

STRUCTURED PROGRAMS OF PHYSICAL ACTIVITY IN THE AQUATIC ENVIRONMENT FOR PARTICULAR GROUPS OF PEOPLE

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ABSTRACT. Physical exercise in water is the most appropriate method for developing or maintaining fitness, weight control, to prevent degeneration of functional systems of the body, either due to aging or the lack of regular physical activity, for people of any chronological or organic age, without being tied to the level of functionality or mobility of the body. This method gives the specialist precise control of the impact on joints and tendons and on the heart rate and blood pressure during exercise. The potential of the proposed method is significant; the results obtained so far in recovery or rehabilitation therapies, as well as in the area of educational and recreational activities, are indisputable and make physical activity in the aquatic environment to be the most recommended or prescribed, when necessary, by professionals of the physical activity or by doctors. ACSM and AHA recommend structured programmes of physical activity with minimum 30 minutes duration for at least 3 days per week (not consecutively), in order to follow up the stimulation of oxidative metabolism through out aerobic exercises, together with exercises for improving muscular resistance and articular mobility.

Keywords: special groups of people, aquatic environment, structured programs.

REZUMAT. *Programe structurate de activitate fizică în mediul acvatic pentru grupuri speciale de persoane.* Exercițiul fizic în apă este metoda cea mai indicată pentru dezvoltarea sau menținerea, fitness-ului, a controlului greutateii corporale, pentru prevenirea degenerării sistemelor funcționale ale organismului, fie datorate procesului de îmbătrânire, fie prin lipsa activității fizice regulate, la persoane de orice vârstă cronologică sau biologică, fără a fi condiționat de gradul de funcționalitate sau mobilitate al organismului. Această metodă permite specialistului un control precis al impactului asupra articulațiilor și tendoanelor și asupra frecvenței cardiace și a tensiunii arteriale în timpul efortului. Gradul de aplicabilitate al unor astfel de programe este foarte ridicat, ținând cont că se pot desfășura activități atât în piscine acoperite, cât și în piscine în aer liber, în lacuri sau râuri pe porțiunile amenajate pentru agrement, dar și pe malul mării. Potențialul metodei propuse este semnificativ,

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rezultatele obținute până în prezent atât în terapii de recuperare sau reabilitare, cât și în aria de activități educative și recreative, sunt incontestabile și fac ca activitatea fizică în mediul acvatic să fie cea mai recomandată sau prescrisă, atunci când este cazul, de către profesioniști ai activităților fizice sau de către medici.

Cuvinte cheie: grupe speciale de persoane, mediu acvatic, programe structurate.

Introduction

Common pathologies of a developed society are the main cause of sick leaves and expenses in the budget for health:

The contemporary modern society we live in generates a series of unhealthy behaviors among the masses, leading to the development of a number of common pathologies both in our country and in the European Union, namely:

- Chronic lumbar or cervical pain
- Osteoporosis, arthrosis, arthritis or rheumatism
- High blood pressure
- High cholesterol level
- Diabetes type II
- Depression, anxiety
- Varicose

All these pathologies, through the size they have touched and the subsidies from the state budget that the public health system needs in order to deal with them, is actually, a real “epidemic” of the XXI century that absolutely require finding and implementing viable solutions for control and prevention (Warburton, 2006).

Objectives

The benefits obtained from physical activity in the aquatic environment, either by valuing those directly related to practice or specialty training or through their effects on health risk factors are:

- Improving blood circulation and heart function;
- Improving lung function;
- Maintaining and improving joint mobility;
- Balanced muscle development;
- Lowering the pressure on the backbone;
- favoring relaxation;
- Developing self-confidence and balance;
- sleep benefits;

- Increases appetite;
- Favors socio-emotional relationships.

Justification

XXI Century - “**epidemiological transition**”

- 60 % of current mortality in developed countries is caused by diseases related to the lifestyle;
- It is expected that this figure will rise to 75 % in 2020;
- 40 % of young people of 15 years old in the EU states declare that do not conduct regular sports activities (Fuster, 2009).

The effects of a sedentary lifestyle, generated especially by the characteristics of a technological society and the lack of adequate education of the population are:

- Hypercholesterolemia;
- High blood pressure;
- Positive energy balance- obesity;
- Diseases of the locomotor system;
- Diabetes mellitus;
- Anxiety.

Among the leading causes of mortality, there are the following pathologies: cardiovascular diseases, hypertension, acute myocardial infarction, diabetes mellitus type II, osteoporosis, breast and colon cancer. For them it was shown that sports activity performed regularly, as part of a **healthy lifestyle is protective** (Myers, 2002).

Since antiquity Ancient Greece passed a memorable and valid concept throughout civilizations: “Mens Sana in Corpora Sano” (healthy mind in a healthy body).

This ideal is based on the “five laws of health”:

- Breathe fresh air;
- Eat healthy foods;
- Drink only natural beverages and in a proper form;
- Practice physical exercise;
- Adequate sleep (Hippocrates of Cos - 460-370 BC., Claudio Galeno - first century BC).

Public Health Strategies

• **Promoting a healthy lifestyle:**

- Performing organized sports activities to enhance the health of individuals and communities they belong to, promoting the adoption of a healthy lifestyle and a healthy environment;

- **Health protection:**

- Development of actions directed **to control the environment**, in its largest sense: at work, in public transportation means, etc.

- **Efficiency as the main criterion:**

- Effectiveness, efficiency
- Performance of sports activities to achieve the desired effect.

- **The Health System vs. Sanitary System**

- Developing a national system for health improvement which would generate lower costs in the sanitary system (Aguado, 2005).

Materials and work methods

Structured Programs vs. Unstructured Programs:

Structured Programs are those programs of physical activity performed in closed spaces, specially designed for various sports activities (paddle, squash, fitness, aqua gym, swimming, indoor football, basketball, handball, volleyball, aerobics, gymnastics, etc.), with fixed schedule and controlled by specialists (trainers, coaches, teachers).

Unstructured programs are those physical activities carried out on their own by the population, without an well-established schedule, not controlled by a specialist and, generally, organized outdoors, arranged by the local administration (multi-sportive terrains, bike trails, parks and recreational spaces, etc.) (Lopez-Grueso, 2009).

Structured programs are recommended to the detriment of the unstructured ones, because they can be controlled and adjusted as necessary (customized training), thus avoiding possible injury or other complications of the functional systems required, caused by improper programming of intensity and volume of the exercise, corresponding to each category of users.

Participants

By **Special Groups** we understand all those persons who are functionally limited in a permanent or temporal form, due to one or more affected systems, requiring both an appropriate adjustment in the amount of exercise and its intensity, specific to each category, as follows:

- Persons with physical and psychiatric disabilities
- Third age persons, over 45 years old
- Children in Pediatric Stage (0-4 years old)
- Pregnant women

- Cardiovascular Diseases
- Respiratory Diseases
- Obesity and poor nutrition (weight control)
- Diabetes Mellitus (Type I and II)
- Diseases of the Locomotor Apparatus (osteoporosis, arthritis, etc.).

Aquatic environment - environment with antigravity features

The aquatic environment has been used as a therapeutic agent since ancient times, by the great civilizations such as Greece and Ancient Rome, China, India, or Japan. Nowadays we live in a time of great interest related to the balneology and hydrology. For more than 20 years, swimming is used as complementary medium of different therapies available. Specifically, specialist doctors (traumatologist, rheumatologists, cardiologists, oncologists, etc ...) in clinics, hospitals or health centers, prescribe their patients the participation in therapeutic swimming programs due to the countless benefits that the aquatic environment brings to the human body.

There are three major **perspectives related to the activity in the aquatic environment**:

1. Recovery Perspective
2. Preventive Perspective
3. Recreation Perspective

The aquatic therapy facilitates movement, which is due to several factors: reduced gravity force, floating action, hydrostatic pressure and water temperature. Buoyancy effect reduces the axial load of the spine, allowing movements hard to realize on land or even impossible for certain groups of patients. Also, due to the hydrostatic pressure, heart rate is lower by 10 beats per minute than on land, however, depending on the level of submersion of the body (Tuero, 1995).

Intervention protocol for different patient groups

1. Initial evaluation and determination of risk factors:
 - Par-q (practice questionnaire of the physical activity)
 - Health questionnaire
 - Informed consent form
 2. Exercises against Resistance Evaluation
 3. Evaluation of Cardiorespiratory Resistance
 4. Assessment of the Flexibility and the Spine
 5. Anthropometric Assessment
- Structuring Model of a session:

Table 1.

Model developed by Felix Stănescu

Provided activities	Active mobilization exercises of body segments	Combination of head-arms-legs movements with respiration	Compensating exercises
Objectives	<ul style="list-style-type: none"> - Strengthening connective and contractile tissue, - Improving force against resistance, - Aerobic capacity development, - Developing flexibility. 		
Materials	Aquatic pulsometer, floating stick, gym weights, swimming raft, swim fins, pullpush.		
Group	8- 12 patients, 1- 3 auxiliary volunteers		
ATTENTION!	<ul style="list-style-type: none"> - Rapid fatigue in the aquatic environment; - Body thermoregulation (attention to color and lips); - Possible breathing difficulties. 		

Warming up	10-15 min
<ul style="list-style-type: none"> - general: 40- 60% VO₂max, 55 - 70 Fcmax; - stretching: 3x15-30 sec/ muscular group, 90 - 100% ROM; - specific: intensity 100%, intermittent actions 2 - 8 sec, 85% of VAM, active recovery 	
Main Part	30- 40 min
<ul style="list-style-type: none"> - Development of lower body muscle strength: 3x10-15 rep., 1-3 min. recovery, execution speed: high- very high; - Development of upper body muscle strength: 3x8-12 rep., 1-3 min. recovery, execution speed: high- very high; - Development of cardio-respiratory resistance: 4 - 6x1-2 min., 2-5 min. rec., average execution speed; - Improving balance and postural control: 8-12x1 min., 30 sec. - 1 min. rec., execution speed: Medium-high. 	
Return to Calm	5 min
<ul style="list-style-type: none"> - 40- 60% VO₂max, 55 - 70 Fcmax; - Stretching: 2x15 - 30 sec/ muscular group. 	

Discussion

The value of an Active Lifestyle is reported to the quantity - quality of physical activity performed:

Promoting Physical Activity is a great **Public Health policy** due to its positive effects related to various **chronic diseases, mental and physical function and life quality**. The effects are greater if, in addition, there are established other **healthy habits**: Healthy diet (weight control, reduced consumption of animal fats and fast sugars, higher consumption of fruits and vegetables, etc.), no tobacco, no other drugs (without alcohol abuse), stress management, adequate sleep hours (an “ordinate” life), etc.

Objective health measures: Maximal Oxygen Consumption (Course-Navette) and Body Mass Index (BMI)

Table 2.

(Moreno, 2007)

Classification	IMC (kg/ m ²)		
	Main values	Additional values	Attributed values
Underweight	< 18.60	< 18.60	
Severe	< 16.00	< 16.00	2
Moderate	16.00- 16.99	16.00- 16.99	4
Acceptable	17.00- 18.49	17.00- 18.49	6
Normal	18.50- 24.99	18.50- 22.99	7
		23.00- 24.99	7
Overweight	>= 25.00	>= 25.00	
Pre-obesity	25.00- 29.99	25.00- 27.49	6
		27.50- 29.99	5
Obesity	>= 30.00	>= 30.00	
Type I	30.00- 34.99	30.00- 32.49	4
		32.50- 34.99	4
Type II	35.00- 39.99	35.00- 37.49	3
		37.50- 39.99	2
Type III	>= 40.00	>= 40.00	1

The amount of Physical Activity may be obtained from a single session or by accumulation (over a number of days in series with a duration greater than or equal to 10 minutes). Daily and work activities, of moderate or high intensity and with a duration superior to 10 minutes should be considered as part of the duty of the prescribed Physical Activity (PA) program.

Muscular strength and endurance

- 8-10 exercises (the main muscle groups): exercises against the resistance and gymnastic exercises with own body weight (all degree of joint mobility);
 - 8 to 12 repetitions (10-12 RM), third age and various pathologies 10 to 15 repetitions;
 - 2 days or more/week (non consecutive).
 - Flexibility exercises:
 - 4 or more repetitions/stretching for each of the major muscle groups (especially the most rigid) to the point of discomfort;
 - 2-3 or more days/week;
 - Passive Techniques (maintaining 10-30 sec.) and active (6 sec. contraction + 10-30 sec. assisted stretching).

Aerobic activity

• Option 1:

- PA of moderate intensity (3-6 METs; 55-70 % FCmax);
- At least 30 min / day;
- Minimum 5 days / week.

• Option 2:

- PA of “vigorous” intensity (>6 METs; > 70% FCmax);
- At least 20 min / day;
- Minimum 3 days / week.

• Option 3:

Combination of **Option 1 + Option 2.**

Flexibility Exercises

- 4 or more repetitions/stretching for each of the major muscle groups (especially the most rigid) to the point of discomfort;
- 2-3 or more days / week;
- Passive Techniques (maintaining 10 to 30 sec.) and active (6 sec. contraction + 10-30 sec. assisted stretching), (ACSM/ AHA, 2010).

Conclusions

“Prevention education is the most powerful weapon which you can change **the health of the world.**” Ronald E. LaPorte

Following the knowledge accumulated along the Erasmus program I have closely acknowledged the beneficial effects of the exercises in the aquatic environment on the physical and mental health of the practicing individuals.

I noticed that the practice of physical activities in natural environments is very attractive for any type of person, from the youngest to the eldest.

Also, the personal moral feelings were fulfilled by the satisfaction seen in the children with special needs that I have performed sportive activity in the aquatic environment.

In general, the benefits of systematic Physical Activity are

- It develops general and special motor skills, particular to the aquatic exercises
- It develops psychic abilities of self confidence but also in the aquatic environment

- It develops social and communication skills with other people from other cultural and social environments
- It improves the cardiovascular and respiratory capacity due to the influences exercised by the aquatic environment
- Mental relaxation occurs due to further oxygenation of the brain through physical exercise
- There are performed extensive movements in all joints, movements that on land cannot be achieved, improving greatly joint mobility.
- A very good control of body weight through fun and relaxing exercises.
- It produces general relaxation and a very good mental state for pregnant women.

As a result of practical experience and the information gathered I started a project to conduct aquatic sports activities with different categories of people in specific groups.

REFERENCES

- ACSM/ AHA Recommendations (2010). *Physical Activity and Public Health, Updated Recommendation for Adults from American College of Sports Medicine and American Heart Association*. Dallas, TX: Circulation (Journal of the American Heart Association).
- Aguado, H. et al. (2005). *Manual de Epidemiologia y Salud Publica*. Madrid: Medica Panamericana.
- Ayala, F., Sainz de Baranda, P., De Ste Croix M. (2010). *Stretching in Warm- Up: Design of Routines and their Impact on Athletic Performance*. Alicante: Apunts.
- Festschrift, B., Fagard, R.H. (2006). *Exercise is good for your blood pressure: effects of endurance training and resistance training* (33, 853- 856). London: Clinical and Experimental Pharmacology and Physiology.
- O' Connor, C.M. et al. (2009). *Efficacy and Safety of Exercise Training in Patients with Chronic Heart Failure: HF- ACTION Randomized Controlled Trial* (301(14): 1439-1450). Chicago, IL: JAMA.
- Fagard, R.H., Veronique, A. (2007). *Effect of exercise on blood pressure control in hypertensive patients* (14: 12-17). Les Templiers, FR: European Journal of Cardiovascular Prevention and Rehabilitation.
- Ernest, C.P., Lavie, C.J., Blair, S.N., Church, T.S. (2009). *Heart Rate Variability Characteristics in Sedentary Postmenopausal Women Following Six Month of Exercise Training: The DREW Study*. Chicago, IL: JAMA.
- Fuster, V., Mearns, B.M. (2009). *Nature Reviews Cardiology*. Boston, MA: NEJM.
- Lopez-Gruoso, R., Vera-Garcia, F.J. (2009). *Physical activity structured programs and no structured*. Alicante: Apunts.
- Colcombe, S.J. et al. (2006). *Aerobic Exercise Training Increases Brain Volume in Aging Humans (Kraemer's group)* (61(11): 1166-70). Oxford, UK: Biol. Sci. Med.
- Tuero M. et al. (1995). *Efectos positivos de la actividad fisica en el medio acuatico*. Barcelona: Paidotribo.

- Nelson, E.M., Rejeski, W.J., Blair S.N. et al. (2007). *Physical Activity and Public Health in Older Adults: Recommendation from the American College of Sports Medicine and the American Heart Association* (39, 8, 1435-1445). Indianapolis, IN: Med. Sci. Sports Exerc.
- Myers, E. (2002). *Growing old gracefully*. Boston, MA: NEJM.
- Warburton Darren, E.R. et al. (2006). *Health benefits of physical activity: the evidence*. Ottawa, ON: CMAJ.
- Moreno, R. et al. (2007). *Intencion de ser fisicamente activo*. Barcelona: Paidotribo.