

# The impact of physical activity on neurological aging

O impacto da atividade física no envelhecimento neurológico

El impacto de la actividad física en el envejecimiento neurológico

## RESUMO

Durante o processo de desenvolvimento e maturação, o ser humano passa por várias transformações que estabelecem um constante aprendizado e envolve aquisições e perdas de funções. A senilidade é um processo patológico que pode surgir com o envelhecimento. Portanto a senilidade acomete os idosos, mas algumas patologias que aparecem na senilidade também podem acometer pacientes mais jovens e são caracterizadas pela perda de capacidade de memorização, déficit de atenção, discursos incoerentes e desorientação. Esses déficits são reflexos do envolvimento da formação do hipocampo. Quando estas são danificadas, várias capacidades e competências podem ser afetadas. Objetivo: Este projeto tem como avaliar o efeito neuroprotetor da atividade física regular, na evolução da saúde do idoso. Método: avaliar o estudo partir de uma revisão sistemática. Resultado: Através deste estudo conseguimos analisar a taxa de envelhecimento em alguns estados do Brasil. Conclusão: A partir dos resultados obtidos vimos que diversos fatores influenciam sim a qualidade de vida das pessoas em diferentes estados de um único país, por isso a importância de estudos como esses serem feitos constantemente pelos pesquisadores.

**DESCRIPTORIOS:** Função cognitiva; Saúde; Idoso; Revisão e Brasil.

## ABSTRACT

During the process of development and maturation, the human being goes through several transformations that establish a constant learning and involves acquisitions and losses of functions. Senility is a pathological process that can arise with aging. Therefore, senility affects the elderly, but some pathologies that appear in senility can also affect younger patients and are characterized by loss of memory capacity, attention deficit, incoherent speeches and disorientation. These deficits reflect the involvement of the formation of the hippocampus. When these are damaged, various capacities and skills can be affected. Objective: This project aims to assess the neuroprotective effect of regular physical activity on the evolution of the elderly's health. Method: evaluate the study based on a systematic review. Result: Through this study we were able to analyze the aging rate in some states in Brazil. Conclusion: From the results obtained, we saw that several factors do influence the quality of life of people in different states of a single country, which is why the importance of studies like these being constantly carried out by researchers.

**DESCRIPTORS:** Cognitive Function; Health; Elderly; Reviews and Brazil.

## RESUMEN

Durante el proceso de desarrollo y maduración, el ser humano pasa por varias transformaciones que establecen un aprendizaje constante e implica adquisiciones y pérdidas de funciones. La senilidad es un proceso patológico que puede surgir con el envejecimiento. Por tanto, la senilidad afecta a los ancianos, pero algunas patologías que aparecen en la senilidad también pueden afectar a pacientes más jóvenes y se caracterizan por pérdida de la capacidad de memoria, déficit de atención, discursos incoherentes y desorientación. Estos déficits reflejan la participación de la formación del hipocampo. Cuando se dañan, pueden verse afectadas varias capacidades y habilidades. Objetivo: Este proyecto tiene como objetivo evaluar el efecto neuroprotector de la actividad física regular sobre la evolución de la salud de las personas mayores. Método: evaluar el estudio en base a una revisión sistemática. Resultado: A través de este estudio pudimos analizar la tasa de envejecimiento en algunos estados de Brasil. Conclusión: De los resultados obtenidos, vimos que varios factores sí influyen en la calidad de vida de las personas en diferentes estados de un mismo país, de ahí la importancia de que estudios como estos sean llevados a cabo constantemente por investigadores.

**DESCRIPTORIOS:** Función Cognitiva; Salud; Anciano; Revisión y Brasil.

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**INTRODUCTION**

**A**ging is a process that affects all human beings, being characterized by several biological, emotional and psychological changes. This is because, aging is a process of life to which several natural changes arise, such as diseases that can affect the entire immune system, neurodegenerative processes, difficulty in locomotion, psychological and among others, which often affect your quality of life<sup>1,2</sup>; There are several changes throughout the body and one of them that is most affected is the nervous system.

The central nervous system (CNS) is responsible for various functions such as sensations, movements and all physiological functions. Changes in neurotransmitters, especially dopaminergic ones, such as decreased acetylcholine production, atrophy of plasticity of muscarinic cholinergic receptors, and decreased cholinergic function.<sup>3,4</sup>

The most common cause of dementia is Alzheimer's disease (AD), which is characterized by a progressive and irreversible memory impairment with deterioration of other cognitive functions and behavioral changes<sup>5,6</sup>; This will cause changes in the person's behavior, personality and functional capacity, which will subsequently make it difficult to carry out their daily activities.<sup>7,8</sup> Sporadic AD can affect adults of any age, but it usually occurs after age 65.

This is the most common form of AD and affects people who may or may not have a family history of the disease.<sup>9</sup>

According to the Brazilian Institute of Geography and Statistics (IBGE), there are currently approximately 20 million people in Brazil aged 60 or over, which represents at least 10% of the Brazilian population. According to studies carried out by the World Health Organization (WHO), in the period from 1950 to 2025, the group of elderly people in the country should increase up to fifteen times more. In this way, Brazil will occupy the sixth place in terms of the number of elderly people, reaching, in 2025, about 32 million people aged 60 or over<sup>10</sup>; All this is due to the increase in life expectancy that has been growing in recent years, women increased to 79.4 years and among men 72.9 years according to surveys carried out by the IBGE in 2017. In 2000, it affected 4.5 million Americans and by 2050 there will be 13 million people with Alzheimer's in the United States.<sup>11</sup>

Faced with population growth, health promotion measures are very important to reduce the prevalence of chronic diseases. Physical activity has shown us, in recent years, great beneficial effects on cognitive functioning and the prevention of dementia. The regular practice of physical exercise in the elderly contributes to the control of depression and decrease of anxiety, allowing greater familiarity with their body and

functions. In this way, physical activity at any age can reduce the risks of depression and cognitive decline.<sup>12</sup> Some prospective observational studies have linked the regular practice of physical activity in the elderly with the prevention and delay of cognitive decline.<sup>13</sup>

Therefore, building a routine of physical activity practice in old age promotes benefits in quality of life, bringing vigor and energy and demonstrating that physical exercise reduces the risk of diseases or chronic-degenerative conditions.<sup>14</sup> Physical activity stimulates the release of substances that improve the functioning of the CNS, such as the brain-derived neurotrophic factor (BDNF), which is a neurotrophin responsible for the process of neural regeneration, favoring neuroplasticity. Physical exercise favors the synthesis of BDNF, stimulating neurogenesis.<sup>15</sup>

BDNF is a neurotrophin, responsible for stimulating the neural regeneration process in several brain areas. 16 Glial cells are part of the nervous system. They are auxiliary cells that support the functioning of the CNS. They differ in form and function and are: oligodendrocytes, astrocytes, Schwann cells, ependymal cells and microglia. Activation of astrocytes and microglial cells occurs in response to a variety of symptoms and plays a critical role in brain health.<sup>17</sup> In people who have AD, the amyloid cells accumulate in the form of deposits and plaques in

the brain.<sup>18</sup> Quality aging has therefore been a concern of Gerontology scholars and others. There are, however, two ways of offering social support to the elderly: formal networks and informal networks. The formal social support network consists of hospitals, outpatient clinics and other health areas, in addition to health professionals.<sup>19</sup> The present study aimed to understand the perceptions of the elderly about the impact of aging and its relationship with health and quality of life, comparing the responses of a group of elderly people. The importance of the research is justified by the fact that today there is a significant layer of the population that is aging. In this sense, it is necessary not only the support of the family, but also the constitution of technical people, such as doctors, psychologists, physiotherapists, social workers, etc. who can provide professional support.<sup>20,21</sup>

**METHOD**

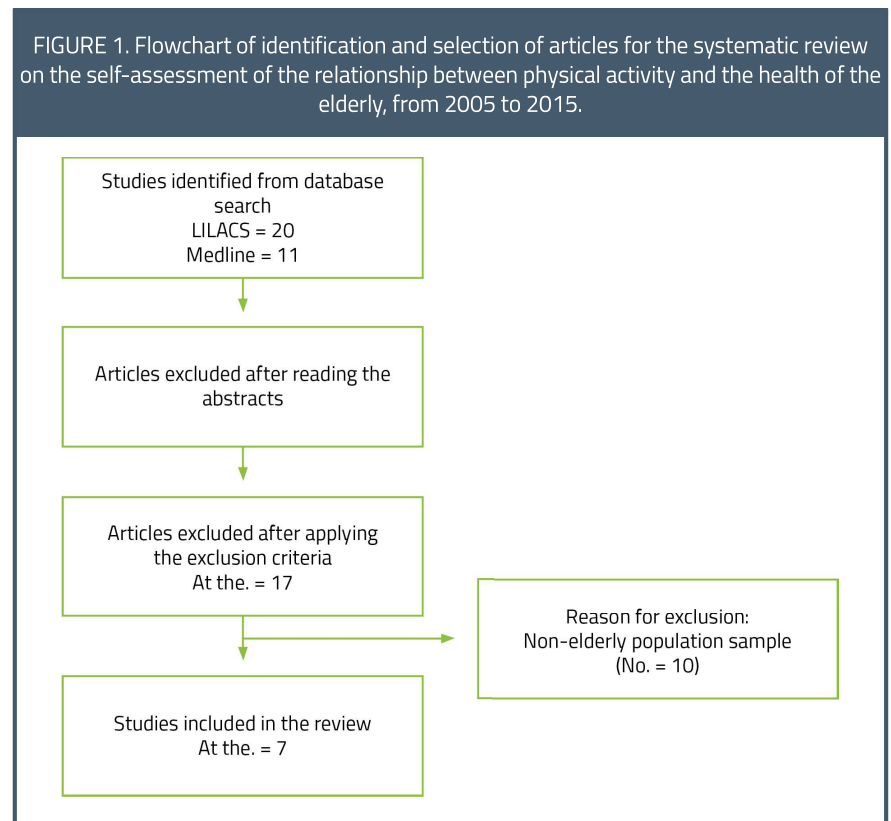
This is a systematic review type study based on a literature review based on the data collected, which will be carried out through a bibliographical study and to correlate all the studies that used questionnaires in their methodology and applied to an elderly population during the period of 2005 to 2015. Data were collected during the years 2016 to 2017, we used to search for journals: Pubmed and Scielo in English and Portuguese. The inclusion/exclusion criteria were: date of the journal, being a work carried out in Brazilian states and that it only had people over the age of 60 years. For the research, we used the word AND as a Boolean operator and used the prism instrument as data treatments. After all the analysis, we created a flowchart (Figure 1) as a final step to finalize the work.

Within this study will only be used works that obtained questionnaires as methodology, that the target public of the research is 60 years old or more and that were made in the south and

southeast regions of Brazil. The target population for the development of the research are people over 60 years of age of both sexes. From these data obtained, we created a flowchart (Figure 1) that clearly and objectively shows how we develop our work.

**RESULTS**

A total of 31 articles were selected, of which 7 were used for the production of the project, the others were excluded based on the exclusion criteria that are age, within its methodology there are questionnaires, which are a Brazilian study and based on the reading of the abstracts.



Source: Authors

TABLE 1. Characteristics of studies on self-assessment of elderly health according to author, year, location, study design and sample, Brazil, 2005 to 2015.

Code	Author, year (reference)	Place	Drawing	Sample(no.)
1	Marcia Novelli et al., 2005 (24)	State of São Paulo	transversal	40 seniors
2	Lucélia Borges et al., 2008 (19)	Florianópolis, Santa Catarina	transversal	129 seniors
3	Tânia Benedetti et al., 2008 (20)	Santa Catarina state	transversal	875 seniors
4	Sebastião Gobbi et al., 2008 (23)	Rio Claro, Sao Paulo	transversal	30 seniors
5	Flávia Coelho et al., 2009 (22)	Cities in the State of São Paulo	transversal	>30 seniors
6	Andy Petroianu et al., 2010 (21)	Minas Gerais state	Cohort	303 seniors
7	Carolina Verdan et al., 2014 (25)	Cities in the State of Rio de Janeiro	Cohort	2073 seniors

The Description (reference) in the table shows the number in which the article is found in the list of references.

As for the general characteristics, the publication, but the old one was from 2005, the articles dealt with cities in the states of São Paulo, Rio de Janeiro, Santa Catarina and Minas Gerais. The cross-sectional design was predominant (73%).

Until 2015, there were few national publications on self-assessment of elderly health related to dementia and physical activity, most of which were concentrated in the southeast of the country. Although there are no data from all Brazilian regions, in the studies it is possible to notice that there is little concern with the health of the elderly, but unfortunately there is a lack of studies in very important regions of the country, this is perhaps due to economic cost factors in other regions of the country.

In general, the prevalence considered good was high in studies that all managed to cover a large number of people considered elderly throughout the research.

For this type of study, we ourselves created our data inclusion and exclusion system with the help of the Prisma tool, the tool considered most suitable for this type of study.

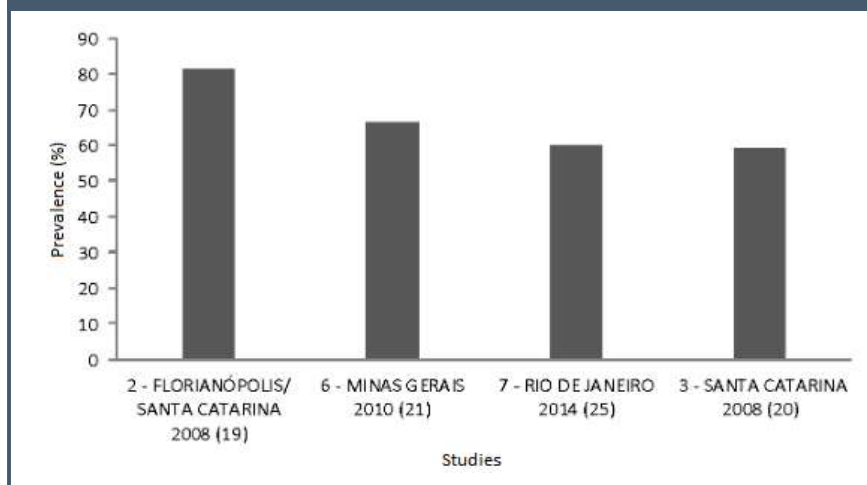
According to the present systematic review of the literature, the care given today to the elderly population is significantly observed. Despite the fact that major obstacles bring difficulties to the life of the elderly, such as exposure variables such as: sex, schooling, monthly household income, lifestyle and among other factors in the great difficulty of medical assistance services or the difficult locomotion to be able to practice physical activity.

## DISCUSSION

Based on studies already carried out by several researchers, we know that physical activity plays a very important role throughout life.

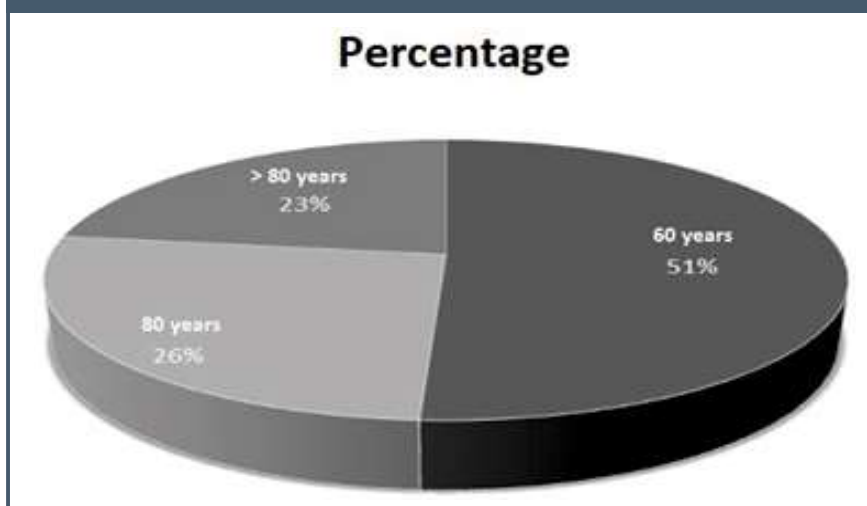
This work is a review that strongly emphasizes the elderly population

GRAPH 1. Prevalence of self-rated health status considered "good" in a systematic literature review, Brazil, 2005 to 2015.



The other studies did not present a prevalence value. Numbers in parentheses in the graph indicate the number where the article is located in the reference list.

GRAPH 2. Average age of participants



today in Brazil, which is increasingly aging and growing more and more with cognitive dysfunction.<sup>22,23</sup> Even knowing the benefits that physical activity can provide us throughout life, we observed that (table 1) the concern regarding aging is even greater in southeastern Brazil, this may be due to socioeconomic issues and even access to a health unit close to their home. Regarding the research, the result (figure

4) was considered good in the state of Santa Catarina, because it was observed that they have a very different lifestyle from other states.<sup>24</sup>

Although the average age (Graph 2) of the participants is considered good, it is necessary for people to have a different look at the elderly population because it does not depend only on government problems but also on their loved ones, of family members and that can

bring much more information through the media, because the number of elderly people in the country is increasing and with all this comes the diseases considered of age that can be alleviated with the practice of physical activity.<sup>25</sup>

With all this, the importance of this work shows us that there is a big difference in the health of the elderly in relation to the region where they live in the country and their age, this is because depending on the region, the lifestyle of that population is observed that somehow is contributing to a healthier aging and that causes diseases considered to be age-related to take much longer to show clinical signs in this population, with that we should be more concerned and encourage projects like this to arise in regions of the country such as the north and northeast, where

unfortunately there are still people who are very lacking in information on quality of life.

## CONCLUSION

There is strong evidence that physical activity plays a key role in preserving cognitive function throughout life. Over several years of research, it was concluded that physical exercise has several effects on the brain, including greater cell proliferation, production of capillaries, increasing the production of neurotrophic factors, stimulation of neurotransmitters, among others.

With regard to individuals with dementia and given that we are witnessing an aging population not only in Brazilian society, but also worldwide, in 2012, the WHO considered dementia

as a public health priority because it can have major economic impacts on the population and health service providers.

Several studies show that sedentary people tend to develop a demential cognitive decline, compared to more active people.

Throughout the study, we observed and had several difficulties in finding studies throughout Brazil, which had in their methodology questionnaires that had been applied only to elderly people, during the period from 2005 to 2015, therefore, it comes to the importance of new studies on aging and to emphasize to the population how important it is to take care of elderly life. From the results obtained, we saw that several factors do influence the quality of life of people in different states of a single country.

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