmetrical arm movements (Table II).

According to Table III, statistical analysis points out signif cant dif erences in all the 3 tests between the results obtained in the f nal and initial assessment, for $p<0.05$. The greatest dif erence was found in test 3 - Asymmetrical arm movements, i.e. 2.666±.277 points, and the smallest dif erence was obtained in test 1 - Symmetrical arm movements, i.e. .875±.173 points. Result analysis shows that the implemented program proved to be ef cient in optimizing the ability of spatial orientation and segmental coordination of children practicing judo.

Conclusions

1. All the results of the present research conf rmed the hypothesis that the development level of spatial orientation and segmental coordination may be improved by practicing judo-specif c action means by children aged 9-12 years.

2. Data analysis demonstrates that all children reached a higher level in the f nal test compared to the initial test, making statistically signif cant progress.

3. Educating spatial orientation and segmental coordination, important components of psychomotor abilities, should be a permanent concern of specialized teachers by diversifying the means and adapting them to as many sports as possible.

Conf icts of interest

Nothing to declare.

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REVIEWS

Particularities of CAD-CAM commercial systems with applicability in the orofacial sphere; digital complete denture

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Abstract

CAD-CAM techniques are based on innovative procedures that have appeared in the last decades. They tend to expand in many domains while diversifying the products of ered to the recipients.

Digital technology is also used in dental medicine, replacing a big part of the conventional fabrication procedures with modern procedures. In oral rehabilitation (e.g.: using a complete denture) there is a rising interest regarding these procedures. Laser beams and CBCT (cone beam computer tomography) have been recently used to gather data in the orofacial sphere. Some of the available commercial systems use subtractive techniques (using milling machines with 3 or 5 axes) or additive techniques such as rapid prototyping or stereolithography in the fabrication process of the f nal product. Knowledge regarding the particularities of dif erent commercial systems is essential. The benef ts of using these techniques are multiple: speed, precision, data reproducibility, comfort, higher ef ciency and reduced costs due to the standardization of the treatment steps.

Key words: CAD-CAM commercial systems, digital denture, CAD-CAM denture, rapid prototyping, stereolithography, CNC milling machines

Introduction

Nowadays, more than ever, mankind is in a continuous search for performance, esthetics and functionality in all domains. Sport is one of the domains in which performance is often obtained by pushing physical resources beyond the organism's limits. This permanent wish for self-improvement leads to the best performances, though it calls for adequate equipment and protection means.

Recent developments in techniques and materials can lead to high quality products. CAD-CAM (computer-aided design – computer-aided manufacturing), is an example of such innovative technology, with a wide applicability in many f elds.

CAD-CAM is also used in dental medicine, of ering the possibility of complex rehabilitation in the orofacial sphere. An example of evolution from conventional techniques towards digital technologies is the fabrication of complete dentures using CAD - CAM systems.

Complete dentures have been fabricated with conventional techniques, using PMMA acrylic resins, for more than 80 years, without signif cant changes in the procedures and materials that are used (Janeva et al., 2017). These materials were introduced by the German chemists Otto Rohm and Walter Bauer, who synthesized the material for the f rst time in 1902. The material was commercially available in 1933. Although the fabrication process is usually based on traditional procedures, new and modern techniques that permit time and costs savings (Kattadiyil et al., 2013) are also used. CAD-CAM technology (design and machine fabrication) appeared in the 70's, and the progress in its development led to its application in dental medicine as well. Duret's major contribution, as a pioneer in digital techniques with his Sopha system in 1971, had a great impact on its future development. However, systems based on this technology f rst appeared in our profession only in the 80's, because of the complexity of the fabrication process. A complete denture was for the f rst time produced with digital techniques using 3D laser lithography in 1984 by Maeda, who developed a computer-aided system for tooth selection, occlusion, external surface and margins using a database (Maeda, 1994). The initial technique was improved with the contribution of Kawahata in 1997 - a duplicate denture obtained from a wax block using numerical control devices CNC after digital data collection (Kawahata et al., 1997). In 2009, Sun introduced laser

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scanning of the edentulous ridges (Sun et al., 2009). Kanazawa used CBCT for the f rst time in 2011 to gather data and a CNC milling machine to obtain a denture base from an acrylic resin block, followed by manual placement of the teeth (Kanazawa et al., 2011).

There are multiple advantages in using CAD-CAM techniques: for the patient, by reducing the time necessary for treatment with complete dentures and by reducing patients' dental visits (Janeva et al., 2017; Kattadiyil et al., 2013; Bidra et al., 2013), an important aspect especially for the very old or disabled; patient satisfaction when wearing CAD-CAM dentures was reported (Saponaro et al., 2016a); for the dentist, by reducing the clinical steps (Kattadiyil et al., 2013), and for the dental technician, by reducing the time needed for laboratory procedures. The data gathered can be saved and further used (Kattadiyil et al., 2013). The precision in the fabrication of the prosthetic reconstruction is greater compared to conventional procedures (Goodacre et al., 2016). The higher technical accuracy of the procedure, having a favorable inf uence on retention values (AlHelal et al., 2016), with an average accuracy deviation of 0.1 mm for the internal surface and 0.5 mm for the external surface of the denture (Kanazawa et al., 2011), is very important for future retention and stability. A minimum thickness of the denture base and also f ne details (papillae, rugae) on the denture's external surface can be achieved. Pre-polymerized acrylic resins have better mechanical and biological properties than conventional resins, higher chemical and volumetric stability, reduced water absorption, all these improvements of ering more favorable conditions during long-term use. They also have a good biocompatibility, lacking toxic and allergic substances - such as residual monomer - a very important aspect for materials used inside the oral cavity. There is no polymerization shrinkage (Kattadiyil et al., 2015), while f nishing and polishing procedures are easy to perform. The material can also be colored to obtain the desired esthetic result. Trial dentures can be used as a guide for dental implant placement. There is growing interest in dental medicine in treatment based on CAD-CAM procedures, because of their standardized and ef cient technological process and reduced costs (Kattadiyil et al., 2013).

Shortcomings are mainly related to the high costs of the devices, software and materials. The technique also requires high qualif cation and skills, being more accessible for experienced practitioners. A study conducted by Saponaro in 2016 evaluating student experience with digital dentures reported 3 types of complications: reduced retention, incorrect vertical dimension of occlusion, inaccurate centric relation (Saponaro et al., 2016b). Most of the available commercial systems still rely on conventional steps, especially for impression making and jaw relation determination. The scanning process is generally time consuming, tooth arrangement is not completely individualized, and perfect occlusal adaptation and balanced occlusion are hard to achieve.

Digital techniques for complete dentures use impression procedures based on laser or CBCT for data collection needed for design (CAD), while fabrication uses computer-aided manufacturing CNC, (simple or with 5 axes) or rapid prototyping, laser lithography (Fig. 1). Subtractive techniques (used by Avadent, Ceramill, Wieland and Baltic Denture) and also additive techniques (Dentca) are described.

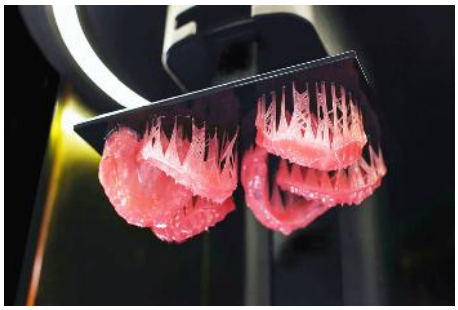

Fig. 1 – 3D printing procedure - Dentca denture base for carbon printers (1)

Generally, using digital techniques, treatment is reduced from 5 to 2 or maximum 3 appointments (when using a trial denture). In the f rst appointment, conventional techniques are used for impression taking and jaw relation determination, with standard or special designed impression trays and transfer bows. The trial denture in the color of the future teeth is obtained by milling, or 3D printing, or just the denture base is milled and then the artif cial teeth are bonded. Next, it is evaluated similarly to the conventional process, and the needed changes or adjustments for an adequate esthetic, phonetic and functional adaptation are made. In the last appointment, the f nal denture - fabricated as a single block or a base with bonded teeth, with enhanced adhesion and stability due to precision in fabrication - is applied, while checking the occlusion, esthetics and phonetics. Clinical adjustments can be made if needed. Yilmaz argues for the advantages of monoblock dentures: reduced risks for teeth fractures and material shrinkage (Yilmaz et al., 2017).

Particularities of commercially available systems used for the fabrication of CAD-CAM dentures

Avadent System (Global Dental Science Scottsdale, AZ, USA) uses subtractive techniques in the fabrication process. The old dentures or special thermoplastic trays, immersed for one minute in 80^0 C, are used for impression taking (Kattadiyil et al., 2013). The jaw relation determination is performed using AMD (Avadent Measuring Device), which consists of custom trays, a vertical screw for f xing the vertical dimension, a mandibular plate for gothic arch registration, a lip support placed on the upper tray, a ruler for measuring the inclination of the occlusal plane in the anterior region, a ruler for measuring the vertical dimension of the occlusion, and a transparent guide for tooth size assessment. Treatment is performed in 2 or 3 appointments - if a trial denture is requested (Baba, 2016; Kattadiyil et al., 2013).

Dentca System (Dentca Inc, CA, USA) uses additive techniques (stereolithography) for trial denture (just the base or whole try-in denture) fabrication, while the f nal denture is made using the conventional procedure. Special impression trays (S, M, L) with detachable posterior

parts are used. The vertical dimension of the occlusion is determined by f xing the custom trays with the vertical screw, while the centric relation is registered by tracing the gothic arch on the maxillary plate (Baba et al., 2016). A special ruler is used for measuring the length of the upper lip - the distance between the incisive papilla and the lip border. The trial denture is fabricated with rapid 3D prototyping in the color of the future teeth, and it can be used as a guide for dental implant placement (Kattadiyil et al., 2013).

Wieland Digital Denture (Ivoclar Vivadent, NY, USA) is a commercial system that uses subtractive techniques. To determine the jaw relation centric trays for preliminary relations – occlusion, vertical dimension - registrations are used. A special UTS CAD transfer bow is then used for preliminary occlusal plane position, by measuring its inclination related to the bipupilar line and Camper plane. Custom trays provided with occlusal borders are used to take the f nal impression. After their fabrication on digital casts using the scanned occlusal relations, the preliminary impressions and the digitally determined preliminary occlusal plane are checked and adjusted if necessary (Baba et al., 2016). Jaw relation is determined by f xing the vertical screw for the corresponding vertical dimension of occlusion and registering the gothic arch on the mandibular plate. The trays are then f xed together using silicone-based impression material and the esthetic lines - median line, smile line, canine line and lip closure - are marked before sending them to the laboratory for scanning. A guide for tooth placement on the denture base is then produced. If requested, a trial denture milled from a single wax block is also made. The denture base is fabricated by f rst milling the external side with the alveoli for tooth placement, then the teeth (from a digital denture tooth library) are bonded and the mucosal side is milled, also reducing the tooth length (gingival extremity) if necessary (Baba et al., 2016).

Baltic Denture (Merz Dental, GmbH, Germany) uses special adjustable impression trays (Key Set) of dif erent sizes, with preset teeth of dif erent shapes and sizes, a transfer bow with an indicator for the midline plane of the face (Key Fin), and Key Lock, for registration of the already determined jaw relations. The teeth placed on the adjustable trays, specif c for this system, facilitate a better esthetic evaluation regarding the occlusal plane position, the visibility, the arrangement of teeth and the general facial aspect. They also of er the patient the opportunity to evaluate the f nal aspect and to express their impressions and observations (Baba et al., 2016).

Ceramill Full Denture (Amann Girrbach, AG, Austria), designed mainly for dental technicians, is an open system that can be used together with other CAD-CAM systems. After the preliminary and f nal impression making, the f nal casts are mounted on the articulator using a transfer face-bow. The digital sequences start with the casts, trays and occlusal relations scanning, then anatomical landmarks for anterior teeth placement are marked on the digital casts. The denture base is milled from a pink wax block and then the teeth are bonded in the wax bases. The f nal denture is then fabricated using conventional techniques (Baba, 2016). A 4-month study processing the feedback from six dental technicians that made 250 complete dentures shows that the milling unit is easy to use, but the scanning process is time consuming, the software is dif cult to learn, the scanning and the design are more accessible for experienced practitioners (2).

Together with the intraoral records, extra-oral facial scanning is associated to the digital workf ow of CAD-CAM denture fabrication for a more rapid treatment and better esthetic and functional results (Eom et al., 2017; Hassan et al., 2017; Schweiger et al., 2016).

Conclusions

1. Practitioners in the dental medicine f eld are more and more interested in these digital techniques, considering their multiple favorable aspects: the speed, precision, quality of treatment, data reproducibility, patients' satisfaction and comfort by reducing the number of dental visits, the higher ef ciency in dentists' activity, standardization of treatment steps and innovations brought in the treatment of complete edentation.

2. However, the contributions of the dentist and the dental technician cannot be substituted, at least for the time being, by digital procedures.

3. Continuous progress in CAD-CAM technologies permits the diversif cation of the obtained products in various f elds, such as medicine, sports and leisure time industry.

Conf icts of interest

Nothing to declare.

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Obesity, exercise, and health

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Abstract

Obesity has become an epidemic reality, which must be controlled by all means, given the dramatic consequences on public health, by increasing and developing metabolic risks (type 2 diabetes, gout, dyslipidemia, hypertension), the risk of cardiovascular disease, cancer or psycho-emotional disorders (anxiety, depression, loss of self-esteem). Most research and interventions have initially focused on the adult population, but at present, child obesity has devastating ef ects on children's and adult's health, drastically increasing the risk of developing associated chronic diseases.

In order to optimize the services in wellness centers, modern technologies for screening the levels of health, nutrition, f tness and lifestyle characteristics are required to develop personalized programs. We recommend the usage of educational and physical applications and also internet programs, to be practical tools focused on the physical part of wellness. Wellness incorporates factors such as proper f tness exercises, personalized diet, stress management, psychological balance, disease prevention, no smoking or alcohol abuse, personal safety, regular physical examination, and health education.

Prevention programs should start early in life and be personalized at some point, in order to have good results. It is certain that overweight can be managed with proper and regular exercise along with a healthy lifestyle and diet, managed by an interdisciplinary team.

Key words: obesity, exercise, diet, wellness

Introduction

Obesity is a serious health problem of the 21st century and is an important cause of morbidity and mortality in adults as well as adolescents and children (Engin, 2017).

Worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults aged 18 years or older were overweight, and of these over 650 million were obese. 39% of adults aged 18 years and over were overweight in 2016, and 13% were obese. Most of the world's population lives in countries where overweight and obesity kills more people than underweight. Over 41 million children under the age of 5 were overweight or obese in 2016, and more than 340 million children and adolescents aged 5-19 years were overweight or obese in 2016.

Since 1997, WHO has recognized obesity as a global epidemic (1). Portugal has of cially recognized obesity as a chronic disease since 2004, but remains the only country in Europe to do so (***, 2017). In 2013, the American Medical Association of cially recognized obesity as a complex chronic disease (Pollack, 2013) as a result of developments over three decades (Kyle et al., 2016), and recognition by the Canadian Medical Association followed in 2015.

Obesity is a complex, multifactorial and heterogeneous disease due to the complex interaction of genetic and environmental factors (Neslihan, 2014); it is a largely preventable disease (Pollack, 2013), which af ects over one-third of the world's population today (Hruby & Hu, 2015).

In the US, one in f ve men and women and one in four children suf ers from obesity, and in the European Union, obesity progressed from 10 to 40 percent of the population between 1980 and 2003. In Europe, more than half of the population aged between 35 and 65 is obese (2). The World Health Organization (WHO) estimates that about 50% of the population of Western countries will suf er from overweight by 2040. Developing countries also record an alarming increase in the population af ected by obesity.

Obesity epidemics

Childhood obesity tends to become an increasingly alarming problem. The prevalence of childhood obesity has increased remarkably over the past 3 decades (Neslihan, 2014). In Europe, the growing incidence of childhood obesity is of particular concern. Child obesity is recognized

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as a predictive factor of obesity in adults, especially in the case of very obese children from obese parents. There is increasing evidence that obesity has negative social, economic and health consequences. Therefore, child obesity is currently recognized as an important public health problem and this has been reinforced by the growing prevalence of adult obesity in both developed and developing countries (3) (Weng et al., 2006).

Obesity is a serious public health problem because, in addition to the decrease in quality of life (Taylor et al., 2013) and life expectancy (Grover et al., 2015), there is an increased risk of chronic diseases (Nyberg, 2018), such as type 2 diabetes, cardiovascular disease, hypertension, coronary artery disease, asthma and certain cancers (Poirier et al., 2006; Guh et al., 2009; Lauby-Secretan et al., 2016). In some cases, even psychological problems arise (4). For society as a whole, obesity involves direct and indirect costs that impose a burden on the health system and social resources. The burden of illnesses is measured by years of disability - adjusted disability (Disability Adjusted Life Years-DALY), which is the sum of the years of life lost through premature deaths and years of disability due to the presence of disease or accidents adjusted for the severity of the illness). Overweight and obesity are responsible for about 10% of the total burden of DALY disease in Western and Central Europe. Between 1990 and 2010, the contribution of overweight to DALY increased by 39% in Europe and Central Asia.

In Romania, in 2012, the DALY burden of illness per 100,000 inhabitants for all causes was 20-40% higher than in western European countries, about 10% higher than in Poland and about 15% lower than in Bulgaria. The major causes of illnesses for which DALY per 100,000 inhabitants are higher in Romania than in Western European countries are those on which excess weight has a proven negative impact, namely: ischemic heart disease, the most common cause of DALY in most countries, is 2-3 times more frequent in Romania than in western European countries, 10% more frequent than in Poland and about 15% less frequent than in Bulgaria; accidental stroke, the second cause in terms of frequency in Eastern European countries, is 3-4 times more frequent in Romania than in Western European countries, about 30% more frequent than in Poland and about 60% less frequent than in Bulgaria; hypertensive disease is in Romania 18 times more frequent than in the Netherlands, 15 times more common than in the UK, 5 times more frequent than in Poland, 4 times more frequent than in Germany and about 75% more frequent than in Bulgaria (5).

The Basal Metabolic Index (BMI) is commonly used to def ne overweight and obesity in adults. Individuals with a BMI of 25-30 are labeled as overweight and those with a BMI over 30 are called obese in most Western societies, while in children, obesity occurs at a BMI ≥95th percentile (***, 2006; Burdette et al., 2008).

Many people f nd it increasingly dif cult to maintain a “normal” weight in a largely obesogenic environment (6). This environment ranges from low breastfeeding rates, dif culties in geographic or f nancial access to the ingredients of a healthy diet, lack of cooking skills, the abundance and marketing of energy-rich foods and food additives, urban planning choices and pressures of a lifestyle that often reduces the opportunity for physical activity (both at work and at leisure) (Mustajoki, 2015; Jaworowska et al., 2013; Birch & Anzman-Frasca, 2011).

Obesity is responsible for direct medical costs (eg. physician fees, clinical tests) and non-medical costs (eg. patient transport to treatment centers). The direct cost per capita of a person with normal weight is lower than that of an overweight/obese person. Costs for overweight and obese individuals were 9.9% and 42.7% higher, respectively, compared to normal weight adults. The whole Europe spends between 1.9% and 4.7% of the total annual health care costs and 2.8% of the annual cost of hospitals for treating overweight or obese patients (Cuschieri & Mamo, 2016).

Obesity life cycle

Pre-conception - The surprising path of obesity begins in the period before conception itself. The nutritional status of women and men before conception has profound implications for the growth, development and long-term health of their children. Epidemiological data and f ndings from developmental biology suggested that intervention to improve the nutritional status of men and women before pregnancy improves long-term outcomes for mothers and children (Barker et al., 2018; Fleming et al., 2018).

The physical and mental health of the future child is determined by the health of both parents (Chiarlitti & Kolen, 2017; Karimzadeh et al., 2017; Boardman et al., 2012). The health of women around the conception period is now a topic of high interest, ref ected in several reports from international agencies (Davies, 2015; Johnson et al., 2012; Hanson et al., 2015; ***, 2013). A woman who is healthy at the time of conception is more likely to have a successful pregnancy and a healthy baby. Observational studies show strong links between pre-pregnancy health and maternal and child health outcomes, with consequences that may extend between generations, but awareness of these links is not widespread. Poor nutrition and obesity are spread among women of reproductive age, and dif erences between high income countries and low income countries have become less distinct (Stephenson et al., 2018). Preconception health research requires mental health academics to work with medical, nutritional, and surgical academics to shape both the mental and physical health of our future of spring (Wilson et al., 2018).

Intrauterine life - Studies have shown that the period of intrauterine life inf uences deeply health and long-term behavior (Marquez et al., 2013; Lewis et al., 2015; Godfrey et al., 2017; Li et al., 2016). The quality of fetal life in the mother’s womb programs the susceptibility to cardiovascular, cerebrovascular disease, diabetes, obesity, etc. (Parlee & MacDougald, 2014; Gaillard, 2015; Villanueva-Ortega et al., 2017).

Lifetime health programming takes place during intrauterine life, the conditions in the mother’s womb being at least as important as genetic programming in determining the mental and physical performance of the child and the adult. Modern research has shown that the organization of neuronal circuits, including those that control the behavior and food intakes of the future child, is established and regulated during the intrauterine period, and this process

is highly dependent on the mother's nutrition (Georgief et al., 2015; Prado & Dewey, 2014).

Proper nutrition is needed from the very beginning, the formation of the neural plate and neural tube being af ected by nutrients such as folic acid, copper and vitamin A. Approximately 22 days after conception, the neural plate begins to fold inward, forming the neural tube, which eventually becomes the brain and spinal cord (Couperus & Nelson, 2006). Seven weeks after conception, cell division begins inside the neural tube, creating nerve cells (neurons) and glial cells (cells that support neurons). These neurodevelopment processes start during gestation and continue during childhood (Prado & Dewey, 2014). From the 4th month of gestation, the fetus begins to taste, by swallowing the amniotic f uid which contains much of the substance that the mother ingests with food (Mennella et al., 2001; Sullivan et al., 2014). Thus, the fetus will consume natural or artif cial sweeteners, excess salt, other organoleptic substances such as glutamates, guanylates, inosinates, artif cial f avors, with a predilection for these food additives.

Food f avors, sweeteners and artif cial f avors, found everywhere in modern food, create dependence during intrauterine life, depending on what the pregnant woman consumes, exacerbating the genetic predisposition of the fetus for the sweet, salty, umami, meat, fat, sour and bitter (Bachmanov et al., 2014). Between the age of 4 months and 8 months, an intrauterine process of dif erentiation of adipocytes begins, i.e. a genetically predetermined number of adipocytes (Berry et al., 2013).

A diet too high in fat of pregnant women inf uences the organization of brain territories, which will coordinate satiety in the child and then in the adult. The neurohormonal circuits that will direct food search, satiety-hunger, the ability to voluntarily stop eating, begin to regulate during intrauterine life (Sullivan et al., 2014). This is why it is estimated that the current epidemic of obesity is largely related to the diet of pregnant women.

Since food has begun to be contaminated, especially with pesticides, many of these pesticides behave like estrogen-like endocrine disruptors (Darbre, 2017; Gore et al., 2018). These endocrine disruptors cause the supplementation of adipocytes, so instead of being born with a number of genetically predetermined adipocytes, the fetus will be born with a much higher number (Bateman et al., 2017; Petrakis et al., 2017; Bommarito et al., 2017; Campioli et al., 2014; Lucchese et al., 2017; Kim & Lee, 2017).

Neonatal period - Steps to obesity continue after birth, during breastfeeding and then throughout life. The newborn baby's development pattern in the f rst 3 months of life has its impact on adult health. Children with a rapid increase in this have a high risk of obesity and development of diabetes (Weng et al., 2006; Couperus & Nelson, 2006). Breast milk and its quality are strongly inf uenced by the diet of the breastfeeding woman. Human milk has species specif city. No other substitute reaches the qualities of mother's milk (***, 2005; Horta et al., 2007), a sterile food, biologically active by enzymes, antibodies, vitamins, providing a balanced proportion of proteins, lipids and carbohydrates, ensuring good digestive tolerance. Maternal milk reduces morbidity through infectious diseases, respiratory diseases (Fredriksson et al., 2007). It also prevents diabetes, obesity and its complications such as hypertension or dyslipidemia (Greer et al., 2008).

The f rst and most important liquid with which the newborn comes into contact is breast milk, which is the only food really adapted to the needs of the newborn and infant. Breastfeeding is recommended for at least 6 months, after which diversif cation can begin. Breastfeeding can continue in parallel to diversif ed foods up to two years of age.

The child's nutritional needs change with age. It is remarkable that the composition of breast milk: colostrum, which is produced during the f rst f ve days after birth, is also changing over time and favors the elimination of meconium; transitional milk between days 6 and 15 and mature milk between day 16 and the next 15 months (***, 2006). These three varieties of breast milk are distinct from the point of view of the content of carbohydrates, lipids, proteins, minerals, vitamins, etc. Moreover, the milk composition changes during sucking, triggering towards its end the feeling of satiety and voluntarily stopping the baby from sucking, with stronger signif cance for the child's health. Although the macronutrient composition of breast milk is slightly altered depending on nutrition, the f ne composition of the juice is sensitive to food additives (E), artif cial f avors, chemical contaminants (radionuclides), chemicals (pesticides, artif cial chemical fertilizer residues, hormones, antibiotics, dioxins, benzpyrenes, monomeric acrylamide, phthalates, bisphenol A etc.), smoking, alcohol consumption, drugs. These substances reach the breast milk ingested with food, inhaled or through the skin - with all the damaging consequences for the baby.

Human milk has the highest amount of lactose needed for the development of the newborn's brain. Mother's milk is very rich in essential polyunsaturated fatty acids (linoleic acid - omega 6, alpha linoleic acid - omega 3, and gamma-linoleic acid). These fatty acids are also essential, together with galactose, in the growth and myelination of the central nervous system. The mother's lifestyle and nutrition are essential for the future child and adult (Couperus & Nelson, 2006).

Childhood - The development of human fat is due to the increase in the number and size of adipocytes. After birth, in the f rst two years of life, fatty tissue growth occurs both in the number and in the size of adipocytes, which is triggered by triglycerides. A new increase in adipocyte counts occurs during adolescence, while in adulthood, weight variations are only due to the increase in adipocyte size. This is why two forms of obesity are present:

- Hypertrophic obesity, through an increase in the size of pre-existing adipocytes during intrauterine life without a new numerical increase, the form of obesity successfully treated through diet and lifestyle. Adipocytes can grow in volume about one hundred times (Gustafson et al., 2013).

- Hyperplastic obesity, through an increase in the number of adipocytes during intrauterine life and adolescence, followed by an increase in adipocyte size, which is the most serious and the most dif cult to treat (Stupin & Arabin, 2014).

Adolescence - Adolescence may be a particularly sensitive period because unhealthy lifestyle behaviors (e.g.

smoking, poor diet, and eating disorders) often develop in the years of adolescence (Stephenson et al., 2018). The basic senses - taste, smell, and vision - have a powerful hedonic function, shaping food behavior, by inducing pleasure-rejection sensations, inf uencing food choices. The taste is af ected by artif cial f avors, synthesis sweeteners, taste-enhancing agents, because they do not function in the same way and the same receptors, while metabolic pathways control and process nutrients other than those induced by natural f avors and nutrients in foods. Thus, any disturbance of the taste and intestinal messages reaching the regulatory centers in the brain causes behavioral malfunctions, which will disregard food consumption in quantitative terms (Melis & Barbarossa, 2017).

Mechanisms within the conscious, unconscious and memorable processes are disturbed by these artif cial tastes, which translate the truncated-thalamus-hypothalamus-cortex messages into truncated messages. Thus, the body loses the natural control of ultraf ne and complex regulation of natural eating behavior, based on the proper appearance of the satiety-hunger sensation. Deregulation of the satiety-hunger sensation through artif cial aroma of food, which causes excessive food consumption, is the deep physiological cause of the dif culty in managing weight and the occurrence of overweight and obesity (Amin & Mercer, 2016).

Adolescence is the period during which frequent disturbances in eating behavior occur that can be corroborated with addictive pathology. These adolescent eating behavior disorders often precede anorexia or nervous bulimia. Recent studies in the US show that 37% of young girls are perceived to be “too fat.” Of these, 57% want to lose weight and 14% of them follow an ultra-restrictive diet, 2.3% use an anorexic medicine and 3.1% use laxatives (Ahmadpour et al., 2018).

At the age of adolescence, the disorder occurs in the form of sudden and violent hunger crises, which often precede the bulimic crisis. This hyperphagic behavior has consequences on body weight. Bulimia and anorexia have a common trait, in addition to being a disturbance of eating behavior - a severe disorder of “perception of the image of one’s own body.” This disorder may manifest itself as a negative distortion of self-esteem. These cases require early psychiatric consultation.

Currently, there are plenty of means by which food can be used to manipulate human behavior. For example, chocolate cocoa contains theobromine and, in small quantities, a substance called phenyl-ethylamine, which has a slightly hallucinogenic activity, giving a state of euphoria and creating dependence on this product. It seems that phenyl-ethylamine is able to induce the sometimes bulimic attraction that chocolate creates, particularly in depressed people. This ef ect is also potentiated by another substance present in chocolate - salsolinol, which is an antidepressant with inhibitory action on biogenic amines, also possessing some af nity for opioid receptors. Recently, the presence of anandamide, which has a cannabinoid-like action, has been highlighted in chocolate, explaining the sensory exacerbation and euphoria induced by excessive chocolate consumption (Simion et al., 2018; Rada, 2017).

Recent Romanian studies showed that physical activities are associated with young age groups, male gender, rural areas, higher educational level and non-smoking status (Rada, 2017; Bădău et al., 2018; Roman et al., 2017), and worldwide researchers agree that eating pattern management, regular exercise and proper nutrition education in schools are important to overcome these lifestyle risks (Ahmadpour et al., 2018; Bădău et al., 2018; Roman et al., 2017).

In order to optimize services in wellness centers, it is required to use modern technologies for screening the levels of health, nutrition, f tness and lifestyle characteristics, to jointly develop customized prof les and programs. We recommend the usage of educational and physical applications and also, internet programs as practical tools focused on physical wellness. Wellness requires implementation of good lifestyle habits to improve health and quality of life, prolong life and achieve total well-being. It incorporates factors such as adequate f tness, proper nutrition, stress management, disease prevention, spirituality, no smoking or alcohol abuse, personal safety, regular physical examination, health education and environmental support (Bădău et al., 2018; Chwałczyńska et al., 2017; Byrne et al., 2016).

Conclusions

1. Lifestyle means conscious development and adoption of responsible, strictly personalized behaviors in order to meet biological, physiological and socio-cultural needs, under optimal conditions, in terms of nutrition, physical activity, mental/emotional activity, professional activity, recreational activity, health and social status. A proper lifestyle (from childhood to the senior period of life) will sustain health and will avoid obesity and other chronic diseases related to it.

2. Physical wellness depends on a strong connection between health and regular exercise, completed by a tailored program of nutrition. In our view, an ef cient wellness program is the result of precocious education with the participation of an interdisciplinary team of specialists in physical education, nutrition, kinesiotherapy and psychology.

Conf icts of interest

No conf ict of interest and no funding to declare.

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The importance of hydration in sport

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Abstract

Water is an essential constituent of living matter; and rehydration is very important for athletic performance. The body loses through sweat salt and minerals, together with water; and only water intake causes a decrease in blood sodium concentration that inhibits the nerve center that is responsible for the triggering of thirst. The aim of the study was to identify the relevant aspects of hydration in sport. The loss of 25% of the body water is incompatible with survival; and a decrease in body f uids of only 2%, a drop that is not even perceived as thirst, determines a reduction in exercise capacity by 15%, a highly signif cant percentage when talking about sports. Moreover, dehydration is highly correlated with fatigue.

Regarding the amounts of liquid that must be managed in a training session, they dif er depending on the amount of f uid loss in each athlete. The most accurate determination method is to weigh the athlete at the beginning and at the end of training sessions; the weight variation (considering the liquids ingested during exercise) representing the amount of f uid loss. The amount of liquid that must be ingested to balance the proportion of water is 1.5/1 to 1.5 liters of f uid intake per 1 liter of liquid loss.

Key words: performance, sport, rehydration

Introduction

It is important to draw attention to the fact that the thirst of athletes is not an accurate indicator of the state of hydration of the body. The body loses through sweat salt and minerals, together with water; water intake causes a decrease in blood sodium concentration that inhibits the nerve center responsible for the triggering of thirst. The health of athletes must be a constant concern to facilitate the obtaining of athletic performance, by optimizing the functional capacity of the body (Gürses et al., 2018; Bădău & Paraschiv, 2007). Studies have shown that a water def cit up to 1.6% of body weight negatively af ects health through: thermal stress, cognitive disorders, cardiovascular and functional overload of the body, occurrence of fatigue, increase in the recovery time (O'Connell et al., 2018; Logan-Sprenger et al., 2015; Lopez et al., 2011).

The aim of the study was to identify the relevant aspects of hydration in sport.

Hydration

There is a precise balance of electrolytes between the intracellular and extracellular compartments, which maintains nerve and muscle function (Von Duvillard et al., 2004; Speedy et al., 2001). Electrolyte balance is maintained by oral administration of substances containing electrolytes, while excesses are excreted by the kidney. The rate of absorption and excretion of f uids and electrolytes is mediated hormonally, basically by the antidiuretic hormone (ADH), aldosterone and the parathyroid hormone (PTH). Variations in physiological levels may cause cardiac and neurological changes. Doctors should know and carefully manage risks such as dehydration and hyperhydration, especially hyponatremia. The most important electrolyte is sodium, which is lost through sweat. Low sodium levels may lead to changes that can be exacerbated by the ef ects of dilution by f uid overload. Intake of potassium - another important electrolyte - also needs to be monitored due to urine and sweat losses.

Dehydration

Heat and f uid losses through stressful exercise are stressors which cause normal homeostasis in athletes. Replacing f uids reduces the risk of disorders caused by heat and improves exercise performance. More than 2% of weight loss during training sessions can af ect the cardiovascular response (Wharam et al., 2006; Saunders et al., 2004). Maintaining skin perfusion and cardiac output enables cooling by evaporation through perspiration. Fluids should be consumed in quantities equivalent to losses occurring through perspiration. Athletes need to rebuild their reserves of depleted f uids by drinking large amounts of water with electrolytes (Reid et al., 2004; Saunders et al., 2004). Often, the athlete is instructed to

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"drink more than he needs." However, in recent years, hyperhydration dangers, especially in the case of non-elite athletes, have been found to gain ground. Hypo-osmolar f uid hyperhydration leads to hyponatremia, which results in many deaths among runners worldwide and especially in the US, where most of the studies on this subject have been conducted.

Optimum oral rehydration during exercise

The best way to determine the rehydration needs is weighing the athlete before and after the race. Weighing before and after training can be a guide for the body f uid needs. Training should simulate the ambient conditions of the respective race: the land, duration, etc. By regularly checking weight before and after training, the athlete will gradually learn to use subjective perceptions such as thirst, sweating and the amount of ambient conditions, and will learn to estimate the need for liquids (Dallam et al., 2005; Noakes, 2003).

This is an analog exercise scale designed by Borg. Daily water requirements for a medium size adult (70 kg) is about 2 liters plus the losses related to training. The recommendations are mixed benef ts of prehydration 1-2 (235 ml) glasses of water, 2 hours before, and ½-1 (115 ml) glass before training. Although this is only intuitive sense, most liquids could be eliminated through the urine, draining the body of sodium. Other 150-300 ml of water are needed for every 15-20 minutes of exercise, but this may be variable. Post-workout, water supply is required, about 1-1.5 liters of water for every kilo lost.

Regarding the amounts of liquid that must be managed in a training session, they dif er depending on the amount of f uid loss in each athlete. For example, an athlete who weighed 72 kg before exercise, weighs around 71.5 kg after exercise, with 0.5 liters of drinking water for the duration of the session, one liter of liquid lost. The amount of liquid that must be ingested to balance the proportion of water is 1.5/1 to 1.5 liters of f uid intake per 1 liter of liquid lost. Since the competitor in the example above only had 0.5 liters of liquid in practice, he is found at the end of workout in a state of dehydration to be compensated with an input of a further 1 liter of liquid.

Prevention and treatment of dehydration

The f rst treatment line is represented by oral rehydration. Minor dehydration is best treated with an oral rehydration solution containing electrolytes such as beverages dedicated to athletes. Aqueous mixtures of salt, sugar and water would have to be administered orally. The optimum concentration for ef cient gastric emptying to reach osmotic equilibrium is available in the form of sports drinks marketed by companies specialized in their production such as the Multipower Company. However, these sports drinks might not have enough sodium, because if they were equivalent to the levels of sodium sweat losses, they could be unpleasant to taste. Most soft drinks contain little or no sodium, af ecting the osmotic balance and do not help the body to recover the losses during training (Shirref s et al., 2004). The rehydration strategies can be simple: after a workout, rehydration can be performed with milk, which is rich in electrolytes.

Sports drinks contain, in principle, a suitable carbohydrate (6%) to optimize absorption in the intestine after gastric emptying. Emergency medical care should be applied in more severe cases, e.g. fainting, loss of consciousness, altered mental status, or persistent nausea accompanied by vomiting. These symptoms require intravenous rehydration. Rehydration solutions, either oral or IV, must contain electrolytes to replace sweat losses or renal excretion. Generally, only prolonged workouts that exceed 60 minutes require rehydration through drink consumption. With little ef ort, suitable electrolytes and calories should be administered to a balanced diet, while excess can be detrimental. Juices (juices, water, not only sugar and food coloring) or milk, and sports drinks can f ll the void left by the lost electrolytes and can saturate the muscle glycogen (Table I).

Hyperhydration and hyponatremia

Hyponatremia occurs in a very high proportion of marathon runners and may be severe, especially in runners that are not performant. The use of NSAIDs may increase the risk of hyponatremia. Ultra-marathon supplements may require the use of salt. Attempts to charge water are useless, because water is generally eliminated in the urine, leading to depriving the athlete of more valuable salts. In recent marathons, it was attempted to use water in combination with glycerol and isomers; however, this technique, although legal in international competitions, has not yet been fully assessed regarding the safety of athletes (Ayus et al., 2005; Hew et al., 2003).

Table I

The composition of the beverage replete (personal contribution of Dan Costin)

Beverages	Sodium (mg/100 ml)	Potassium (mg/100 ml)	Carbohydrates	Observations
Gatorade	46	12.5	5.8	
Skimmed milk	50-55	140-170	5.4	It contains a variety of animal fat Proteins = 3.5 g/100 ml
Chocolate milk	75-85	135-175	11	Proteins = 3.3 g/100 ml
Isodrink	28	5	3.1	
Water from Bucharest	2.99	2.99	0	
Amino Vital	4	15	1.7	Amino acids – 308 mg/100 ml
Coca Cola	9-10	negligible	11	
Perla Harghitei	8.22	1.67	0	
Orange juice	0	188	11	

The symptoms of hyponatremia

Amateur endurance runners are in the greatest danger of dehydration, especially those who are not ahead in the competition, but those behind the group of runners, who spend several hours in the heat. Performant athletes will complete a marathon before they become too exhausted, while amateur athletes may require several hours to complete it (Orchard et al., 2006). Recent reviews have reported a high incidence rate of hyponatremia in dif erent runners who f nished the marathon (Halperin et al., 2005; Peate, 2005). Participants should also be advised on strategies for cooling, instead of drinking too much water. For example, some runners bear a white cap containing ice cubes to reduce the temperature of the body. Obstacles to perspiration such as inappropriate clothing or using too much sunscreen should be avoided. Athletes should consume sodium to saturate losses. Oral foods such as pretzels or crisps are good sources of sodium, salt and fat. Some athletes would also require medicines containing salt. Guidelines suggest that marathon runners need 400-800 mg of sodium per hour during heating and hot weather conditions (Coyle, 2004; Montain et al., 2006).

Athletes must also be advised that urination may continue even in a state of dehydration if hyponatremia develops while the body tries to hemoconcentration.

Conclusions

1. Consequently, thirst is quenched by lowering blood serum sodium, before f uids are repleted at an optimum level. This physiological mechanism is that water is not the ideal rehydration f uid in sports.

2. A suitable rehydration solution contains 6% glucose (energogenic role during ef ort) and a small amount of sodium chloride (salt). A solution with a higher glucose concentration decreases the rate of absorption of f uid in the intestine, as well as an osmotic solution that is too concentrated.

3. The most accurate determination method is to weigh the athlete at the beginning and at the end of the training sessions; the weight variation (considering the liquids ingested during exercise) represents the amount of f uid loss.

4. The amount of liquid that must be ingested to balance the proportion of water is 1.5/1 to 1.5 liters of f uid intake per 1 liter of liquid lost.

5. It is recommended that the training sessions contain several rehydration breaks every 15 to 20 minutes, when the athlete may be given 150-200 ml f uid intake.

6. Administration of larger quantities of f uids at rare time intervals is not recommended because it exceeds the intestinal f uid absorption rate.

7. The administration of rehydration f uids during the training sessions is benef cial for sports performance and may prevent fatigue.

Conf icts of interest

There are no conf icts of interest.

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Functions of outdoor adventure education programs

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Abstract

This research had as an objective to identify modern theoretical aspects which def ne education through adventure. Experiential education can be found in the performance systems of education, contributing to acquiring general competences from the syllabus but also to developing non-cognitive social abilities.

Together with formal, non-formal and informal education, outdoor education comes to complete the student's image, thus curricular adaptations being required. The boundaries of adventure education are expanding continuingly due to the programs that are analyzed, observed and implemented at a worldwide level. This can involve a wide range of participants, from students from the primary level to adults.

The activities are based on recreation but also involve values and abilities extremely useful in daily living. During the adventure education activities, abilities and theoretical knowledge from History, Psychology, Ecology, or Geography are correlated with experience during the practical application performed throughout a program of specif c activities.

The ef ects that the participants benef t from are especially those of developing the manifestation index of motor skills, vital skills usefully applied and coordinative capacities. Its practical nature establishes it as an extension of Physical Education, which has as an objective the formation of a healthy lifestyle and makes the transition from passive to active learning.

Key words: adventure education, outdoor education, physical education, conceptual delimitations

Introduction

The possibilities to change the methods used during practice activities led us to the idea of conducting a research regarding the functions of outdoor education through adventure. As part of experiential education, this can be found in the educational performance systems, which contributes to the acquirement of the general competences presented in the syllabus but also to the acquirement of social and non-cognitive abilities. It has been increasingly observed that students use in their free time television and internet as a source of information at a large scale for creating components of individual study and virtual information transmission of certain landscapes from nature.

One of the aims of physical education, according to the Physical Education and Health Society, is that children need to establish "patterns of regular involving into a signif cant physical activity". However, the participation in physical education courses alone is not enough for pupils and students to reach the daily recommended levels of physical activity (Schwamberger & Sinelnikov, 2015).

Their content is diverse and depends on the general aim of the program, on the target group and on the nature of activities that create the program. The def ning objectives proposed by EA programs are increasing physical activity, developing leadership skills, social and personal development, assimilating some survival techniques, assimilating knowledge in the natural science domain and developing skills that are found in nature-oriented sports.

Education through adventure (EA), a basic component of experiential education, favors the creation of physical harmony, the consolidation of motor skills and the increase in the manifestation index of a bigger intellectual accomplishment which can become the basis for a positive behavior of humans in society (Bădău, 2014). EA is a teaching approach where the human being is placed in an unfamiliar environment, which creates imbalances and focuses on developing problem solving skills. This can stimulate self-ef cacy and intergroup relations and

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can reduce ethnic identity; therefore, it can be used as a process of social integration because the exterior context encourages social and interpersonal abilities (Shikuku et al., 2015).

Experts in the f eld def ne EA as a variety of activities and teaching experiences and learning that usually implies a close interaction with a natural environment with elements of danger or actual risk, where the result, although uncertain, can be inf uenced by the participants' actions and the circumstances (Ewert & Sibthorp, 2014).

Outdoor education has synthesized over the years models based on practices and continues to grow in popularity as an educational frame for physical education teachers around the world, and more models have been modif ed by adding the adventure and controlled risk component, proving to be a success that can be applied to dif erent contexts in the physical education domain (Fernandez, 2015).

During outdoor activities, there is correlated knowledge from dif erent school subjects such as physical education, history, psychology, ecological education, or geography (Karppinen, 2012). The skills acquired by students through the organizing and the performing of activities are of an educational, motor and safety nature, organization, instruction, easing, f exible leading, judgement based on experience and collaboration (Bădău, 2017). EA activities stimulate physical, mental, social and cultural abilities, experimenting in real circumstances the human boundaries, taking risks, emotional stimulation, novelty and challenge (Moldovan & Enoiu, 2015).

The researchers' attempt to def ne it during the last decade has pointed out the boundaries of the new type of education which are in a continuous expansion due to the programs that are designed, researched and implemented at a global level. Its addressability includes a wide variety of participants, from primary level students to adults. The activities start from the concept of recreation but come together with a set of abilities and values extremely useful in real life.

The functions of adventure education

The relation between the structured activities of spending the free time and the positive results of development is a major component in analyzing youngsters and teenagers (Mahoney et al., 2005; Trainor et al., 2010; Bradley & Inglis, 2012). Adventure education has the potential to reach the mass population. In the f eld of education, adventure education has become a distinct subsystem, whose main purpose is the development of people's abilities and skills.

The main objective of adventure education, as part of non-formal education, is the same as that of formal education, which needs to lead to wisdom, accomplishment and personal development among people. In the last twenty years, EO programs in general and EA programs in particular have reported a series of positive ef ects on personal and social development, on physical activity, academic performances and leadership abilities for a wide variety of participants and age groups (Waite, 2011).

The hypothesis of education with the help of adventure is that exposure to challenges, games on the ground and at an altitude or personal development experiences helps the groups to change while they are exposed directly and deliberately. This targets the synchronization of four functions: educational, social, motor and recreational (Fig. 1).

Fig. 1 – The functions of adventure education (original contribution)

The educational function is represented by very valuable activities for society, vital for individual and group survival, for community's and nation's survival. Education is normally unnatural and children and teenagers reject it because it is against instinct, natural behavior. The importance of implementing education for any human society has been recognized since ancient times and over the years, solutions have been proposed and applied for the educational process to reach its objectives. Studies place EA specif c activities in an area that favors a strong impact on the educational, cultural and outdoor aspects (Camarda et al., 2010), their results being personal development and cognitive abilities development. The improvement of educational and academic preparation must target adaptation to international standards and the curricular modernization tendency. The increase in physical education competitiveness among the young generation can be achieved by implementing some innovative subjects in the curricula that can assimilate information and abilities according to the modern requirements of physical activity practice.

The social function generates multiple positive ef ects on several social categories. The recreational type of activities of ers the possibility to form good communication and develop interpersonal conf dence. In this way, new qualities can be discovered, new friends can be made, working groups are formed and the socialization phenomenon appears within the group. Involvement and constant participation in outdoor activities allow for increased socialization in all the other domains where students interact. Therefore, a social transfer is identif ed from recreational activities to dif erent areas of society. Practicing these as a social phenomenon leads to human social integration, assuring abilities that allow a normal development of social life. Social abilities are not innate, as are temperamental features or ref exes. They are learned, for which reason there is a signif cant def ciency in modern society (Johnson & Chin, 2016). Non-cognitive abilities represent important assets in developing resilience, def ned as a positive adaptation to a situation despite the presence of risk (Rutter, 2000; Masten, 2001). From an economic point of view, cognitive and non-cognitive abilities are

equally important. According to economic studies, the increase in the level of non-cognitive abilities has an ef ect on behavior that is comparable to and sometimes even higher than the increase in cognitive abilities (Heckman et al., 2006). EA programs of specif c activities represent a modern method through which full development of a child-teenager-youngster-adult can be accessed by assimilating social and non-cognitive abilities. These permanently target integration in all its forms.

The motor function is mentioned in studies that conf rm, in the case of developed states, a high level of association between practicing physical activity with a recreational purpose at a personal level and a high social activity. Statistics show that 17% of the adult population is totally inactive from a physical point of view, and a proportion of 41% is represented by adults who, despite exercising, do not have a suf cient level of physical activity to take advantage from its benef cial ef ects (Martin et al., 2006). EA focuses on growing and developing through activities based on the principles of experiential education. This improves motor and psychological capacities by exploring the real circumstances that involve a certain level of risk and stress. EA is a dynamic form of education available today and therefore, the motor aspect is found and given a great importance during the program activities. The objective of using EA is to help people mature themselves through experiences, which promote physical, cognitive and emotional development. The constant presence of EA programs in the students' life develops the basic motor skills usefully applied, the manifestation index of motor skills and coordinative capacities. The analysis of evidence suggests that the specif c programs of EA activities have the potential to contribute to teenagers' development from a physical, social, af ective and cognitive point of view. Research supports that it is one of the activities where a series of parameters of the physical development and f tness level can be improved. This also mentions the EA distinctive role in acquiring and developing children's movement abilities and physical strength as well as in improving the level of concentration, which can bring indirect benef ts to the academic results (Richard et al., 2009). EA programs have a large variety of activities such as backpacking, rope courses from high or low altitude, climbing, sky, snowboarding, forest biking, certain interval time trips during the night, applied track in adventure parks, orientation with a map and a compass, photo trip adventure, canoeing, performed outdoors, which contributes to proactive behavior by improving mental and social abilities (Ionescu & Bădău, 2018). These require from the participants: an active involvement that implies technical and physical skills and from the organizer: an optimal management of potentially dangerous situations that involve a certain risk. Combining the idea of motor development through formal activity during physical education lessons and EA potential, representing non-formal education, results in a new vision of the real dimension and potential that must be improved in the curricula by implementing a new optional school subject at certain levels of education.

The recreational function is represented by activities that belong to non-formal education. These have been diversif ed during the last years, generating new classif cations, from the performing environment to the degree of dif culty, the fun part, risk assumption and the large variety of values or life abilities assimilated or developed. A very important aspect that def nes modern non-formal education represents the possibility of adults' participation, no age limit, in recreational or self-development activities. An important aspect of the outdoor adventure education programs is that they can contribute to the level of participants' well-being, the concept of recreation or active participation during the free time in relation to the proposed personal development is identif ed in specif c actions and activities of the EO and EA programs. Physical exercises and recreational education specif c exercises are of great importance and represent the core of wellbeing that def nes the health concept. The physical ef ort performed in a group has a social integration role. Teenagers who wish to extend the systematic practice of EA specif c activities require an optimal space for each experience and also meeting their basic needs. By forming a new vision of the activities with a recreational and personal development role and also of the exclusive positive aspects, the recreational function of the EA programs is aimed at maintaining permanent contact, in order to assimilate the of ered benef ts on a social level and to maintain the health state. The role of recreational activities in society surpasses the dimensions of certain recreational activities, being part of the citizen's development and preparing program for work and for social life (Ganea & Grosu, 2018; Badau, 2017). EA specif c activities in relation to general motility ensure the harmony and the ease of a motor manifestation through dif erent body activities, amusing, sporting as an expression that requires the intervention and coordination of important muscle groups.

Conclusions

1. These possibilities of ered by technology cannot be considered a replacement for the authentic real life personal experiences and cannot replace each student's ef ort and involvement in their own development.

2. Their integration in a school stage through non-formal education and then in a continuous stage of education throughout the whole life must represent a constant preoccupation for creating an appropriate environment ensuring and keeping a balance in personal development.

3. Practicing specif c outdoor and adventure education activity programs represents a solution for promoting a healthy lifestyle.

4. Methodical and constant practice has positive inf uences on the cardiovascular, respiratory, locomotor, nervous systems and on the optimal functioning of metabolism.

5. Physical activities in the presence of programmed adventure have a major impact on motivation, the degree of involvement and the limits of the allocated time with irreparable negative ef ects on physical, cognitive and emotional capability.

6. EA is performed in a well-established time and space and is accompanied by a feeling of tension or risk, but also by the feeling that the activity is not an ordinary one.

Conf icts of interest

No conf ict to declare.

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A brief analysis of the relationship between QiGong and stress

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Abstract

Qigong (QG) is a form of mind-body exercise that can be done anywhere and at any time without any special equipment. In accordance with the traditional Chinese medicine philosophy, QG achieves a harmonious f ow of vital energy (Qi) and regulates the body's functional activities through breathing, conscious concentration, and gentle movements.

QG can be classif ed into two categories: dynamic QG (dong gong) and static QG (jing gong). There are two types of QG: a) internal QG or QG exercise, which is a self-directed form; and b) external QG, which is usually routed by experienced masters. In studies on the use of QG in stress, the following groups participated: adults with dif culties, middle-aged adults, students, hospital staf , people who regularly practice QG and healthy volunteers.

Compared with sedentarism, physical activity or intervention exercises, QG can signif cantly improve the quality of life. QG has ef ects on anxiety, vigilance, depression, fatigue, psychological stress; it also reduces work-related stress. QG exercises reduce the hyperactivity of the HPA axis and the release of the glucocorticoids circulating in the body from the adrenal cortex, so QG reduces blood concentrations of noradrenaline, adrenaline and cortisol.

Therefore, QG also causes stress reduction through the nervous, endocrine and immune systems. Specialized studies, although still limited in number, support the utility of QG in stressful situations.

Key words: Qigong, stress, stress mechanisms

Introduction

In recent years, unconventional methods have proven ef ective in lowering the blood levels of one of the most important stress hormones, cortisol; this is also the case of Qigong (QG), Tai Chi and Yoga (Matousek et al., 2010).

"QG is practiced in the Chinese communities by a large number of people to increase health, and in recent years an increasing number of studies have documented the ef ectiveness of QG for improving physical health and reducing stress and anxiety" (Wang et al., 2013).

Excessive stress has a negative impact on health and is associated with an increased incidence of anxiety and mood disorders as well as functioning def ciencies in every organ of the body (Selye, 1936; Luine et al., 2007).

This article is a continuation of previous research of the authors regarding the topic of Ginseng (Jurcău et al., 2013; Jurcău et al., 2018b) and stress modulation (Jurcău et al., 2017; Jurcău et al., 2018a).

QiGong

Def nition of QG

Qigong is an ancient form of martial arts developed in China over 3000 years ago and has been used continuously until now (Liu, 1999; Tsang et al., 2002).

Characteristics of QG

QG allows individuals to cultivate natural strength or energy („Qi"), associated with physiological and psychological functionality (Jahnke et al., 2010). Common practice, focus on mind and breathing lead to a balanced and improved mood. Core components of QG include concentration, relaxation, breathing adjustment, body posture, movement and meditation (Tsang et al., 2002).

Types of QG

The f rst forms of QG represent one of the historical roots of the Theory and Practice of Contemporary Chinese Traditional Medicine (TCM). QG can be classif ed into two categories: dynamic QG (dong gong), involving coordination

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of movements and meditation; and static QG (jing gong), which focuses on concentrating the mind and relaxing the body without physical movement. Depending on the experience gained by the practitioner, there are two types of QG:

a) Internal QG or QG exercise is a self-directed form involving the use of movements, meditation, and controlled breathing patterns.

b) External QG is usually routed by experienced masters who use their hands to direct Qi energy (called emitted Qi) to the patient for healing or treatment.

PubMed information on QG

When searching for information about Qi Gong (2019.01), PubMed publishes dif erent publication numbers depending on the keywords used (Table I):

Table I
QiGong PubMed publications depending on the keywords used

Keywords	Number of publications	Period of time	Number of years
QiGong	635	1981-2018	37
QiGong exercise	277	1981-2018	37
QiGong therapy	535	1981-2018	37
QiGong stress	77	1996-2018	22
QiGong evaluation	53	1989-2018	29
QiGong for health	355	1989-2018	29

QG and stress

Countries where stress-related QG was studied

Studies on the use of QG in stressful situations have been conducted predominantly in Asia: Hong Kong (Chan et al., 2012; Chan et al., 2011; Cheung et al., 2005; Chow et al., 2012; Tsang et al., 2013; Tsang et al., 2006; Tsang et al., 2003), Mainland China (Liu et al., 2008), South Korea (Lee at al., 2004; Hwang et al., 2013).

The ef ect of QG on stress compared to dif erent sports

QG for health consists of holistic consciousness exercises that alleviate the symptoms of chronic physical states and emotional disturbances (Ng & Tsang, 2009; Tsang et al., 2006; Tsang et al., 2013). Compared with sedentarism (Tsang et al., 2013; Tsang et al., 2006), physical activity (Tsang et al., 2007) or intervention exercises (Tsang et al., 2007), QG can signif cantly improve the quality of life. So, QG has benef cial ef ects on stress (Lee et al., 2004).

Scale used in QG assessment in stress

In stress-based QG studies, dif erent stress assessment scales have been used, such as: Stress Perception Scale (Grif th et al., 2008; Hwang et al., 2013); Depression and Stress Anxiety Scale (Chow et al., 2012); Checklist of symptoms - 90 (Liu et al., 2008).

Subjects participating in studies on QG in stress

The following subjects participated in studies on the use of QG in stress: adults with dif culties (Hwang et al., 2013); middle-aged adults (Chow et al., 2012); students (Liu et al., 2008; Manzaneque et al., 2009); hospital staf (Grif th et al., 2008); people who regularly practice QG (Johansson et al., 2008); healthy volunteers (Lee et al., 2004).

Studies that conf rm the favorable ef ect of QG use in stress

It has been proven that external QG without touching (QTN) or with touching has signif cant ef ects on anxiety, vigilance, depression, fatigue, psychological stress, cortisol levels, cytotoxicity of NK cells, and neutrophil function (Jung et al., 2006). In another stress study, compared to the control group, QG signif cantly reduced stress-related arterial markers: the blood concentrations of noradrenaline, adrenaline and cortisol (Lee et al., 2003b). In addition, QG has been shown to reduce blood pressure (Lee et al., 2003a; Lee et al., 2004; Tsai et al., 2003). QG exercises have immediate and lasting ef ects on stress in middle-aged adults by reducing cortisol levels (Jung et al., 2006; Lee et al., 2004). Thus, due to the safety of this method, its minimal costs and clinical health benef ts, QG may be an adjunctive therapy for elderly patients with corneal conditions (Ng & Tsang, 2009). QG exercises can also reduce work-related stress, such as computer-related stress (Skoglund & Jansson, 2007).

Possible mechanisms of QG in stress

It is assumed that breathing regulation and structured movements of the body during QG exercises lead to long, deep and rhythmic diaphragmatic breathing, which acts on the autonomic nervous system (ANS) and the endocrine system, causing increased cardiac output and oxygen consumption and elimination of carbon dioxide, which would have the ef ect of stabilizing the mood and restoring homeostasis (Wang et al., 2010).

Exercising QG has a signif cant ef ect on the hypothalamic-pituitary-adrenal axis: it decreases plasma concentrations of ACTH, aldosterone and cortisol and improves anxiety (Lee et al., 2004). In addition, QG reduces urinary norepinephrine excretion, cardiac rhythm and temperature by reducing sympathetic nervous system activity (Skoglund & Jansson, 2007).

There would be three psychobiological pathways that could explain the ef ects of QG exercises on stress and depression: a) the hypothalamic-pituitary-adrenal axis; b) monoamine neurotransmitters in the brain; and c) neurotrophic factors derived from the brain (Tsang & Fung, 2008). Among these, the „neuroendocrine hypothesis" (Tsang & Fung, 2008) assumes that: the mindfulness element of QG health exercise could reduce stress signals sent by the limbic system to the hippocampus and amygdala, which would reduce the secretion of the corticotropin-releasing factor from the periventricular hypothalamus and release of the adrenocorticotropic hormone from the anterior pituitary gland. Therefore, QG exercises for health would reduce hyperactivity of the HPA axis in individuals with depression and the subsequent release of glucocorticoids circulating in the body from the adrenal cortex.

Conclusions

1. The practice of QG leads to removal of diseases, strengthening of health and, in time, to achievement of longevity.

2. Studies on QG and stress have been conducted on populations of dif erent ages and professions, using psychological, functional and biological assessments.

3. QG causes stress reduction through the nervous, endocrine and immune systems.

4. Specialized studies, although still limited in number, support the utility of QG in stressful situations.

Conf icts of interest

Nothing to declare.

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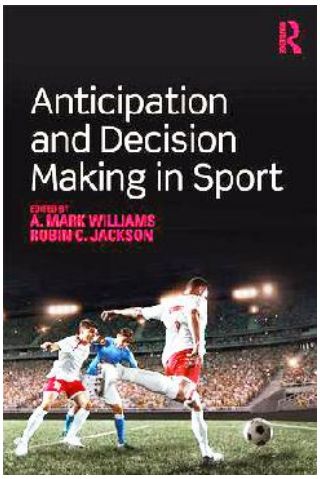
RECENT PUBLICATIONS

Book reviews

Anticipation and decision making in sport
Editors: A. Mark Williams, Robin C. Jackson
Routledge; 1st edition, March 7, 2019
428 pages; price: £39.99 (paper) /from £20.00 (eBook)



Two editors and a considerable number of 48 world-renowned researchers in the f eld have fruitfully collaborated to this f rst edition of a book that will probably remain the reference work in anticipation and decision making in sport for at least the next decade. A book for good reason considered the f rst which identif es the science underlying the anticipation and decision making processes in sport and approaches both topics not only from a psychological point of view, but also from the perspective of related f elds, such as biomechanics, neuroscience, physiology, computing science and performance analysis.

The text of the work is distributed into three parts. The f rst one, dedicated to the characteristics of expert anticipation in sport – in other words to the mechanisms underpinning anticipation – is the most substantial; it contains 10 of all 21 chapters. Certainly, each of these 10 chapters is important and interesting, but those teaching us about contextual information (3), visual search behaviors (4) and the role of peripheral vision (5) of er the key knowledge for both understanding and training anticipation. On the other hand, taking into consideration the signif cant harmful impact of anxiety on performance in sport, Chapter 7 – "Emotion and its impact on perception" – needs special attention and deep understanding, especially in the case of practicing psychologists and coaches.

The second part, "Characteristics of expert decision making in sport", is composed of much fewer chapters, but although so small it represents a comprehensive and systematic approach of the unfortunately not so exhaustive research base existing in decision making in sport. The scarcity of extensive information and clarif cations in the f eld is also evidenced by the fact that none of the four chapters strictly and specif cally addresses the decision making process of athletes. Thus, if Chapter 11 reviews research on creativity and decision making, the next chapter focuses on the role of heuristics and biases in… business and economics. Somehow more specif c to the practice of high-performance sport seems to be the Chapter 13, which explores the ef ects of stress on decision making, but the closing section only refers to how match of cials and judges (not athletes) make accurate decisions.

The last part is more applied and evidently more useful to practitioners, as it teaches them how to design and implement training interventions aimed at ef ectively improving anticipation and decision making. It f rst shows why and how non-coach-led and game-related practice sessions (Chapter 15), f lm-based simulation training (16), and so-called less prescriptive methods such as guided discovery and implicit learning (17) are of real help in this attempt. Chapter 18 presents the benef ts of performance analysis, while Chapter 19 highlights the perspectives the use of virtual reality opens to enhancing perceptual-cognitive expertise in sport. Finally, the ending sections of the work provide up-to-date information on the favorable ef ects of training under pressure (20), and on the question whether superior anticipation and decision making can be transferred within and across sports.

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EVENTS

Some news regarding the ski competitions in the mountain centers in Cluj county - 2019

It is our pleasure to remind the fact that the 7 cross-country skiing competitions that are held every winter are included in the educational health prevention project in rural areas *Sport - an alternative for a healthy life*, along with the spring and autumn cross-country running races. The f rst novelty this year was the abundant presence of snow, which allowed the competitions to take place under optimal conditions. The second novelty is the fact that some of the former participants, now at the age of adolescence, continue to practice cross-country skiing as members of the Cluj University (U) Club and rank on top positions in national competitions such as those held in Grădiștea Brașovului or other locations. We mention Bogdan Buș, Török Boglarka and Radu Forț, or more recently, Söcs Imola, Claudiu Vâtcă and Flaviu Dobra in Valea Rîșnoavei-Predeal. The third novelty is the record of participants, whose number amounted to 100 in one of the competitions. A high level of emulation from local authorities and the management of the organizing schools was maintained concerning the involvement in this type of competitions.

This year, the cross-country skiing competitions took place in the period 24 January - 27 February 2019. The date of the f rst competition organized in Rogojel on 24 January coincided with the celebration of the *Union of the Romanian Principalities* (1859), on which occasion the Union Hora was danced at the award ceremony.

1. Rogojel Center - The *Vlădeasa* Cup, 7th edition, 24 January 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Török Zolán-Sâncraiu	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Sâncraiu	Râşca
2	Şchiop Gabriela-Răchiţele	Roba Marius- Măguri	Bîlc Ioana-Beliş	Dobra Flaviu-Beliş	Râşca	Măguri
3	Tomoş Ioana-Râşca	Dinescu Andrei-Beliş	Forţ Alexandra-Rogojel	Todoruţ Paul-Răchiţele	Răchiţele	Sâncraiu

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, 14th edition, 25 January 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Toader Ovidiu-Măguri B	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Sâncraiu	Sâncraiu
2	Tomoş Ioana-Râşca	Török Zolán-Sâncraiu	Bîlc Ioana-Beliş	Todoruţ Paul-Răchiţele	Râşca	Râşca
3	Görgy Andrea-Sâncraiu	Pleş Claudiu-Rogojel	Abrudan Mădălina-Râşca	Roba Vasile-Măguri	Beliş	Măguri

Physical education teacher: Csudom Norbert; Director: Prof. Okos-Rigó Dénes; Mayor: Póka András György; Cluj-Napoca mountain rescue - organization and assistance

3. Beliş Center - The *Scoruşet* Cup, 24th edition, 2 February 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Toader Ovidiu-Măguri	Söcs Imola-Sâncraiu	Todoruţ Paul-Răchiţele	Râşca	Râşca
2	Tomoş Ioana-Râşca	Mariş Andrei-Mărişel	Abrudan Mădălina-Râşca	Vâtcă Claudiu-Râşca	Sâncraiu	Măguri
3	Şchiop Gabriela-Răchiţele	Török Zolán-Sâncraiu	Bîlc Ioana-Beliş	Dobra Flaviu-Beliş	Răchiţele	Sâncraiu

Physical education teacher: Crăciun Cosmin Florentin; Director: Mihaela Mocean; Mayor: Viorel Matiş; Cluj-Napoca mountain rescue - organization and assistance

https://doi.org/10.26659/pm3.2019.20.1.43

4. Râşca Center - The *Sălănducu* Cup, 21st edition, 3 February 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Mariş Andrei-Mărişel	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Râşca	Râşca
2	Tomoş Ioana-Râşca	Török Zolán-Sâncraiu	Abrudan Mădălina-Râşca	Todoruţ Paul-Răchiţele	Mărişel	Mărişel
3	Şchiop Gabriela-Răchiţele	Toader Ovidiu-Măguri	Abrudan Mihaela- Mărişel	Suciu Flaviu- Răchiţele	Răchiţele	Sâncraiu

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

5. Mărişel Center - The *Pelaghia Roşu* Cup, 33rd edition, 16 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	Roba Marius- Măguri	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Râşca	Râşca
2	Şchiop Gabriela-Răchiţele	Mariş Andrei-Mărişel	Abrudan Mihaela-Măroşel	Todoruţ Paul-Răchiţele	Răchiţele	Mărişel
3	Tomoş Ioana-Râşca	Forţ Marian- Rogojel	Abrudan Mădălina-Râşca	Dobra Flaviu-Beliş	Sâncraiu	Măguri

Physical education teacher: Ionuţ Bal; Director: Prof. Dana Mirela Feneşan; Mayor: Viorel Ghic; Cluj-Napoca mountain rescue - organization and assistance

6. Măguri Bogdăneşti Center - The *Avram Iancu* Cup, 3rd edition, 17 February 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Roba Marius- Măguri	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Măguri	Râşca
2	Tomoş Ioana-Râşca	Török Zolán-Sâncraiu	Forţ Alexandra-Rogojel	Todoruţ Paul-Răchiţele	Râşca	Măguri
3	Şchiop Gabriela-Răchiţele	Mariş Andrei-Mărişel	Abrudan Mădălina-Râşca	Roba Vasile-Beliş	Sâncraiu	Răchiţele

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

7. Băişoara Center - The *Little Mountain Hunters* Cup, 40th edition, 22 February 2019

Place	Girls 11-12 years	Boys 11-12 years	Girls 13-14 years	Boys 13-14 years	Relay	Team ranking
1	Tomoş Estera-Râşca	Roba Marius-Măguri	Söcs Imola-Sâncraiu	Vâtcă Claudiu-Râşca	Măguri	Măguri
2	Şchiop Gabriela-Răchiţele	Mariş Andrei-Mărişel	Abrudan Mădălina-Râşca	Roba Vasile-Beliş	Râşca	Mărişel
3	Toader Denisa- Măguri	Toader Ovidiu-Măguri	Forţ Alexandra-Rogojel	Pleş Cosmin-Rogojel	Mărişel	Râşca

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

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Rogojel

Participants f ghting the fog

Award ceremony for 13-14-year-old boys, conducted by the school director, Prof. Mariana Paşcalău

The Union Hora in Rogojel, with mayor Gheorghe Cuc

Sâncraiu

Speech of Péter György Árpád, deputy mayor of Sâncraiu, at the award ceremony

Award ceremony for 13-14-year-old boys, conducted by the school director, Prof. Okos-Rigó Dénes

Award ceremony for 13-14-year-old girls, conducted by School Inspector Laura Ionescu

Beliş

Maximum focus at the technical meeting before the competition

Speeches of the of cials at the award ceremony

Award ceremony for the girls' relay event, conducted by School Inspector Cristian Potoră

Râşca

Competitor during the race in Râşca

Award ceremony for the relay event, with Prof. Florin Cotiş, school director, to the left and Prof. Ardelean Ilea to the right

Mayor Teodor Petre awarding prizes to the team leading teachers

Mărişel

Participants before the start of the competition

The three young ladies wearing folk costumes who handed the prizes at the award ceremony

At the award ceremony, mayor Viorel Ghic alongside the school director Dana Mirela Feneşan

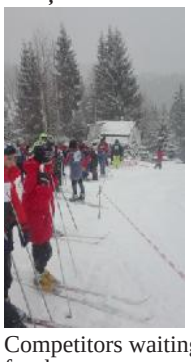
Măguri-Bogdăneşti

The most beautiful and dif cult route of all competitions, that of

Speech of mayor Petru Prigoană

Award ceremony for the relay event

Băişoara



Competitors waiting for the start

Getting to the place of the competition

Award ceremony for 13-14-year-old girls

Award ceremony for the team leading teachers

FOR THE ATTENTION OF CONTRIBUTORS

The subject of the journal

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

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

Among articles devoted to original studies and research, we are particularly interested in the following: methodology in physical education and sport; inf uence of some ions on ef ort capacity; psychological prof les of students regarding physical education; methodology in sport gymnastics; selection of performance sportsmen.

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

The authors of the two sections are doctors, professors and educators from university and pre-university education, trainers, scientif c researchers etc.

Other sections of the journal are: the editorial, editorial news, reviews of the latest books in the f eld and others that are rarely presented (inventions and innovations, university and pre-university programs, forum, memories, competition calendar, portraits, scientif c events).

We highlight the section "The memory of the photographic eye", where photos, some of which extremely 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, the variability of cardiac rhythm, the stages of ef ort 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 f eld. The journal assumes an important role in the achievement of necessary scores by the teaching staf in university and pre-university education, as well as by doctors in the medical network (through recognition of 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 a summary in English for all articles. Frequently, articles are published in extenso in a language of international circulation (English, French).

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

Health, Sports & Rehabilitation Medicine
Chief Editor: Prof. Dr. Traian Bocu
E-mail address: hesrehab@gmail.com; traian_bocu@yahoo.com
Postal address: Clinicilor street no. 1, postal code 400006, Cluj-Napoca, Romania
Phone: +400264-598575
Website: www.jhsrm.org

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 University Titles and Diplomas).

We also intend to encourage the publication of studies and research that include relevant original elements, especially by 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 fulf ll 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 f nal page.

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

Illustrations:

The images (graphics, photos, etc.) should be numbered consecutively in the text, with Arabic numerals. They should be edited with EXCEL or SPSS programs, and sent as distinct f les: "f gure 1.tif", "f gure 2. jpg", to the editors. Every graphic should have a legend, written under the image.

The tables should be numbered consecutively in the text, with Roman numerals, and sent as distinct f les, accompanied by a legend that will be placed above the table.

PREPARATION OF THE ARTICLES

1. Title page: Includes the title of the article (maximum 45 characters), the f rst name of the authors followed by their surname, workplace, postal address of the institute and postal address and e-mail of the f rst author. It will follow the name of the article in English.

2. Abstract: Original articles require a summary structured in: (Background, Aims, Methods, Results, Conclusions), of maximum 250 words, followed by 3-8 key words (if possible from the list of established terms). All articles will have a summary in English. Within the summary (abstract), abbreviations, footnotes or bibliographic references should not be used.

Background. 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. Descriptive and inferential statistical data (with specif cation of the statistical tests used): the dif erences between the initial and the f nal measurement for the investigated parameters, the signif cance of correlation coef cients are necessary. The level of signif cance (the value ***p*** or the dimension of ef ect ***d***) and the type of the statistical test used, etc. should be mentioned.

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

Orientation articles and case studies should have an unstructured summary (without respecting the structure of experimental articles) up 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 information), Results, Discussing results, Conclusions and suggestions. Other types of articles, such as orientation articles, case studies, editorials, do not have an obligatory format. Excessive abbreviations are not recommended. The f rst time an abbreviation is used in the text, it should follow the term *in extenso*, being placed in parentheses, and thereafter the short form should be used.

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

4. References

The bibliography should include the following data:

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

Articles: Carlos S, de Irala J, Hanley M, Martínez-González MÁ. The use of expensive technologies instead of simple, sound and ef ective lifestyle interventions: a perpetual delusion.See comment in PubMed Commons below 2014;68(9):897-904. doi:10.1136/jech-2014-203884.

Books: Fox SI. Human Physiology. Twelfth Ed. Publ MCGraw Hill. New York, 2011,403-470.

Chapters from books: Sternfeld B, Lee IM. Physical activity and cancer: the evidence, the issues and the challenges. In: Lee IM, Eds. Physical Activity and Health Epidemiologic Methods and Studies. New York: Oxford University Press, 2009.

Starting with issue 4/2010, every article should include a minimum of 15 and a maximum of 100 bibliographic references, mostly journal 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 the recent international literature (not older than 10 years).

Conf ict of interest

The authors must mention all possible conf icts of interest including f nancial and other types. If you are sure that there is no conf ict of interest, we ask you to mention this. The f nancing sources should also be mentioned in your work.

Acknowledgements

The specif cations must concern only people outside the study who have had a substantial contribution, such as statistical processing or review of the text in English. The authors have the responsibility to obtain the written permission from

the persons mentioned within the respective chapter, in case readers refer to the interpretation of results and conclusions of these persons. Also it should be mentioned if the article uses partial results from certain projects or if these are based on master or doctoral theses defended by the author.

Peer-review process

In the f nal stage, all materials will be closely reviewed by at least two competent referees in the f eld (professors and docent doctors) so as to correspond in content and form to the requirements of an international journal. After this stage, the materials will be sent to the journal's referees, according to their prof les. After receiving the observations from the referees, the editorial staf shall inform the authors of the necessary corrections and 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 has been accepted for publication or not. If it is accepted, a period of correction by the author will follow, in order to meet the publishing requirements.

Ethical criteria

The Editors will notify the authors in due time whether their article is accepted or not or if there is a need for modifying the text. 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 the sources used (bibliographic references, f gures, 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 certif cate for doctors, for studies in human subjects;
- certif cate from the Bioethical Committees, for human study protocols;
- certif cate from the Bioethical Committees, for animal study protocols.

This information will be mentioned in the paper, in the section Materials and Methods. The documents will be obtained before the beginning of the study. The registration number of the certif cate from the Bioethical Committees will also be mentioned.

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

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