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Project for the testing of the fitness level of students and carrying out kinetic prophylactic programs to increase the endurance level

Proiect de testare a nivelului de fitness la studenţi şi realizarea de programe kinetoprofilactice de creştere a nivelului de anduranţă

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Abstract

Background. It is well documented that exercise exerts multiple positive effects on the body, including the maintenance and strengthening of health functions, and is also a means of recovery in different more or less serious conditions. Exercise is the basis of kinetic prophylaxis, with applications addressing primarily healthy people and people who are in special biological situations.

Aims. The research aimed at highlighting the fitness of students from the University of Bucharest and providing students with kinetic prophylactic programs to increase endurance levels in order to promote, maintain or regain health.

Methods. We used experimentally a myoarthrokinetic test which includes joint mobility testing, balance testing, and muscular strength testing. The final results will be statistically analyzed and graphically represented.

Results. The results of the study will highlight that fitness exercises and the programs for improving strength, mobility and balance lead to a significant increase in scores obtained by students in the ten tests of the Hettinger system.

Conclusions. Physical exercise as a way to strenghten health leads to functional improvement and increased psycho-physical efficiency. It is known that after the age of 20 years, the myoarthrokinetic system begins to decline, so it is important that healthy young people know kinetotherapy programs, which are based on physical exercise, in order to maintain and optimize health and to prevent premature degradation of the body and its functions in general.

Keywords: fitness, kinetotherapy, endurance, students.

Rezumat

Premize. Ideea de la care s-a pornit, care stă la baza studiului este aceea că exerciţiul fizic exercită multiple influenţe pozitive asupra organismului, printre care menţinerea şi întărirea sănătăţii, a funcţiilor, dar şi mijloc de recuperare în diferite afecţiuni mai mult sau mai puţin grave. Exerciţiul fizic stă la baza kinetoprofilaxiei, cu aplicaţii ce se adresează în primul rând oamenilor sănătoşi, dar şi oamenilor aflaţi în situaţii biologice speciale.

Obiective. Cercetarea şi-a propus să evidenţieze nivelul de fitness al studenţilor Universităţii din Bucureşti şi să ofere studenţilor programe kinetoprofilactice de creştere a nivelului de anduranţă pentru promovarea, menţinerea sau recâştigarea sănătăţii.

Metode. Vom folosi un experiment de tip constatativ. Se testează aparatul mioartrokinetic care cuprinde: testarea mobilităţii articulare, testarea echilibrului, testarea forţei musculare. La final rezultatele vor fi prelucrate statistic şi reprezentate grafic.

Rezultate. Rezultatele studiului vor evidenţia faptul că în urma practicării exerciţiilor de fitness, a programelor pentru îmbunătăţirea forţei, mobilităţii şi echilibrului, se va constata o creştere semnificativă a punctajului obţinut de studenţi, la cele zece probe ale sistemului Hettinger.

Concluzii. Exerciţiul fizic ca mijloc de întărire a sănătăţii, conduce în timp la perfecţionarea funcţională şi mărirea randamentului psiho-fizic. Este ştiut faptul că după vârsta de 20 de ani, aparatul mioartrokinetic începe să intre în declin, de aceea, este important ca tinerii sănătoşi să cunoască programe de kinetoterapie ce au la bază exerciţiile fizice, în scopul menţinerii şi optimizării stării de sănătate, în vederea prevenirii degradării premature a organismului şi a funcţiilor sale în general.

Cuvinte cheie: fitness, kinetoterapie, anduranţă, studenţi.

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Introduction

The concept of fitness takes its origins in the Anglo-Saxon literature, representing a theme approach for people who search solutions to raise their quality of life and maintain their health (Dumitru, 2007).

Fitness is (Falls et al., 1980, quoted by Sabău, 2002) a form of self-motivated and systematic participation in physical exercise, to improve the quality of life.

Fitness is a multidimensional, dynamic condition, which is based on positive health and which includes a lot of components: intellectual, social, spiritual and physical fitness (Hidi, 2007).

Fitness is a term that indicates the level of the cardiovascular system, as a result of high energy reserves. It strictly refers to the amount of oxygen consumption. Practically, it refers to the optimal performance of the body and its state of welfare. We can speak about fitness levels, which are determined by age, sex, heredity, inactivity or training, disease condition, etc.

Physical fitness in relation to health consists of: cardiorespiratory resistance, muscle strength, mobility and body composition.

Kinetotherapy is part of physical medicine – a therapeutic specialty which uses the following methods: movement, heat, electric power, climate, massage and water. It is the newest branch of physical medicine and represents an active methodology for the consolidation or restoration of body functions affected by diseases or trauma (Cordun, 2009).

Kinetotherapy is an individual therapeutic form which, starting from static and dynamic exercises, can be used in prophylactic treatment and recovery programs, in order to maintain a good functional level or increase the functional level (gymnastics, fitness, walking, jogging, aerobics, for good health) (Cordun, 1999).

The general objectives in the treatment by kinetotherapy are (Kiss, 2007):

- restoration of muscle strength and increase of muscle resistance;
- increase and adaptation of exercise capacity, improvement of coordonation functions, control and balance of the body;
- relaxation training capacity;
- posture of the body;
- increase of joint mobility;
- rehabilitation sensitivity.

Endurance is a sustained effort at high parameters and is expressed by the capacity to maintain effort as long as possible, in the absence or suppression of fatigue, without significant changes in respiratory and cardiac frequency (Bompa, 2001).

Endurance depends on the pulmonary function, blood oxygen transport capacity, cardiac function, capacity of the tissue to extract oxygen from blood, and on the muscle oxidative potential.

Physical education is an activity which works the whole body, so that we can talk about a close relation with medicine. Physical exercise is an important way to strengthen health, with a prophylactic and a therapeutic role.

Specialists consider that physical activity is a factor of first importance for the quality of life (Balint, 2010).

We aimed to find potential deficits of the body by testing the myoarthrokinetic system with the Hettinger test (Sbenghe, 2005). Also, we wanted to inform students about the effects of systematic physical exercise and the programs aimed at maintaining and optimizing health in order to prevent premature degradation of the body and its functions.

The current state of knowledge in the thematic area

Colibaba & Bota (1988) consider that fitness is full vitality (the related physical availability) of the human body, allowing to obtain high results in some activity, test or sports discipline. In other words, general physical condition or fitness ensures:

- health;
- prevention of illness;
- delay of aging;
- conservation of professional or occupational skills;
- physical and mental health gained by practicing physical exercise or leisure activities;
- updating or permanent reconstruction of the self by systematic practice;
- integration in the social environment;
- general physical capacity as a basis of high results.

Keeping an ideal body weight is based on a positive self-image. Fitness acts on the self-image and physical aspect.

The majority of the English specialists distinguish two types of fitness (Morrow & Jackson, 2010):

a) fitness, whose components can be improved even if a person does not have physical abilities, positive results depending only on health;

b) motor fitness, whose components are based on neuromuscular physical fitness, with an important genetic determination, the evolution of these being limited

Motor fitness derives from the general concept of fitness and means movement efficiency.

Fitness can be decomposed in:

- physical fitness – optimization of physical condition;
- mental, emotional fitness - psychic comfort, emotional stability, self-confidence;
- intellectual fitness - optimization of mental procceses, positive thinking, creativity;
- social fitness - interhuman relation, self-respect, professional success, social status;
- aesthetic fitness - appearance, body shape, in relation to tendencies, fashion;
- physiological fitness – optimization of vital body functions represented by the respiratory, cardiovascular systems, adequate metabolism, central nervous system and analyzers.

Aerobic fitness or aerobic exercise capacity represents an important factor when speaking about functional capacity and health (Bota, 2002).

The term aerobic resistance is determined by metabolic characteristics of energetic processes (Todea, 2001).

Allsen et al. (1989) consider physical fitness a reflection of the ability to work with vigor and pleasure, without fatigue, having sufficient energy for hobbies and recreative activities, which is related to the mental and physical state.

Physical fitness is part of physical education, which must become a responsibility for sport teachers. Aerobic exercise has been practiced for a long time in order to lose weight and achieve physical fitness. In establishing programs for increasing and maintaining physical fitness, the following principles of life should be taken into consideration: overcompensation, specificity, progressive effort, frequency, intensity and duration, individualization (Dragnea & Bota, 1999).

To have a high fitness level means to have the energy and strength to perform daily activities in a vigorous manner and in the end to have enough energy left for fun actions and urgent requests; the heart and lungs must be strong, and the weight and percentage of body fat must be within the recommended parameters: for women less than 25% of the body weight, for men less than 18% of the body weight (Sheehy, 1993).

Physical fitness is not only a training program executed 2-5 times a week, fitness is a way of life for everybody, during which people spend their free time training and socializing. When we speak about sanogenic effects, we refer to positive physical changes as well as to a good influence against diseases (Plas & Hagron, 2001).

Corbin & Lingsey (1984) explain why a good level of fitness is the positive answer to these questions:

- Do you perform daily work vigorously, without feeling fatigue?
- Do you have a correct body posture?
- Do you have sufficient energy for free time activities, at the end of the day?
- Do you have a thin and agile body?
- Can you sustain prolonged physical effort?

Useful applications of fitness include (Kenneth, 2000):

- elimination of stress and tension and an inoffensive way to release anger;
- a challenge, elimination of boredom;
- current problems are forgotten, and later, they will not be so stressful;
- sleep is good and the person feels much better;
- if the person is good enough in an activity, it raises self-confidence;

Social benefits of fitness in the free time include (Katz, 1988):

- meeting people with common interests and making new friendships;
- developing team-work and the capacity of cooperation, which is good for other activities than sport.

Fitness exercises are frequently used in kinetotherapy because of their simplicity and because they act on different muscle groups, facilitating the monitoring of the evolution of the person between sessions.

Objectives

Establishing the principal indicators that assess the level of fitness. Selection of methods. Finding physical deficiencies. Training by establishing the intensity, duration and frequency of exercise programs. We wanted to have a complete image of the fitness level of the University of Bucharest students, in order to have objective arguments for making decisions about programs for the promotion, maintenance and recovery of health.

Hypothesis

The engagement in and commitment to an aerobic physical activity has a positive influence on the human body, reflected by improved levels of motor and functional abilities, when individuals male or female are practicing these types of physical activities.

Materials and methods/ study design

Research protocol

The study was approved by the Ethics Committee of the University of Bucharest and the students gave their informed consent.

a) *Period and place of the research*

The project spans a 2 year period, from 2014 to 2016, in which we hope to test the fitness level of the students and to develop kinetic prophylactic programs to increase their endurance level, including body activities practiced regularly. In this project, teachers from the University of Bucharest and other universities will participate.

Research stages

The research will be carried out in several stages:

- development, files registration: 1-30 September 2014
- the sample: 1-15 October 2014
- measurements: 15-30 October 2014
- recording of results: 1-30 November 2014
- data processing, correlation parameters investigated: 1 December 2014 - 30 February 2015
- conclusions: 1-15 March 2015
- developing programs to optimize health: 1-30 April 2015
- application: May-December 2015
- making feed-back by repeating the measurements: 15-30 January 2016
- final conclusions: 1-15 March 2016

b) *Subjects and groups*

We aim to evaluate 1500 first year students (500 male and 1000 female) studying different sport disciplines.

c) *Tests applied*

The testing methods used are aimed at the objective evaluation of the myoarthrokinetic system: joint mobility testing, balance testing, and muscular strength testing.

Testing of the myoarthrokinetic system

The literature shows that after 20 years of age, the myo-arthrokinetic system begins to decline, intervertebral discs and vertebral cartilage start to present degenerative elements that occur on a metabolic background. Subsequent evolution is determined by a limitation of movement and a decrease in the quantity and quality of movements (Cordun, 2011).

One of the most successfully used systems aimed at myoarthrokinetic testing is the *Hettinger* system (Sbenghe, 1987), which can prove that healthy persons may have important deficits that in time affect the body structure and function. The exercises testing the myoarthrokinetic system applied in the study are shown in Table I.

d) *Statistical processing*

The software programs used for statistical calculation are: Microsoft Word, Microsoft Excel (Gagea, 1999). The main statistical indicators will be calculated: X-arithmetic, S-standard deviation, Cv%-variability coefficient. Graphic representation will allow the expression of the processed data and findings (Tudor, 2008).

Table I
Exercices for the test of the myoarthrokinetic system.

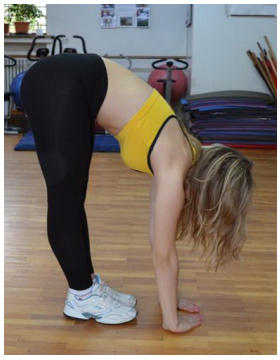
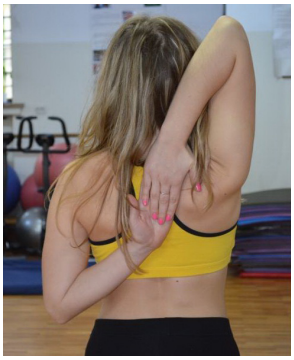
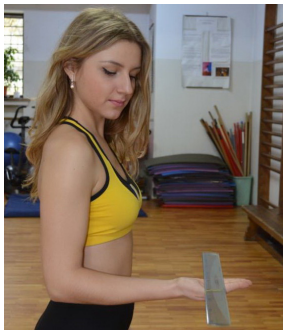
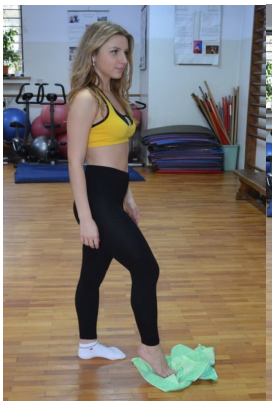
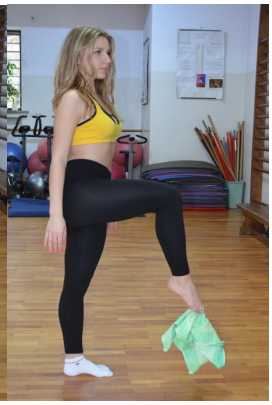
Physical exercise-technical description	Image	Score
Testing joint mobility and balance: - From a vertical position (with relaxed and streched knees and closely positioned feet), the subject has to bend his/her body until he/she touches the floor with the palms of the hands.	 Fig. 1	- palms touching the floor - 10 points - fingers touching the floor - 8 points - finger tips touching the floor - 6 points - less than 2 cm distance remaining between the fingers and the floor - 5 points - 3-5 cm distance remaining between the fingers and the floor - 4 points - 6-10 cm distance remaining between the fingers and the floor - 3 points - 11-15 cm distance remaining between the fingers and the floor - 2 points - for a distance greater than 15 cm between the fingers and the floor - 1 point
- From a sitting position on the floor, hold the foot with both hands to be able to bring the hallux bone of the big toe next to the nose (bend the upper body, keep the head forward and guide your foot with both hands).	 Fig. 2	- if able to touch the nose - 5 points - less than 5 cm distance remaining between nose and foot - 4 points - 5-10 cm distance remaining between nose and foot - 3 points - 10-20 cm distance remaining between nose and foot - 2 points - a distance greater than 20 cm remaining between nose and foot - 1 point
- From a standing upright position, the back of the right hand on the back with elbow towards the floor, the fingers orientated upwards, try to overlap them with the figers of the left arm which is brought over the shoulder with elbow positioned upwards and the palm touching the back reaching for the right hand.	 Fig. 3	- for overlapping fingers - 5 points - touching fingers - 4 points - a distance of 5 cm remaining between fingers - 3 points - a distance of 5-10 cm remaining between fingers - 2 points - a distance greater than 10 cm remaining between fingers - 1 point
- Position the arm and the forearm at 90 degrees, keeping the elbow close to the body. On the open palm place a 40-50 cm ruler. Try to balance the ruler and count: 21, 22, 23 for each second until the ruler falls. Perform the exercise three times with each arm, taking into consideration the best performance.	 Fig. 4	- over 12 seconds (counting above 32) - 5 points - up to 10-12 seconds - 4 points - up to 7-9 seconds - 3 points - up to 4-6 seconds - 2 points - under 3 seconds - 1 points
- Place a towel on the floor and try to lift the towel with your toes in the air until the thigh/ femoral bone is parallel with the floor/ 90 degrees with the body.	 Fig. 5  Fig. 6	- complete five attempts with each leg and 1 point will be awarded for each successful attempt.

Table I

Exercices for the test of the myoarthrokinetic system.

Physical exercise-technical description	Image	Score
Testing muscle strength - From a dorsal decubitus position, lift the upper body and legs simultaneously until balance is obtained by sitting on the coccyx area of the body, with hands placed on the thighs.	 Fig. 7	- over 45 seconds - 10 points - up to 41-45 seconds - 9 points - up to 36-40 s - 8 points - up to 6-10 seconds - 2 points - under 5 seconds - 1 points
- From a ventral decubitus position, place the palms on the buttocks and lift the legs, keeping them streched and record the time during which this position is maintained.	 Fig. 8	- over 45 seconds - 10 points - up to 41-45 seconds - 9 points - up to 36-40 seconds - 8 points - up to 6-10 seconds - 2 points - under 5 seconds - 1 point
- From a pushup position (the rhythm is given by counting 21, 22, 23, etc. with each pushup per second), perform the exercise by lightly touching the floor with the abdomen.	 Fig. 9  Fig. 10	Men / Women / Score above 21 pushups / above 14 pushups / 10 points 21 pushups / 14 pushups / 9 points 18 pushup / 12 pushups / 8 points 15 pushups / 10 pushups / 7 points 12 pushups / 8 pushups / 6 points 9 pushups / 6 pushups / 5 points 6 pushups / 4 pushups / 4 points 4 pushups / 3 pushups / 3 points 3 pushups / 2 pushups / 2 points 2 pushups / 1 pushups / 1 points
- From a ventral decubitus position, keep feet close together and bend them under the body. Perform the "rabbit jump" to stretch the legs, keeping head towards the floor and buttoks upwards as in image no 12.	  Fig. 11 Fig. 12  Fig. 13	Men / Women / Score over 24 jumps / over16 jumps / 10 points 24 jumps / 16 jumps / 9 points 21 jumps / 14 jumps / 8 points 18 jumps / 12 jumps / 7 points 15 jumps / 10 jumps / 6 points 12 jumps / 8 jumps / 5 points 9 jumps / 6 jumps / 4 points 6 jumps / 4 jumps / 3 points 4 jumps / 3 jumps / 2 points 2 jumps / 1 jumps / 1 points
- From a dorsal decubitus position, with palms placed behind the neck, perform upper body liftups. Keep the heels on the ground to maintain stability and follow the rhythm of a second for a liftup and another second for a laydown. The score is different for the two sexes.	 Fig. 14  Fig. 15	Men / Women / Score over 27 liftups / over 18 liftups / 10 points 27 liftups / 18 liftups / 9 points 24 liftups / 16 liftups / 8 points 21 liftups / 14 liftups / 7 points 18 liftups / 12 liftups / 6 points 15 liftups / 10 liftups / 5 points 12 liftups / 8 liftups / 4 points 9 liftups / 6 liftups / 3 points 6 liftups / 4 liftups / 2 points 4 liftups / 3 liftups / 1 points

Expected results

The evaluation of the fitness level will be done by testing the myoarthrokinetic system, which will include testing joint mobility, the ability to maintain a state of balance, and muscular endurance.

The results of this study will highlight that the benefit of practicing fitness programs is reflected in a significant growth of the number of points/score obtained by the students in the ten types of physical exercices of the Hettinger system.

1. All the characteristics of physical fitness are directly influenced by the level of health of every individual, but overall the fitness level can be significantly improved for each individual even when the individual is lacking sports aptitudes.

2. Fitness education is an important component of physical education, which we wish to promote and implement and which will bring the ultimate benefit of improving the wellbeing and the health level of every individual.

3. The programs which have been designed and experimented are aimed at improving the fitness level and help students to orientate themselves towards the self-analysis and self-evaluation of their own body health potential. These programs will contribute not only to an improved fitness level, but also to a harmonious development of individual personality.

4. The collected data that will reflect the students' level of fitness will allow to reorganize the means suitable for every sport discipline, so that the students will be evaluated and graded taking into consideration their individual interest and commitment and real progress during the courses they study rather than their athletic performance.

Conflicts of interests

There are no conflicts of interest declared in regards with this study.

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All teaching staff from the Department of Physical Education and Sports of the University of Bucharest have contributed to the successful development and finalization of this project which has tested a sample population of approximately 1,500 students currently studying a range of sport disciplines.

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