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**PHYSICAL ACTIVITY IN THE ELDERLY:  
IMPORTANCE IN BALANCE AND RISK OF FALLS**

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*Abstract*

Maintaining physical exercise in the elderly is fundamental, as it strengthens physical fitness, increases autonomy, reduces imbalance and reduces risk of falls. Thus, it is important to identify the risk of falls in the elderly and to determine correlations between this risk, sedentarism/ physical activity (PA) and body mass index (BMI). This is a cross-sectional, descriptive-correlational and quantitative study involving a non-probabilistic sample comprising 124 elderly individuals, 68 females and 56 males, aged 65-88 years (M = 71.9; Dp = 5.05). The data collection instrument included questions of sociodemographic characterization, health profile and the Berg Balance Scale (BBS). The results show that only 12.9% of the elderly present levels of recommended physical activity. The risk of falls is high to 13.8%, of the elderly, medium to 55.6% and low risk to 30.6%. The risk of falls is higher in older people ( $p = 0.000$ ), those with higher BMI ( $p = 0.023$ ), and less physical activity ( $p = 0.000$ ). There were no statistically significant differences between men and women ( $p = 0.668$ ). Evidence shows that an increase in PA and maintenance of BMI within normal values translates into lower levels of imbalance and risk of falling in the elderly. Thus raising the awareness of the elderly and caregivers about these factors should be a strategy to develop, in order to provide an active and healthy aging.

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**Keywords:** Elderly, physical activity, risk of falling, imbalance.



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## 1. Introduction

Physical activity (PA) comprises any body movement produced by muscle contraction that results in an energy expenditure above the resting level. Although related to physical activity, physical exercise is a less comprehensive concept and is defined by planned, organized and repeated body movements in order to maintain or enhance one or more components of physical fitness. PA is currently considered to be a behaviour determinant of health and functional capacity (health-enhancing physical activity - HEPA), especially when seen from the perspective of the elderly.

The increasing aging of the population in Western societies has been one of the most striking demographic phenomena since the mid-twentieth century, as it is profoundly affecting the way countries plan governance in order to ensure a quality life for all citizens.

According to the United Nations Population Division report, it is a phenomenon that is far from being finalized. This report states that by 2050 the world's aging population is expected to continue to increase and, by that time, around 22% of the inhabitants will be over 60 years old. In Portugal, the ratio between the number of elderly people and young people in 2012 was reflected in an aging rate of 118 elderly people per 100 young people, with a dependency ratio of 26.3%. This number is higher than the 25.6% of the community mean (Chau, Soares, Carvalho, & Sacadura, 2012).

The increase in the proportion of the elderly population represents an increase in health costs for most countries, since the natural process of aging is accompanied by a general deterioration of the body and mind. In addition, there is also an increase in social costs, since the elderly do not often have a social support network, requiring the intervention of the State to guarantee their quality of life (Monteiro and Martins, 2013).

We know that, with the advancing of age, the body undergoes profound cellular and metabolic changes that alter, among other things, muscle function. This is threatened by sarcopenia, a syndrome that affects the majority of elderly individuals, and is associated with a progressive decrease in muscle mass. Thus, this leads to generalized muscle atrophy and, in turn, a concomitant reduction of muscle strength. This phenomenon is associated with other physiological anatomical changes, such as the progressive decrease of the mineral component of the skeleton (osteopenia), the significant increase in fat mass, the decrease in the basal body temperature, and the accumulation of cytological alterations caused by oxidation and insulin resistance (Gilloteaux And Rochelle, 2009). In parallel, there are transformations that particularize the use of anthropometry in the analysis of obesity among the elderly. There is a progressive loss of lean mass with the increase in the proportion of body fat, as well as the decrease in stature, relaxation of the abdominal muscle, kyphosis and altered skin elasticity (Cabrera and Filho 2011). Together, these factors cause functional alterations, mainly to the levels of posture, balance and consequent propensity for falls.

Falls are a complex problem in the elderly population. They profoundly worsen some clinical conditions, decisively compromise their quality of life and, in many cases, even lead to death. According to data from the Portuguese Directorate General of Health Services (DGHS) in 2012, the main cause of injury in elderly individuals was the fall. This represents a percentage of 76% in the group aged 65-74 years, and 90% in the elderly over 75 years of age. According to Martins et al (2016), imbalance is a

relevant factor in the occurrence of falls, severely limiting the life of the elderly, and possibly leading to a reduction or complete loss of autonomy.

Matzudo (2009) tells us that physical exercise (PE) acts as a form of prevention and rehabilitation of the elderly's health, strengthening physical fitness, improving their independence, autonomy and functional activities, and substantially reducing the risk of falls. Moreno (2013), is more specific when he reports that PE increases bone density, prevents and minimizes osteoporosis, improves glucose tolerance, decreases insulin resistance, and facilitates the obtaining of raw material for the production of energy to the cell.

There are many studies confirming the importance of physical activity, not only in maintaining balance and preventing falls, but also in the treatment of different conditions that promote a significant improvement in the quality of life of elderly people (Félix, 2015).

## **2. Problem Statement**

Falls are a complex problem in the elderly population, because they seriously aggravate their quality of life, leading in many cases even to death. Physical exercise has been shown to be a fundamental element in the prevention of falls and therefore it is fundamental to evaluate its impact.

## **3. Research Questions**

What is the risk of falls in the elderly and how does physical inactivity / physical activity and body mass index influence this risk?

## **4. Purpose of the Study**

To identify the risk of falls in the elderly in addition to defining the influence of sedentarism/physical activity (PA) and the body mass index (BMI) in that risk.

## **5. Research Methods**

This was a non-experimental, cross-sectional, descriptive-correlational, quantitative study, whose main objective was to identify the risk of falls in the elderly population, and to determine the influence of sedentarism/physical activity (PA) and body mass index (BMI) in that risk.

A non-probabilistic sample, for convenience purposes, was chosen. It consists of 124 elderly people from the Centre region of Portugal, in which 68 are female and 56 male, aged between 65 and 88 years ( $M=71.9$ ;  $SD=5.05$ ). Participant eligibility emerged from the following inclusion criteria: must be over 65 years of age, engaging in some form of physical activity, and having cognitive ability to collaborate in the study (assessed through the Mini Mental State Examination).

Data collection was carried out between January and June 2014, and the data collection instrument used consisted of three sections: one for sociodemographic characterization, the other for contextual characterization, and the third included the Berg Balance Scale (BBS). All of the procedures were carried out in accordance with strict ethical conduct (with authorizations on behalf of the Institution's governing

bodies and respective Ethics Commissions), guaranteeing the anonymity and confidentiality of the data collected. Statistical treatment was carried out through the Statistical Package for the Social Sciences Version 19.0 for Windows and Microsoft Word, and was rendered using descriptive statistics and inferential statistics.

## 6. Findings

The elderly individuals of the sample are between 65 and 88 years old, with a mean of 71.9 years (SD=5.5) and the majority (54.8%) are female. We also saw that 62.9% are married and the levels of schooling found (88.2%) are generically low (basic education).

The levels of physical activity practiced and analysed, number of days per week, show that 24.2% of the elderly in the entire sample are insufficiently active (practicing very little or no PA), 40.3% practice PA, on average, 2 days a week, whereas the remaining 35.5% have practices ranging from 3 to 7 days a week. Only 12.9% of the sample present physical activity levels that correspond to the internationally recommended ones, that is, 150 minutes/week, of moderate intensity, 30 min/day, 5 days/week (National Observatory of Physical Activity and Sport, 2011).

A comparative gender analysis reveals that, on average, elderly males perform less physical activity (1.6 - 1.9 days) than elderly females (1.9 - 2.4 days). Nonetheless, the statistical differences are not significant ( $p=0.118$ ). We also found that PA levels decrease with the increasing of age (65-74 years:  $2.1\pm 2.7$  days/week, 75-84 years:  $0.9\pm 1.4$  days/week, and above 85 years: 0.58 days a week). There was a negative and significant correlation between the two variables ( $r = -0.417$ ,  $p = 0.001$ ).

Regarding the occurrence of falls, and when faced with the question "did you fall within the last year?", we saw that 29.3% of the elderly answered yes, but only 6.4% of the respondents said they had received treatment in health institutions after the respective fall. The analysis of the risk of falls (Table 1) shows that 13.8% of our participants presented a high risk of falling, 55.6% had a medium risk and 30.6% had a low risk. The comparative study between men and women reveals that men are at a higher risk of falling (14.2%) than women (13.3%), but the statistical differences are not significant ( $\chi^2=3.256$ ;  $p=0.660$ ).

**Table 01.** Distribution of the sample according to gender and risk of fall

Gender	Male		Female		Total		Chi-Square Test:
	N	%	N	%	N	%	
<b>Risk of Fall</b>	<b>(56)</b>	<b>(45,2)</b>	<b>(68)</b>	<b>(54,8)</b>	<b>(124)</b>	<b>(100,0)</b>	
<b>High</b>	8	14,2	9	13,3	<b>17</b>	<b>13,8</b>	$\chi^2=3,256$ ; $p=0,660$
<b>Medium</b>	30	53,7	39	57,3	<b>69</b>	<b>55,6</b>	
<b>Low</b>	18	32,1	20	29,4	<b>38</b>	<b>30,6</b>	

Correlations show that there is a significant relation between age and risk of falls ( $r=0.506$ ,  $p=0.000$ ), in which the older elderly people show lower values on the Berg balance scale. There was also

a significant correlation between PA and the risk of falls ( $r=-0.760$ ,  $p=0.000$ ), suggesting that the most active elderly patients are those with the lowest risk of falls.

Considering the body mass index (BMI) of the participants, we found that only 24.2% have a normal weight, 46.8% are in a pre-obesity stage, 25.8% present obesity in class I and the remaining 3.2% in obesity class II. There were no statistically significant differences between men and women ( $p=0.668$ ). We also found that there was a significant negative correlation between BMI and PA ( $r= -0.290$ ,  $p=0.022$ ), as the increase in BMI is associated with a decrease in PA. We also found that the increase in BMI seems to compromise the health of the elderly individuals, since it presents a positive and significant correlation with the risk of falls ( $r=0.291$ ,  $p=0.023$ ).

## 7. Discussion

The results of our study show that most of the elderly people surveyed do not present regular physical activity habits, since only 12.9% practice levels of physical activity that correspond to the internationally recommended ones. Epidemiological evidence points to a decrease in the level of physical activity with the increasing of chronological age (a finding that is also present in our study), making sedentarism a risk factor for morbidity and mortality during the aging process. In fact, as Lopes (2013) tells us, it must be borne in mind that traditionally the Portuguese population maintains a single activity throughout their adult life, which is the work activity. Therefore, when they reach the age of 65, in most cases, there is a drastic change in the routines of daily life, especially when one suddenly moves from an active professional situation to a situation of complete inactivity, without prior planning of transition to retirement. The concept of active aging (AA), which has been so popular in recent times, shows a new perspective on how to face life after retirement. Drago and Martins (2012) emphasize that regular physical activity is one of the major contributions to an active aging with benefits for both physical and mental health and, consequently, better quality of life.

Although the statistical differences were not significant ( $p=0.118$ ), the men in our sample do less physical activity (1.6 - 1.9 days) than women (1.9 - 2.4 days), since, for cultural reasons, women are assigned diverse tasks related to the household.

As with other studies, we also found that there is a strong influence between the practice of PA and BMI in the risk of falls in the elderly. In actual fact, older people who do not develop regular PA have a higher BMI and are more likely to suffer falls. The combination of a low rate of PA with a high BMI represents an increased risk of falls with serious implications for the public health and quality of life of the elderly (DGHS, 2012).

In this group of elderly people, there is a clear tendency for pre-obesity (46.8%), obesity I (25.8%) and obesity II (3.2%). Obesity, as mentioned by Cabrera and Filho (2011), causes serious disturbances in the individual's health conditions. Such changes can be due to psychological and social disturbances, an increased risk of premature death and an increased risk of developing diseases of high morbidity, namely AHT, diabetes, dyslipidaemias, cardiovascular diseases and cancer. The analysis of the risk of falls showed that, in this group of elderly individuals, the values are lower because only 13.8% present a high fall risk, 55.6% a medium fall risk and 30.6% low fall risk. Indeed, a study carried out by Silva et al.

(2014) showed that the majority (66.7%) of the elderly had a high risk of falling, although with different degrees of fragility. In our case, it should be remembered that the inclusion criteria selected (practicing some kind of physical activity and presenting cognitive ability to collaborate in the study), at the outset, eliminated the cases of more severe frailty.

The comparative study between men and women reveals that the men in this sample have a higher risk of falling (14.2%) than women (13.3%), which differs from many other studies. Nevertheless, the statistical differences are not significant ( $p=0.660$ ). Finally, we found that the only sociodemographic variable that correlates significantly with the practice of PA and the occurrence of falls is age, which is also associated with a greater risk of falls. In fact, as Hernandez et al. (2010) points out, the advancing of age determines a set of degenerative changes of the organism that result in a successive loss of abilities, greater sedentarism and an increased probability of occurrence of falls.

## **8. Conclusion**

The main conclusions of this study reinforce the paradigm that the sedentary lifestyle in the elderly is more present than the regular practice of physical activity, since it is practiced by only 12.9% of the participants. We also saw that the older ones were also the most sedentary. Regular physical activity is very important to maintain functionality, since it causes an increase in muscle strength, greater balance and, consequently, a decrease in the risk of falls. Although the percentage values found in the assessment of the risk of falls are lower than those of other studies on the elderly, (13.8% high risk of falls, 55.6% medium risk and 30.6% low risk), we observed that 29.3% of these individuals fell at least once within the last year, even though only 6.4% of the respondents resorted to health institutions for treatment. Hence, the evidence, already highlighted in other studies, of the systematic devaluation of falls by the elderly people and the lack of awareness for its prevention, is also reinforced here. The tendency of older people to increasing degrees of obesity (75.8%) was also a notorious fact, since only 24.2% presented a normal weight. Associated with this, we found correlations which significantly show that the elderly with a higher BMI were those who practiced less PA and presented a higher risk of falls. In summary, the evidenced results demonstrate the need for structured interventions by health professionals, especially rehabilitation nurses, in order to carry out educational sessions for the elderly and the population in general. The focus would be on the importance of regular practice of PA, effective weight control with BMI normalization, and also appropriate fall prevention programs, since it is the only way to promote real and effective Active Aging.

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## References

- Cabrera, M. A. S., & Filho, W. J. (2011). Obesidade em idosos: Prevalência, distribuição e associação com hábitos e co-morbidades. *Arquivo Brasileiro de Endocrinologia Metabólica*, 5(45), 494-501. Acedido em <http://www.scielo.br/pdf/abem/v45n5/6867.pdf>
- Chau, F., Soares, C., Fialho, J., & Sacadura, M. (2012). O envelhecimento da população: dependência, ativação e qualidade. Lisboa: Universidade Católica Portuguesa- Faculdade de Ciências Humanas, Centro de Estudos dos Povos e Culturas de Expressão Portuguesa. Acedido em [http://www.qren.pt/np4/np4/?newsId=1334&fileName=envelhecimento\\_populacao.pdf](http://www.qren.pt/np4/np4/?newsId=1334&fileName=envelhecimento_populacao.pdf)
- Drago, S., & Martins, R. (2012). A depressão no idoso. *Millenium*, 43, 79-94. Acedido em <http://www.ipv.pt/millenium/Millenium43/5.pdf>
- Félix, P. R. (2015). Atividade física na terceira idade: Estudo comparativo entre praticantes de atividade física e sedentários (Dissertação de mestrado, Universidade da Madeira). Acedido em <http://digituma.uma.pt/handle/10400.13/870>
- Gilloteaux, J., & Rochelle, A. (2009). O envelhecimento dos músculos esqueléticos. In C. M. Theiebauld, & P. Sprumont, *O desporto depois dos 50 anos: Abordagem científica para médicos e profissionais do desporto*. Lisboa: Instituto Piaget.
- Hernandez, S. S. S., Coelho, F. G. M., Gobbi, S., Stella, F. (2010). Efeitos de um programa de atividade física nas funções cognitivas, equilíbrio e risco de quedas em idosos com demência de Alzheimer. *Revista Brasileira de Fisioterapia*, 14(1), 68-74. Acedido em <http://www.scielo.br/pdf/rbfis/v14n1/11.pdf>
- Lopes, M. (2013). A problemática dos cuidados aos idosos constrangimentos e desafios. In A. Escoval, *Financiamento: Inovação e Sustentabilidade*. Lisboa: Companhia de Ideias.
- Martins, R., Campos, D., Moreira, H., Albuquerque, C., Andrade, A., & Martins, C. (2016). Prevalência e determinantes do risco de queda em idosos institucionalizados. *Millenium*, 2(Especial 1), 185-192. Acedido em <http://revistas.rcaap.pt/millenium/article/view/10062/7404>
- Matzudo, S. M. (2009). Envelhecimento, atividade física e saúde. *BIS*, 47.
- Monteiro, C., & Martins, R. (2013). Idosos residentes em meio rural: Satisfação com o suporte social. *Gestão e Desenvolvimento*, (21), 229-244.
- Moreno, G. (2013). *Terceira idade: 250 aulas (2ªed.)*. Rio de Janeiro Sprint.
- Nakasato, C. (2006). Promoção da saúde nos idosos: Promoção do envelhecimento bem-sucedido no contexto dos cuidados primários de saúde. *Geriatrics*, 2(1), 47-53.
- Pimentel, R. M., & Scheicher, M. E. (2009). Comparação do risco de quedas em idosos sedentários e ativos por meio da escala de equilíbrio de Berg. *Fisioterapia e pesquisa*, 16(1), 6-10. Acedido em <http://www.scielo.br/pdf/fp/v16n1/02.pdf>
- Portugal, Direcção Geral de Saúde, Divisão de Doenças Genéticas Crónicas e Geriátricas. (2012). *Programa nacional para a saúde das pessoas idosas*. Lisboa: DGS.
- Portugal, Observatório Nacional da Atividade Física e Desporto. (2011). *Livro verde da atividade física*. Lisboa: Instituto do Desporto de Portugal, I.P.
- Silva, A., Almeida, G. J. M., Cassilhas, R. C., Cohen, M., Peccin, M. S., Tufik, S., & Mello, M. T. (2008). Equilíbrio, coordenação e agilidade de idosos submetidos à prática de exercícios físicos resistidos. *Revista Brasileira de Medicina Esportiva*, 14(2), 88-93. Acedido em <http://www.scielo.br/pdf/rbme/v14n2/01.pdf>
- International Maritime Organization (2010). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978/1995/2010*. Please replace this text with References list of your paper (Delete the example).