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THE IMPORTANCE OF GAIT- AND SWIMMING-BASED KINESITHERAPY IN MAINTAINING HEALTH STATUS IN OLDER ADULTS

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Maintaining the health of the elderly population represents a major priority in the context of demographic aging and the rising incidence of chronic degenerative diseases. Structured physical activity has emerged as an essential strategy for both prevention and therapeutic intervention. The present study highlights the role of physiotherapeutic programs based on dosed walking and swimming in promoting somatic and psychological health in older adults. Evidence from the specialized literature indicates that regular walking improves joint mobility, postural balance, and reduces cardiovascular risk. Swimming, through the global activation of the musculature and the reduction of joint overload, supports neuromuscular relaxation, coordination, and respiratory function. Both forms of physical activity contribute to enhanced functional capacity, stress reduction, and improved quality of life. In conclusion, the analyzed findings underscore the necessity of developing and implementing individualized physiotherapy programs grounded in walking and swimming, tailored to the functional level and specific characteristics of each older adult, as an effective strategy for maintaining optimal health and functional autonomy.

Keywords: *physical therapy, active aging, walking, swimming, older adults, functional decline, health.*

IMPORTANȚA KINETOTERAPIEI BAZATE PE MERS ȘI ÎNOT ÎN MENȚINEREA STĂRII DE SĂNĂTATE LA PERSOANELE ÎN VÂRSTĂ

Menținerea sănătății populației vârstnice reprezintă o prioritate în contextul îmbătrânirii demografice și al creșterii incidenței bolilor cronice. Activitatea fizică structurată se afirmă ca strategie esențială de prevenție și intervenție terapeutică. Studiul dat evidențiază rolul programelor kinetoterapeutice bazate pe mers dozat și înot în promovarea sănătății somatice și psihice la vârsta a treia. Datele furnizate de literatura de specialitate atestă că practicarea sistematică a mersului îmbunătățește mobilitatea articulară, echilibrul postural și reduce riscul cardiovascular. Înotul, prin activarea globală a musculaturii și diminuarea suprasolicitării articulare, susține relaxarea neuromusculară, coordonarea și funcția respiratorie. Ambele forme de mișcare contribuie la creșterea capacității funcționale, reducerea stresului și optimizarea calității vieții. În concluzie, rezultatele analizate susțin necesitatea dezvoltării și implementării unor programe kinetoterapeutice individualizate, fundamentate pe mers și înot, necesită adaptarea nivelului funcțional și particularităților fiecărui vârstnic, ca strategie eficientă pentru menținerea unei stări optime de sănătate și a autonomiei funcționale.

Cuvinte-cheie: *kinetoterapie, îmbătrânire activă, mers, înot, vârstnici, declin funcțional, sănătate.*

Introduction

The aging process of the population is a major demographic trend worldwide, driven by the increase in average life expectancy and the need to implement effective measures aimed at maintaining health and functional independence among the elderly. With advancing age, the body undergoes progressive and irreversible physiological changes, which can favor the reduction of exercise capacity and physical activity levels, while also contributing to the emergence or evolution of chronic diseases.

The need to promote and maintain physical activity among the elderly is a major current issue, given the increasing number of chronic conditions, the decline in mental health, and the increased tendency towards marginalization and social isolation characteristic of this population category. Constant involvement in motor activities and specific physiotherapy programs significantly contributes to reducing the risk of developing severe pathologies, while also favoring the preservation of functional independence and optimizing general health and quality of life. In this sense, physical exercise represents a fundamental element in preventing and limiting degenerative

processes associated with aging. The recommended physical activities in the third age include in particular aerobic exercises, such as walking, swimming, cycling or dancing, complemented by physiotherapy interventions adapted to the functional capacities of each individual. These forms of movement are distinguished by their accessible nature and by the possibility of individualizing the level of demand, depending on the biological and functional particularities of the elderly. In this sense, supporting a physically active behavior constitutes a central element of the concept of active aging, having beneficial effects both on the general state of health and functional autonomy, and on the prevention of chronic pathologies associated with the aging process [1, 3, 6].

Practiced consistently and adapted to the physiological and functional particularities characteristic of old age, physical activities play an important role in limiting the processes of physical and cognitive decline, while also contributing to maintaining joint mobility, postural stability and the functionality of the cardiovascular and musculoskeletal systems. Among the forms of movement recommended for the elderly, walking and swimming stand out for their high degree of accessibility, increased level of safety and multiple beneficial effects on the body, being considered effective ways of supporting health and functional autonomy [2, 5, 11].

Due to its easy nature and the possibility of being practiced without special resources, walking stands out as an effective form of physical activity for the elderly. Its integration into the daily routine contributes to supporting the functional capacity of the body and preventing cardiovascular pathologies, having beneficial effects on the general state of health.

Swimming is considered one of the most complete forms of physical activity, as it allows for aerobic training with multiple benefits, without overloading the osteoarticular system. Thanks to the aquatic environment that reduces the impact on the joints and favors controlled movement, this activity involves the main muscle groups in a balanced way, contributing to increasing muscle strength, improving neuromotor coordination and optimizing respiratory function. At the same time, the reduced joint stress makes swimming a safe and effective option, recommended for a wide age range, having a favorable impact on maintaining and promoting general health [6, 11, 12].

In this context, this paper aims to highlight the importance of controlled walking and swimming in supporting health in the elderly, emphasizing the need to develop personalized physical activity programs, adjusted according to the level of physical fitness and the individual characteristics of each subject.

Aim of the study: Analysis of the process of designing treatment and functional recovery programs for the elderly, based on the controlled use of walking and swimming with a therapeutic role.

Objectives:

1. Identification and analysis of the fundamental principles underlying the design of physiotherapy programs focused on the use of walking and swimming, intended for the elderly.
2. Analysis of the initial assessment stages and the individualization of recovery programs for the elderly, in accordance with the functional and clinical particularities of each case.
3. Presentation and analysis of standardized protocol models used in the treatment and functional recovery process of elderly people, who present various associated comorbidities.

Materials and Methods: This paper is based on a comprehensive analysis of the specialized literature, including sources from both national and international literature. In this regard, relevant scientific papers and reference studies were consulted that reflect the practice and experience accumulated globally in the field of public health, with an emphasis on treatment and recovery strategies applied to elderly people with multiple associated conditions. The documentation of the information was carried out through online search engines and recognized scientific databases, such as Medline, ScienceDirect and PubMed, thus ensuring a solid and updated scientific foundation for the investigative approach.

Results and Discussion

Various studies in the specialized literature have demonstrated that consistent practice of moderate-intensity physical exercise has favorable effects on general health, contributing to the regulation of physiological functions and the maintenance of metabolic homeostasis [1, 2, 5].

Elderly people who regularly engage in physical activity frequently experience a decrease in blood pressure, an improvement in peripheral circulation, and an increase in the high-density lipoprotein (HDL) fraction, associated with cardiovascular protective effects. These changes contribute significantly to reducing the risk of major cardiovascular diseases, such as myocardial infarction and stroke [2].

At the same time, maintaining an adequate level of physical activity supports the preservation of muscle mass and bone mineral density, essential aspects in the context of the aging process. With advancing age, susceptibility to osteoporosis and episodes of postural instability with a risk of falling increases, and regular physical exercise acts as an important preventive factor, contributing to maintaining functional independence and quality of life [4, 6].

In addition to its beneficial effects on the body, physical activity also plays an important role in maintaining psychological balance and mental health. In the elderly population, social isolation is a frequent risk factor associated with the onset of depressive symptoms, accelerated cognitive decline and deterioration in quality of life.

In this context, involvement in social activities and maintaining interpersonal interactions contribute to strengthening the sense of belonging and social involvement, having positive effects on the affective state and reducing the psychological stress experienced.

Regular exercise is associated with the stimulation of the release of endorphins, neurotransmitters involved in regulating mood and inducing a general state of well-being. At the same time, specialized studies indicate that physical activity can contribute to slowing down the neurodegenerative processes specific to aging, having a role in supporting cognitive functions [3].

In particular, aerobic exercise is correlated with improving memory, improving attention capacity and increasing the level of concentration, aspects that favor the maintenance of intellectual performance in the long term [4].

According to the recommendations of the World Health Organization (WHO), adults aged 18 to 64, as well as those over 65, should practice between 150 and 300 minutes of moderate-intensity aerobic physical activity or between 75 and 150 minutes of high-intensity physical activity per week, in order to achieve significant effects on health, including reducing the risk of chronic diseases. In addition, exercises aimed at developing and maintaining muscle strength are an indispensable component of an active and balanced lifestyle [14, 16].

Walking is included in the group of the main forms of moderate-intensity physical activity that support the improvement of aerobic capacity, along with light running, swimming, cycling and cross-country skiing. Among all the modes of movement, it is distinguished by its natural and easily accessible character, being easily integrated into everyday activity. Therefore, walking has an important role in maintaining general health, especially among people with chronic conditions.

During walking, the main muscle groups of the body are engaged in a coordinated manner, with the predominant involvement of the lower limb muscles, the dorsolumbar region and the abdominal muscles, while the upper limb muscles and the shoulder girdle participate in a secondary manner, stabilizing and balancing the movement.

From a functional point of view, one of the most important effects of walking is its influence on the cardiovascular system. Being an aerobic activity, it stimulates cardiac activity and improves blood circulation, acting as a natural heart training factor, with favorable effects on functional capacity and resistance to effort.

At the same time, due to its biomechanical characteristics, walking stands out as a form of low-impact physical activity, which moderately demands the locomotor system, cardiovascular system and respiratory system, thus being recommended for maintaining general health and for its use for prophylactic and recuperative purposes [3, 4, 12].

Walking is recognized in the specialized literature as a therapeutic method with a scientific basis, being frequently integrated into prevention, treatment and functional recovery programs. This form of physical activity is widely used in the management of chronic conditions with high incidence, such as obesity, type 2 diabetes, hypertension and degenerative diseases of the osteoarticular apparatus, and can be adapted to different age categories and socio-professional levels. And due to its accessibility and the possibility of

individually adjusting the intensity and duration of the effort, walking contributes to the improvement of metabolic, cardiovascular and functional parameters, representing an effective component in maintaining and restoring health [6, 8, 10].

However, the effectiveness of dosed walking is not constant in all clinical situations, and it may vary depending on the particularities of each patient. Therapeutic results may be diminished when there is no appropriate correlation between the parameters of the effort (intensity, duration and frequency) and the actual level of physical condition or the individual's capacity for tolerance to effort.

At the same time, in the case of advanced degenerative rheumatic diseases or severe functional limitations, walking may become difficult to perform or even contraindicated, as it may cause overstrain of the joint structures and increase pain, which limits the therapeutic benefits of this form of activity.

In this context, swimming stands out as a particularly advantageous therapeutic option in certain situations, especially in the elderly. Due to its low mechanical impact nature and the effect of reducing the gravitational load specific to the aquatic environment, this activity significantly reduces the pressure exerted on the joints, facilitating the achievement of an efficient aerobic effort in safe conditions.

In addition, the global and balanced involvement of the main muscle groups, the improvement of joint mobility and the stimulation of cardio-respiratory function give swimming an important role in supporting functional independence and improving the quality of life in old age [3, 5, 11].

In this sense, the objective pursued consisted in the methodological substantiation of a functional recovery program for the elderly, based on the integration of dosed walking and therapeutic swimming as the main means of physiotherapy intervention, in order to support the recovery process and maintain functional capacity.

In the process of designing a treatment and prophylaxis program for the elderly, based on the use of dosed walking and therapeutic swimming, it is necessary to take into account some essential factors highlighted in the specialized literature. These factors condition both the safety of the intervention, as well as the efficiency and the degree of adequacy of the program to the physiological and functional particularities specific to the geriatric population.

It is recognized that the aging process is associated with a series of changes in the neuromuscular, cardiovascular and respiratory systems, including a reduction in muscle mass and strength (sarcopenia), decreased joint mobility and tissue elasticity, and disruption of balance mechanisms. These changes increase vulnerability to falls, the onset of frailty and the risk of functional decompensation. Consequently, such features must be carefully evaluated and integrated into the process of developing physical activity programs for the elderly.

The initial functional assessment is an essential step in planning the therapeutic intervention, as it provides the possibility of determining the level of aerobic capacity, joint mobility and fall risk, thus facilitating the individual adaptation of the recovery program.

In the case of the elderly patient, this assessment is a fundamental element in the development of interventions based on physical activity, ensuring the personalization, safety and efficiency of the exercise program. According to the recommendations of the World Health Organization, the American College of Sports Medicine and the American Heart Association, the assessment should be carried out in a complex and integrated manner, including the analysis of cardiovascular function, joint mobility, postural balance and exercise tolerance capacity.

In the functional assessment of the elderly, it is necessary to use tests that meet the criteria of simplicity, safety, reproducibility and relevance to the usual activities of daily life. In this context, functional walking tests, such as the 6-minute walk test (6MWT) and the Get Up and Go Test (TUG), are frequently used as standardized assessment tools, due to their high sensitivity in detecting changes in functional level and significant prognostic value.

These tests can objectively assess the overall functional capacity of the individual, which facilitates the development of individualized physical activity programs. Thus, the intensity and volume of the effort are adjusted in accordance with the physiological peculiarities and the real level of tolerance to effort of each subject [7, 10, 12, 15].

The 6-minute walk test (6MWT) is recognized as a standardized tool for assessing submaximal aerobic capacity, endurance to walking, individual tolerance to stress and cardiovascular response under conditions of physical activity. The procedure consists of measuring the total distance covered by the subject in a six-minute interval, at a self-imposed pace, close to the usual walking, which gives it a high functional value and practical applicability in the assessment of the effort capacity in everyday life.

Due to its submaximal nature, the test is well tolerated and can be used safely including in elderly people or in patients with stable chronic conditions, without it being necessary to reach the maximum effort limits. Due to its specificity, the 6MWT faithfully reflects the level of functional performance necessary to carry out daily activities and provides relevant data for the initial assessment of cardiorespiratory capacity, including in the context of the development of therapeutic swimming programs.

The parameters resulting from the test, such as distance covered, heart rate and perception of dyspnea, are used in establishing the intensity of the effort (related to functional capacity), in determining the initial training pace and distance, as well as in planning the gradual progression of exercises and monitoring the body's adaptation to the effort. Thus, this test constitutes an essential objective benchmark in the individualization and optimization of recovery and training programs [1, 2, 16].

The parameters obtained – namely the total distance walked, heart rate, and perceived level of dyspnea are used to determine exercise intensity (expressed as a percentage of functional capacity), to establish the initial walking distance and pace, and to plan the gradual progression of exercise. Furthermore, these indicators enable ongoing monitoring of physiological adaptation to training. Consequently, the 6MWT serves as an objective benchmark for the individualization and optimization of rehabilitation and training programs.

The „Timed Up and Go” (TUG) test is widely used in geriatric practice for the functional assessment of patients presenting with various pathologies, such as Parkinson's disease, dementia, deforming osteoarthritis, post-stroke sequelae, sarcopenia or frailty syndrome.

This test allows the assessment of global mobility, dynamic balance, the ability to perform transfers and the degree of risk of falling, by analyzing some common motor sequences from daily activity, namely getting up from a chair, moving, turning and returning to a sitting position.

An increase in execution time is suggestive of functional instability and indicates the need to introduce balance exercises before progressing the intensity of the walking program. Also, the results obtained within the TUG contribute to guiding the choice of training environment: good functional performances allow the exercises to be carried out in varied terrain conditions, while low values require the use of controlled and safe environments, such as a treadmill or an aquatic environment, including therapeutic swimming [1, 3, 7].

The simultaneous use of the two tests allows for a comprehensive assessment of functional level, balance and fall risk, thus offering the possibility of adequately adapting the dosed walking and therapeutic swimming programs to the individual capacity of the elderly.

In this regard, Table 1 presents the criteria for classifying elderly subjects according to the results obtained at the initial assessment, carried out through the 6-minute walking test and the „Get up and walk” test, which constitute the basis for establishing personalized physical activity programs, either through dosed walking or curative swimming.

Table 1. Parameters for Classifying Older Adults in Order to Design Graded Walking and Therapeutic Swimming Programs

Assessed Parameter	Instrument	Good Level	Moderate Level	Low Level	Program Implications
Aerobic capacity	6-Minute Walk Test (distance covered)	> 500 m	350 – 500 m	< 350 m	Good → sustained walking; Moderate → interval walking; Low → gradual initiation + light swimming
Exercise tolerance	Heart rate, perceived exertion (Borg scale)	Controlled increase	Moderate fatigue	Marked dyspnea	Adjust intensity and duration

Functional mobility	Timed Up and Go (TUG)	< 10 sec	10 – 14 sec	>14 sec	> 14 sec → prioritize balance training and safe environment
Balance	Clinical observation	Stable	Mild instability	Unstable	Unstable → aquatic environment preferred
Lower limb strength	Repeated chair stand test	> 12 repetitions	8 – 12 repetitions	< 8 repetitions	Low strength → strengthening exercises before increasing volume
Fall risk	TUG + fall history	Absent	Moderate	High	High risk → supervision + avoid uneven terrain
Cardio vascular comorbidities	Medical evaluation	Stable	Stable with limitations	Unstable	Unstable → only light, supervised activity

The effectiveness of any therapeutic approach directly depends on the completion of a complex, multidimensional initial assessment. In this context, the 6-Minute Walk Test (6MWT) stands out as a tool with important predictive value in assessing cardiorespiratory reserve, the distance covered being closely correlated with global functional status and, in certain situations, with indicators of longevity.

Aerobic capacity is recognized as a significant benchmark in estimating the level of health, the degree of functional independence and the prognosis in elderly people. Depending on the results obtained, the following situations can be outlined:

Good functional level (> 500 m): suggests the existence of an adequate physiological reserve, which allows the use of sustained walking as an effective method of cardiovascular training.

Reduced functional level (< 350 m): indicates limited physical capacity, in which case it is recommended to either gradually initiate the exercise program or focus on activities such as swimming, where the aquatic environment reduces cardiac stress by reducing gravitational effects and facilitates thermal regulation.

Functional mobility is closely correlated with the efficiency of the biomechanical mechanisms of gait, as well as with the ability of the central nervous system to coordinate and integrate the motor sequences necessary for movement and maintaining balance.

An increased execution time in the TUG test (over 14 seconds) reflects a decrease in functional performance, being associated with an increased risk of postural instability and falls. In such situations, the physiotherapeutic intervention must emphasize patient safety and the reduction of joint strain, by using means adapted to the functional level [7].

In this regard, alternative forms of physical activity can be recommended, such as Nordic walking, which provides additional support through the use of poles, contributing to improving stability and a more efficient distribution of effort in the upper and lower limbs. As an alternative or complement, therapeutic swimming is a particularly valuable option, thanks to the aquatic environment that reduces the gravitational load on the joints, facilitates controlled movement, and favors the maintenance and improvement of functional capacity in conditions of increased safety [1].

Physical activity programs based on dosed walking and therapeutic swimming represent effective methods of intervention both in the prophylaxis and in the management of complications associated with the aging process, having favorable effects on cardiovascular capacity, muscle strength and postural control.

In relation to individual functional indicators — such as distance covered, speed of movement, results obtained in the TUG test or the response of the cardiovascular system to effort — interventions can be adapted and oriented either towards progressive walking programs or towards therapeutic swimming programs. This differentiation allows increasing the efficiency and safety of the intervention.

At the same time, such a strategy facilitates the personalization of the kinetic program, ensuring a gradual and controlled increase in the level of demand, while reducing the risk of falls, injuries or functional overload.

Table 2 highlights the main functional parameters resulting from the gait test assessment, as well as how they can be interpreted to classify elderly people into different functional categories. Based on these data, guidance is made towards the most appropriate form of physical activity, adapted to the individual level of capacity and tolerance to effort.

Table 2. Clinical indicators used as benchmarks in assessing functional capacity and estimating injury risk in older people (65 and 74 years old)

Test	Parameter	Men 65–74 years (approx.)	Women 65–74 years (approx.)	Clinical Interpretation
6 MWT	Distance (m)	500 – 650 m	450 – 600 m	Compare with normative values/ equations; < 400 m suggests significant limitation
6 MWT	Final HR	60 – 80% of estimated HRmax during submaximal effort	Similar, possibly slightly higher at the same relative workload	Assess chronotropic response and 1-minute recovery
6 MWT	Borg dyspnea	3 – 5/10 (moderate exertion)	3 – 6/10	HR–Borg disproportion → investigate deconditioning/comorbidities
6 MWT	Speed (m/s)	~1.4 – 1.8 m/s	~1.3 – 1.7 m/s	< 1.0 m/s indicates increased functional risk
TUG	Time (s)	8 – 10 s	8.5 – 11 s	≥ 13.5 – 14 s = increased fall risk

Note: The values are indicative for healthy community-dwelling adults; they are adjusted for age >75/80 years and comorbidities.

Research on the 6-Minute Walk Test highlights that this test allows for the accurate assessment of submaximal functional capacity, reflecting in an integrated manner the response of the cardiovascular, respiratory, and musculoskeletal systems to exertion [7].

This test is used to assess the patient’s aerobic capacity and general level of physical performance, the distance covered being an important indicator of functional status and long-term health prognosis.

Typically, values considered normal range between 500–650 m in men and 450–600 m in women. Achieving a distance below 400 m indicates the presence of a significant functional limitation, a situation in which a more cautious and progressive intervention is necessary, sometimes it is recommended to initiate the program through activities carried out in the aquatic environment, where gravitational stress and the impact on the joints are reduced [1, 3].

Also, the final heart rate is an essential parameter of the evaluation, it being recommended to fall between 60–80% of the estimated maximum heart rate. The analysis of this indicator allows the assessment of the chronotropic response of the heart, namely the heart’s ability to adapt its rhythm under stress conditions, as well as the evaluation of the cardiac recovery rate after the first minute post-stress, aspects of major importance in cardiovascular recovery programs [1, 2].

Conclusions

1. Interventions based on walking and swimming constitute fundamental pillars of active longevity, being validated by clinical and experimental research. These activities are not simple forms of movement, but complex therapeutic approaches aimed at systemic optimization of the elderly body, and the integration of these physiotherapeutic strategies, personalized according to the individual’s capacity for effort, represents a safe and effective method to prevent the “deconditioning syndrome” and to maintain the functional independence of older people.
2. Walking is not just a form of exercise, but a rigorous clinical tool for the assessment and rehabilitation of the geriatric population. And specialist sources confirm that the use of walking as an assessment

tool provides the scientific rigor necessary to transform an everyday activity into a personalized, safe and clinically validated therapeutic approach.

3. The application of standardized progressive walking and therapeutic swimming programs confirms the efficiency and applicability of these methods in the functional recovery of elderly people diagnosed with associated chronic conditions.

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