

BALANCE IMPROVEMENT THROUGH LUDIC RECREATIONAL WATER ACTIVITIES LIKE AQUA-PULLPUSH-GYM

A. BĂDĂU¹ D. BĂDĂU² D. IONESCU-BONDOC¹

Abstract: *Ludic recreational water activities hold the first position among sportive recreational activities that can be practiced in confined spaces. Aqua-pullpush-gym represents an innovative ludic recreational activity of water gymnastics, consisting in a set of body segments movements, by using the pullpush paddle, with the view to improve the health and physical condition as well to increase muscular tonification.*

The purpose: balance improvement by practicing an aqua-pullpush-gym program was aimed in this research. Methods: The test sample was made of 48 female students at UMF Targu Mures that executed two 50 minute long aqua-pullpush-gym programs, twice a week. The study was developed on a period of 14 weeks, from February 15th until June 2012 and enclosed two tests, the balance test and the unipodal test. The methods used for this research are: bibliographic study, observation, tests, statistical-mathematical method and graphic representation. Results: The mean value of the progress registered by the 48 subjects, during the unipodal balance test, after the aqua-pullpush-gym program was: +43 seconds on the left leg and +45 seconds on the right leg. Conclusions: The research results show that practicing aqua-pullpush-gym contributes to the subjects' balance improvement, both on the right as well as on the left leg.

Key words: *aqua-pullpush-gym, balance, unipodal test, left leg, right legs.*

1. Introduction

Ludic recreational water activities hold the first position among sportive recreational activities that can be practiced in confined spaces and aqua pull-push gym is one of them.

Aqua pull-push gym represents an innovative ludic recreational activity of water gymnastics, consisting in a set of body segments movements, by using the

pull-push paddle, with the view to improve the health and physical condition as well to increase muscular tonification.

The successive modifications upon the current environment regarding the physical condition aim to progressively get sport into our life, by making the population participate in physical activities within various environments and also to diversify activities with the help of training methods using technical innovations for sportive

¹ *Transilvania* University of Brasov, Romania.

² University of Medicine and Pharmacy of Târgu Mures, Romania.

equipments, these being transferred to guided activities [9].

Ervilha and collaborators [3] sustain that there is a wider preoccupation in understanding the behavior of human biological systems within the water environment, as creating exercises in this setting is continuously increasing.

2. Hypothesis

We started from the premise that practicing aqua pull-push gym activities with the help of innovative materials which

can adapt to both inferior and superior members, requires physical effort for body balance while executing exercises, therefore determining improvement of muscular balance.

The purpose: balance improvement by practicing an aqua pull-push gym program was aimed in this research.

The practice of ludic recreational water activities implies a series of characteristics with obvious effects on sanogenetic, social and psychic level as well as on motric level, improving the main components of motric capacity.

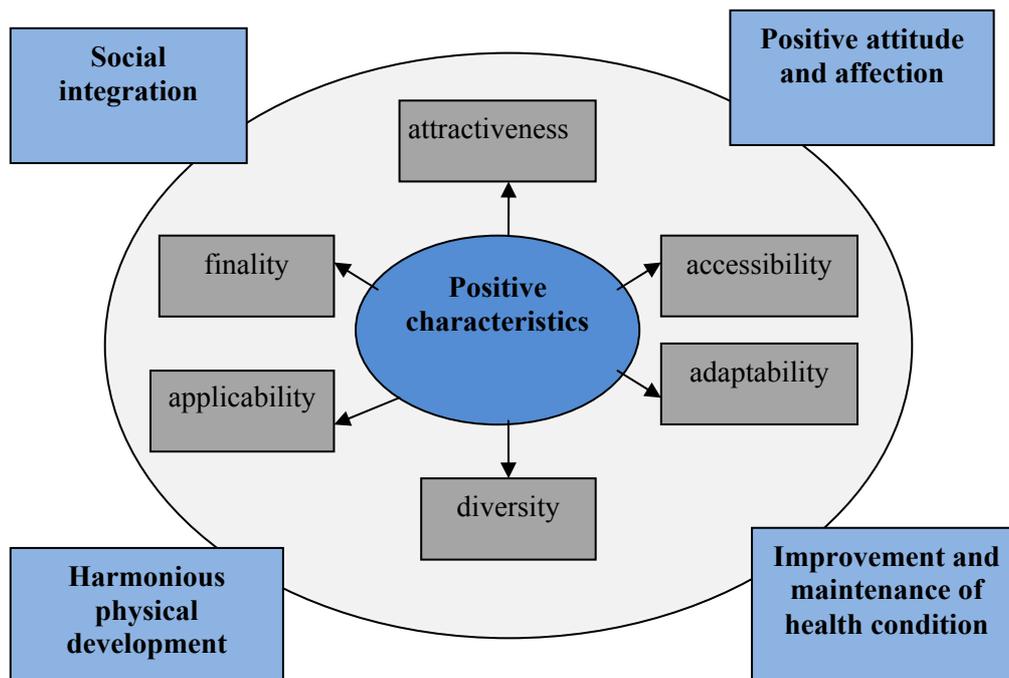


Fig. 1. *Positive characteristics of recreational water activities – Personal suggestion*

“This aqua gym method is addressed to persons above 18 years of age, no matter the gender, weight or physical training. The basic movements consist of push and pull actions, lift, bring down, stretch and bend moves, which are vertically executed along with the go motion which is executed horizontally. The method uses

pull-push paddles as exclusive didactic materials.”[1].

This new and attractive activity consists of a varied set of simple or complex action means, adaptable to the individual particularities of participants and to water environment, having a complex role on physical and health condition, combining

simple and compound movements of body segments or the entire body.

The muscular balance is defined as the homogenous resistance around the body with hydro-gravitational influence, making

every movement requiring a noticeable mechanical action of antagonist and agonist muscles, leading to the rebalance of pair muscles.

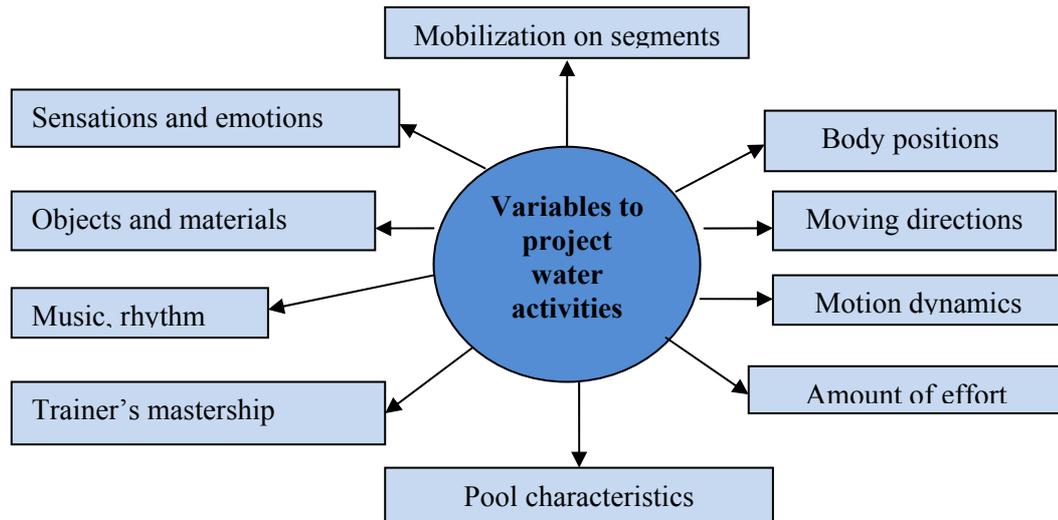


Fig. 2. *The influence of variables occurring on the ludic recreational water activity class – Personal suggestion*

“The physical properties of water, the physiological effects of the immersion and the exercises have a positive influence on balance control”[6]. Adds the fact that “the body balance within a water environment depends on the relation between the floating power and gravity.” [2].

The author also states that there is an interesting characteristic of the gravity center (CG) and floating centre (CF). On articulate bodies like the human body, their location varies according to the body’s position on water surface as well as the arrangement of body segments. As a consequence, Barbosa T. [2] distinguishes three types of water balance:

1. Stable balance – it is carried out when the gravity centre and the floating centre are aligned, without these two points concurring on their spatial arrangement.

An example of stable balance position is represented by the jelly fish.

2. Instable balance – when there is no alignment between the two centers: gravitational and floating.

3. Neutral balance – it is reached when the two centre concur. In order to reach this type of balance, the human body has to be symmetrical on its various plans and should also be homogeneously built. As the human is heterogeneously built, this type of balance cannot be reached”.

Barbosa T. (2005) claims that: changing the position of a body segment will also change the location of the gravity centre, therefore modifying the relation of forces” [2].

“For a higher efficiency in executing the exercises and preventing the accidents it is ideal that the executant remains continuously on a stable balance (traction

vector consists of the vertical projection of the weight vector, but having different points for applying forces) [2].

Studies on balance, with the subjects having the same age as the subjects of our research, were carried out by [10] on 22 healthy young female students (age $20,6 \pm 1,0$) from a non-profile faculty, during a period of 8 weeks, with 2 classes per week of 30 minutes, leading to positive results regarding the improvement with 0.017 of physical condition parameters" like force, flexibility and balance.

Some studies discovered that trainings with progressive over heaviness with the use of certain objects lead to better results both on the ground and in water – many times, significant differences being registered between them [5], [7].

The use of objects during recreational water activities offers an increased productivity to the exercises, due to the floatability factor which becomes resistant when an object immerses into water and to the viscosity added to the environment forces [4], [8, p. 71].

2. Methods:

The test sample was made of 48 female students at UMF Targu Mures that executed two 50 minute long aqua pull-push gym programs, twice a week.

The study was developed on a period of 14 weeks, from February 15th until June 2012, from which 12 weeks were assigned to programs especially created and selected for this study, enclosing two tests: Ti at the beginning of the research and Tf at the end. The first and the last week were destined to the initiation process, to adjustment and evaluation.

For both initial (Ti) and final (Tf) tests the unipodal balance test was applied: the technique consisted in a standing position on one leg, the other one lifted and bended forward, the arms on the sides, with the

registration of the time while this position is maintained until the first imbalance, for both the right and the left leg.

The methods used for this research are: bibliographic study, observation, tests, statistical-mathematical method and graphic representation

The class structure of aqua pull-push gym programs is the following: warm-up on the ground for 3-5 minutes followed by the warm-up in water with the view to get accustomed with the environment, after which two exercises are executed during the main phase, using the pull-push paddles, first for the superior body then for the inferior body, by the end using the paddles attached to the feet and hands. The class ends with some stretching water exercises for relaxation, for about 5 minutes.

The aqua pull-push gym feature is that it uses the same materials, namely the pull-push paddles during the entire length of the class, the order of the exercises taking into account the rules of the accessibility principle.

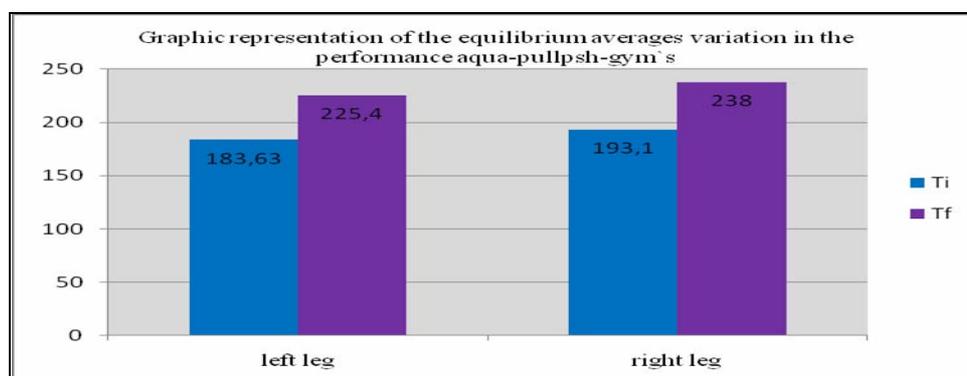
Aqua pull-push gym, a motric water activity newly introduced, uses innovative materials called pull-push paddles, which are characterized by a hydrodynamic shape like a flower, with five "petals" of 37cm in diameter, on the centre having an ergonomic handle to hold, slightly rough to prevent slipping.

These can also be fixed on the soles in order to execute exercises for the inferior members, having also an accessory called fixopié, looking like sandals, provided with two clips disposed on complementary directions in order to facilitate fixing with a twisting action. Due to its wide contact surface with the water and also to the small free space between the petals, the paddle can take during its energetic pull actions, a hydrodynamic shape like a jelly fish, this representing the position with the most stable balance.

Table with the index summary of unipodal balance

Table 1

Index	Left leg Ti	Left leg Tf	Right leg Ti	Right leg Tf
Mean	183,63	225,40	193,10	238,00
Variance	7216,49	7047,65	7249,24	7225,96
Observations	48,00	48,00	48,00	48,00
Pearson Correlation	0,98		0,95	



Graph 1. Arithmetical mean variation

3. Discussions

A significant difference can be observed for the test sample mean, between the initial and final test, therefore on the left leg there are 41.77 sec while on the right one there is a 44.9 sec difference. The mean comparison shows that these differences can be accepted for the whole population and it is not the effect of the research (by accident, the first sample had higher values).

The variance is significantly modified, the experiment having the effect of result concentration around the average.

With regard to the Pearson correlation index, the obtained value is relatively high, close to 0.5 which reveals a good correlation between the result sets, with the interpretation that the decrease of values after the experiment takes place unvarying: the observations with earlier high values

generally remain at the same level after the experiment.

4. Conclusions

The research results show that practicing aqua pull-push gym contributes to the subjects' balance improvement, both on the right as well as on the left leg, fact that contributes to the confirmation of the hypothesis.

The pull-push paddles determine the increase of muscular strain in water and therefore the increase of balance and physical condition.

As compared to the previous studies of other researchers, the results of our research confirm that water gym programs, using adapted materials, determine significant increase of balance.

Aqua pull-push gym programs are recommended for their effects as well as their attractiveness.

References

1. Badau, A., Badau, D.: *Aqua-pullpush-gym, an innovative method of water gymnastics*. Brasov. Ed. Universitatii Transilvania din Brasov, 2011.
2. Barbosa, T.M., Queiros, T.: *Manual Prático de Actividades Aquáticas e Hidroginástica*, (2^a Ed.) Lisboa. Xistarca, Promoções e Publicações Desportivas, LDA, 2005.
3. Ervilha, U.F., Duarte, M., Amadio, A.C.: *Padrão do sinal eletromiográfico de músculos do membro inferior e cinemática do joelho durante o andar em ambiente aquático e terrestre*. In: Congresso Brasileiro de Biomecânica, 9, 2001. Gramado. Anais. Porto Alegre: Escola de Educação Física da UFRGS, 200, vol.2, p.290-294.
4. Duarte, M., Fortuna, A.: *O contributo da Hidroginástica e do Deepwater na melhoria da Aptidão Física e Composição Corporales dos seus praticantes*, 2009. Available on <http://repositorio-aberto.up.pt/bitstream/10216/19564/2/9682.pdf>. Accessed at: 15.10.2011
5. Foley, A., Halbert, J., Hewitt, T. I., Crotty, M.: *Does hydrotherapy improve strength and physical function in patients with osteoarthritis - a randomised controlled trial comparing a gym based and hydrotherapy based strengthening programme*. In: *Annals of Rheumatic Diseases*, 2003, Nr. 62(12), p.1162-1167.
6. Mendez Resende S., Rassi C.M., Viana, F.P.: *Novo protocolo de hidroterapia na recuperacao do Equilibrio e prevencao de ouedas em idosos*. In: *Brasilian Journal of Physical Therapy*, 2008, vol.12, no.1 São Carlos, Jan./ Feb.
7. Martinez, F.G., Ghiorzi, V, Loss, J., F., Gomes, L. E.: *Caracterização das cargas de flutuação de implementos de hidroginástica e hidroterapia*. In: *Revista Mackenzie de Educação Física e Esporte*, 2011, Nr. 10(1), p. 64-75.
8. Prentice W. E., Voight M. L.: *Técnicas em Reabilitação Musculoesquelética*. Porto Alegre. Artmed, 2003.
9. Rebullido Rial, T., Lameiro Villanueva C.: *Clasificasion de las nuevas tendencia en las actividades acuaticas dirigida*. In: *EFDeportes.com, Revista Digital, Buenos Aires*, 2011, Nr 155. Available on <http://www.efdeportes.com/efd155/nuevas-tendencias-en-las-actividades-acuaticas.htm>. Accessed at: 22.11.2011
10. Saavedra, J.M., Escalante, Y., Pino, J., De la Cruz, E. Y., Rodríguez, F.A.: *Aplicación de un programa de aqua-aerobic de muy corta duración (4 semanas) en la mejora de la condición física saludable en mujeres jóvenes sanas*. In: *Apuntes Educación física y deportes*, 2006, Nr. 86, p. 14-21. Available on: http://articulosapuntes.edittec.com/86/es/086_014-021ES.pdf. Accessed at: 21.10.2011