

212 - QUALITY OF GAIT IN ELDERLY WOMEN: AN AQUATIC PHYSIOTHERAPY PROPOSALFABRÍCIA GUBERT DELEVATTI
VALANA FORMIGHIERI PUZZIFaculdade Assis Gurgacz – FAG, Cascavel, Paraná, Brasil
fabriciadelevatti@yahoo.com.br**INTRODUCTION**

Aging is a dynamic, progressive and irreversible process, which is associated with biochemical, morphological and structural changes in the body, causing a decline in functional capacity of the elderly, leading to a compromised health and quality of life in this population (MAZO et al, 2007).

The changes caused by normal aging vary from one individual to another, which can be observed in all systems of the body. Among the main effects that come with advancing age because of these changes are: the decrease in muscle strength; reduction of muscle flexibility and range of active movements; the slow postural reflexes and coordination of movements; the memory disturbances, mood and sleep; the slow thinking; problems of communication and spatial orientation; reduced sensitivity and the balance alteration during static and dynamic conditions (GALLO et al, 2001).

Silva et al (2008) reported that the locomotor system suffers significant changes, caused by the sum of the effects of alterations mentioned above. Rose and Gamble (2007) add that older people generally adopt a conservative gait pattern, reducing its speed. The same authors explain that the slowing of gait is the result of a longer time in support of two members, the reduction of the length and height of the step, the decrease in pelvic and shoulder rotation, reduction of the timing of the members, the base of support enlargement and dislocation of the center of gravity forward.

Due to these defections, the performance of the daily activities is impaired, leading to a reduced functional capacity, autonomy and independence of this population. To Pires and Farias (2007), it is important that these people stay functionally independent, because the functional decline directly affects the quality of life of older, causing psycho-emotional disorders.

Rose and Gamble (2007) report that a treatment program, based on physical exercises, promotes many benefits to this population, as it can maintain the health and quality of life of the elderly, slowing the aging process, physical and functional dependence.

Long time ago, the water physiotherapy has been used as a physiotherapy resource to prevent, retain, retard, get better or treat physical dysfunctions typical of aging, because the aquatic environment is considered safe and effective in the rehabilitation of the elderly (CAROMANO and CANDELORO, 2001). Agreeing, Ide et al (2004) adds that the benefits of aquatic physiotherapy are justified by the influence of the physical principles of water in an immersed body, resulting in physiological and therapeutic responses of the treatment in a therapeutic pool.

The treatment program in aquatic physiotherapy for elderly patients should be organized in accordance with the aims of rehabilitation. Resende et al (2008) report that the liquid environment facilitates the attainment of these goals, because it is a different environment, where you can sum the physical properties of water to the kinesthetic exercises.

For Candeloro and Caromano (2007) some physical properties of water act directly in the rehabilitation of gait in the elderly, such as the specific heat of water, which has an important role in improving and maintaining muscular flexibility and range of joints' motion. In addition, the action of thrust / flotation helps to lessen the joint impact and of pain perception, causing the submerged elderly perform movements of joints in larger amplitudes. In submersion the muscle strengthening exercises are also potentiated, due to the action of the physical principles of hydrostatics, which can generate constant multidimensional resistance to movement.

To Mazo et al (2007), the physical exercises minimizes the physical and functional declines, due to the sum of the changes that they cause in the body of the elderly, promoting performance improvement in motor skills, independence in daily activities, and consequent health improvement of this population.

Based on what was showed above and in the importance of exploring the issue, this study had like aim to verify the gait performance after the intervention of aquatic physiotherapy in elderly women.

METHODOLOGY

The present research was an explanatory study, quantitative of cause and effect type, lengthwise. His performance followed the ethical principles for research involving human subjects, according to resolution 196/96 of the National Health Council and was approved by the Ethic Committee in researches of the Faculdade Assis Gurgacz (FAG), under approval number 266/2008.

For its development, there was a dissemination of it in the elderly meetings of the Center Nair Venturin Gurgacz FAG. Upon released, the volunteers were selected according to inclusion and exclusion criterions, being the inclusion criterions: age between 55 and 75 year-old, female, a member of the Action and Citizenship Group of FAG, independent gait, independence in DLA's, level of cognition preserved for the understanding of proposed activities, complete adaptation to the water, the absence of contraindications to exercise in the water environment, availability of time to participate, and signing the consent form.

After selection, 11 elderly women fit the criterion of inclusion, but one of them didn't complete the study. Thus, 10 elderly, with average age of $64,00 \pm 6,68$ years, were part of the investigated sample.

The study was conducted in the Integrated Clinical FAG, located at Torres Avenue, Number 500, Cascavel - PR, and the evaluation was performed in the office and the internal space of the Rehabilitation Center and treatment at the Department of Aquatic Physiotherapy.

The materials used in data collection were: stopwatch, measuring tape, masking tape, shoe box, cones, stethoscope, sphygmomanometer and the Dynamic Gait Index developed and validated in 1995 by Shummway-Cook & Woolacott and adapted culturally in 2005, by Sandra Meirelles De Castro, Monica Rodrigues and Fernando Freitas Perracini Ganança.

During the course of the consultations were used: stethoscope, sphygmomanometer, therapy pool with 60m², adapted with heating system (average 35 °C) with various levels of depth and high entrance with stairs and handrail.

The subjects' evaluation occurred at two different times before and after physical therapy intervention, which was used as evaluation protocol for gait the Dynamic Gait Index, chosen because it is functional, validated, internationally accepted, with easy implementation and low cost. The test evaluates balance and gait of human body in different contexts, through eight functional tasks including flat surface, changes in walking speed, horizontal and vertical movements of the head, go over and around obstacles, turning on its axis body up and down stairs. The score of each task ranges from zero to three points, as the performance of each

subject in each of the tasks described by the test. The maximum score that can be achieved is 24 points. The test was administered by the researcher, according to the procedures described by the authors, who translated and adapted it to Brazil.

The duration of the study was 05 weeks, when was held 10 sessions, twice a week (Mondays and Wednesdays), with a duration of 30 minutes each day.

The aquatic physiotherapy treatment program included the use of kinesthetic exercises adapted to the water. This consisted of 05 minutes heating (walking at different depths doing light movements with their arms), 10 minutes stretching various muscle groups of both the upper and lower limbs (especially the hamstrings, triceps surae, and ileopsoas quadriceps), 10 minutes of aerobic exercise (strengthening of the muscles stretched, activities that challenge balance and jumping, walking and running at various depths) and 05 minutes of relaxation, with light exercises associated with breathing. The exercise intensity ranged from low to moderate, with the intensity, frequency and constant speed during the 10 sessions.

The data were tabulated on Microsoft Office Excel 2007. After we used the program Primer of Biostatistics and with the Student t test for dependent measures to examine whether there was a significant difference between the scores in the evaluation and review the progress of the elderly, with a significance level of 5%.

RESULTS

Upon completion of the evaluation and review of gait using the Dynamic Gait Index, in Table 1 can be seen the results for the score obtained by participants in each task (average ± standard deviation).

TABLE 1: Average and deviation of the scores of the tasks observed in the assessment and reassessment

Tasks	ASSESSMENT		REASSESSMENT	
	Average	Deviation	Average	Deviation
01	2,50	0,53	2,90	0,32
02	2,20	0,79	2,80	0,42
03	1,70	0,48	2,10	0,32
04	1,90	0,57	2,20	0,42
05	1,50	0,53	2,50	0,53
06	2,00	0,00	2,70	0,48
07	2,40	0,70	3,00	0,00
08	2,90	0,32	3,00	0,00

SOURCE: Data from the author (2009)

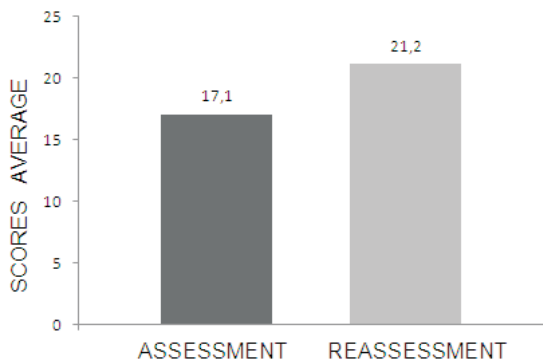
After five weeks of aquatic physiotherapy intervention, there has been a significant improvement (P=0,00) on average results (score), from 17,10 to 21,20 (±0,79) points on the Dynamic Gait Index. It can be seen in Table 2 and Graphic 1 the statistical results obtained in this study.

TABLE 2: Average and deviation of the scores obtained in the assessment and reassessment

Scores	Average	Deviation
Assessment	17,10	2,69
Reassessment	21,20	0,79

SOURCE: Data from the author (2009)

GRAPHIC 1: Average scores obtained during the assessment and reassessment of the functional tasks related to gait.



DISCUSSION

Previous studies of the authors cited above have shown that aging leads to a series of changes in the neuro-muscular-skeletal and sensory system resulting mainly for flexibility, muscle strength and balance deficit, which factors are responsible for problems related to gait in the elderly.

This study addressed an aquatic physiotherapy intervention based on kinesthetic exercises, but the specific effects of exercise have not been quantified, priority was given to quality of gait after the intervention. In the consulted literature, there are few studies with similar methodology to it, addressing the influence of aquatic therapy in the improvement of gait performance in elderly women, making a comparative analysis of results.

According Ruoti et al (2000) and Booth (2004), the water is a different environment, because it offers support and stimulates the various systems in different ways, resulting in improved balance and therefore improved gait. McDermott et al (2006) notes that a kinesthetic exercise program prevents the loss of muscle mass, strength, flexibility and joint mobility, which helps to acquire a better performance of gait, preventing the occurrence of falls.

In Table 1, stood out the averages of tasks 03, 04 and 05, which showed the difficulty of participants in carrying out the activities that submitted them to walk by changing the head position (horizontally and vertically) and walk by turning on its body axis. The degree of difficulty was expected, because these tasks require a complex interaction of sensory systems (visual, vestibular and somatosensory), which due to the aging process is changed.

According to the results obtained after 10 sessions, you may notice an increase in the average 03 tasks, 04 and 05, which indicate improvement in balance after the execution of the exercise program in aquatic physiotherapy. The present study is matches with the study of Resende et al, (2008), who evaluated and treated 25 elderly through a program of aquatic physiotherapy exercises for 24 sessions, in which the results showed improvement in balance of the elderly. Bruni et al (2008) also found positive results regarding the improvement of postural balance and gait, after evaluating and treating 11 elderly through a program of aquatic

physiotherapy exercises for 10 sessions.

The results presented in Table 2 and Graph 1 show that a kinesthetic exercise program tailored to the water has a positive effect on the quality of gait in the elderly population. Bruni et al (2008) reported in their study that any motor task requires a complex interaction of postural adjustments to maintain coordination and balance during gait. They also say that the water is an environment where the posture adjustment is encouraged at all times, because this way allows the body to feel different sensations and movements.

The studies of Shkuratova et al (2004) showed that adjustments during gait are performed to produce a walking safer and more stable, and one of the factors responsible for reducing the speed of locomotion for the elderly. With the improvement of the balance provided by research participants, an increase in security and confidence displayed during the march, making it deliver a better quality of movement, improving the score.

The study results are very close to those found in the study of Cristopoliski et al (2008) held in soil, where the authors found a relation between the exercises for flexibility and improves the kinematic variables of gait in elderly. Other research that relates to this study is carried out by Silva et al (2008), which evaluated the effect of exercise applied in ground for balance, coordination and agility of the elderly. The results indicated that a program of resistance training is favorable in the improvement of balance, coordination and agility of the elderly.

Morgan et al (2004) show in their study that to improve functional gait must be the restoration of flexibility, joint mobility, muscle strength, balance and postural stability, because from that, the elderly will feel more confident when walk, improving the gait pattern, decreasing the incidence of falls and injuries. Corroborating, Ide et al (2004) reported in their study that aquatic physiotherapy promotes conservation or increase range of motion, lowering the tone and muscular spasms, pain and stress factors. Moreover, it can be through aquatic physiotherapy focus attention on improvement of the physical condition of the muscles, improving strength and endurance, making it easier to improve the quality of gait.

Moreover, Skelton (2001) states in his study that adherence is an important factor for the success of an exercise program. In the present study was observed a good adhesion, where the participants got no absent. To Caromano and Candeloro (2001) it is explained that the water is a well-differentiated, safe and enjoyable, allowing the practice of group activities, promoting social interaction, which combined with functional enhancements, improve self-esteem, self-confidence and quality of life in this population.

FINAL COMMENTS

Although the study time was limited and the research carried out in small group of elderly, this study showed significant results, demonstrating that a kinesthetic exercise program adapted to the water has a positive effect on the quality of gait in the elderly population.

During the study, was found difficulty in relation to studies about the effect of hydrotherapy on the gait of the elderly, due to a deficit of publications with this focus. Is recommended the development of new studies on the subject, with a larger number of participants of both sexes and a longer time of intervention.

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QUALITY OF GAIT IN ELDERLY WOMEN: AN AQUATIC PHYSIOTHERAPY PROPOSAL**ABSTRACT**

Currently, the population has experienced a growing aging process, which is characterized by several changes occurring in the body, causing gradual reduction of the efficiency of the locomotor system, decreasing functional capacity, and independence of this population. The aquatic physiotherapy has been used as a physiotherapeutic resource to prevent, retard, get better or treat physical dysfunctions specifics of aging, because the aquatic environment is considered safe and effective in the rehabilitation of the elderly. The aim of this study was to evaluate the performance of the gait after the intervention of aquatic physiotherapy in elderly women. The sample consisted of 10 elderly, with an average age of 64 years. The gait of the subjects was evaluated at two different times, before and after the aquatic physiotherapy intervention, and the Dynamic Gait Index was used as an evaluation protocol. The program of aquatic physiotherapy included the use of kinesthetic exercises adapted to the water. After five weeks of aquatic physiotherapy intervention, there has been a significant improvement ($p=0,00$) in the scores average of the Dynamic Gait Index, which indicates an improvement in the quality of gait of elderly people. Thus, this study found that water physiotherapy, through a kinesthetic exercise program adapted to the water, has a positive effect on the quality of gait in the elderly population.

KEY WORDS: Elderly women. Gait. Aquatic physiotherapy.

QUALITÉ DE LA MARCHÉ CHEZ LES FEMMES ÂGÉES: UNE PROPOSITION DANS LA PHYSIOTHÉRAPIE AQUATIQUE**RÉSUMÉ**

Actuellement, la population vient en passant par un processus de vieillissement croissant, qui se caractérise par de diverses modifications qui se produisent dans l'organisme, en causant une réduction graduelle de l'efficacité de l'appareil locomoteur, en diminuant la capacité fonctionnelle, l'autonomie et l'indépendance de cette population. La physiothérapie aquatique a été utilisée comme ressource physiothérapeutique pour empêcher, maintenir, retarder, améliorer ou traiter dysfonctionnements physiques caractéristiques du vieillissement, donc l'environnement aquatique est considéré assuré et efficace dans la réhabilitation de la personne âgée. L'objectif de cette étude a été vérifier la performance de la marche après l'intervention de la physiothérapie aquatique chez les personnes âgées. L'échantillon s'est composé de 10 femmes âgées, avec âge moyen de 64 ans. La marche des sujets a été évaluée au deux moments distincts, avant et après l'intervention physiothérapeutique, en étant qu'il a été utilisé comme protocole d'évaluation l'Indice de Marche Dynamique. Le programme de traitement physiothérapeutique aquatique proposé a inclus l'utilisation d'exercices kinésithérapeutiques adaptés au moyen liquide. Après les cinq semaines d'intervention dans la physiothérapie aquatique, on a été remarquée une amélioration significative ($p=0,00$) dans la moyenne des scores de l'Indice de Marche Dynamique, ce qui indique amélioration de la qualité de la marche des femmes âgées. En étant ainsi, cette étude a conclu que la physiothérapie aquatique, à travers d'un programme d'exercices kinésithérapeutiques appropriés au moyen liquide a effet positif sur la qualité de la marche de la population âgée.

MOTS-CLÉS : Femmes âgées. Marche. physiothérapie aquatique.

CUALIDAD DE LA MARCHA EN MAYORES: UNA PROPUESTA EN FISIOTERAPIA ACUÁTICA.**RESUMEN**

Actualmente, la población viene pasando por un proceso de envejecimiento creciente, que se caracteriza por diferentes alteraciones que ocurren en el organismo, causando reducción gradativa de la eficiencia del aparato locomotor, disminuyendo la capacidad funcional, independencia y autonomía de esta población. La fisioterapia acuática tiene sido utilizada como recurso fisioterapéutico para precaver, mantener, retardar, mejorar o tratar disfunciones físicas características del envejecimiento, pues el ambiente acuático es considerado seguro y eficaz en la rehabilitación del mayor. El objetivo de este estudio fue verificar la performance de la marcha después de la intervención de la fisioterapia acuática en mayores. La muestra fue compuesta por 10 mayores, con edad media de 64 años. La marcha de las personas fue evaluada en dos momentos distintos, antes y después de la intervención fisioterapéutica, siendo que fue utilizado como protocolo el Índice de Marcha Dinámica. El programa de tratamiento fisioterapéutico acuático propuesto incluyó la utilización de ejercicios cinesioterapéuticos adaptados al medio líquido. Tras las cinco semanas de intervención en fisioterapia acuática, se notó una mejora significativa ($p=0,00$) en la media de los scores del Índice de Marcha Dinámica, la que implica mejora de la cualidad de la marcha de las mayores. Siendo así, este estudio concluyó que la fisioterapia acuática por medio de un programa de ejercicios cinesioterapéuticos adaptados al medio líquido tiene efecto positivo sobre la cualidad de la marcha de la población mayor.

PALABRAS-LLAVES: Mayores. Marcha. Fisioterapia acuática.

QUALIDADE DA MARCHA EM IDOSAS: UMA PROPOSTA EM FISIOTERAPIA AQUÁTICA**RESUMO**

Atualmente, a população vem passando por um processo de envelhecimento crescente, que se caracteriza por diversas alterações que ocorrem no organismo, causando redução gradativa da eficiência do aparelho locomotor, diminuindo a capacidade funcional, autonomia e independência desta população. A fisioterapia aquática tem sido utilizada como recurso fisioterapéutico para prevenir, manter, retardar, melhorar ou tratar disfunções físicas características do envelhecimento, pois o ambiente aquático é considerado seguro e eficaz na reabilitação do idoso. O objetivo deste estudo foi verificar a performance da marcha após a intervenção da fisioterapia aquática em idosas. A amostra foi composta por 10 idosas, com idade média de 64 anos. A marcha dos sujeitos foi avaliada em dois momentos distintos, antes e após a intervenção fisioterapéutica, sendo que foi utilizado como protocolo de avaliação o Índice de Marcha Dinâmica. O programa de tratamento fisioterapéutico aquático proposto incluiu a utilização de exercícios cinesioterapéuticos adaptados ao meio líquido. Após as cinco semanas de intervenção em fisioterapia aquática, notou-se uma melhora significativa ($p=0,00$) na média dos scores do Índice de Marcha Dinâmica, o que indica melhora da qualidade da marcha das idosas. Sendo assim, este estudo concluiu que a fisioterapia aquática, por meio de um programa de exercícios cinesioterapéuticos adaptados ao meio líquido tem efeito positivo sobre a qualidade da marcha da população idosa.

PALAVRAS-CHAVES: Idosas. Marcha. Fisioterapia aquática.

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