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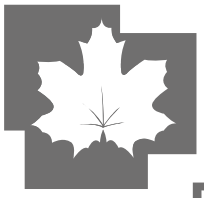

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Older adults in a pandemic, vulnerability and resilience

Since the beginning of the COVID-19 pandemic in 2020, older people have been identified as belonging to an at risk group. Most countries advised isolating as much as possible, in addition to the use of masks and the hygiene measures recommended for all. Some have remained isolated since that time, for almost a year, without seeing or embracing their loved ones, if they live alone. Those living in care facilities have been unable to see their families. Many have been living in a world without hugs, of online shopping and celebrations, of sometimes having to deal with social networks they are not fully comfortable with. The difficulties are even worse for those in unstable financial situations.

I am in this category of older adults, as I am 74 years old and live alone. I spent five months without seeing my son who lives in Brazil, or my granddaughter. My daughter and her family live in London. I have an 88-year-old sister-in-law who also lives alone and who spent a year in almost total isolation. The situation of older adults during the pandemic is something that is always on my mind, not just because of my personal situation, but also because I am a researcher in developmental psychology, interested in the life cycle, from conception to death.

When preparing a lecture for the inaugural class to commemorate the 30 years of the Graduate Program in Social Psychology of the Psychological Institute of UERJ (Rio de Janeiro State University), I chose the theme "Science and Social Psychology During A Pandemic." To this end, I identified and reviewed many scientific articles, none of which dealt with the psychological effects of the pandemic on older adults. When invited to write this editorial, I returned to my search. Although some of the results were a pleasant surprise, they must be considered with caution, and require further investigation.

Before any further comment, the variability of this population, as well as that of other age groups, should be considered in terms of health conditions, housing, educational level, schooling, support networks, life experience, beliefs and values, the presence of dementia or otherwise, among other factors, making generalization almost impossible. It is also important to think about the social inequality endemic in Brazil, which affects older adults. However, some reflections are possible.

The first impacts that emerge are due to older adults being considered part of the at risk and more vulnerable groups. Feelings of fear, anxiety, stress and even anger can be expected, and need to be accepted. In addition, conditions of isolation bring loneliness and can affect the well-being and mental health of older adults. In a systematic review by Tappenden & Tomar[1] "...it was indicated that feelings of isolation or loss of social relationships had implications for a decline in cognition, mood and sensitivity to threats" (p. 25-

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26). They can lead to increased cortisol and decreased immunity, affecting sleep and causing weight gain. Thus, effects on physical and mental health are expected. Javadi and Nateghi[2] also mention these effects.

This is certainly worrying and requires protective measures for older adults. At the same time, there is some evidence, as discussed by Vahia, Jeste & Reynolds III[3], that at least part of this population is more resilient than other groups. According to this study, resilience can be attributed to internal or external factors. The former include cognitive ability, personality traits, physical health and differences in the reaction to stress, while the latter involve aspects such as social status and financial stability. This could include the availability of a support network and some mastery of electronic and social media tools.

The authors also discuss a particularly interesting aspect, based on a study with 482 older and middle-aged adults on loneliness and wisdom. Wisdom, according to the study is "a complex personality trait, consisting of specific components such as empathy, compassion, emotional regulation, the capacity for self-reflection, decision-making abilities, and accepting the uncertainty and diversity of perspectives, social counseling and spirituality" (p. 2254). Compassion seems to be a key element.

Wisdom appears to favor resilience, which is essential for dealing with various crises, especially those as long and complex as that which we are experiencing. It is a capacity that can be developed, and involves people's ability to adapt to difficulties, traumas, threats, tragedies or significant sources of stress. Zanon et al[4] consider it one of the concepts of positive psychology used in interventions against the psychological suffering caused by the COVID 19 pandemic and its consequences.

A World Health Organization document[5] lists some of the concerns of older people and their caregivers and how to deal with them: the need for practical and emotional support through informal networks and health professionals; dissemination of simple and clear information on how to reduce the risk of infection; the learning of simple practices of daily physical activities; keeping in touch with loved ones by phone or digitally (and receiving help with the latter); maintaining regular routines as much as possible or developing new ones.

A publication by the British National Health Service, cited by Tappenden & Tomar[1], complements these health-promoting recommendations. This document recommends creating a daily routine to offer structure and goals, and a weekly routine that guarantees a good mix of rest and leisure; identifying that which triggers discouragement to reduce such triggers and negative feelings; taking care of one's health and well-being, maintaining a healthy diet and exercising regularly to maintain physical and mental health; and keeping in contact with others to reduce loneliness and isolation.

It can be seen, therefore, that although older adults represent a generally more vulnerable group, they do not always react negatively to the adverse conditions of the pandemic. Through their wisdom, they can display resilience and maintain their mental health and reasonable well-being. It is important to remain attentive to their needs and offer protection and care to promote their health, and reduce the psychological suffering inherent in a situation of threat and isolation. These recommendations need to be inscribed in a broader care scenario for older adults.

"We urgently need to reinforce policies for primary health care, create remote monitoring strategies, guarantee supplies for survival, offer concrete guidance and support to LTCFs, care for older adults who live on the streets, support older people who care for other older people or who still work informality for their livelihood, in addition to guaranteeing a humanitarian approach and palliative care, when necessary" (Kalache et al, 2020)[6].

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Retirement Planning of college professors: an integrative review

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Bruna Marta Kleinert Halberstadt[1]
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Abstract

Objective: to analyze the evidence available in the literature related to the retirement planning of college professors. *Method:* an integrative review carried out in the LILACS, Web of Science, PSYCNET, PubMed databases, as well as manual search using the keywords "retirement" and "professor". Thirteen studies were retrieved and analyzed by the evidence hierarchy in the first half of 2019. *Results:* the studies address complex issues and are related to personal health, family ties, financial aspects, and organizational and institutional issues. Investing in institutional policies for effective retirement planning stood out, considering labor relations, dissatisfaction, and acknowledgment of the teaching and research work, as well as paying attention to feelings of emotional exhaustion, fatigue, or distress resulting from work. *Conclusion*: retirement is a subjective event. The decision to retire is related to the implicit planning to remain active either in the workplace or in the post-retirement period. Therefore, preparing to leave the work environment can promote and favor a flexible and progressive transition with quality and health.

Keywords: Retirement. Faculty. Higher Education Institutions. Occupational Health.

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INTRODUCTION

Retirement is part of every worker's life and can be considered a liberating or reluding event as it brings feelings of uncertainty towards withdrawal from the labor world. This process may start up to fifteen years before the final retirement situation, and due to being a long period, it is divided into pre and post-retirement[1,2].

Pre-retirement corresponds to perceptions, attitudes, decision making, and planning for the near future[1,2]. In this period, feelings of (in)decision, yearnings, and desires about the expectation of what will be experienced stand out associated with beliefs and perceptions that influence the effective withdrawal from the work environment[3].

The post-retirement period is understood as a time of satisfaction and adaptation to this new life[1,2]. The well-being and achievements of retiring result from the active effort that the worker made throughout the pre-retirement process. However, feelings of frustration, physical and emotional instability, illness, and feelings of ambivalence may occur[4-6], even leading to the loss of the meaning of life and manifestation of suicidal behavior[7].

In this imminent retirement scenario, preparation becomes relevant for the worker to be aware of personal needs and behavioral changes, believing in their ability to influence the model adopted of moving from work to retirement[8,9]. In this perspective, retirement planning of college professors stands out and needs to be contextualized and (re) evaluated according to the particularities that the profession presents[9-11].

In the work context, teaching involves intellectual knowledge and maturity regarding the years of experience in teaching, research, and extension, in addition to achieving the fullness of immaterial theoretical production[12]. Analyzing the subjectivities and singularities resulting from the profession, the disruption from labor to retirement can bring feelings of exclusion, loss of the main sources of appreciation and identity of these workers[8-10], as well as it can be painful for the individual[11].

Despite the scientific literature gradually addressing[1-6] the theme of retirement, studies are still incipient and focus on describing the feelings and frustrations of workers regarding this event. Considering the imminent retirement, the need to formulate strategies, plans, and preparation policies to promote the health of this professor is reaffirmed, thus emphasizing the relevance of the role of nurses in retirement guidance and planning[13].

Based on questions like "how to recognize the motivation of professors to work for longer than the estimated retirement time?; what is the contribution to quality in increasing life expectancy and (re)evaluating the context of professor shortages in several countries?; how do Higher Education Institutions prepare their teaching staff for this event?", the nurse can understand how the worker experiences this phenomenon, and thus have the necessary interactions to establish an active co-participation relationship with the development of goals to facilitate a healthy termination of work[13].

Besides, it is relevant for society to have insights on the causes and motivations of retirement among college professors and the mitigating factors of a withdrawal process without effective preparation. Therefore, the objective of the present study is to analyze the evidence available in the literature related to the retirement planning of college professors.

METHOD

It is an integrative review developed in six stages: definition of the research question based on the problem, literature search, application of the inclusion criteria, evaluation of studies, data analysis, and synthesis of knowledge with the presentation of the review[14]. The recommendations of the guide Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) were followed to assist in the writing of the study[15].

The search was carried out in June and July 2019 based on the guiding question *what evidence is available in the literature related to the retirement planning of college professors?* To develop this question, the PICo

strategy[15] was used where the letter P corresponds to the population (professors), I is interest (preparation for retirement), and Co is the context (Higher Education Institutions).

To search for the studies, the LILACS (Latin American and Caribbean Literature in Health Sciences), Web of Science, PsycNet, PubMed databases were selected, as well as manual search in the Google Scholar Electronic Resource. The controlled descriptors of Medical Subject Headings (MeSH) and Health Sciences Descriptors (DEcS) "retirement", "professor", and "college professor" were used combined with the boolean operators *AND* and *OR*, according to the search strategy systematized in Table 1.

The inclusion criteria were defined as being a primary paper addressing aspects related to retirement planning of professors, in addition to being available *online* in full with free open access, published in Portuguese, English, and Spanish, without delimiting the time frame. When the full paper was not available in the database, the search strategies were exhausted by contacting the authors and the institutions of origin of the papers. Papers that did not answer the research question were excluded, and duplicates were considered only once.

Data were extracted by two authors of the review in a double independent way, and a third author was invited to solve and minimize possible errors of interpretation, search, evaluation, and analysis of the papers given the doubts that may arise from the review process. The nomenclatures related to the type of study indicated by the authors were maintained.

From that, 178 studies were retrieved. After reading the title and abstract, 59 publications were excluded because they did not answer the research question. Subsequently, the articles were read in full and the selection criteria were applied, with 106 publications being excluded and resulting in 13 primary studies for the *corpus* of this integrative review, as shown in Figure 1.

Table 1. Search strategies for recovering productions.

Search	Strategy
LILACS	"RETIREMENT" [Words] AND ("COLLEGE PROFESSOR") OR "PROFESSOR"
Web of Science	SUBJECT: (Retirement) AND TOPIC: (teacher) AND TOPIC: (university)
PSYCNET	Retirement AND Any Field: teacher AND Any Field: university
PubMed	(faculty [Title_Abstract] OR college professors_[Title_Abstract])
Manual search at Google Scholar	"Retirement Planning of professors"

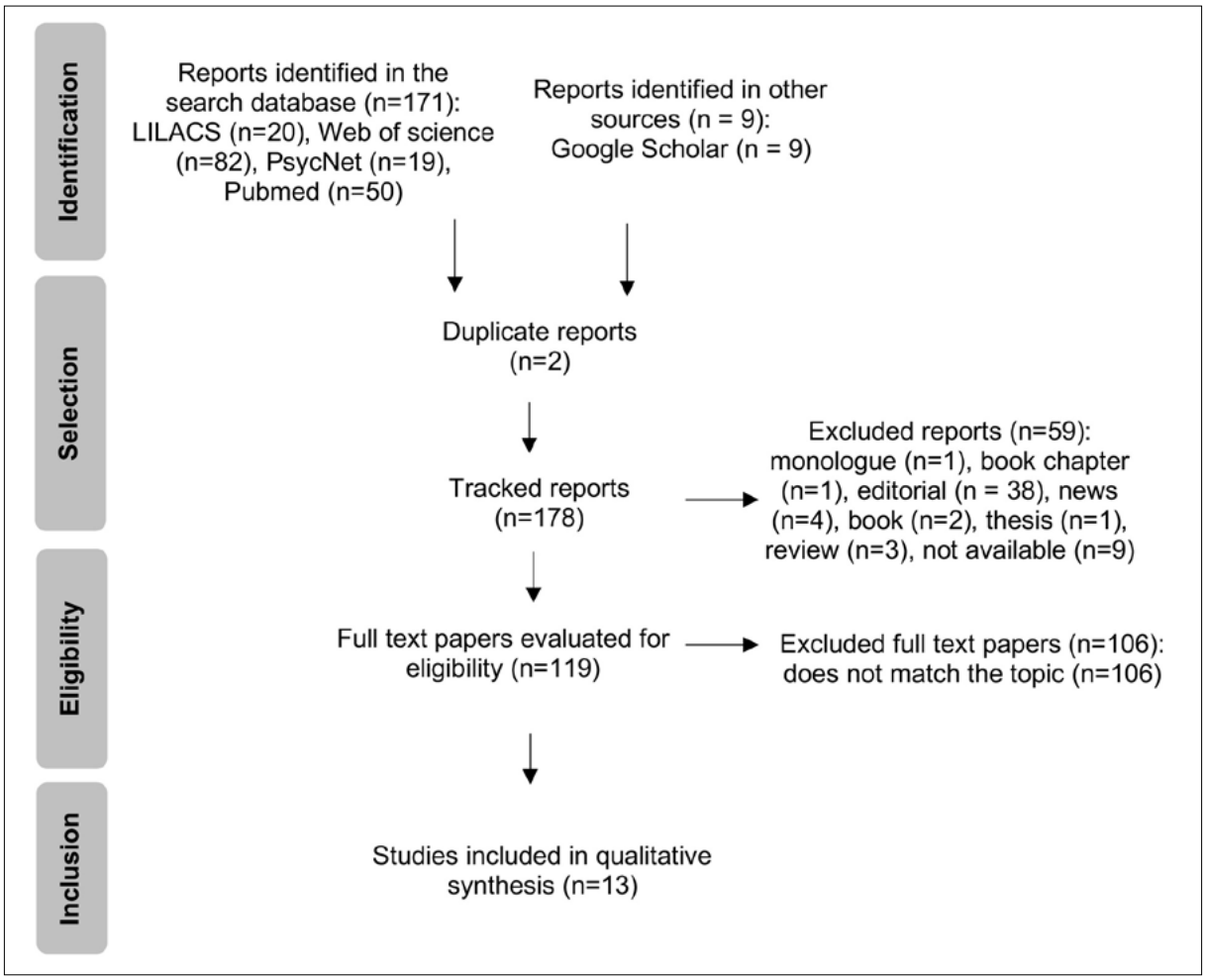

Figure 1. Flowchart developed for the study, adaptation of PRISMA.

To extract the information from the studies during the analysis phase, a summary table was created with the characteristics of the primary studies included, namely: title of the article, author(s), year of publication, journal, objective(s), type of study, main results, and conclusions. It should be noted that the precepts of Law No. 9,610/1998 regulating copyright[16] were respected.

Each study was classified according to the level of evidence. The method used to classify the strength of evidence from primary studies corresponds to the hierarchy of evidence associated with strength levels: Intervention/Treatment or Diagnosis/Diagnostic test; Prognostic/Prediction, and Meaning. The study identified only clinical questions about Meaning, whose strength of evidence is classified into five levels: I) Meta-synthesis of qualitative studies, II) A qualitative study, III) Synthesis of descriptive studies, IV) Only a descriptive study, and V) Expert opinion[17].

RESULTS

Regarding the level of evidence of the clinical question about Meaning, the study's findings indicate that the primary papers are 38.4% predominant at level II[18-22], 7.7% at level III[23], and 53.8% at level IV[24-30]. Table 2 systematizes the selection of the studies included and emphasizes the reference and year of publication, objectives, main results, evidence, and level of evidence of the clinical question about Meaning.

Table 2. Description of the studies selected in the integrative review

Reference/ Year	Objectives	Results	Evidence	Level of evidence
Dorfman[18] 1984	To investigate reactions to the retirement of professors from liberal arts colleges and a comprehensive university	Specific assistance to professors during this period; support in the continuity of labor work; proposals for gradual retirement	Personal well-being; Organizational and institutional policies	II
Ricardo et. al.[19] 1999	To promote rethinking about this phase of life and prepare for the retirement process	Institutional retirement planning policies; support in the continuity of labor work; retirement programs; propositions for gradual retirement	Personal well-being; Organizational and institutional policies	
Debetir[20] 2011	To evaluate the contribution of the retirement guidance program developed at Universidade Federal de Santa Catarina for a positive experience in this phase of life	Teachers' emotions and feelings; motivation; reflection; changes like positive attitude	Personal well-being	
Bressan et. al.[21] 2013	Get to know the perceptions of federal civil servants about well-being in retirement and how they were preparing for this transition	Wel-being of the retiree; family role in preparing for retirement	Personal well-being; Family ties	
Machado, Lucas[22] 2017	Unveiling the influence of work and family ties on the decision to retire	Preparation as a positive event for those with stable health conditions; cultural and leisure activities; family participation	Personal well-being; Family ties	
Villardón-Gallego, Moro, Atxurra[23] 2017	To analyze the conditions, emotions, and feelings associated with the moment of retirement of the university faculty	Labor relations within the institution; dissatisfaction with the workload and performance of administrative functions; lack of acknowledgment such as lack of prestige; absence of a management plan of the institution human resources	Personal well-being; Organizational and institutional policies	III

to be continued

Continuation of Chart 2

Reference/ Year	Objectives	Results	Evidence	Level of evidence
Dorfman[24] 1980	To analyze the faculty knowledge regarding the retirement system	Financial losses; the need for financial planning	Financial aspect; Organizational and institutional policies	IV
Jones[25] 1992	To know retirement benefit programs for medicine professors and the retirement incentive programs being used	Need to implement retirement programs; favorable financial conditions	Financial aspect; Organizational and institutional policies	
Ghent, Allen, Clark[26] 2001	Provide preliminary results of the effects of starting a phased retirement program on faculty retirement decisions	Plans and strategies for implementing the retirement planning; programs to reduce workloads; influence on work performance; salary increases	Personal well-being; Financial aspect; Organizational and institutional policies	
Allen, Clark, Ghent[27] 2003	To examine the experience of the phased retirement system for professors in the system of the University of North Carolina	Participation in retirement programs; increase in work performance; financial incentives	Personal well-being; Financial aspect; Organizational and institutional policies	
Latif, Alkhateeb[28] 2012	To describe the retirement plans and perceptions of faculty members and examine the factors, perception, or conditions that may influence the retirement decision	Family participation in preparing for retirement; reduced distress in the teaching profession; transition with quality of life	Personal well-being; Family ties	
Dodds, Cruz, Israel[29] 2013	To identify common perceptions and ideas about preparing and planning for retirement in academic ophthalmology departments	Emotional exhaustion; lack of incentive; financial insecurity; lack of family income generation; the need for family action	Personal well-being; Family ties; Financial aspect; Organizational and institutional policies	
Van Droogenbroec, Spruyt[30] 2014	To examine the determinants of early retirement among senior working and retired professors aged 45 to 65 in Flanders, Belgium	Feelings of emotional exhaustion, fatigue, or distress; high workload; dissatisfaction with activities not related to teaching	Personal well-being; Organizational and institutional policies	

These studies were published in 1980[24], 1984[18], 1992[25], 1999[19], 2001[26], 2003[27], 2011[20], 2012[28], 2013[21,29], 2014[30], 2017[22,23]. Regarding the country of origin, it was shown that 46.1% of the studies came from the United States of America (USA)[18,24-27,29], 30.8% were from Brazil[19-22], besides one survey in Belgium[30], one in Spain[23], and one covering Canada and the United Kingdom[28].

Regarding the participants, 53.8% of the studies involved all professors of the educational institution[18,22-24,26,27,29], 15.4% corresponded to the faculty of the Medicine course[25,29] and technical-administrative staff[20,21], 7.8% of the studies are part of the faculty of the Pharmacy course[28] and the senior professors[30]. The quantitative methodological design was adopted in 53.8% of the productions[23-27,29,30], the qualitative one in 38.4%[18-22], and one study carried out both quantitative and qualitative approaches[28]. Among the quantitative studies, one was characterized as cross-sectional[29]; the remaining 46.1% were not specified. In the qualitative studies, one case study[18], one exploratory study[20], and one descriptive study[22] were carried out, and two studies[19,21] did not specify the approach.

The journals chosen by the authors to publish the research were the *Research in Higher Education*[18,24],

Research on Aging[26,30], Revista Brasileira de Geriatria e Gerontologia[21,22]; the others were the *Academic Medicine*[25]; *American Journal of Pharmaceutical Education*[28]; *Industrial and Labor Relations Review*[27]; Revista InterAÇÃO[19]; Ophthalmology[29]; ReCaPe – Revista de Carreiras e Pessoas[20], and Revista Eletrônica Interuniversitária de Formação de Professores[23].

DISCUSSION

The findings of the present study indicate that the scientific production on retirement was gradually developed from the 1980s. Although aspects involving all professors of an institution are mostly discussed, the studies present specific discussions on the fields of knowledge of Medicine and Pharmacy, and for Technical-Administrative and Senior professors. Despite being carried out based on quantitative designs, the results of the research contemplated the complex and subjective issues surrounding retirement and were published in journals addressing the process of human aging.

Levels of evidence of the clinical question about Meaning resulting from qualitative studies were found[18-22] and classified as level II. They infer the need for institutional policies for more effective retirement planning [19] with specific assistance for professors during this phase, a greater amount of information about retirement, support in the continuity of work, and proposals for gradual retirement[18,19].

Retirement planning is developed as a positive event for those professors who have stable health conditions and more involved in cultural and leisure activities, and mainly with time to enjoy the family life [22,31], which accentuates the feeling of "retiree's well-being" when associated with the family's participation emphasizing the need to involve it in the preparation of these university employees[21,22].

Considered a moment of transition, retirement planning involves raising awareness, instrumentalization, and strategies to (re)signify that moment. The results show the importance of developing institutional programs to offer possibilities for the promotion of quality of life and personal growth instead of something immediate [19]. Such actions can contribute to the expression of emotions and feelings of professors in the pre-retirement phase as a motivator for reflection and changes to positive attitudes[20].

Level III evidence derived from the synthesis of the descriptive studies[23] shows that labor relations within the institution, dissatisfaction with the workload related to administrative functions, lack of acknowledgment of the teaching and research work for years, and the lack of prestige directly influence retirement planning[23].

Thus, we can infer the relevance of propositions for the implementation of a human resources management plan for institutions to take advantage of the high potential of professors who are often devalued with the effective removal from the work environment[23]. The experiences of the so-called program "*Emeritus colleges*" developed in the USA corroborates these propositions since flexible activities were implemented in a gradual way to offer a continuous relationship to research professors during the retirement planning to enable the reduction of workloads, dissatisfactions, and frustrations that could result from this process[23,32].

Regardless of the proposals chosen by the Educational Institutions to manage this pre-retirement phase for their workers, they must be committed to supporting professors before the changes resulting from retirement to favor a flexible and progressive transition. Therefore, the preparatory strategies for retirement must meet the needs of professors to reduce the possibility of a traumatic personal process affecting students, and that can therefore benefit the university by maintaining quality in teaching[23].

Worker participation in a retirement planning program aimed at interventions consistent with the needs of workers is a tool for achieving positive results, therefore improvements in expectations and knowledge about this process of retiring[13].

In this sense, the important role of nurses in stimulating and guiding this preparation program stands out through the help in setting goals and managing feelings in the care of physical, emotional, and cognitive health with insertion in social activities, financial planning, and interpersonal relations[13].

Level IV evidence resulting from descriptive studies[24-30] indicates that retirement involves feelings of emotional exhaustion, fatigue, or distress resulting from workloads [29,30]. They result from the possible loss of incentive to work, insecurity of financial status, (in)existence of a partner to generate family income, as well as aspects involving the work mood and the lack of pressure to retire.[29,33].

These aspects mainly affect the younger professors in the pre-retirement phase, in contrast to the older ones who seek to postpone the moment of retirement to remain active[29]. The institutional support which is essential to neutralize any discomfort that may be caused in the pre-retirement phase[34] influences the decisions on the preparation of the faculty.

The anxieties and doubts can be alleviated by inserting the family in the pre-retirement phase[21,28,29,32]. Furthermore, it implies reflecting on how Higher Education Institutions are organized, and what are the prerogatives of plans and strategies for implementing retirement planning offered to the faculty to favor the moment of transition from work to retirement[25-27].

The experience of the so-called program "*Emeritus colleges*" of the Institutions that are part of the study carried out in the USA provides an ongoing relationship with the research professors by offering flexible activities during the retirement planning in a gradual manner, thus enabling the reduction of workloads[23,35] and discussions about dissatisfaction with activities not related to teaching (administrative functions) to propose and discuss solutions[23,30].

These are also evidenced in institutions in North Carolina, USA, where the phased retirement program was provided and allowed older professors to work part-time and receive full retirement benefits in the same way[23]. These findings indicate that there is a considerable relationship between the professor who adheres to the phased retirement and the work performance which is also influenced by salary increases[26,27].

It is possible to perceive a contemporary model related to the health of this old person who is still at work, the need to have associated health promotion actions, prevention of preventable diseases, early care, rehabilitation of injuries, and education. This means a comprehensive care line based on the needs of the workers, with the healthcare professional being the protagonist and being able to mediate in care actions and attitudes[36].

Evidence suggests that reacting to the distress on the teaching career seems essential to avoid an abrupt withdrawal from the context of full-time work and to understand the desirable active transition with quality of everyday work[26,28]. Despite the culture of immediatism and lack of preparation observed, it can result in a reduction in the quality of transition from work to retirement and a decrease in personal progression in the post-retirement phase in the daily life of the worker.

Transition to retirement directly influences having a job after retirement (bridge employment), in addition to the postponement of retirement or permanence in the institution[37]. Information related to retirement planning constantly emphasizes the relevance of the financial planning that should be carried out at the beginning of the teaching career not to interfere in the retirement of the worker[24].

It appears that each worker experiences the interruption of work activities in different ways. The break from work can trigger anxiety, identity crises, ambivalent and confused feelings, mood swings, and psychosomatic disorders. Therefore, retirement planning programs tend to assist in this process, provided the worker integrates it and is prepared while still working. Retirement planning programs can be configured as a reference for workers who are close to retirement, helping to develop life projects after work[38].

In this sense, retirement planning programs were considered essential to expand the level of understanding of the faculty about financial benefits and losses since there may be doubts about the individual retirement system and/or about social security[24,25]. However, participation in retirement planning programs is not a condition to an active preparation but contributes as a motivating axis for reflections and initial attitudinal changes which are considered by the studies' evidence as positive and trigger for well-being[27-29].

To effectively contemplate the transition to retirement, the responsibility of competent bodies for the health of the worker is evident, as well as the health professionals who are essential to recognize the aspects that are directly related to the retirement planning of professors. In this context, the nurse and the nursing staff stand out to allow promoting actions and planning strategies to meet the interests of professors in the pre-retirement period, as well as the interests of the institution associated with keeping this worker in the institution and the (re) organization of retirement planning programs[39].

As a limitation of the present study, we point out the absence of indexing in the bases of some journals addressing the theme, and controlled descriptors in publications corresponding to those selected for this review. It is inferred that including other databases and controlled descriptors may cover a greater amount of publications, besides considering the resumption of evidence on the retirement planning of studies published in the scientific community. Lastly, it is considered that studies like this can provide subsidies for institutions to implement and adjust their retirement planning systems for their faculty.

CONCLUSION

The evidence in the present study shows that retirement is considered an event of singular concepts and subjective order. Regardless of the reasons associated with the decision to retire, implicit planning consists of the will to remain active, whether in the workplace or after retirement. However, said preparatory actions become a source of stress, anguish, and concerns of an identity-cultural, family, social, financial, and institutional-organizational order when making the transition from the work context to an often uncertain future.

The study allowed us to know the nuances involved in the retirement planning for college professors emerging from the experiences of the national and foreign scenario disseminated in the scientific community. This knowledge can provide subsidies to professors and institutions in the decision-making process when managing the pre-retirement process.

It is understood that retirement planning can minimize stress and generate feelings of confidence about the years after retirement. We can infer the need to carry out studies to implement and evaluate the use of different strategies such as integrated programs adapted to each Educational Institution and corresponding to the needs of their professors.

Also, we believe that it is possible to experience this transition effectively and healthily as long as everyone involved resignifies their responsibility in this scenario of the professor's retirement. Thus, it is suggested that the health legislation for workers and old people is more effective; that Educational Institutions implement and revise their retirement planning program; that health professionals - specifically nurses - are more engaged in ensuring the care of these workers by subsidizing care in the principles of geriatrics and gerontology; and last but not least, that professors understand the relevance of preparing for withdrawal from work activities in the Educational Institution and that it can impact their quality of life.

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Negative effect of task complexity on the balance and mobility of healthy older adults

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Abstract

Objective: to analyze the impact of task complexity on the mobility and balance of healthy older adults. *Methods:* ninety older adults were enrolled in the study. The participants performed tasks that simulated problems common to aging, such as low visual acuity, changes in the base of support and difficulties in carrying out activities simultaneously. Mobility was evaluated with the Timed Get Up and Go test during dual cognitive and motor tasks. Balance was assessed using a force plate with different bases of support and visual information. Cognitive tests were applied to characterize the sample and to analyze the association between the motor and cognitive variables. For statistical analysis, the Friedman test was used to verify the impact of task complexity on the older adults and the Spearman correlation coefficient was used to verify the association between the motor and cognitive variables. Significance was set at 5%. *Results:* task complexity impacted the mobility of participants, with a greater number of steps and time required to complete the test (p=0.001). Similarly, small bases of support and restricted visual information resulted in greater insecurity among the participants in terms of balance reactions (p=0.001). Correlation tests identified significant associations between executive functions and complex motor tasks (p<0.05). *Conclusion:* healthy older adults exhibited motor instability when performing complex tasks, potentiating aging-related changes. The association between the cognitive and motor variables suggests the need of multi-professional care to prepare older adults for their daily challenges.

Keywords: Health of the Elderly. Postural Balance. Mobility Limitation. Accidental Falls. Cognition.

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INTRODUCTION

The aging process is associated with a series of bodily transformations which often deprive individuals of the independence required to carry out their routine activities[1]. In such cases, older adults perceive they no longer have the same dexterity and motor skills they had in the past and that their cognitive processing cannot keep up with the growing demand for information and decision-making that is a feature of today's society[2]. Thus, older adults often find themselves in conflicting situations and, without realizing it, are subjected to conditions that cause risks to their health[3].

Several studies have sought to analyze the impact of aging on people's health, and problems of frailty, balance, motor coordination and muscle strength have been extensively reported in literature[4-6]. However, although the influence of cognition on daily tasks has been investigated in recent years, a significant number of studies have focused their analysis on older adults with dementia – a situation where cognitive decline is prominent and pathological[7,8].

Task complexity is an important aspect of the analysis of the routines of older adults. Healthy older adults are subjected to cognitive demands during their daily activities which cause the focus of their attention to become divided[9]. The cognitive apparatus of such adults needs to be preserved as complex situations require attention, concentration and cognitive processing for their execution. These aspects tend to be influenced by aging and affect the health of older adults[10].

Understanding the changes that occur in the body is important when analyzing the impact of aging on the routine of older adults, and can prevent complications and risks. In the present study, healthy older adults performed complex tasks that potentiated changes common to aging, such as low visual acuity, changes in the base of support and difficulties in performing simultaneous tasks. With such a premise, the intention was to evaluate the impact that task complexity has on the motor apparatus (mobility and balance) of healthy older adults.

The researchers' hypothesis was that the performance of complex activities that potentiate changes common to aging would affect the mobility and balance of older adults, generating risks to their health. Such information may be useful for health professionals focusing on the field of geriatrics and gerontology, as it promotes fresh discussions on the relationship between aging and the complex daily activities of older adults.

METHODS

A cross-sectional research with quantitative data was undertaken. The selection of participants was carried out through a stratified probabilistic approach, with age and sex as selection criteria. Participants were recruited in the city of Campo Grande, Mato Grosso, Brazil, and all subjects provided written consent prior to assessment. The study was carried out in accordance with the Declaration of Helsinki and its protocols were approved by the institutional ethics committee (protocol number 2.305.644; CAAE: 73163817.2.0000.0021).

The inclusion criteria involved participants of both sexes, aged 60 years or over, with no history of neurological or psychiatric diseases, and with higher cognitive scores in the Mini-Mental State Examination (MMSE)[11] than the cut-off points stipulated by Brucki et al.[12]. The normal MMSE parameters for the Brazilian population are: a minimum of 20 points for illiterate people; a minimum of 25 points for people with one to four years of schooling; a minimum of 26.5 points for people with five to eight years of schooling; a minimum of 28 points for people with nine to 11 years of schooling; and a minimum of 29 points for people with more than 11 years of schooling.

The exclusion criteria involved cases of vertigo, participants who used lower limb orthoses or prostheses, wheelchair users, bedridden patients and those who were unable to remain in an orthostatic position for 60 seconds. In addition, those who had been hospitalized or had had surgery in the previous six months were excluded, as were residents of long-term care facilities.

The sample size was calculated assuming a statistical power of 80%, with a type I error of 5% and an effect size of 0.27[13]. The final analysis revealed

the need for a minimum of 83 participants, and 110 older adults were originally recruited. Of these, nine were excluded as they did not wish to participate in the study, four were removed due to having lower limb prostheses, and seven were excluded for having cognitive scores below the cut-off point stipulated by Brucki et al.[12]. Thus, 90 older adults made up the final sample of the research, a figure 8.4% above the minimum required sample size.

All the methodological procedures are described in accordance with the STROBE[14] initiative. The participants underwent a two stage evaluation at the Biomechanics Laboratory of the Health Institute of the Universidade Federal de Mato Grosso do Sul (the Federal University of Mato Grosso do Sul). The first stage involved an anamnesis with questions about general aspects such as age, education, marital status, professional occupation, body mass index and physical activity practices, while in the second stage, the researchers used specific tests to assess the cognition, mobility, risk of falls and balance of the participants. All tests were applied randomly in accordance with Latin Square distribution[15].

Cognitive functions were analyzed using the MMSE[11.12] and the Frontal Assessment Battery (FAB)[16]. The MMSE was used to assess the general cognition of the participants. This instrument consists of seven specific categories: temporal orientation, spatial orientation, registration of three words, attention and calculation, immediate and delayed recall of the three words, language and visual-constructive practice. MMSE score ranges from 0 to 30 points and the cutoff points adopted were those defined by Brucki et al.[12] (specifications as previously described).

The FAB was included to assess the executive functions of the participants. This instrument addresses the following cognitive skills: concept recognition, lexical flexibility, motor programming, conflicting instructions, inhibitory control and environmental autonomy. The FAB score ranges from 0 to 18 points and the cutoff points adopted in this study were those established by Beato et al.[17]: a minimum of ten points for people with one to three years of schooling, a minimum of 12 points for people with four to seven years of schooling, a minimum of 13 points for people with eight to 11 years of schooling, and a minimum of 15 points for people with more than 11 years of schooling.

Mobility assessment was performed using the Timed Up and Go (TUG)[18] test, which consists of an individual's ability to get up from a chair, walk three meters, come back and sit in the chair. A greater number of steps and time needed to complete the task indicates an increased risk of falls[19]. In this study, the TUG was applied in three different ways: 1st) normal test, as developed by Podsiadlo & Richardson[18]; 2nd) dual motor task test, where the participant performed the test holding a glass with 100 ml of water in their dominant hand; and 3rd) dual cognitive task test, where the participant performed the test concomitantly with the random naming of animals. These different approaches were applied to analyze the mobility of older adults when performing single and simultaneous tasks. The order of application of the tests was randomized, to minimize the learning effect on the results.

In addition to the mobility analysis, the researchers assessed the risk of falls of the participants, measured herein by the Falls Efficacy Scale International (FES-I)[20] and the number of falls suffered in the previous twelve months. Falling was defined for the participants as any marked imbalance that culminated in unintentional contact between the body and the ground. The FES-I is a quick and easy test to apply, which measures an individual's level of concern about falling during social and physical activities inside and outside their home. In this instrument, higher scores indicate a greater concern about falls.

Postural balance was assessed using a force plate (BIOMEC 400_V4, EMG System®), composed of a 500 mm plate^2, four load cells and a 100 Hz calibration system. This plate was chosen due to its ability to analyze the center of gravity of older adults. Participants performed all tests in their bare feet and were instructed to remain on the plate for 60 seconds, the standardized period in classic tests that assess the body balance of older adults[21].

Balance assessment was based on the variables body displacement (cm), area (cm^2) and postural displacement speed (cm/s). The force plate data

were processed using the MATLAB® program (The Mathworks, Natick, MA). The data routine was defined for a sampling of 100 frames per second, with a 2nd order digital low-pass Butterworth filter at 35 Hz. On the force plate, negative values in the anteroposterior and mediolateral planes represented body displacement backwards and to the left, respectively.

The force plate assessments involved four tasks, differing in terms of visual information (eyes open and eyes closed) and base of support (bases of support of 30 and 10 cm). The use of these conditions aimed to simulate changes common to age, such as low visual acuity and an unstable base of support. Like the TUG, the conditions were applied to the force plate in random order, with the objective of minimizing the learning effect on the results. For safety reasons, two researchers remained on each side of the participants during the assessments, in order to prevent falls.

The Shapiro-Wilk and Levenne tests were applied to all data to analyze the normality and homogeneity of variance patterns. Data that exhibited normality and homogeneity in their variance parameters were analyzed by parametric statistics, while those that did not were analyzed by non-parametric statistics.

The independent Student-t, Mann-Whitney U and Fisher tests were therefore used when the aim was to compare the variables of the present study (parametric and non-parametric) in relation to men and women. The Friedman test was applied to verify the effect of task complexity on mobility and the balance variables, and the Wilcoxon post-test was used to perform paired comparisons. Spearman's correlation coefficient (rho) was applied with the sex variable as a covariant factor. The purpose of such an analysis was to investigate the association between the cognitive and motor variables, with the difference between sex controlled in an inferential analysis.

For a better visualization of the findings, the variables are described as number of events, percentage and mean ± standard deviation. In all analyses, the significance level was set at 5%. Outliers were identified as values greater than 3 interquartile ranges, and were excluded from the descriptive and inferential analyzes[22].

RESULTS

Table 1 shows the sex, age, education, marital status, professional occupation, body mass index, physical activity practices, cognition and risk of falls of the participants.

Table 2 details the mobility of the participants during single and simultaneous activities. The results show that women took the same time as men to perform the activity, but required a greater number of steps. The analysis of the impact of task complexity on mobility indicated the effect of the dual cognitive and motor tasks on the participants, with more time and a greater number of steps required to perform the dual cognitive task activity, followed by the dual motor task activity.

Table 3 details the participants' static balance during activities that simulated low visual acuity and a restricted base of support. The results indicated similar responses among men and women for the various activities performed, other than for the base of support area, which was larger among men than women. Complementary analyzes confirmed the impact of visual acuity and base of support on the balance of older adults.

Table 4 shows the Spearman's correlation coefficient between the cognitive and motor variables. The results revealed a significant association between the executive functions and the mobility tests, but weaker associations with the balance tests.

Table 1. General characteristics of the participants (n=90). Campo Grande, Mato Grosso do Sul, 2019.

Variables	Men	Women	*p*
Sample size, %	27.8	72.2	0.001
Age (years)	68.1±7.0	68.6±7.3	0.797
Schooling, %			0.297
Complete higher education	28.0	6.2	
Incomplete high school education	8.0	7.7	
Complete high school education	36.0	23.1	
Incomplete high school education	0.0	0.0	
Complete primary education	16.0	36.8	
Incomplete primary education	12.0	6.2	
Marital status, %			0.001
Single	4.0	15.4	
Married	72.0	41.5	
Divorced	4.0	13.8	
Widow/widower	12.0	27.7	
Civil union	8.0	1.6	
Body Mass Index Kg/m^2	27.1±4.2	27.1±4.3	0.981
Physical activity			0.465
Yes	56.0	66.2	
No	44.0	33.8	
MMSE, pts	27.5±2.1	26.7±2.3	0.134
FAB, pts	15.3±2.1	14.2±2.4	0.030
FES-I, pts	25.0±5.3	25.8±7.8	0.993
Falls			0.064
Yes, %	12.0	32.3	
No, %	88.0	67.3	

Data are expressed in number of events (%) and mean ± standard deviation. *P* values from the Fisher's exact test for sample size, education, marital status, professional occupation, physical activity and falls in the last twelve months. *P* values from the independent Student-t test for age and body mass index. *P* values from the Mann Whitney U test for the MMSE, FAB and FES-I.

Table 2. Impact of task complexity on mobility of participants (n=90). Campo Grande, Mato Grosso do Sul, 2019.

Variables	Single task	Dual motor task	Dual cognitive task	$p_{(task)}$
Time				
Men	10.2±2.2	10.8±2.5	13.8 ± 5.4[a, b]	0.001
Women	10.8±2.2	11.1±2.7	13.5±4.3[a,b]	0.001
$p_{(sex)}$	0.248	0.623	0.810	---
Number of steps				
Men	13.4±2.6	13.9±2.3	14.0 ± 3.3[a]	0.011
Women	15.2±2.2	15.7 ± 2.5[a]	15.7±3.2	0.001
$p_{(sex)}$	0.004	0.007	0.016	---

The data are expressed in number of events (%) and mean ± standard deviation. *P* values from the U-Mann Whitney test when comparing sex. *P* values from the Friedman test when analyzing the impact of task complexity. Complementary analyzes were performed using the Wilcoxon post-test. [a] = means difference in the same group compared to the single task. [b] = means differences in the same group compared to the dual motor task.

Table 3. Impact of task complexity on balance of participants (n=90). Campo Grande, Mato Grosso do Sul, 2019.

Variables	BS30-EO	BS30-EC	BS10-EO	BS10-EO	$p_{(task)}$
AP Position (cm)					
Men	-1.0±3.0	-1.1±2.4	-2.9±2.8[a]	-2.0±2.8[b]	0.001
Women	-1.4±2.5	-2.2±2.9[a]	-2.4±2.5[a]	-2.3±3.2	0.001
$p_{(sex)}$	0.311	0.060	0.405	0.452	---
ML Position (cm)					
Men	-0.8±1.5	-0.8±1.6	-0.6±1.0	-0.4±1.0	0.299
Women	-1.2±1.3	-1.3±1.4	-0.9±0.9[a, b]	-0.9±1.1[b]	0.001
$p_{(sex)}$	0.153	0.152	0.193	0.077	---
Area (cm^2)					
Men	2.9±1.4	3.7±2.1	5.4±2.8[a,b]	9.8±6.9[a, b, c]	0.001
Women	2.2±1.8	2.3±1.4[£]	3.7 ± 1.5[a, b]	5.6±3.3[a, b, c]	0.001
$p_{(sex)}$	0.013	0.006	0.006	0.003	---
AP Speed (cm/s)					
Men	1.5±0.6	1.7±0.6[a]	1.4±0.4[b]	2.0±0.8[a, c]	0.001
Women	1.3±0.3	1.5±0.3	1.4±0.3	1.7±0.4[a]	0.001
$p_{(sex)}$	0.431	0.364	0.777	0.051	---
ML Speed (cm/s)					
Men	1.0±0.2	1.0±0.3	1.4±0.4[a,b]	2.0±0.8[a, c]	0.001
Women	1.0±0.3	1.0±0.2	1.3±0.3[a,b]	1.6±0.4[a, b]	0.001
$p_{(sex)}$	0.788	0.555	0.651	0.035	---

BS30-EO: Base of support of 30 cm, eyes open. BS30-EC: Base of support of 30 cm, eyes closed. BS10-EO: Base of support of 10 cm, eyes open. BS10-EC: Base of support of 10 cm, eyes closed. AP: anteroposterior. ML: mediolateral. The data are expressed in mean ± standard deviation. *P* values of U-Mann Whitney test when comparing sex. *P* values of the Friedman test in analysis of the impact of task complexity. Complementary analyzes were performed using the Wilcoxon post-test. [a] = difference in the same group compared to BS30-EO; [b] = difference in the same group compared to BS30-EC; [c] = difference in the same group compared to BS10-EO.

Table 4. Spearman correlation index (rho) between motor and cognitive variables (n=90). Campo Grande, Mato Grosso do Sul, 2019.

Motor variables	Cognitive variables	
	MMSE	FAB
FES-I	-0.247*	-0.153
Simple TUG		
Time	-0.031	-0.468*
Number of steps	-0.044	-0.394*
TUG with dual motor task		
Time	-0.012	-0.475*
Number of steps	0.036	-0.460*
TUG with dual cognitive task		
Time	-0.019	-0.376*
Number of steps	0.029	-0.361*

to be continued

Continuation of Table 4

Motor variables	Cognitive variables	
	MMSE	FAB
30 cm base eyes open		
AP Position	0.027	0.212
ML Position	0.108	-0.240*
Area	-0.081	-0.273*
AP Speed	-0.166	-0.212
ML Speed	-0.093	-0.205
30 cm base eyes closed		
AP Position	0.193	0.097
ML Position	0.085	0.130
Area	0.117	-0.070
AP Speed	0.096	-0.100
ML Speed	0.027	-0.170
10 cm base eyes open		
AP Position	0.108	-0.231*
ML Position	0.004	0.035
Area	-0.189	-0.131
AP Speed	-0.161	-0.154
ML Speed	-0.213	-0.143
10 cm base eyes closed		
AP Position	-0.042	0.050
ML Position	-0.074	-0.257*
Area	-0.102	0.036
AP Speed	-0.083	0.001
ML Speed	-0.160	0.043

MMSE: Mini Mental State Exam FAB: Frontal Assessment Battery. FES-I: Falls Efficacy Scale International. TUG: Timed Up and Go. AP: Antero-posterior. ML: Mediolateral. Significant correlations are highlighted with asterisks.

DISCUSSION

The present study investigated the impact of task complexity on the mobility and balance of older adults. The results showed that, in healthy older adults with a low risk of falls, task complexity impacted mobility, with individuals requiring a greater number of steps and a longer period of time to perform the activity. Similarly, a restricted base of support and reduced visual information caused greater insecurity in participants when remaining in an orthostatic position. Understanding these results is important for the development of therapies capable of reducing health risks for older adults.

The initial aim of the study was to include a similar number of men and women in order to investigate the impact of task complexity on both groups. The reality observed, however, included considerably more women than men. Factors that explain this scenario are related to the higher life expectancy of women and their tendency to be more proactive in research projects than men[23].

Regarding cognitive functioning, the groups were similar for overall cognition, but diverged in relation to executive functions. The FAB differs from the MMSE in that it focuses its analysis on the executive functions of subjects, which are mainly associated with the prefrontal cortex[24]. The MMSE, in contrast, is responsible for an overall analysis of cognition and is used to track cases of dementia in combination with a clinical evaluation of the patient[25]. The difference in executive functioning

between groups, while statistically significant, is not clinically relevant, as it describes normal FAB scores according to the reference values identified by Beato et al.[17]. In addition, this divergence of scores between men and women may have been influenced by the level of schooling of women (slightly lower than that of men) and the routines of women (linked in this study to household activities). As the FAB scale is influenced by both factors[26,27], it is likely that these aspects impacted the final score of women, without identifying signs of cognitive decline.

Most participants reported that they had not suffered falls in the previous twelve months. On the FES-I scale, the subjects had scores corresponding to a sporadic risk of falling[28]. Even with these parameters, health professionals should not neglect older adults with a low risk of falls, as the participants in the present study, despite falling infrequently, suffered the impact of complexity of task on their mobility and balance.

The researchers' initial hypothesis was confirmed when the impact of task complexity on the time and number of steps required to complete the TUG test was observed, a result that corroborates the findings of previous studies[29,30]. Interestingly, both men and women had greater difficulty performing the dual cognitive task activity than the dual motor task activity. This proves the impact of challenging cognitive situations on the daily lives of older adults, especially when the focus of attention is divided between more than one activity performed simultaneously.

Women were found to require more steps to perform mobility tasks than men, although this difference was not observed in relation to the time variable. Several factors may be associated with this finding, such as stride length, fear of suffering falls and cognitive functions. Further studies should be carried out to address this theme and investigate the topic in greater depth.

In relation to stabilometric measures, the participants presented oscillations in balance when subjected to a restricted base of support and imprecise visual information. Both factors impacted the balance of healthy older adults, corroborating previous studies[31,32]. As poor vision and an unstable base of support are common in aging, the results suggest the use of different bases of support and visual aids during rehabilitation procedures as a way of encouraging older adults to deal with daily motor challenges.

Regarding the association between the cognitive and motor variables (Table 4), the MMSE, which assesses overall cognitive aspects, was not associated with measures of mobility and balance. The FAB, in contrast, revealed a significant association, especially with mobility tests. These results reinforce the interference of the prefrontal executive functions in the daily motor activities of older adults. The authors attribute the few, weak associations between executive functions and stabilometric tests to the fact that the activities performed on a force plate involve physical restrictions (a restricted base of support and imprecise visual information), but present low cognitive demands.

Although the correlations were significant between executive functions and mobility, the analyzes identified weak ($0.10<|r_s|<0.39$) and moderate ($0.40<|r_s|<0.69$) intensities[33]. This reveals that factors other than executive functions are associated with the mobility of older adults. Further studies should address this issue and seek to identify other factors that are associated with mobility in the population in question.

Certain limitations should be considered when assessing the results of the present study. Firstly, the sample was composed predominantly of "younger older adults". Difficulties in including older seniors are related to mobility problems, high rates of hospitalization, the inability to attend the assessment center and a higher prevalence of cognitive decline[34]. Secondly, the number of men was significantly lower than the number of women. Finally, the correlations between cognitive and motor tests, although significant, were weak and moderate in scale – which indicates that there may be other factors, not included in the present study, associated with mobility and balance.

CONCLUSION

Healthy older adults experienced mobility and balance difficulties when performing complex tasks. The association of cognitive and motor

variables reinforces the impact of prefrontal executive functions on the mobility of older adults, and suggests the importance of multiprofessional rehabilitation in stimulating such individuals to face daily challenges. Further research must be carried out to analyze whether other factors impact the mobility and balance of older adults, in addition to the variables analyzed in the present study.

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Motoric cognitive risk syndrome in older adults at a health service in the Distrito Federal: a cross-sectional study

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Abstract

Objective: To verify the prevalence of the motoric cognitive risk syndrome (MCR) in older adults from the Distrito Federal (DF), Brazil, who attended the health services of a reference unit in Geriatrics and Gerontology, compare groups of older adults with and without the syndrome and investigate the possible associated factors for the development of this syndrome. *Method:* This is an observational cross-sectional analytical study, developed with older adults (age ≥ 60 years) with independent gait and without severe cognitive dysfunctions, who had a record of sociodemographic data, cognitive assessment, functional capacity and gait speed in medical records dated 2017 to 2019. Data analysis was expressed as mean and standard deviation, frequency and percentage, and *odds ratios* (OR) with 95% confidence intervals. Comparisons between groups with and without MCR were made using the chi-square, U Mann Whitney and t-student tests. *Results:* There were no significant differences in the comparison of variables between groups. The prevalence of MCR in the studied population was 24%. None of the factors analyzed showed an association with the presence of the syndrome. *Conclusion:* The prevalence of MCR in the sample was 24% and was shown to be higher in the population of the DF when compared to the populations studied in other countries. There were no differences between the groups of older adults with and without the syndrome, and the associated factors were not found. Screening for the syndrome is hugely relevant, as, from these findings, mechanisms can be developed to prevent dementia in old people.

Keywords: Health of the Eldely. Syndrome. Cognitive Dysfunction. Walking Speed. Dementia.

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INTRODUCTION

The aging process has repercussions for several physiological changes at all levels in the body's systems, the main characteristic of this process being the decrease in the physiological reserve, with a consequent decline in the functional capacity of the old person[1]. The vulnerability to damage, resulting from the flaws that arise in the body's molecules, cells and tissues throughout the aging process, can favor the acquisition of age-related diseases, which have the potential to generate disability and fragility[2].

Within this aging process, brain aging is noteworthy, which is characterized by the number of neurobiological, anatomical, metabolic, neurochemical and neuronal circuit changes, directly affecting the sensory motor and cognitive functions of old people[3,4], being considered an important marker in relation to the functional capacity of this group[5].

Another important marker of functional capacity in old people relates to gait speed, which acts as a marker of motor and cognitive functions. In healthy old people, gait speed has significant relationships with scores on cognitive assessment tests[6], and reduced gait speed has been shown to be a predictive factor of cognitive decline in this population[6–9].

In this context, the motoric cognitive risk syndrome (MCR) appears as an alternative for the early detection of the risk of developing dementia and dysfunctions / disabilities, being defined as the presence of cognitive complaints and slow gait in old people who do not have a diagnosis of dementia or inability to move[10,11]. Screening for this syndrome is extremely relevant, as its presence has been associated with frequent risk factors in the Brazilian population, such as heart disease, chronic diseases and visual impairment[12–15], in addition to being shown to be predictive of the development of dementias, risk of falls, dysfunctions / disabilities and mortality in old people[16,17].

In addition, Brazil is the second country with the highest prevalence of dementia globally[18], which favors the hypothesis that MCR may be more prevalent in our old people population. Thus, the present study aimed to verify the prevalence of MCR in old people in the Federal District (DF) who attended health services at a reference unit in Geriatrics and Gerontology, to compare groups of old people with and without the syndrome and to investigate the possible factors associated with the development of this syndrome in the population described.

METHOD

The present study was developed as an observational, cross-sectional and analytical research using secondary data from medical records.

The study was carried out using a convenience sample, and the data were collected from the medical records of patients who were referred by the Basic Health Units (UBS) in the region and admitted to the elderly care service of a reference unit in Geriatrics and Gerontology (secondary level), between the years 2017 to 2019.

Figure 1 shows the flowchart of the users who were taken to the reference unit in Geriatrics and Gerontology and their distribution according to the inclusion and exclusion criteria.

The reception was performed by a multidisciplinary team composed of a nurse, a physiotherapist, a nutritionist and a social worker or psychologist. This team was responsible for conducting an anamnesis based on the criteria of the comprehensive geriatric assessment (CGA)[19] and for conducting screening tests of cognitive function[20], functional capacity[21–25] and social / psychological vulnerability, and after performing this assessment, the team defined whether the user would be admitted to this unit or if the counter-referral would be made to the UBS of origin.

The results of these evaluations performed during the reception were recorded in spreadsheets, through a computer program, and in the medical records of the old people, and the data collection used in this study (and described a posteriori) was done through these reception records.

Figure 1. Flowchart of sample capture. Taguatinga, DF, 2017 to 2019.

This study included data from the medical records of people aged 60 years or over, capable of walking through independent gait and who underwent tests to assess gait speed and cognitive performance, as well as independence for carrying out activities of daily living[10].

The following exclusion criteria were adopted: old people with severe motor dysfunction already in place, with a previous diagnosis of dementia syndrome, even though the disease was in its initial stage[10,11], in addition to other disorders of the nervous system (eg sequeale of stroke, Parkinson's disease, among others) and amputations. Medical records data that were not fully filled out and that lost information could not be retrieved were also excluded from the study.

Regarding the MCR diagnostic criteria, in order for their presence to be recognized, the old person had to present four characteristics: I) cognitive complaints assessed in neuropsychological tests, II) slow gait, characterized as gait speed one standard deviation or more below the predicted, according to age and sex, III) preserved ability to carry out their activities of daily living (ADL), and IV) absence of the diagnosis of dementia[10].

In this study, to detect the presence of MCR, cognitive function was measured using the Mini Mental State Examination (MMSE), which assesses the presence of cognitive changes. The cutoff points adopted for the existence of changes in the MMSE were: for illiterate old people, the test score was less

than 18 points; for old people with up to four years of schooling, the test score is less than 24 points; for old people with up to eight years of schooling, the test score is less than 26 points; and for old people with schooling greater than or equal to nine years of study, the test score is less than 27 points out of a total of 30 points, assessing the cognitive domains of temporal orientation, spatial orientation, immediate memory, attention and calculation, and evocation and language[20].

The detection of slow gait was performed using the usual gait speed test (UGS). In a corridor of approximately 10 meters in length, the participants were instructed to walk at a comfortable speed the referred distance, the first three and the last four meters being excluded. The performance in the test was timed and the UGS value was determined by dividing the distance covered by the time obtained on the stopwatch, with the value of 0.8 meters / second being adopted as the cut-off score[24,26].

The assessment of the ability of the old person to perform their ADL was performed using two instruments: the Katz index, to measure the degree of independence for basic activities of daily living (BADL)[21], and the Lawton & Brody questionnaire, to assess the degree of independence for instrumental activities of daily living (IADL)[22].

Participants were classified as independent for BADL when they had a test score of 0, need assistance for BADL when they had test scores ranging from 1 to 5 points, and totally dependent for BADL when they had a test score of 6 points[21,23]. As for the IADL, the participants were considered independent when they had a score on the test equal to 27 points, they need assistance when they had scores on the test ranging between 18 and 26 points, and totally dependent when they had scores on the test ranging between 9 and 17 points[25].

Once a week, the two researchers involved in the study accessed the data record system of patients at the reference unit in Geriatrics and Gerontology (DF) and collected the necessary data for the research, and this collection took place between the months of March and May 2020.

Data were analyzed descriptively using measures of central tendency (mean and median) and variability (standard deviation and interquartile range [25% and 75% percentiles]) for continuous data and measures of absolute and relative frequency for categorical data. The distribution of continuous data was analyzed using the Kolmogorov-Smirnov test. The comparison of categorical data between groups of old people with and without MCR was analyzed using the chi-square test, and continuous numerical data using the Mann-Whitney U test (non-parametric data) and independent Student's t test (parametric data). The values of the w indexes were calculated as measures of the effect sizes between the groups, being considered small effect ($d = 0.20–0.49$ and $w = 0.10–0.29$), medium effect ($d = 0.50– 0.79$ and $w = 0.30–0.49$) and a large effect ($d \geq 0.80$ and $w \geq 0.50$). Univariate logistic regression was used to determine associations between the characteristics investigated with the identification of MCR. Odds ratios (OR) with a 95% confidence interval were calculated for each independent variable. The significance level of 5% was considered.

Respecting the ethical aspects addressed in Resolutions 466/2012 and 510/2016, this research was submitted to and approved by the Research Ethics Committee (CEP) of the State Health Department of the Federal District (SES / DF) (Opinion 4.198. 150/2020). Data collection was carried out based on medical record research, with participants not having to sign the Informed Consent Form (ICF).

RESULTS

The clinical and sociodemographic characteristics of the old people who comprised the sample of this study are shown in Table 1. The analyzes indicated that there was a greater predominance of female subjects in the sample (71.4%). In addition, the majority (76.0%) of the old people had low education (illiteracy or elementary education), polypharmacy (68.5%) and independence to perform basic activities (75.7%) and instrumental activities of daily living (57.5%).

Table 1. Clinical and sociodemographic characteristics of the sample (N=346). Taguatinga, DF, 2017 to 2019.

Variables	General Sample
Gender, % (n)	
Female	71.40 (247)
Male	28,60 (99)
Age	
mean (SD)	77.71 (±8.10)
median [percentiles 25%; 75%]	78.00 [72; 84]
Schooling,% (n)	
Illiterate	28.60 (99)
Elementary School	47.40 (164)
High school	19.70 (68)
University education	4.30 (15)
Diagnostics,% (n)	
Systemic arterial hypertension (yes)	74.30 (257)
Diabetes Mellitus (yes)	34.40 (119)
Musculoskeletal changes (yes)	42.80 (148)
Depression (yes)	23.80 (82)
Number of medications	
mean (SD)	5.55 (±3.35)
median [percentiles 25%; 75%]	5.00 [3; 8]
Polypharmacy (yes), % (n)	68.50 (237)
BMI	
mean (SD)	26.11 (±4,88)
median [percentiles 25%; 75%]	25.63 [22.87; 28.52]
Nutritional status,% (n)	
Low Weight (BMI <22 Kg / m²)	18.20 (63)
Eutrophy (BMI = 22 to 27 Kg / m²)	43.60 (151)
Excess Weight (BMI> 27 Kg / m²)	38.20 (132)
Cigarette exposure (yes), % (n)	31.50 (109)
Alcohol consumption (yes) % (n)	14.70 (51)
Physical exercise practice (yes),% (n)	23.40 (81)
Fall history (yes),% (n)	34.10 (118)
Basic activities of daily living,% (n)	
Independent	75.70 (262)
Assistance	15.90 (55)
Dependent	8.40 (29)
Instrumental activities of daily living,% (n)	
Independent	57.50 (199)
Assistance	24.90 (86)
Dependent	17.60 (61)

SD: standard deviation; BMI: body mass index.

In this study, 24% of the old people investigated had MCR. The criteria identified and analyzed in each group are shown in Table 2. Among the group without MCR, the criterion for the most prevalent syndrome was independence for BADL, followed by cognitive deficit and slow gait. All criteria showed a significant difference (p <0.001) in the comparison between groups of old people with and without MCR.

None of the factors examined showed a difference between the study groups. The comparison of these factors between the groups is shown in Table 3.

In the univariate logistic regression analysis, none of the factors analyzed proved to be a factor associated with the presence of MCR. This result is shown in Table 4.

Table 2. Diagnostic criteria investigated for the presence of motor cognitive risk syndrome (N=346). Taguatinga, DF, 2017 to 2019.

Variables	General Sample	Old people without MCR (n=263)	Old people with MCR (n=83)
MCR, % (n)			
Positive	24.00 (83)	-	-
Negative	76.00 (263)		
Basic activities of daily living,% (n)			
Independent	75.70 (262)	68.10 (179)	100.00 (83)
Assistance	15.90 (55)	20.90 (55)	0.00 (0)
Dependent	8.40 (29)	11.00 (29)	0.00 (0)
BADL criterion (yes-independent),%(n)	75.70 (262)	68.10 (179)	100.00 (83)
(MMSE score)			
mean (SD)	19.29 (±6.57)	20.96 (6.13)	13.98 (4.89)
median [percentiles 25%; 75%]	20.00 [15; 24]	22.00 [18; 26]	15.00 [10; 17]
Cognitive criterion (yes-cognitive deficit),%(n)	64.70 (224)	53.60 (141)	100.00 (83)
Usual gait speed (m/s)			
mean (SD)	0.83 (±0.30)	0.90 (0.30)	0.61 (0.14)
median [percentiles 25%; 75%]	0.80 [0.60; 1.00]	0.90 [0.75; 1.00]	0.60 [0.50; 0.75]
Gait criterion (yes – UGS<0.8m/s),%(n)	47.70 (165)	31.20 (82)	100.00 (83)

MCR: Motoric cognitive risk syndrome; MMSE: Mini-Mental State Examination; *p*<0.001.

Table 3. Comparison of the variables under study among old people with and without the motoric cognitive risk syndrome (N=346). Taguatinga, DF, 2017 to 2019.

Variables	Old people without MCR (n=263)	Old people with MCR (n=83)	*p*-value	Effect size (power)
Gender***, % (n)				
Female	70,30 (185)	74,70 (62)	0,48	0,04 (41%)
Male	29,70 (78)	25,30 (21)		
Age*				
mean (SD)	77,49 (±8,10)	78,42 (8,12)	0,36	0,11 (15%)
median [percentiles 25%; 75%]	77,00 [72; 83]	78,00 [72; 85]		
Schooling***,% (n)				
Illiterate	27.40 (72)	32.50 (27)	0.14	0.12 (41%)
Elementary School	45.60 (120)	53.00 (44)		
High school	22.10 (58)	12.00 (10)		
University education	4.90 (13)	2.40 (2)		

to be continued

Continuation of Table 3

Variables	Old people without MCR (n=263)	Old people with MCR (n=83)	*p*-value	Effect size (power)
Diagnostics ***,% (n)				
SAH (yes)	75.30 (198)	71.10 (59)	0.47	0.04 (41%)
DM (yes)	36.90 (97)	26.50 (22)	0.08	0.09 (41%)
Musculoskeletal changes (yes)	44.10 (116)	38.60 (32)	0.44	0.04 (41%)
Depression (yes)	24.00 (63)	22.90 (19)	0.88	0.01 (41%)
Number of medications **				
mean (SD)	5.38 (±3.17)	6.07 (3.83)	0.20	0.20 (34%)
median [percentiles 25%; 75%]	5.00 [3; 7]	5.00 [3; 9]		
Polypharmacy (yes) [c], % (n)	67.30 (177)	72.30 (60)	0.41	0.04 (41%)
BMI**				
mean (SD)	25.99 (±4.86)	26.51 (4.92)	0.48	0.11 (13%)
median [percentiles 25%; 75%]	25.64 [22.77; 28.30]	25.58 [23.07; 29.73]		
Nutritional status ***,% (n)				
Low Weight (BMI <22 Kg / m²)	19.40 (51)	14.50 (12)	0.57	0.06 (41%)
Eutrophy (BMI = 22 to 27 Kg / m²)	43.30 (114)	44.60 (37)		
Excess Weight (BMI> 27 Kg / m²)	37.30 (98)	41.00 (34)		
Cigarette exposure (yes)***, % (n)	31.60 (83)	31.30 (26)	0.96	0.002 (41%)
Physical exercise practice (yes)***,% (n)	25.10 (66)	18.10 (15)	0.23	0.07 (41%)
Fall history (yes)***,% (n)	34.60 (91)	32.50 (27)	0.79	0.02 (41%)
IADL***, % (n)				
Independent	57.40 (151)	57.80 (48)	0.20	0.09 (41%)
Assistance	23.20 (61)	30.10 (25)		
Dependent	19.40 (51)	12.00 (10)		

MCR: motoric cognitive risk syndrome; SAH: systemic arterial hypertension; DM: diabetes mellitus; BMI: body mass index; IADL: instrumental activities of daily living; * Variables with normal distribution (Kolmogorov-Smirnov test); Intergroup comparisons using the independent Student t test; ** Variables with non-normal distribution (Kolmogorov-Smirnov test); Intergroup comparisons using the Mann-Whitney U test; *** Categorical variables; Comparisons using the chi-square test.

Table 4. Univariate logistic regression analysis to identify factors associated with motoric cognitive risk syndrome in the sample (N=346). Taguatinga, DF, 2017 to 2019.

Variables	Occurrence of MCR OR [95% CI]	*p*-value
Gender	1.245 [0.710; 2.182]	0.444
Age	1.014 [0.984; 1.046]	0.359
DM	0.617 [0.357; 1.068]	0.084
Depression	0.938 [0.522; 1.684]	0.830
SAH	1.239 [0.714; 2.150]	0.446
Musculoskeletal changes	0.795 [0.480; 1.317]	0.373
Medications	1.062 [0.988; 1.142]	0.103
Polypharmacy	0.789 [0.457; 1.361]	0.394
BMI	1.021 [0.972; 1.073]	0.402
Physical activity	0.658 [0.353; 1.230]	0.190

MCR: Motoric cognitive risk syndrome; OR = Odds Ratio; CI = Confidence Interval; DM: diabetes mellitus; SAH: systemic arterial hypertension; BMI: body mass index.

DISCUSSION

This study aimed to evaluate the prevalence, to compare the groups of old people with and without MCR and to investigate the factors associated with its occurrence, which has been shown to be predictive of dementia in old people from other countries[10,11,14,16,17,27].

Our hypothesis consisted of a higher prevalence of the syndrome in Brazilian old people, when compared to old people from abroad, due to the socioeconomic conditions of the population of the country, specifically the Federal District. The findings of the present study corroborate this hypothesis, and the sample of this research found a prevalence of 24% of old people with MCR, while in previous studies, carried out in other countries, the prevalence of the syndrome varied between 2.65 and 12.8% of the sample[13,14,28,29].

However, it is noteworthy that this higher prevalence rate of MCR in the old people in this study may be related to the selection of a sample by convenience, using data from medical records of old people who attended health services, which may indicate a more fragile and vulnerable sample, since this group has diseases that require greater complexity of health care, having been referred to a referral service. In addition, this profile of old people (old people who need health services) is characterized by having lower income, low education, not practicing physical activity regularly and presenting a high risk for the occurrence of cardiovascular and metabolic diseases, for example[30], which may favor even more functional disability and other health problems.

In addition, in relation to the MCR diagnostic criteria, in the present study, the old people who presented the syndrome had worse performance on the cognitive test and slower gait than the old people who did not have the MCR. To explain the difference in cognitive performance between the old people with and without the syndrome, Maguire et al.[14] evaluated some domains of cognitive function and found that old people with MCR had worse performance in tests of memory, global cognition and sustained attention than old people without the syndrome. Regarding the differences in gait speed of the old people with and without MCR, Ayers and Verghese[31] analyzed the gait parameters and found that the old people with the syndrome had shorter stride length and less time in the swing phase when compared to the old people without the MCR.

In the comparison between the groups of old people with and without MCR, in this study, there were no significant differences between the groups for the low education, presence of chronic diseases, polypharmacy, overweight and physical inactivity variables, which differs from the findings of previous researches that demonstrated significant differences for the presence of these variables between the groups[13,32].

In addition, previous studies that analyzed the factors associated with the presence of MCR found that the practice of physical activity[12,33], being overweight[12,14,28,33], depression[12,14,33], cardiovascular diseases (such as systemic arterial hypertension)[34], musculoskeletal changes (osteoporosis) and polypharmacy[33], influence the occurrence of the syndrome, which differs from the findings of the present study, which showed no relationship between these same factors investigated with the presence of MCR. This result can be explained by the sample size of this study, which was not sufficient to generate an adequate effect (power) size - 80% - for any of the variables analyzed, and by the selection of participants through a convenience sample from a medium-complexity health service, these being limitations of the research.

Despite these limitations, this was a pioneering study in the investigation of MCR in the population of Brazil, specifically in the Federal District, being a relevant research because this syndrome has been related not only to the progression to dementia, but also to other health problems, such as brain and musculoskeletal disorders - which affect cognitive and motor changes that contribute to frailty in old people[35]; increased risk of falling and increased mortality rate[16].

CONCLUSION

This research verified the prevalence, compared two groups of old people and analyzed the possible

factors associated with the motoric cognitive risk syndrome, a geriatric syndrome predictive of dementia. In the sample, selected for convenience and in a non-probabilistic way, and coming from a health service, the prevalence rate of this syndrome was higher than the rates recorded in other studies, but there were no differences between the groups of old people with and without the syndrome for the variables under study, with the exception of diagnostic variables, and the factors associated with this higher prevalence were not found. However, these findings are extremely relevant for clinical practice, since by detecting the prevalence of the syndrome, mechanisms can be developed for the prevention and control of the development of dementia in old people, since dementia affects the functional capacity and the quality of life of this group. Further research with a larger number of participants is necessary to define the prevalence rate of the syndrome on a national basis and to allow verification of the factors associated with the development of the motoric cognitive risk syndrome.

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Institutionalized old people, depressive disorders, and dental issues: what is the state of the art?

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Abstract

Objective: To map and discuss scientific knowledge involving the research object Oral health conditions and depression in institutionalized old people. *Method:* Scope review of the literature mapping type. The mapping of the selected data was done using the data systematization technique through the Summative Content Analysis from the perspective of Manifest Themes in the texts. After the exclusions, 27 articles were selected. *Results:* With the analysis of the articles it was possible to divide them into two themes. All continents have publications on the topic. Regarding its methodology, a lot of research with the design of deductive studies was carried out and few researches were developed with inductive methods. *Conclusion:* The present study identified that there is a communication between some oral health conditions (xerostomia and tooth loss) and the prevalence of depressive disorders in institutionalized old people.

Keywords: Homes for the Aged. Oral Health. Depression. Review Literature as Topic.

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INTRODUCTION

The last 30 years have presented a scenario of significant changes in the Brazilian family composition. There was a decrease in the fertility rate and the consequent reduction in the average size of families[1]. In addition, the Brazilian age pyramid revealed phenomena such as the increase in life expectancy and, therefore, the trend of an aging population. According to the 2018 estimates of the Brazilian Institute of Geography and Statistics (IBGE)[2], there has been an 18% increase in the old people population in the last decade. As a consequence of these changes in the characteristics of the population, the profile of the most prevalent diseases in the country also changes, leading to a greater pattern of chronic diseases[3].

Among chronic diseases, depression can be highlighted, which affects approximately 264 million people worldwide. Depressive disorders in old people appear in the context of other chronic illnesses, disabling illnesses and family problems[4]. In addition, factors such as personal or family history of psychiatric disorders, likewise, can contribute to development, as pointed out by data revealed by the World Health Organization, which show that depression affects about 7% of the old people population, which includes people above 60 years old[4]. It is known that there is a difference between the prevalence of depressive illnesses in non-institutionalized and institutionalized old people, and institutionalized old people have a higher prevalence of depressive illnesses[5]. Depressive disorders in old people can lead to weight loss, worsening quality of life, altered self-esteem, in addition to increasing the use of health services and worsening oral health[6,7].

Oral health of old people, institutionalized or not, is fundamental for a satisfactory quality of life for this population[8,9]. The maintenance of remaining teeth and the ability to occlude are important to prevent functional disabilities and maintain a satisfactory quality of life[10]. Depressive symptoms in old people can be determinant of cavities which shows that depression can affect the oral health of old people[11,12]. Institutionalized old people are more affected by depressive disorders and, in this process, it is believed that the prevalence of oral problems in institutionalized old people is an important indicator related to depression in this group of old people[13,14,15].

Given the assumption that conditions related to oral health may be associated with conditions suggestive of depression in old people who are institutionalized, it is essential to map the available evidence to contribute with scientific knowledge in the field of geriatrics and gerontology. Thus, the objective of this scope review was to map and identify scientific production involving the following research object: "Oral health conditions and depression in institutionalized old people".

METHOD

To carry out the present study on the state of the art[16], involving the intersection of subjects such as oral health conditions and depression in institutionalized old people, it is essential to develop a dense bibliographic search due to the amplitude of the theme. In this way, the present study proposes to develop a Systematic Scope Review of the literature mapping type[17,18]. In a scope review, the focus is on the search for the state of scientific knowledge on a topic, carried out through analysis and general discussion of the scientific research carried out and published[17]. Thus, the present literature review proposes to answer the following research question: What is the state of the art involving the interface between questions about oral health and depression in old people who are institutionalized?

The mapping of the data selected for the research, developed by the technique of systematizing the Summative Content Analysis data, was organized in the perspective of Manifest Themes in the texts[19]. In sequence, the synthesis, presentation and description of the results were carried out in a discursive and thematic way[17] organized as shown in Chart 1.

Chart 1. Construction of themes involving the state of the art. Oral health and suggestion of depression in institutionalized old people. 2020.

Themes	Subthemes
1-Oral health condition: LTCF, depressive disorders and pluralities	Xerostomia, dysphagia, mucosal lesions and chewing depression, oral condition and cognitive impairment, dysphagia, need for multiprofessional training and access to dental care
	Cortisol in saliva, depression diagnostic tools
	Life histories, oral health needs of institutionalized old people
	Masticatory skills, implants, oral health conditions and quality of life
2-Depression in institutionalized old people: medicalization, oral health conditions and subjectivities	Medications, dysphagia, depression and behaviors
	Depression in life transition to a care facility
	Interprofessional care, recreational activities, physical exercise, nutritional intervention and depression care
	Social activities and care and reduction of institutionalization
	Depression prevention actions
	Access to oral health services
	Cancer, tooth loss and depression

A bibliographic search was carried out in national and international databases with free access through the Virtual Health Library (VHL) platform with free access via https://pesquisa.bvsalud.org/portal/decs-locator/?lang=pt. This platform includes the following literature databases: Latin American and Caribbean Literature in Health Sciences (LILACS), Spanish Bibliographic Index in Health Sciences (IBECS), Medical Literature Analysis and Retrieval System Online (MEDLINE) e Scientific Electronic Library Online (SciELO). In all the databases accessed, the Boolean operator AND is used in descriptors controlled via Medical Terms (MeSH) for the access of scientific events on a worldwide level.

The search took place from March 12 to April 22, 2020. Similar to the study by Mota et al.[20], controlled descriptors in Portuguese were used, since the VHL search platform retrieves publications in any language through descriptors in Portuguese, English or Spanish. In this process, it is worth noting that the selection of the material was carried out by two researchers, individually and independently, and there was a consensus regarding the selected articles. The search and selection process for the studies in this review is presented in the flowchart (Figure 1), according to a checklist adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[21].

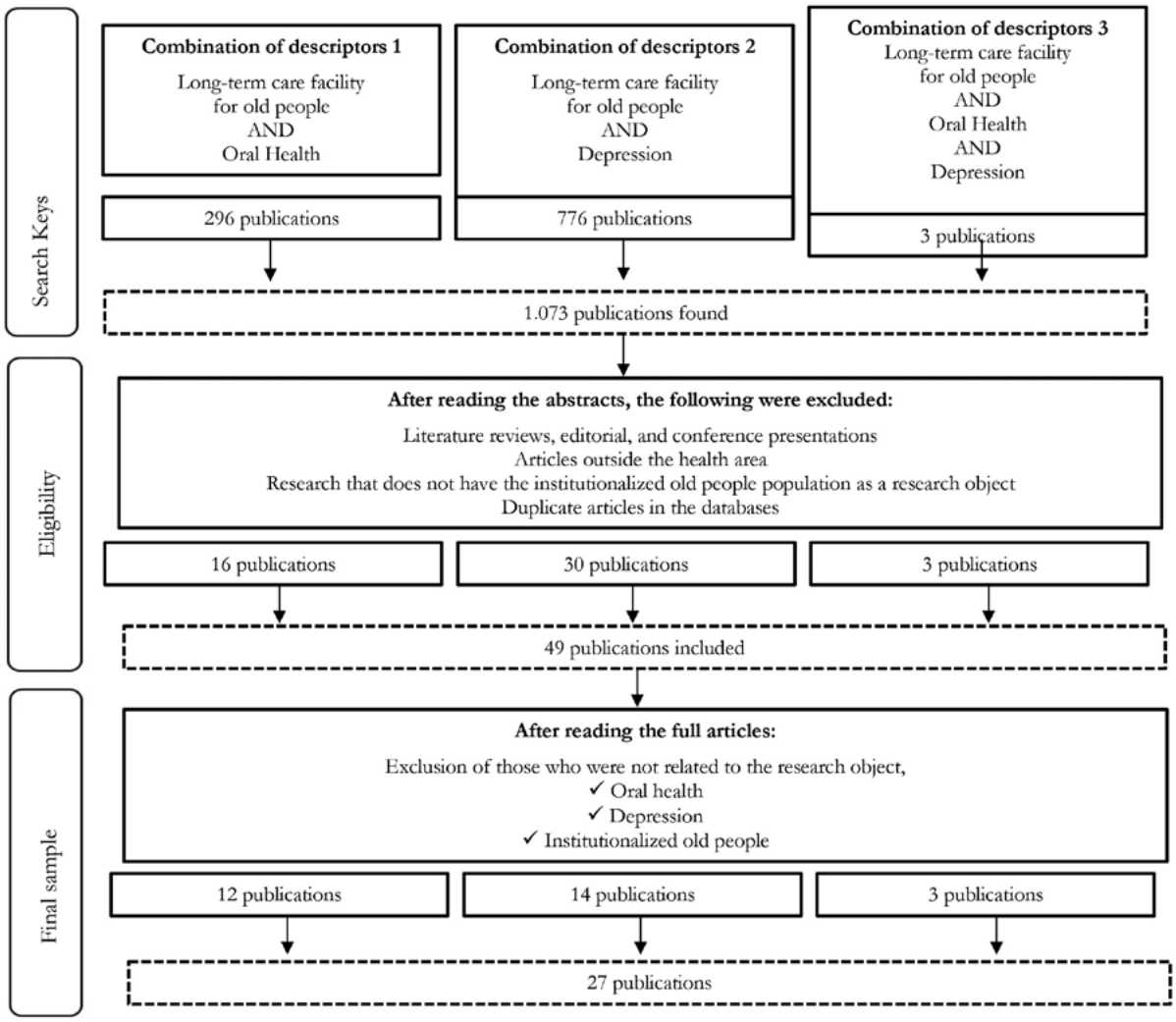

Figure 1. Institutionalized old people, dental issues and depressive disorders. Flowchart of the study selection process, adapted from PRISMA[21], 2020.

Thus, articles were included: with year of free publication, to register the first published evidence on the topic; articles that had their titles, abstracts, and full articles available in Portuguese, English or Spanish; articles that were related to the proposed theme, and that were accessed by the descriptors used. Literature review articles, case reports, editorials and manuals, clinical care reports and protocols were excluded. From the final sample, production characterization data were analyzed, such as: year of publication; country of conduct of the research; study objective; methodological approach; subject related to depression and oral health.

The search strategies allowed to identify 1,073 articles. The reading with analysis of the 49 titles and abstracts, to select the articles that were pertinent to the research question, resulted in the maintenance of 27 articles, which had as a phenomenon of interest the study of institutionalized old people themes, dental issues and depressive disorders. Each article was read in full by peers and was structured on the following themes: Oral health condition: Long-term Care Facilities (LTCF), depressive disorders and pluralities and Depression in institutionalized old people: medicalization, oral health conditions and subjectivities.

RESULTS

In response to the question of the present research, it was observed that there was a heterogeneity in the subthemes of the articles accessed, as well as in the characteristics of the published studies.

The first study accessed was published in 2009 and is Brazilian. The last publication was in the year 2019 and has Brazil and the United States as origins of the research. In this context, it is possible to point out that among all the studies analyzed, six studies originate in Brazil and, of these, three bring the dialogue on the subjects of depression and oral health in institutionalized old people (Tables 1 and 2).

Among the studies, several objectives were observed, such as the description of the oral health condition and the status of dental implants in institutionalized old people, up to objectives more associated with the analysis of the risk of dementia with the use of anticholinergics. (Tables 1 and 2). As for the methodologies used in the analyzed studies, it was observed that many researches with deductive study design were carried out and few researches were developed with inductive methods. In addition to these aspects, only one study, of Australian origin, uses a mixed methodology, which shows that little has been researched with such a method (Table 2).

Table 1. Mapping of the studies included in the scope review categorized in Theme 1, in increasing chronological order based on the year of publication, 2009-2020.

Year of Publication / Author(s) / Country of origin of the research	Objective of the study	Methodological approach	Depression-related issue addressed	Oral health-related issue addressed
2009/De Mello ALSF, Padilha DMP/ Brazil[22]	To identify the characteristics of oral health care for institutionalized old people.	Qualitative/ Thematic analysis	-	Oral hygiene, dental care.
2009/Ferreira RC, et al. / Brazil[23]	To describe the oral health of the institutionalized old people regarding dental cavities, oral hygiene and periodontal disease.	Quantitative / Descriptive study	-	Oral hygiene, coronary and root tooth decay and periodontal disease.
2009/Haumschild MS, Haumschild RJ/ USA[24]	To assess the importance of long-term oral health care and its relationship to maintaining general health.	Qualitative / Narrative analysis	-	Oral hygiene and periodontitis.
2009/Isaksson R, et al. / Sweden[25]	To investigate oral health and the status of oral implants in patients who receive long-term care or who are institutionalized, all with prostheses.	Quantitative / Cohort study	-	Stomatitis, dental care for old people, edentulism, dental prosthesis supported by implant and dental plaque.
2009/Kim HY, et al. / South Korea[26]	To assess the association between masticatory capacity and quality of life related to oral health, associating it with other factors.	Quantitative / Descriptive study with secondary data	-	Masticatory capacity, edentulism and self-perception in oral health.
2010/Bush HM, et al./ USA[27]	To assess the oral health status of old people.	Quantitative / Descriptive study with secondary data	-	General oral health status (pain, bleeding gums and tooth loss, use of dentures) and access to dental services.

to be continued

Continuation of Table 1

Year of Publication / Author(s) / Country of origin of the research	Objective of the study	Methodological approach	Depression-related issue addressed	Oral health-related issue addressed
2010/De Visschere L, et al. J./ Belgium[28]	To compare a supervised versus an unsupervised implementation of an oral health guideline.	Quantitative / Randomized clinical trial	-	Oral hygiene.
2011/Ozkan Y, et al / Turkey[29]	To determine the health status, in addition to treatment needs, in institutionalized old people.	Quantitative/ Descriptive study	-	Access to dental services, current dental status, use and status of prostheses, oral hygiene and edentulism.
2012/Mozafari PM, et al/ Iran[30]	To determine the prevalence of lesions of the oral mucosa in institutionalized old people.	Quantitative/ Analytical study	-	Lesions of the oral mucosa.
2014/Pretty IA/ England[31]	To address the assessment of oral health needs based on the course of life and vulnerability in institutionalized old people.	Quantitative/ Descriptive study	Depression as a comorbidity	Use of prostheses, presence of pain, access to oral health services, self-care in oral health.
2018/Cocco F, et al/ Italy[32]	To assess the prevalence and severity of tooth loss in institutionalized old people and associate other data.	Descriptive observational quantitative sectional study with primary and secondary data	Depression as a comorbidity	Tooth Loss
2018/Machado ACB/ Brazil[33]	To analyze the salivary cortisol concentrations of institutionalized and non-institutionalized old people and verify the conditions of oral health and physical dependence.	Cross-sectional, descriptive and analytical study	Depression as a central object	Use and need of dental prosthesis
2019/Recker E, et al/ Brazil and USA[34]	To describe and compare xerostomia and general health in institutionalized old people.	Descriptive quantitative study with secondary data	Depression as a comorbidity	Xerostomia

Table 2. Mapping of the studies included in the scope review categorized in Theme 2, in increasing chronological order based on the year of publication, 2009-2020.

Year of Publication / Author(s) / Country of origin of the research	Objective of the study	Methodological approach	Depression-related issue addressed	Oral health-related issue addressed
2012/Cassie KM, Cassie WE./ USA[35]	To analyze the effect of culture and climate on depressive symptoms among institutionalized old people.	Quantitative / Descriptive study with secondary data	Depression as a central object	-
2012/Davison TE, et al./ Australia[36]	To examine the use of the Cornell Scale in care facilities in Sydney and Melbourne, Australia, for depressed residents.	Quantitative / Descriptive study	Depression as a central object	-

to be continued

Continuation of Table 2

Year of Publication / Author(s) / Country of origin of the research	Objective of the study	Methodological approach	Depression-related issue addressed	Oral health-related issue addressed
2013/Bomfim FMS, Chiari BM, Roque FP/ Brazil[37]	To identify the factors associated with signs suggestive of oropharyngeal dysphagia in institutionalized old women.	Quantitative / Descriptive study	Depression as a comorbidity	Number of teeth in mouth
2013/Drageset J, Eide GE, Ranhoff AH/ Norway[38]	To analyze the hypothesis that anxiety or depression is related to the survival of patients with and without cancer.	Quantitative / Cohort study	Depression as a central object	-
2013/Underwood M, et al./ United Kingdom[39]	To test the hypothesis that an exercise program would reduce depressive symptoms.	Quantitative / Randomized clinical trial	Depression as a comorbidity	-
2014/Miller LM, et al./ USA[40]	To determine the role of physical activities in the risk of placement in LTCF.	Quantitative / Cohort study	Depression as a comorbidity	-
2014/Van Schaik DJ, et al./ Netherlands[41]	To assess the effects of an intensive care program to prevent the onset of depression in institutionalized old people.	Quantitative / Randomized clinical trial	Depression as a central object	-
2015/Chesler J, et al./ Australia[42]	To investigate an intervention program designed to promote relationships between old people in care.	Mixed study	Depression as a comorbidity	-
2016/Bali V, et al./ USA[43]	To analyze the risk of dementia with anticholinergic use in old people with depression living in nursing homes.	Quantitative / Case control study	Depression as a central object	-
2016/Menezes AV, et al./ Brazil[44]	To verify the effectiveness of physical therapy intervention on cognition, mobility and functional independence of institutionalized old people.	Quantitative / Randomized clinical trial	Depression as a comorbidity	-
2016/Mountford CG, et al./ United Kingdom[45]	To establish the prevalence of malnutrition and investigate the effectiveness of a nutritional intervention program	Descriptive quantitative observational cohort study	Depression as a comorbidity	-
2018/Byers AL, Lui et al./ USA[46]	To determine the association between cumulative burden of depressive symptoms and risk of placement in LTCF.	Analytical quantitative observational cohort study	Depression as a central object	-
2019/Ozaki T, Katsumata Y, Arai A/ Japan[47]	To investigate the association between changes in the use of psychotropic drugs and psychological symptoms of dementia.	Analytical quantitative observational cohort study	Depression as a comorbidity	-

DISCUSSION

This scope review mapped themes with institutionalized old people, dental issues and depressive disorders in national and international databases of interest. According to the 2019 World Population Prospects report, it is estimated that by 2050, one in six people in the world will be over 65 years old[4]. On the European continent and in North America, on the other hand, estimates are different. In these places, one in four people may be 65 or older. Still, according to the report, poorer countries will have their population with life expectancy seven years lower than the world average[4]. By relating the estimates of the world's population aging to the data obtained in the current study, it is possible to analyze that the 27 selected articles were published in 14 countries in total. And, of these countries, nine are among the 25 most developed in the world and, therefore, have a longer life expectancy and a higher projection of an aging population compared to the least developed ones[35].

In the nine countries mentioned above, the number of Long-Term Care Facilities for Old People is greater in absolute and relative numbers than the number of other countries of origin of the articles[37]. With this, one can relate the great scientific production of developed countries on this subject with the high percentage of its old people population. In this context, it is important to emphasize the relevance and the Brazilian lead in the construction of scientific knowledge on the observed themes. In general, all the continents originated studies on the theme; and in Latin America, only Brazil published studies on the topic.

In the articles in which oral health was addressed, the most prevalent oral problems in old people were cited, among which tooth loss, periodontitis, xerostomia, lesions in the oral mucosa and dental cavities stand out. The control of these diseases, in addition to bringing benefits to oral health, also provides improvement in general health[15]. However, the epidemiological pattern of oral diseases in old people is changing as the population ages.

In a study carried out with 75 old people from a long-term care facility for old people in Egypt, oral health education was approached as an important factor for expanding the quality of life of residents. The study participants in which the education tools were applied demonstrated a significant improvement in self-care of oral hygiene. The data in the referenced article demonstrate that institutionalized old people have, in fact, the potential to have greater autonomy in relation to their own oral hygiene care, since, in some articles of the sample, the old person's oral health care is considered the sole responsibility of the institution or their family[43].

Considering the theme 'Oral health condition: LTCF, depressive disorders and pluralities' it can be seen that the oral health condition of an old person reveals a lot about their general health condition as well as their mental health[13]. Elucidating oral health in mental health issues and institutionalized old people, twelve studies were found that constituted the content of the present theme. The literature often points out poor oral health conditions for institutionalized old people and, as a reflection of this aspect, the consequent vulnerability of institutionalized old people.[22,23,27,31]. The literature also shows that there is a communication of findings on the oral health conditions of institutionalized old people, such as xerostomia, tooth loss and the prevalence of depressive disorders in this same population[24,29,32,34]. Studies that point to findings about precarious oral conditions are linked, in a way, to the scientific evidence on depressive disorders in this population. Thus, it is believed that the relationship between depressive disorders and oral health is a subject to be investigated for the old people population in LTCF, as the state of the art points out gaps to be investigated. In addition, the literature shows the importance of including the dental surgeon in care to prevent mental health problems in old people[13].

When addressing the plurality of subjects and research topics involving the issue of oral health and depressive disorders, it is worth noting that depression can affect the oral health of old people, as this disease leads to negligence in hygiene procedures and cariogenic feeding, which leads to an increased risk of cavities and periodontal disease[6]. In this context, old people with depression report dry mouth and oral pain in a higher prevalence than old people without depressive disorder[9].

The present literature review points out that depressive disorders can be diagnosed through the oral cavity. By identifying the concentration of cortisol in saliva, the diagnosis of depression is possible[33]. More broadly, it was also possible to notice that the improvement in masticatory ability with the use of implants directly affects the quality of life[25,26,30].

A study by Cocco et al.[32], which used tools to assess number of functional teeth, presence and types of dental restorations, presence and types of prostheses, caries lesions and systemic factors such as body mass index, mental health conditions and nutritional status. Thus, qualitative studies are not being used frequently, in the scientific approach of this topic. In qualitative studies, the author seeks to interact directly with the object of study, in order to make an analysis without statistical data on the subject, individually analyzing the responses and making a reflection considering their initial hypothesis and the results obtained[17]. Therefore, it is believed that subjective factors that may alter objective and statistical data can be carefully analyzed by answering the question in the present study. Therefore, it is suggested that qualitative methodologies can be further explored with respect to the topic under study.

The results of Machado's study[33], point to higher concentrations of cortisol in the saliva of institutionalized old people with negative self-perception of oral health. Taking into account that cortisol is associated with stress levels, it was realized that high levels of cortisol can lead this population to the development of depressive disorders.

The theme "Depression in institutionalized old people: medicalization, oral health conditions and subjectivities", brings the institutionalized old person to the focus of the discussion between depressive disorders and issues involving oral health, as depression in institutionalized old people can lead to functional impairments and loss of autonomy for self-care[14]. In addition to these aspects, institutionalized and depressed old people have a high prevalence of tooth loss, lack of preventive care and lack of access to dental treatments, which leads to worse oral health[15].

It is observed that, unlike the previous theme, this theme has examples of studies that explore research methods to explore quantitative data and subjectivities. The study by Cassie et al.[47] stands out as an example, which addressed the values, beliefs and expectations of workers in institutions as factors that could directly affect the quality of life and depression of residents. This study obtained as one of its results greater depressive symptoms in institutionalized old people in institutions with a healthy work environment. One of the authors' considerations about this result was the fact that, in more pleasant environments, the individual characteristics of residents are observed by professionals with greater attention and care, thus, depressive symptoms become more evident in these places.

In this theme, the subject of medicalization was directly addressed in two studies, but it is recurrent as an additional factor associated with other objects in studies of themes 1 and 2. In the study by Ozaki, Katsumata and Arai[48], psychotropic drugs, especially anxiolytics and hypnotics, are associated with increased symptoms of dementia in residents of long-term care facilities. Bali et al.[49], also sought to associate mortality among institutionalized old people with the concomitant use of anticholinergic and depressive drugs. In this case, no associations were found. The large number of studies in the literature on medicalization in institutionalized old people can be due to the high number of drugs consumed by this population, compared to a younger age group. However, it is worth emphasizing the importance of making constant comparisons between institutionalized and non-institutionalized old people, in order to understand whether these studies could be applied to the entire population of a region. It is important to investigate the differences in the way that drugs can interact in different depressive conditions and vulnerabilities.

The only subject addressed regarding oral health in the aforementioned Theme 2, was the number of teeth in mouth[50]. Oral health and depression can be associated and the reduced number of teeth is a reflection of this association[6,15,23]. Studies that address the mental health of institutionalized old people and their relationship with the oral health of this population do not seem to be representative in the world literature. It is suggested that the low number of studies on this topic is due to this fact.

Thus, the question arises: in studies whose central theme is depression, shouldn't the topic of oral health be further studied?

It was observed that, regarding the two themes presented in the present study, the association between socioeconomic aspects and cognitive capacity or depression appears recurrently. The study by Ozkan et al.[29], addresses these two issues emphatically. Its objective was to determine the state of oral and general health, in addition to the needs, of institutionalized old people in the city of Istanbul. It is interesting to highlight the results obtained in this case, taking into account that oral health in this population was considered deficient. One of the relevant factors for the oral health status of this population was the price of the procedures and, therefore, the lack of access to dental care for this population. Like Brazil, Turkey is an emerging country, that is, a country in economic development, with average human development indexes, large population and with exports, mainly, of raw material[24]. In general, emerging countries share the characteristic of being nations with great social inequalities. These characteristics can not only affect the nation's economy, but also the quality of life and health of its population. It is suggested that lower socioeconomic indicators are considered limiting factors for good oral health conditions in a population.

It is important to highlight the limitations of the present study, starting with the inclusion of studies accessed through descriptions in English, Spanish and Portuguese simultaneously and not just access in English. Despite this limitation, the results of the present study were not invalidated, as scientific articles published in indexed journals were used. There was also a restriction of bases and terms used. However, this research was based on internationally recognized references, such as *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA)[21]. Thus, the result of the mapping on oral health conditions and depression in institutionalized old people may contribute to scientific knowledge in the field of geriatrics and gerontology.

CONCLUSION

The knowledge that has been produced about oral health and mental health in institutionalized old people is relatively recent, reflecting the contemporary nature of the theme. In addition, the construction of this knowledge is associated with the diversity of epidemiological and qualitative studies seeking to answer questions that involve technical and subjective plurality involving mental health and oral health of institutionalized old people.

The present study identified that there is a communication between oral health conditions such as xerostomia and tooth loss and the prevalence of depressive disorders. The relationship between depression and oral health needs studies with longitudinal designs to identify possible mechanisms involved in this association in institutionalized old people. It is suggested that further studies be carried out with other data sources and with different descriptors to expand knowledge in the area. Furthermore, it is essential to develop new public policy agendas with measures for prevention, promotion and assistance encompassing oral and mental health.

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Retirement and planning for post-work life: a study with civil servants from a Federal Institute of Education

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Abstract

Objective: To investigate factors associated with creating a post-work life project with workers from the Federal Institute of Tocantins, and check topics of interest to create a Retirement Preparation Program. *Method:* This was an exploratory, quantitative, and cross-sectional study. The respondents were 94 civil servants among administrative technicians and scholars who would retire in 5, 10 and 15 years. Participants were assessed using a sociodemographic questionnaire - the QWLQbref questionnaire - to assess the quality of work life (QWL), and the Key Factors for Retirement Planning (KFRP) Scale. *Results*: There were statistically significant and positive correlations between the psychological subdomain of QWL and the Risk Factor or Survival, and between the professional domain of QWL and the Family Relationships Factor. The group of professionals to be retired in 5 to 10 years had the highest average in the psychological domain of QWL (p=0.039). Female participants focused more on the new professional beginning than men (p=0.023), and participants without a partner had a lower score in the item 'family relationship' as a post-retirement planning factor (p=0.027). Among the topics for the Planning of the Retirement Program, the following stand out: financial planning (13%), specific legislation on retirement (11%), and entertainment and quality of life (7%). *Conclusion*: Retirement planning was associated with the quality of life related to work, gender, and marital status. These variables together with the topics proposed by the servants can contribute to the planning of a Retirement Preparation Program.

Keywords: Retirement. Life Project. Retirement Preparation Programs.

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INTRODUCTION

In view of the accelerated aging process observed in Brazil, retirement is one of the most debated topics in the country's political and economic scenario. In this context, Fagnani[1] states that the most recent social security reform increases the workers' access to social security benefits and given this condition it is worth considering Boehs et al.[2] regarding the role of work in people's lives, because this is how man's relations with the environment are intermediated.

Thus, for Corrêa[3] and Albornoz[4] work has an existential meaning, and its earnings supplies for basic human needs of livelihood and satisfaction. Therefore, work is a ruling condition for human achievement since it enables a transformative action on nature and people, contributing to survival and personal fulfillment.

In the discussions about retirement, the concept of post-work frequently appears. However, it is still a scarce topic in the literature. Nevertheless, in the Portuguese online dictionary[5], the origin of the word "post" comes from the Latin *post*, afterwards. In other words, it is a term "that gives the idea of what is subsequent, what happens afterwards in space and time". Thus, it is understood that this is a period that is after work.

According to Fagnani[1], the topic of retirement was recently addressed in a social security reform resulting from the Proposed Constitutional Amendment known as PEC 287/16, which culminated in raising the minimum age plus the contribution time, transition rules that set a longer time to retire and changes in the INSS [Brazilian Social Security Institute] discount rates.

This way, Fagnani[1] confirms that the new social security will keep the worker for longer in the work organizations, that is, the workers will age at work, the exact time of life in which they are more susceptible to non-normative events affecting the individual's well-being and quality of life, in addition to reducing the functional performance and the body's efficiency to respond to environmental stressors. Nascimento e Polia[6] understand that, given this debate, there will be "a direct impact on the present and future projects of those who are close to retiring".

Based on this, Soares et al.[7] say it is possible that the transition to post-work life requires planning. For this, it is possible to propose the implementation of Retirement Preparation Programs (PPA). In this sense, the study by Menezes and França[8] demonstrated that planning in advance is also a mandatory requirement for a successful retirement, since besides promoting positive attitudes it increases satisfaction with retirement (autonomy, recognition of rights, security, dignity, well-being, and health) compared to those that were not planned.

Rafalski and Andrade[9] ratify that the body that has a retirement preparation service significantly influences planning in the financial, social, and emotional dimensions.

To outline a Retirement Preparation Program, it is essential to know about the topic and mainly the wishes and needs of the workers who will be the subject of these programs. Thus, in the specialized literature on key factors for retirement planning, Froidevaux[10], França and Hershey[11] noted that planning should be directed to issues such as financial investment, planning and family ties, health planning, leisure activities, maintenance of the social network, voluntary activities, changes in lifestyle, and voluntary retirement.

In view of retirement planning, the study by Cheremeta et al.[12] emphasize that some factors such as job satisfaction and quality of work life are aspects that can influence leaving or staying in the organization.

In this sense, the present study aimed to investigate factors associated with creating a post-work life project with workers from the Federal Institute of Tocantins, and check topics of interest to create a Retirement Preparation Program.

METHOD

It was an exploratory, quantitative, cross-sectional study developed by means of field study. The administrative technicians and scholars of the effective and active staff of the Federal Institute of Tocantins (IFTO), Brazil, participated voluntarily in the study.

The sample was selected by collecting the functional data of the worker such as age and time worked provided by the IFTO Directors of People Management by researching the SIAPE (Integrated Human Resources Administration System) system of the Federal Public Administration.

The sample inclusion criteria were employees who would retire in 5, 10 and 15 years, who were fit for the functions assigned to the position they held, and available to answer the questionnaires. Workers with communication and language problems, diagnosed with depression and/or occupational diseases without treatment, retired in another position, in technical cooperation, requested, in provisional and substitute work were excluded from the sample.

The sample consisted of recruiting 94 civil servants meeting the aforementioned selection criteria of the total population of 124 civil servants. The sample size formula for finite population was used to calculate the sample. The sample size calculation considered a 95% confidence level and an error of 5%, p-value equal to or less than 0.05. Participants who consented to participate in the research were invited to sign the Informed Consent Form (ICF), and later to respond the study questionnaires.

In the present study, the following evaluation instruments were used: sociodemographic questionnaire comprising 11 questions regarding the characterization of participants such as age, marital status, gender, education, income, link with the institution, type of career, *campus* of work, expectation to retire, and retirement preparation programs; questionnaire to assess quality of work life (QWLQ-bref) prepared by the researchers Cheremeta et al.[12] comprising 20 questions formulated for a Likert-type scale and organized into four domains: personal, health, psychological, and professional following the same standards set out in the World Health Of Quality Of Lilfe-bref from the World Health Of Quality Of Lilfe 100; and the KFRP (Key Factors on Retirement Planning). This scale was adapted for non-managerial professional categories by França and Carneiro[13] based on the original scale on attitudes towards retirement created in 2008 for Brazilian and New New Zealander executives. This adapted version presents 15 items divided into four dimensions assessing personal well-being factors, risk or survival factors, new professional beginning, and family relationships.

The study was carried out at the *Campus* Palmas and the dean's office of the IFTO located in the city of Palmas, Tocantins, a state that is in the Northern Region of Brazil. The period of application of the collection instruments was from January to February 2020.

The scholars selected were invited to participate in the study via institutional e-mail. Two meetings were scheduled in two professors' rooms on the *Campus* to complete the questionnaires. Subsequently, those who did not attend were approached individually in their rooms to fill it out. The same happened with administrative technicians who were recruited individually. Regarding the workers of the dean's office, they were recruited individually.

The data was analyzed quantitatively and using statistical tests. Initially, the data was described by means, standard deviation, and frequency. Subsequently, the normality of the variables was assessed by the Shapiro-Wilkis test, and the type of analysis (parametric or non-parametric) was chosen to compare the groups. The level of significance used in the analyzes was 5%, or $p > 0.05$.

This study was approved by the Human Research Ethics Committee within the scope of the human sciences of the Catholic University of Brasilia - UCB, under protocol number 18145319.3.0000.0029, and all participants signed the ICF.

RESULTS

As shown in Table 1, most of the population comprised professionals aged 50 to 55 years, married, with a master's level of education, income range between 8 and 11 minimum wages, teaching career, with up to 15 years to retire, and Very or Extremely worried about retirement. Almost half of the population comprised male professionals, and less than half of the participants reported knowing what a Retirement Preparation Program was.

In the sample in general, there was a higher score in the psychological domain for quality of work life, followed by the personal, physical, and professional domains (Table 2). In this context, work can be associated with well-being and personal satisfaction. Regarding the domains of Key Factors for Retirement Planning, participants gave greater importance to the domains Risk or Survival, followed by Family Relationships, Personal and social well-being, and New professional beginning. In this context, data suggests that regarding retirement planning, greater importance was given to issues related to financial investments, intellectual development, health promotion, and healthy eating, which comprise the domain Risk or Survival, followed by relationships with the partner, children, and parents that comprise the domain Family Relationships. It is possible that the low score in the domain New professional beginning indicates that the investigated sample does not intend to engage in other post-retirement professional activities.

Table 1. Sociodemographic characterization of IFTO civil servants (N=94), Palmas, TO, 2020.

Variables	n (%)
Gender	
Female	46 (48.9)
Male	48 (51.1)
Age group (years)	
45 to 50	35 (37.2)
50 to 55	38 (40.4)
55 to 60	12 (12.8)
>60	9 (9.6)
Marital Status	
Single	16 (17)
Married	64 (68.1)
Divorced	9 (9.6)
Widow/er	0 (0.0)
Stable relationship	5 (5.3)
Education	
Higher education	4 (4.3)
Post-graduation	24 (25.5)
Master's degree	32 (34)
Incomplete Master's degree	10 (10.6)
Doctorate degree	20 (21.3)
Incomplete Doctorate degree	2 (2.1)
High School	1 (1.1)
Postdoctoral degree	1 (1.1)
Income (in minimum wages)	
3 to 5	13 (13.8)
5 to 8	23 (24.5)
8 to 11	41 (43.6)
>11	17 (18.1)
Type of Career	
Technician	29 (30.9)
Scholar	65 (69.1)

to be continued

Continuation of Table 1

Variables	n (%)
Exercise	
Dean's office	8 (8.5)
Campus Palmas	86 (91.5)
Expectation to retire	
Bonus	7 (7.4)
Up to 5 years	12 (12.8)
Up to 10 years	14 (14.9)
Up to 15 years	61 (64.9)
Have already heard of the Retirement Preparation program	
Yes	42 (44.7)
No	52 (55.3)
Worried	
Not at all	11 (11.7)
Very little	8 (8.5)
More or less	23 (24.5)
Very	29 (30.9)
Extremely	23 (24.5)

Table 2. Score in the domains of Quality of Work Life and Key Factors for Retirement Planning among IFTO civil servants (N=94), Palmas, TO, 2020.

Score in the scales	Mean (SD)	Min-Max
Quality of Work Life		
Physical	3.63 (±0.55)	2.00-4.00
Psychological	4.04 (±0.67)	2.00-5.00
Personal	4.01 (±0.56)	2.00-5.00
Professional	3.62 (±0.57)	2.00-5.00
Key Factors for Retirement Planning		
Personal and social well-being	3.03 (±0.61)	1.50-4.00
Risk or survival	3.38 (±0.63)	1.00-4.00
New professional beginning	2.80 (±0.61)	1.00-4.00
Family relationships	3.36 (±0.90)	1.00-4.00

SD: Standard deviation; Min: Minimum; Max: Maximum.

According to Table 3, there were statistically significant and positive correlations between the psychological subdomain of QWL and the Risk or Survival factor (Spearman's correlation coefficient: r=0.209; p> 0.05), and between the professional domain of QWL and the Family Relationships Factor (Spearman's correlation coefficient: r=0.215, p> 0.05). In other words, the greater the relevance of the psychological domain quality of life, the more the participants valued the Risk or Survival Factor as an important attribute and a key factor for retirement planning. The same occurred between the professional and quality of work life domains and the Family Relationships Factor. In both assessment instruments, there were positive associations between the subdomains.

Regarding the relationship between expectation to retire, the group with 5 to 10 years to retire had the highest average in the psychological domain Quality of Work Life (p= 0.039), and there was a trend in the group with permanence bonus to present a higher score in the personal domain (p=0.076) (Table 3). It is possible that the role of work in the groups closest to retirement may have mediated these associations, subsidized by mechanisms of social comparison, choice, personal engagement, and social insertion. Another hypothesis refers to the greater social ability of this group in dealing with work-related stressors. Regarding the concern about retirement, the groups A little worried and Very worried had the lowest scores in the factors personal and social well-being (Table 4).

Table 3. Quality of Work Life according to expectations for retirement and sociodemographic variables of IFTO workers (N=94), Palmas, TO, 2020.

	Quality of Work Life							
Expectation for retirement and Sociodemographic variables	Physical M (SD)	*p-value*	Psychological M (SD)	*p-value*	Personal M (SD)	*p-value*	Professional M (SD)	*p-value*
Expectation for retirement								
Bonus	3.86 (±0.38)	0.387	4.14 (±0.69)	0.039	4.43 (±0.53)	0.076	3.71 (±0.49)	0.173
5 to 10 years	3.69 (±0.47)		4.31 (±0.68)		3.92 (±0.56)		3.77 (±0.59)	
Up to 15 years	3.57 (±0.59)		3.92 (±0.64)*		4.00 (±0.55)		3.54 (±0.56)	
Age group (years)								
45 to 50	3.57(±0.61)	0.516	4.03 (±0.71)	0.557	4.03 (±0.45)	0.244	3.60 (±0.55)	0.793
50 to 55	3.71 (±0.52)		4.00 (±0.57)		3.97 (±0.54)		3.68 (±0.57)	
55 to 60	3.50 (±0.52)		4.00 (±0.85)		3.83 (±0.83)		3.50 (±0.67)	
≥60	3.67 (±0.50)		4.33 (±0.71)		4.33 (±0.50)		3.56 (±0.53)	
Income (in minimum wages)								
3 to 5	3.38 (±0.51)	0.133	3.69 (±0.75)	0.190	3.85 (±0.38)	0.351	3.77 (±0.60)	0.450
5 to 8	3.57 (±0.66)		4.13 (±0.55)		4.00 (±0.67)		3.48 (±0.59)	
8 to 11	3.68 (±0.47)		4.05 (±0.67)		4.00 (±0.55)		3.66 (±0.57)	
Gender								
Female	3.63 (±0.57)	0.844	4.04 (±0.59)	0.884	4.07 (±0.57)	0.296	3.67(±0.52)	0.317
Male	3.63 (±0.53)		4.04 (±0.74)		3.96 (±0.54)		3.56 (±0.62)	
Marital Status								
Without spouse	3.38 (±0.72)	0.089	4.06 (±0.57)	0.959	3.88 (±0.81)	0.415	3.62 (±0.72)	0.934
With spouse	3.68 (±0.50)		4.04 (±0.69)		4.04 (±0.50)		3.62 (±0.54)	
Degree of concern								
Not at all	3.55 (±0.69)	0.760	4.18 (±0.75)	0.670	4.09 (±0.55)	0.760	3.75 (±0.65)	0.961
Very little	3.75 (±0.46)		4.13 (±0.64)		4.13 (±0.35)		3.88 (±0.35)	
More or less	3.70 (±0.56)		3.91 (±0.51)		4.00 (±0.43)		3.61 (±0.50)	
Very	3.66 (±0.48)		4.07 (±0.80)		4.00 (±0.53)		3.59 (±0.57)	
Extremely	3.52 (±0.59)		4.04 (±0.64)		3.96 (±0.77)		3.52 (±0.67)	

* Up to 15 years to retire <5 to 10 years;

Table 4. Key Factors for Retirement Planning according to expectations for retirement and sociodemographic variables of IFTO workers (N=94), Palmas, TO, 2020.

	Key Factors for Retirement Planning							
Expectation for retirement sociodemographic variables	Personal and social well-being	*p-value*	Risk or survival	*p-value*	New professional beginning	p-value	Family relationships	*p-value*
Expectation for retirement*								
Bonus	2.88 (±0.37)	0.432	3.50 (±0.29)	0.678	2.81 (±0.63)	0.857	3.43 (±0.84)	0.977
5 to 10 years	3.06 (±0.80)		3.18 (±0.87)		2.77 (±0.78)		3.25 (±1.13)	
Up to 15 years	3.03 (±0.55)		3.45 (±0.51)		2.82 (±0.53)		3.40 (±0.81)	
Age group (years)								
45 to 50	2.91 (±0.63)	0.642	3.36 (±0.68)	0.844	2.80 (±0.64)	0.967	3.36 (±0.86)	0.937
50 to 55	3.11 (±0.61)		3.42 (±0.63)		2.83 (±0.58)		3.39 (±0.91)	
55 to 60	3.06 (±0.64)		3.25 (±0.68)		2.69 (±0.66)		3.29 (±1.16)	
≥60	3.11 (±0.56)		3.47 (±0.32)		2.85 (±0.63)		3.33 (±0.79)	
Income (in minimum wages)								
3 to 5	3.00 (±0.65)	0.361	3.19 (±0.69)	0.089	2.69 (±0.66)	0.197	3.46 (±0.88)	0.140
5 to 8	3.16 (±0.47)		3.61 (±0.47)		2.77 (±0.55)		2.96 (±1.09)	
8 to 11	3.06 (±0.57)		3.43 (±0.48)		2.96 (±0.43)		3.55 (±0.74)	
Gender								
Female	3.14 (±0.60)	0.102	3.48 (±0.55)	0.142	2.96 (±0.55)	0.023	3.20 (±0.96)	0.075
Male	2.92 (±0.61)		3.29 (±0.69)		2.66 (±0.63)		3.52 (±0.82)	
Marital Status								
Without spouse	3.25 (±0.64)	0.132	3.56 (±0.45)	0.236	2.81 (±0.62)	0.790	2.78 (±1.22)	0.027
With spouse	2.98 (±0.60)		3.34 (±0.65)		2.80 (±0.61)		3.48 (±0.78)	
Degree of concern								
Not at all	3.33 (±0.58)	0.001	3.66 (±0.32)	0.053	3.15 (±0.50)	0.099	3.86 (±0.32)	0.057
Very little	2.44 (±0.62)*		2.75 (±0.99)		2.63 (±0.92)		2.88 (±0.88)	
More or less	2.90 (±0.64)		3.46 (±0.73)		2.88 (±0.66)		3.22 (±0.91)	
Very	2.89 (±0.52)**		3.29 (±0.53)		2.64 (±0.56)		3.53 (±0.74)	
Extremely	3.38 (±0.45)		3.50 (±0.44)		2.83 (±0.48)		3.22 (±1.15)	

* Very little <None Little and Extremely; ** Very <Extremely

Comparisons according to gender indicated that women focused more on New professional beginning than men (p=0.023), and men tended to invest in Family Relationships (p=0.075) (Table 4). Participants without a partner had a lower score in the item Family Relationships as a post-retirement planning factor (p=0.027) (Table 4). There was no association between age group, income, type of career (teaching and technical), quality of work life, and the key factors for retirement planning.

Regarding the respondents' suggestions on topics for the creation of a Retirement Preparation Program, the categories of greatest relevance were financial planning (13%), specific legislation on retirement (11%), entertainment and quality of life

(7%), paid occupational activities after retirement, entrepreneurship, and psychological support (6%), health promotion and life projects for old people (4%), volunteering (2%), and PPA for disabled workers (1%).

DISCUSSION

The profile of the population studied comprised participants aged 50 to 55 years, representing 40.4% - with up to 15 years for retirement (64.9%). They are in the categories very or extremely worried about retirement, 30.9% and 21.5%, respectively. This concern corroborates the contemporary discussions of Faganani[1], Holland and Málaga[14] regarding retirement under the current federal government, which reverts workers' rights based on the social security accountability. As a result, workers who are close to retirement show concern about their rights in the future.

When considering the variable Quality of Work Life, there is a higher prevalence of the Psychological factor, followed by the Personal, Physical and Professional ones. It is a feeling about work, and that these factors are possibly related to the perception of well-being and personal satisfaction. In this sense, Ferreira[15] and Barretto[16] state that QWL is a set of rules, guidelines, and practices within the scope of work organizations aimed at promoting personal well-being and development of workers.

In this context, the findings of Ferreira[15], Klein[17] and Diniz seem to indicate that QWL can be associated with the establishment of priorities for retirement. Professionals who mentioned greater importance to the psychological domain may have attributed greater importance to the Risk or Survival factor, as it encompasses domains related to personal well-being, whereas the greater relevance of the professional domain may be associated with giving greater importance to family relationships, whose coexistence can be challenging or the target of greater dedication of time and or affective investment.

These results are associated with the study by Hamm et al.[18] assessing the engagement of middle-aged and old people in the domains health, work, finances, well-being, marital and child relationships during their retirement process. The study pointed out that plausible involvement in these dynamics is an important factor for an easy transition during life.

This analysis is similar to the results obtained in the study by Klein and Diniz[17] analyzing the driving factors of QWL based on the perception of public servants where the factors influencing satisfaction with QWL are the opportunities of professional growth and relationship with colleagues. Family and social relationships, leisure, and the work attributes of the individual can be added to these factors in the decision to retire. In addition, the recent study by Barretto[16] on the main sources of well-being at work relates aspects of pleasant socio-professional relationships, professional achievement and growth, satisfactory management, and a sense of social function.

In the context of retirement planning, the findings of said study are in line with those by France and Menezes[19] indicating that financial security is necessary, followed by family, marital, social, relationships, health care, and healthy eating. These factors are related to the study by Leandro-França[20] on the aspects of cognitive, motivational, and behavioral changes, changes in health, finances, social and leisure activities within the universe of retirement planning. According to Ferreira[15] and Barretto[16], these dimensions are associated with both intellectual development and associations, cultural and leisure activities. On the other hand, for Boehs et al.[2] the positive perception of quality of work life is an intention factor for career continuity in retirement. Another relevant factor in this study is the association between quality of work life and retirement planning factors, which statistically showed that the groups studied showed satisfaction in the psychological, personal, and professional domains. According to Ferreira[15], the quality of work life is related to general satisfaction with life in the work environment.

This idea corroborates the study by Boehs et al.[2] investigating the relationship between career quality of life and the decision to retire. The result showed that the better the understanding of quality of work life, the higher the levels of job satisfaction, and this factor contributes to arouse interest in the permanence in development of work activities during retirement.

These data are favorable in the context of transition from work to retirement, since workers with a good

quality of work life have satisfactory conditions to plan life after retirement, thus investing in domains that make sense to their life course and history.

For Zanelli[21], the expectation to retire is related to the meaning of work in the subject's life. Thus, the psychosocial aspects of work play an important role in the retirement process. In the analysis by Bressan et al.[22] and Argimon[23], added to this factor are the satisfactory conditions of physical and psychological health, leisure and social activities, family relationships, and friendship ties. These resources work as important mechanisms as they influence the quality of life of retired people.

Another factor related to this context was indicated in the study by França and Carneiro[13] with executives in which they pointed out that younger workers were more favorable to staying at work for a longer time, thus postponing retirement, unlike the older workers, who envisioned the period of inactivity to dedicate to their family and leisure activities.

In the present study, the relationship between concern about retirement and the personal and social well-being factor was emphasized as one of the elements for retirement planning. Professionals who reported being Very little worried had lower scores in this domain than those who reported Not a t all, a little and extremely; and Very worried professionals had a lower score than those who reported Extremely. The relationship between these variables should be better explored, considering that the concern can denote anxiety and the planning and expectation about retirement at the same time.

It is possible that the results of the present study are related to the high level of education of the sample, and to the socially accepted gender roles: men with life dedicated to work, women with double or triple journey related to the orchestration of roles in the scope of work and family. Regarding the gender role, the study by Bohes et al.[2] pointed out that women who have highly responsible jobs, and with a high level of education and wages do not fit the standard role assigned to women of domestic activities, and it is expected that they give greater value to their professional role. Thus, in the absence of work, women would have greater flexibility to engage in new activities, selecting resources and projects consistent with variables related to personal development or to projects that they were unable to carry out in other stages of their life. Davidson et al.[24] report that women considered their satisfaction with their personal and professional roles coupled to the personal desires with social demands, dealing with professional and financial success while playing the maternal role.

Regarding the topics for the promotion of a PPA, the most reported items according to the responses of the participants were "financial planning, followed by specific legislation on retirement, entertainment and quality of life, paid occupational activities after retirement, entrepreneurship and support, health promotion, life projects for old age, volunteering", and lastly the "PPA aimed at disabled employees". It is noteworthy that with retirement many workers have a decrease in their wages, followed by the increase in health expenses and the transitions that come with this phase of life, such as children living home, smaller contact network, and adjustments with making use of free time. Interest in aspects of the legislation may be anchored by the recent changes in the laws regulating retirement started in 2016 and in force with the Social Security Reform enacted in 2019. In this sense, Nascimento and Polia[6] show the main perceptions for retirement of professors at a Federal University, which changed the perspective of retirement for some professors who showed concern and anxiety about their future due to the uncertainties of the last social security reform.

In this context, it is worth briefly mentioning the Social Security Reform in Brazil, emphasizing the latest changes according to the perceptions of Fagnani[1], Nascimento, Polia[6] and Aguiar[25]. Thus, the first change in the Brazilian social security system occurred in 1991 during the Collorera, where the calculation of the benefit amount started to take into account the monetary correction. Later, in 2003, during Lula government which focused on civil servants, the reform made it difficult for civil servants to retire. In 2015, during Rousseff's government, a bill of law was enacted and created a new social security calculation, the formula 85/95. Temer government attempted a reform with PEC 287/2016, but it was not approved. In turn, Bolsonaro's reform with PEC 6/2019 aimed to reduce the deficit in public accounts and changed the social security model from

distribution to capitalization. This reform changed the rules of retirement, setting a minimum retirement age and increasing the contribution time.

This synthesis shows that the Brazilian social security system is fragile, and that other reforms may arise according to the interests of the government or to the society pressure. In this scenario, Aguiar[25] states that the Social Security Reform forces the worker to remain working for longer without considering the human limitations caused by the aging process in which the transformations derived from senescence can affect the working activities, and the excessive wear and tear of the worker over the years with their functional tasks.

Although the findings emphasize the association between quality of work life, gender, marital status, and factors for retirement planning, it is important to mention that the application of the questionnaires showed that some scholars and administrative technicians had not yet thought about retirement planning.

Given the findings, it is suggested that the following studies compare the careers of civil servants and the creation of other similar studies, so that the topic of retirement planning goes beyond the public field, also awakening private organizations to develop preparation programs for the retirement of their workers.

CONCLUSION

Retirement planning seems to be influenced by the quality of work life and variables such as gender and marital status. The study allowed exploring the retirement planning, providing thematic contributions for the organization to develop a Retirement Preparation Program according to the suggestions of the workers interviewed.

The social contribution of the present research allowed the investigated subjects to better understand and reflect on retirement, as well as the scientific field, as it demonstrated the concerns of the investigated population and presented strategies that favor the preparation and planning to face the challenges of humanity in the aspects permeating this discussion in a dialogue with the guidelines of the Brazilian social security system, which in the context of the reform changed the rules of access to social security benefits, making retirement a universe of uncertainties for many workers, impacting mainly the old population.

In the retirement planning agenda, institutions must incorporate the complexity of elements related to aging fostering intergenerational actions, as well as promoting reflections that contribute to the civil servant's perception of retirement as a natural process.

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Implications of comprehensive geriatric assessment on quality of life in older adults with cancer: an integrative review

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Abstract

Comprehensive geriatric assessment (CGA) improves the quality of care for older adults with cancer, as it identifies geriatric problems and weaknesses that have implications for the health of the individual. Despite the benefits of CGA, difficulties related to time of application and cost of this tool limit its implementation in practice. The purpose of this review is to evaluate the relationship between CGA and the quality of life (QoL) of older adults with cancer, through an integrative review. A search was performed for articles in the PubMed, Medline, IBECS and Lilacs databases, published between 2015 and 2020, that addressed the implications of CGA on the QoL of older adults with cancer and, of the 298 studies found, 21 were selected for analysis. These studies revealed that CGA performs an important role in identifying older adults with a higher risk of QoL impairment during the course of cancer and cancer treatment, as well as guiding the indication of specific geriatric interventions that prevent the deterioration of QoL. Thus, the present review highlights the importance of the broad assessment of older adults with cancer, which, through different spheres, whether prognostic or interventionist, can play a fundamental role in preserving the QoL of this population. It is imperative that strategies are developed that incorporate CGA in the care of older adults with cancer.

Keywords: Geriatric Assessment. Neoplasms. Quality of Life.

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INTRODUCTION

Cancer is a disease associated with aging, and is a major public health problem, currently representing the second leading cause of death in the world, with a tendency to increase over the coming years[1,2]. The care of older adults with cancer is often challenging, due to its complex constellation of medical and psychosocial issues, and requires the joint efforts of an interdisciplinary team in order to guarantee comprehensive care for these patients[3,4]. However, as there the health status of older adults of similar ages is highly heterogenous, it is important to identify individuals with risk factors that can negatively influence the treatment of cancer and the evolution of the illness[5,6].

A useful tool in the management and monitoring of older adults with cancer is the comprehensive geriatric assessment (CGA), a multidimensional diagnostic process, which goes beyond chronological age to comprehensively assess health status[7,8]. It consists of a systematic approach, with an emphasis on functional, cognitive, nutritional, psychological and socio-environmental parameters, in addition to the identification of comorbidities and medications used[9,10].

CGA allows the identification of geriatric problems and weaknesses that have implications for the health of the individual, and has proved to be a predictive marker for survival and treatment tolerance in older adults with cancer[3,10,11]. In addition, it provides a platform for dealing with individualized needs and managing reversible conditions, creating opportunities to improve the functional status of older adults with cancer, and assisting in the development of an individualized geriatric care plan[12,13].

Another particularity of care for older adults with cancer is that when making decisions on cancer therapy this population tends to value the preservation of quality of life (QoL) and the maintenance of independence more than the response criteria of traditional clinical trials, such as general response rates, survival free from progression or increase in life expectancy[14,15]. However, few studies incorporate and evaluate QoL as an outcome of interest for cancer treatment[16].

Despite the benefits of CGA and the recommendations of international guidelines[3,7,12,17] for its routine application in the care of older adults with cancer, these tools require considerable time and resources to be integrated into practice, limiting their widespread use, especially outside of specialized academic environments, requiring more robust data on their benefits, in order to reinforce this approach[13,18].

Thus, the objective of this review was to assess the relationship between CGA and the QoL of older adults with cancer.

METHODS

The methodology adopted was an integrative literature review, a process described by Whittemore and Knafl[19], which allows the synthesis of multiple published studies and enables general conclusions to be drawn regarding a particular area of study[20].

The present study was carried out using articles published in the electronic scientific databases PubMed, MEDLINE, IBECS AND LILACS, which addressed the implications of CGA for the QoL of older adults with cancer. The search was carried out in March 2020 by two researchers, and was performed independently in order to guarantee the reliability of the present study. Observational studies (cross-sectional, case-control and cohort) and clinical trials, in English, Spanish or Portuguese, published in the period 01/05/2015 to 05/31/2020, were analyzed. The studies could involve older adults with any type of cancer and who were undergoing any type of cancer therapy. As an exclusion criterion, articles that did not address the topic, review articles, monographs, dissertations, theses, abstracts in event annals and book chapters were disregarded.

The following descriptors were used: *geriatric assessment, cancer, quality of life, geriatric assessment, cancer, quality of life*, *evaluación geriátrica, cáncer, calidad de vida*, *avaliação geriátrica, câncer* and *qualidade de vida*. All descriptors were searched for using separate MeSH terms and then were crossed with the Boolean operator 'and'. The crossing of the descriptors *geriatric assessment*[Mesh]*ANDcancer*[Mesh]*ANDquality of life* resulted in 263 records in PubMed; 229 records in MEDLINE; 1 record in IBECS; and 0 records in

LILACS. Of the articles found, 185 did not include the proposed theme, 92 were excluded because they were review articles and 195 were duplicated in the research platforms (Figure 1).

After selecting the articles, a database was created that allowed the organizing and compilation of the following information from the selected studies: article title, year of publication, country of origin, study design, objective, sample, method and results (report of CGA in the QoL of older adults with cancer).

The variables for analyzing the results included: CGA/QoL instruments and alternate domains; association between the application of CGA and QoL; and correlation mechanisms, either for providing prognostic information or for assisting in the indication of a specific geriatric intervention. Subsequently, the studies were grouped by similarity of content and the results were interpreted based on the literature related to the theme of the study, enabling the synthesis of knowledge.

RESULTS

In this integrative review, 21 articles that met the previously established selection criteria were analyzed. Below, Chart 1 presents an overview of the articles evaluated, considering authorship, year of publication, country of origin, sample, method, objective, instrument and conclusions.

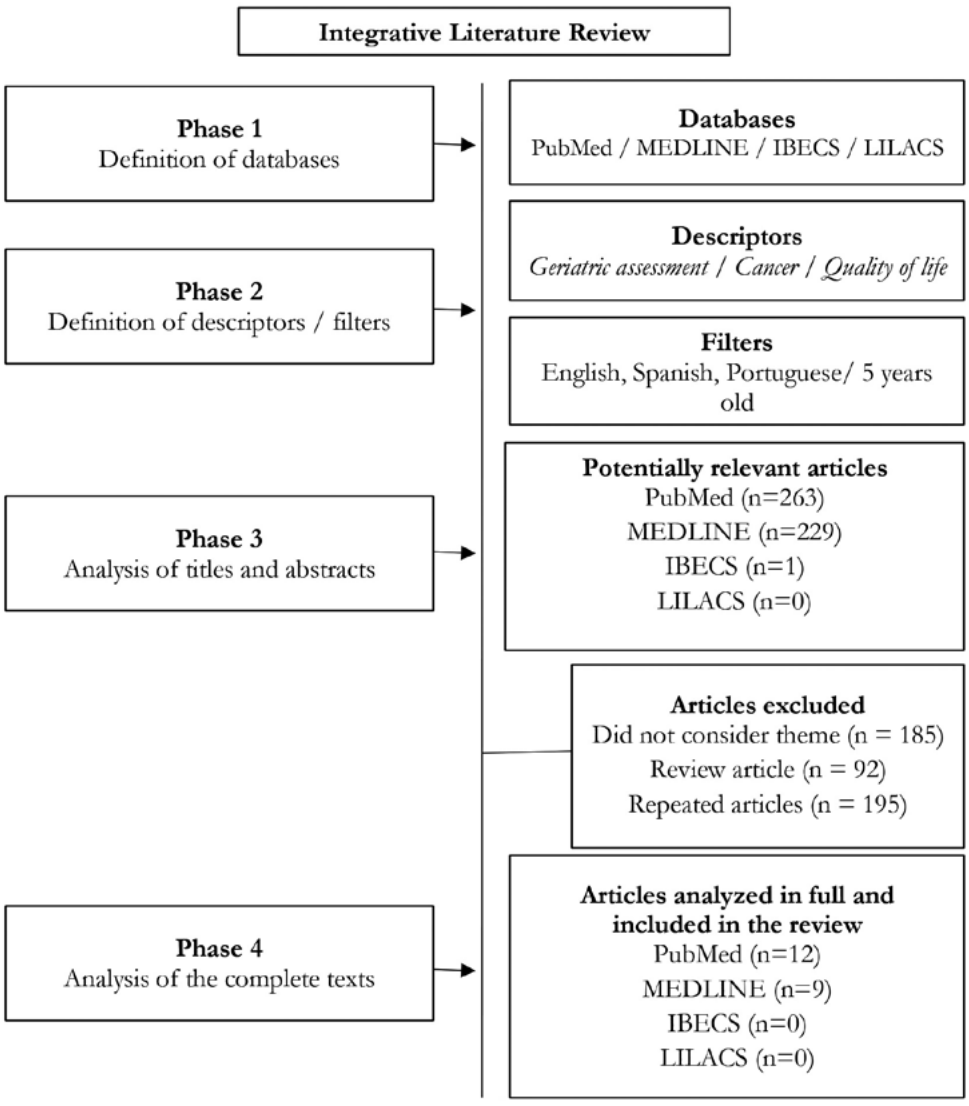

Figure 1. Flowchart of integrative review of scientific evidence on geriatric assessment, cancer and quality of life.

Chart 1. Presentation of the synthesis of articles included in the integrative review.

Authors Year/Country	Sample	Method/Objective	Instrument	Conclusions	Report of CGA and QoL
Pottel et al.[21] 2015 / Belgium	≥65 years, head and neck neoplasms, submitted to radiotherapy / N = 100	Cohort / Determine if CGA is indicative of long-term health-related QoL and overall survival	EQ-5D	Vulnerable patients had lower long-term health-related QoL levels	CGA was a predictor of QoL
Baier et al.[22] 2016 / Germany	> 70 years old, any neoplasia, submitted to surgery with curative intention / N = 200	Cohort / Assess the prognostic impact of CGA on independence and QoL six months after surgery	EORTC QLQ-C30	QoL correlated with Karnofsky index, emotional functioning and activities of daily living	CGA was a predictor of QoL
Hempenius et al.[23] 2016 / Netherlands	≥65 years old, any neoplasm, submitted to elective surgery / N = 260	Clinical trial / Assess the long-term outcomes of a geriatric intervention for the prevention of delirium in frail older adults	Short Form-36 score	There were no differences between the intervention group and the usual treatment group for any of the outcomes three months after discharge.	Geriatric intervention based on CGA findings did not improve QoL
Pergolotti et al.[24] 2017 / USA	≥65 years, any neoplasm / N = 768	Cohort / Describe functional status and QoL and identify associations with demographic variables, comorbidities and functional status	FACT-G	The presence of comorbidities and reduced levels of activity / functional capacity were associated with worse levels of QoL	CGA was a predictor of QoL
Ribi et al.[25] 2017 / Switzerland	B-cell lymphoma not eligible for intensive treatment / N = 57	Clinical trial / Characterize the patients by objective response and survival based on CGA and QoL and describe QoL changes after treatment	Domains assessed: physical well-being, mood, coping, functional status, tiredness, nausea/ vomiting and taste disorders	CGA impairment is an important factor in clinical outcomes and interventions in specific geriatric domains translate into improved QoL	CGA was a predictor of QoL
Schmidt et al.[26] 2017 / Germany	≥70 years, any neoplasm / N = 100	Clinical trial / Assess the impact of an CGA-based intervention program on QL preservation	EORTC QLQ-C30	Geriatric intervention demonstrated benefit in preserving QoL	Geriatric intervention based on CGA findings helps to preserve QoL

to be continued

Continuation of Chart 1

Authors Year/Country	Sample	Method/Objective	Instrument	Conclusions	Report of CGA and QoL
VanderWalde et al.[27] 2017 / USA	≥65 years, head and neck or lung cancer undergoing radiotherapy / N = 50	Cohort / Assess the association between functional status based on CGA and treatment tolerance results	EORTC QLQ-C30	There was no association between dysfunction and tolerance, but altered CGA was associated with continuous decline and lack of recovery of QoL	CGA was a predictor of QoL
Goineau et al.[28] 2018 / France	≥75 years old, prostate cancer, submitted to radiotherapy / N = 100	Cohort / Assess the effect of radiotherapy on QoL and identify predictors of QoL reduction	EORTC QLQ-C30	Radiotherapy for prostate cancer was well tolerated among this population and no predictive factor was found to determine which patients would have impaired QoL after radiotherapy	CGA was a predictor of QoL
Phaibulvatanapong et al.[29] 2018 / Thailand	≥70 years old, any neoplasm under systemic treatment / N = 151	Cohort / Assess factors that predispose individual to chemotherapy-related toxicity and QoL	FACT-G	Performance status and the presence of comorbidities were associated with a higher incidence of serious adverse events and worse QoL	CGA was a predictor of QoL
Puts et al.[30] 2018 / Canada	≥70 years old, gastrointestinal, genitourinary or EC II-IV breast cancer, before start of chemotherapy / N = 61	Clinical trial / Explore the feasibility and impact of CGA and an integrated care plan on QoL and cancer treatment decisions	EORTC QLQ-C30	Patients who received CGA-based support had better QoL levels	Geriatric intervention based on CGA findings helps to preserve QoL
Jeppesen et al.[31] 2018 / Denmark	Lung neoplasm T1-2N0M0, not candidates for surgical treatment / N = 51	Clinical trial / Investigate whether CGA as part of an interventionist tool can impact QoL and overall survival	EQ-5D	CGA did not impact QoL and overall survival in this population	Geriatric intervention based on CGA findings did not improve QoL
Kirkhus et al.[14] 2019 / Norway	≥70 years old, any neoplasm under systemic treatment / N = 288	Cohort / Identify potentially modifiable factors that affect physical function and QoL during cancer treatment	EORTC QLQ-C30	Depressive symptoms, reduced mobility and physical symptoms increased the risk of decreases in QoL scores	CGA was a predictor of QoL

to be continued

Continuation of Chart 1

Authors Year/Country	Sample	Method/Objective	Instrument	Conclusions	Report of CGA and QoL
Kirkhus et al. [32] 2019 / Norway	≥70 years, any neoplasia / N = 288	Cohort / Investigate whether the frailty identified by an CGA was associated with an increased risk of QoL deterioration during cancer treatment and follow-up	EORTC QLQ-C30	Frail patients had significantly worse physical functioning and QoL during follow-up	CGA was a predictor of QoL
Mohile et al.[3] 2019 / USA	≥70 years old, any neoplasm, impaired CGA domain / N = 541	Clinical trial / Determine whether providing CGA-guided recommendations to oncologists can improve communication about aging-related concerns	FACT-G	Geriatric assessment improves patient-centered communication about aging-related concerns, but has not changed QoL	Geriatric intervention based on CGA findings did not improve QoL
Quinten et al.[33] 2019 / Belgium	≥70 years old, any neoplasia, submitted to chemotherapy or surgery, G8 ≤ 14 / N = 1424	Cohort / Determine the minimum estimates of clinically important differences in QoL and evaluate prognostic characteristics for these changes in QoL	EORTC QLQ-C30	Minimum estimates of clinically important differences in QoL vary by instrument and treatment, but can be used to assess significant changes in QoL	CGA was a predictor of QoL
Williams et al.[5] 2019 / USA	≥65 years, breast cancer / N = 190	Cohort / Assess the association between frailty and QoL	PROMIS®	Frailty in older women with breast cancer was associated with worse QoL results	CGA was a predictor of QoL
de Boer et al.[6] 2020 / Netherlands	≥70 years, metastatic breast cancer / N = 100	Cohort / Assess the prevalence of psychosocial diseases and longitudinal changes in functional status, psychosocial functioning and QoL	EORTC QLQ-C30	High prevalence of psychiatric disorders in this population; its identification, through CGA can improve QoL	Geriatric intervention based on CGA findings helps to preserve QoL
Mian et al.[16] 2020 / Canada	≥65 years, recent diagnosis of multiple myeloma / N = 40	Cohort / Understand the changes in the geriatric domains and QoL parameters during cancer treatment	FACT-G	In this population, QoL remained stable during the 6-month follow-up period; the Timed Up and Go test can provide a dynamic indicator of functional status and QoL	CGA was a predictor of QoL

to be continued

Continuation of Chart 1

Authors Year/Country	Sample	Method/Objective	Instrument	Conclusions	Report of CGA and QoL
Nipp et al.[13] 2020 / USA	≥65 years, incurable gastrointestinal or lung cancer / N = 62	Clinical trial / Determining the feasibility of a transdisciplinary intervention based on an CGA	FACT-G	Transdisciplinary intervention aimed at the care needs of older adults showed encouraging estimates to improve QoL	Geriatric intervention based on CGA findings helps to preserve QoL
Nipp et al. [8] 2020 / USA	≥70 years, recent diagnosis of incurable gastrointestinal neoplasm N = 132	Cohort / Determine whether categorizing patients as vulnerable by an CGA could identify those with the worst health outcomes	EORTC QLQ-C30	Patients identified as vulnerable by CGA have worse QoL and overall survival	CGA was a predictor of QoL
Quinten et al. [15] 2020 / Belgium	≥70 years old, early stage breast cancer N = 109	Case-control / Assess the relationship between CGA and QoL	EORTC QLQ-C30	Functional measures of CGA are strongly correlated with the patient's self-reported functioning; the initial altered CGA has a modest probability of predicting deterioration of QoL	CGA was a predictor of QoL

CGA: comprehensive geriatric assessment; QoL: quality of life; Euro Quality of Life Instrument-5D: EQ-5D; European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire-C30: EORTC-QLQ-C30; Functional Assessment of Cancer Therapy-General: FACT-G; Patient-Reported Outcomes Measurement Information System®: PROMIS®; United States of America: USA.

DISCUSSION

Disorders of physical functioning, nutritional deficit and psychosocial problems occur in about 20-40% of older adults diagnosed with cancer[34-37]. Such changes, tracked by the application of CGA, can identify frail patients, in which the manifestations related to neoplastic disease and cancer treatment are associated with a substantial burden of symptoms and can reduce the functional state and threaten the ability to live independently of older adults, negatively affecting QoL during the course of the disease[32].

Accordingly, several studies evaluated showed that patients with impairment in a CGA domain had worse QoL than patients without such impairment, that is, they presented greater deterioration in QoL indexes during follow-up[5,6,8,15,21,22,24,25]. Pottel et al.[21] identified that the classification of vulnerability, based on impairment in two or more CGA domains, was an independent predictor for lower scores in QoL indices in a population of 100 older adults with head and neck cancer, in a follow-up period of up to 36 months.

As CGA is a multidimensional approach process, different domains may be altered and predict greater susceptibility to the impairment of QoL in older adults with cancer. While some studies used the classification of patients as vulnerable or frail, using a specific gradation[5,8,21,25,32], others evaluated the impact of different domains individually, with the geriatric factors found to be most often predictive of a relevant decrease in QoL being functional capacity (Karnofsky index, activities of daily living or ECOG performance status), emotional functioning and body mass index[6,14,15,22,24,29]. Only one study[21] demonstrated that the greater the number of altered CGA domains, the greater the impact on QoL.

Most of the studies evaluated described overall QoL score. In studies that report the domains measured separately, the impairment of the QoL of older adults with CGA dysfunction often occurs in different spheres, including physical, emotional, cognitive and social function, performance of role and symptoms[5,8,14,15, 27.32].

Despite this logical association between vulnerability and worsening QoL of older adults with cancer, some studies evaluated did not show a statistically significant association between changes in CGA and QoL impairment. Goineau et al.[28] applied CGA to a cohort of older adults who underwent intensity-modulated radiation therapy for prostate cancer. No geriatric parameter was predictive of impaired QoL after treatment, however in this study, radiotherapy was well tolerated and QoL was preserved in most patients. Likewise, a study conducted by Mohile et al.[18] did not detect statistically significant differences between groups in the QoL scale score, regardless of baseline CGA values. Despite this, the study demonstrated that including CGA in oncology consultations improved patient-centered communication about concerns related to aging and patient and caregiver satisfaction.

In addition, Kirkhus et al.[32] followed a cohort of older adults with cancer and found that although most aspects of QoL were worse in patients classified as frail by CGA, the changes followed a similar course to non-frail patients, however, as the former had lower QoL baseline values, changes of the same magnitude affected these patients more profoundly.

The impact of the aging process on the pharmacodynamic and pharmacokinetic mechanisms of medications is widely known, thus resulting in the minimization of normal tissue tolerance to antineoplastic agents and greater toxicity, which plays an important role in the QoL of this population[29,38]. Thus, the ability of the CGA to predict tolerability to cancer treatment is of crucial importance, as it can assist in anticipating measures aimed at preventing treatment toxicity. Phaibulvatanapong et al.[29] found that disorders of functional capacity, nutritional status and the presence of comorbidities were factors considered predictive of severe toxicity and impaired QoL in older adults with cancer.

In addition to the impact on tolerance to cancer treatment, the progressive decrease in the functional reserve of multiple organ systems associated with aging also influences the individual's ability to recover from acute toxicities, resulting in prolonged functional deficits and, consequently, in a reduction in QoL[24,29,30]. In this context, CGA may also represent a predictor of the inability to recover QoL after antineoplastic therapy. In fact, two studies[21,27] demonstrated that older adults with basal dysfunction in CGA, in addition to having a more significant drop in QoL indexes, were more likely to keep their QoL levels low even after the end of cancer treatment.

Thus, the possible benefit of cancer treatment in older patients must be weighed against the potential harm it causes and, as treatment options for older adults are based on extrapolations of evidence derived from clinical trials that predominantly involve younger or older patients without functional impairment, CGA may represent a useful tool in treatment decisions[18,29,39]. Previous studies have described that CGA findings can lead to changes in cancer treatment in approximately 30% of the treatment plans of older adults, aiming to ensure better tolerance and, consequently, a positive impact on QoL[40,41]. One study evaluated showed that CGA can assist in this process of individualization of cancer treatment, causing a positive impact on QoL[33].

Systematic symptom assessments, interventions targeting specific geriatric concerns and supportive interdisciplinary care can improve the outcomes of older adults with cancer. Therefore, it is recommended that the CGA is followed by an integrated care plan to address the issues identified[30,32]. A study by Schimidt et al.[26] carried out a pilot intervention test with intensified support therapy during the care of older adults with advanced cancer and the results showed that the overall QoL measure of most participants (72%) improved or remained stable. Other selected studies that evaluated the implementation of targeted interventions based on CGA findings also showed better QoL outcomes in patients assigned to the intervention group, than in those designated for usual care[13.30].

Jeppensen et al.[31] used CGA as part of an interventionist tool to optimize the general health status of included patients and, while statistically

significant differences between groups were not found, there was a reduction in long-term QoL scores in the group that did not receive a geriatric intervention, which did not occur in the intervention group. Only one study[23], which carried out a geriatric intervention aimed at the risk factors for postoperative delirium in older patients classified as frail submitted to surgery for a solid tumor, did not demonstrate benefits in the QoL outcome in the follow-up of these patients. However the incidence rate of delirium, which was below expectations, and the high standard of basic care in the control group may have influenced the long-term results.

The usefulness of CGA in improving the results of older adults with cancer has been described in previous review studies[42-44], demonstrating its benefits in different outcomes, such as improved treatment tolerance and overall survival. However, data on the implications of the approach on the QoL of this population are scarce, demonstrating the importance of the present study. The limitation of the study, however, was the fact that it did not use all the databases in the field of health, therefore encompassing a smaller sample of studies. However, the review allowed gaps in the literature to be identified, particularly the lack of studies with more objective designs aimed at understanding the benefits and viability of CGA, and which specifically assess its impact on QoL, an important outcome for the older adult population, in order to provide relevant information that can be used to facilitate treatment decisions. During the search on the research platforms, three clinical trials in progress were identified which have a better design and a larger sample, and which will offer more robust data on this theme (NCT02704832; NCT02284308; NCT02748811)[45-47].

CONCLUSION

From the analysis of scientific production on the relationship of CGA and QoL in older adults with cancer, the importance of a comprehensive evaluation of these people was evidenced, both for prognostic definitions and treatment tolerability, as well as to assist in cancer treatments and the guidance of support interventions. Through these different applications, it was observed that CGA helps to preserve the QoL of this population.

These results suggest the importance of developing strategies for incorporating CGA into the care of older adults with cancer, in order to guarantee a comprehensive approach for these individuals and the best care possible for this vulnerable population, prioritizing the improvement of QoL.

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Home deaths of older people in the city of Rio de Janeiro during the Coronavirus pandemic, 2020

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Abstract

Objective: to analyze deaths in the city of Rio de Janeiro (RJ, Brazil) according to the place of occurrence, age group, cause, and sociodemographic characteristics in the context of the Covid-19 pandemic. *Method*: the distribution of mortality by place of occurrence, age group, and the cause was calculated. The "excess mortality" was analyzed by comparing the monthly averages of deaths by place of occurrence, causes, and sociodemographic characteristics in April to June of the years 2017, 2018, and 2019 with those that occurred in the same months of 2020. *Results*: home deaths increased when compared to the average in the previous triennium. The main causes of mortality were not altered but had significant increases. The growth of unclassified respiratory failure and deaths due to ill-defined causes is emphasized. Regarding the sociodemographic characteristics, there was a greater increase among men of black race/color, widowers, and with low education. *Conclusion*: the increased home deaths found in the city of Rio de Janeiro may be associated with the effects of the Covid-19 pandemic. Besides, the increase in deaths due to ill-defined causes may be associated with the Covid-19 pandemic due to the lack of tests and difficulty in accessing health services. The greater vulnerability of older people is known, but additional studies are important to understand the gender and marital status differences. Black race/color and a lower level of education are associated with a higher chance of home mortality due to an overlap of risks throughout life, leading people in these groups to greater vulnerability.

Keywords: Pandemics. Coronavirus Infections. Mortality. Health of the Elderly.

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INTRODUCTION

Since March 6, 2020, when the first case of Covid-19 was recorded in the State of Rio de Janeiro, the risk of death from the disease has increased rapidly. In October 2020, the State had the second-highest mortality rate due to Covid-19 (117.5 per 100,000 inhabitants according to data from "Monitora COVID-19" of Osvaldo Cruz Foundation)[1], having accumulated 20,292 deaths from this cause until October 27, 14,797 of which were older people (72.9%). In the city of Rio de Janeiro, there were 11,952 deaths, with 9,179 (76.8%) of people aged 60 years or older[2].

The lethality rate of older people is especially relevant in the State of Rio de Janeiro since the percentage of older people in the population is the second-highest in the country (16.3%), only behind Rio Grande do Sul (17.6%). In the municipality, the ratio of older people is 14%[2].

Along with the increase in deaths caused by Covid-19, it is also possible to observe an increase in home deaths, a problem that is emphasized by the situation of the pandemic observed in the country[3,4]. Although the phenomenon has been pointed out, its causes and meanings for the mortality of older people are still poorly analyzed.

It is important to emphasize that home death does not necessarily point to failures in the healthcare system. When it happens due to chronic-degenerative causes, being followed by palliative care [5] with a good support network and with specialized guidance in a quiet and comfortable environment, without physical pain, and in contact with the beloved ones, home death can be an indicator of a dignified and humanized death, a "good death"[6]. However, this is not the case for deaths from highly communicable diseases, which often demands hospitalization for treatment as is the case of Covid-19. Home deaths show lack of care, gaps in the healthcare system and social assistance, as well as lack of timely and preventive care that should be offered by the Primary Health Care (PHC)[4].

Another important aspect when analyzing home deaths during the Covid-19 pandemic is the impact that the discharge of hospitalizations for this cause can have in the scenario of home mortality, both regarding the set of causes of mortality and its amount.

All these aspects are even more relevant when dealing with the collective residences of older people such as Long Term Care Facilities (LTCF), where illness by Covid-19 can represent a great risk of infection for other institutionalized people and workers,[7,8] and where several older people in a fragile and vulnerable state are concentrated and more likely to be affected by the decrease of beds available for hospitalization due to their reversal for the treatment of coronavirus.

Moreover, inequalities in access to the healthcare system and differences within the municipal territory bring an even more challenging element to the scenario of fighting the pandemic in Rio de Janeiro[9,10]. Therefore, the analysis of the causes of home deaths by place of occurrence and sociodemographic markers is essential to understand the progression of the pandemic in the state and municipality.

Given the above, the present study aims to analyze deaths in the city of Rio de Janeiro according to the place of occurrence, age group, cause, and sociodemographic characteristics in the context of the Covid-19 pandemic.

METHOD

The study sample was all deaths that occurred in the city of Rio de Janeiro between 2010 and 2020 according to the place of occurrence, age group, and cause of death. We used data from the Death Certificates (DO) consolidated in the Mortality Information System (SIM) of Rio de Janeiro and made available online by the Municipal Health Department and the Health Department of the State Government of Rio de Janeiro[11]. Although it is possible to obtain the most recent data, the choice to analyze only the period from April to June is justified by the quality of the data. It is expected that the non-inclusion of the most recent periods avoids potential failures or delays in the death record. These problems may occur given the need for state and municipal health departments to review the cases. The data was updated until October 15, 2020.

The place of occurrence was sorted according to the DO, with the following options: 1. Hospital; 2. Other health facilities; 3. Home; 4. Public areas; 5. Other (if not listed already); and 6. Ignored (option used when it is not possible to identify the place of death). Note that the DO does not allow to identify the type of home (private or collective), making it impossible to identify deaths in LTCF, for example.

The identification of alterations in the place of occurrence and age group of deaths was made by analyzing the number and ratio of general deaths and at home according to age group and year in the city of Rio de Janeiro between 2010 and 2020. Four age groups were considered for the analysis: less than 30 years, 30 to 59 years, 60 to 79 years, and 80 years and older.

The measure of "excess mortality" of older people was used as a way to identify deaths related to Covid-19. To estimate the "excess mortality" of older people during the pandemic period in the city of Rio de Janeiro, deaths of people aged 60 years or older between April and June 2020 were compared with the monthly average of deaths of the same age group in the same months of the occurrence of the previous three years (2017, 2018 and 2019) according to the place of death. Then, the percentage difference between mortality in 2020 and the monthly average of the previous three years was estimated. Said difference indicates the "excess mortality" in 2020.

The excess mortality of the old population in the period was also estimated according to causes, according to the 10th Revision of the International Classification of Diseases (ICD-10) for deaths occurring at home. This analysis was deepened by estimating the ratio of older people deaths due to ill-defined cause (Chapter XVIII of ICD-10) that occurred at home, month by month, comparing the same months of the triennium of 2017-2019 and 2020 in the city of Rio de Janeiro. This indicator is a frequently used measure to assess the quality of the record of the deaths due to ill-defined cause and the quality of care since it also reflects the structure for diagnosis available.

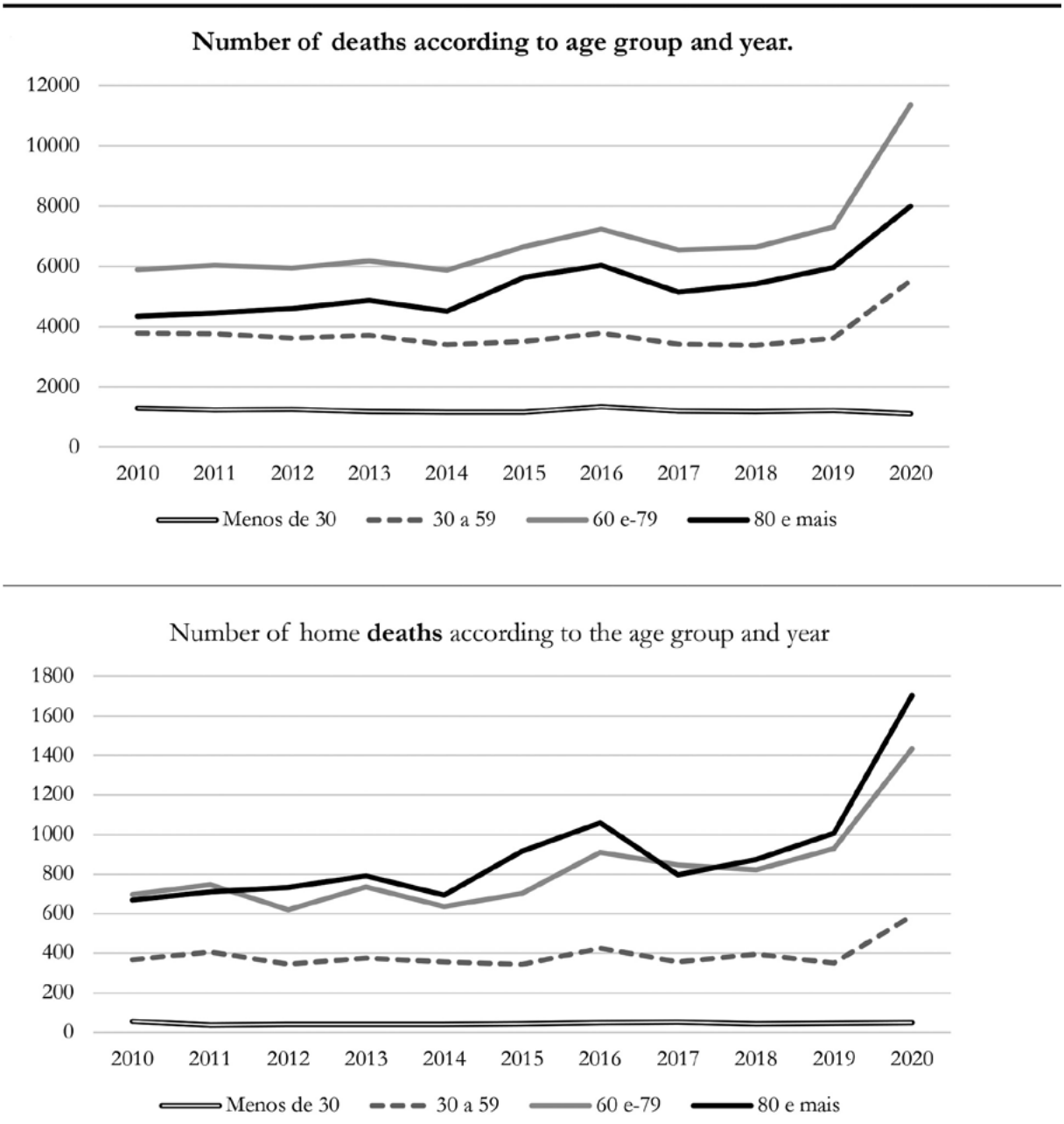
Lastly, the sociodemographic distribution of deaths of older people according to the place of occurrence (home or general deaths) was analyzed in the same period based on the variables available in the system, namely: gender, race/color, marital status, and education.

All data used is secondary publicly available data on the SIM, eliminating the need for appreciation by the Research Ethics Committee according to current legislation.

RESULTS

Figure 1 shows the difference in the age distribution of the number of deaths per place of occurrence. For home deaths, the predominant age group is 80 years or older, while for deaths in all places of occurrence the age group between 60 and 79 years of age had a higher number. It is also shown that the ratio of deaths that occurred at home increases significantly for the group aged 80 years or older.

Table 1 deals with deaths of older people in the State and Municipality of Rio de Janeiro according to the place of occurrence. It is possible to identify that the State of Rio de Janeiro had an excess of general mortality of 9,215 older people representing an increase of 36.5% compared to the same period of the previous year. Note that 57% of deaths in the State are concentrated in the city of Rio de Janeiro (n=7.023).



Ratio of home deaths according to the age group and year.											
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Less than 30 years	4.3	3.1	3.3	3.5	3.6	3.9	3.8	4.5	3.7	4.0	4.4
30 to 59	9.8	10.8	9.6	10.1	10.5	9.9	11.2	10.4	11.7	9.7	10.7
60 and -79	11.9	12.4	10.4	11.9	10.8	10.6	12.6	13.0	12.4	12.7	12.6
80 and over	15.4	16.0	16.0	16.3	15.4	16.2	17.6	15.5	16.2	16.9	21.3

Fonte: SMS/SUBPAV/SVS/CAS/GTDV - Sistema de Informações sobre Mortalidade (SIM). Dados sujeitos a revisão. Os dados utilizados referem-se aos meses de abril a junho.

Figure 1. Number of overall deaths and at home, and the ratio of home deaths according to the age group and year in the city of Rio de Janeiro, 2020.

Table 1. Number and percentage distribution of deaths of older people in Rio de Janeiro (state and municipality) in April to June of the triennium (average from 2017 to 2019) and 2020 according to place of death, and absolute and percentage difference in the period.

Place of death		Total deaths		Excess mortality in 2020
		Average (2017-2019)	2020	Difference
		N (%)	N (%)	N (%)
State of Rio de Janeiro				
Total deaths of older people		25,260 (100)	34,475(100)	9,215(36.5)
Place of occurrence	Hospital	17,468(69.2)	22,878(66.4)	5,410(3.0)
	Another health facility	3,603(14.3)	5,280(15.3)	1,677(46.5)
	Home	3.756(14.9)	5,795(16.8)	2,039(54.3)
	Public areas	69(0.3)	71(0.2)	2(3.4)
	Others	359(1.4)	446(1.3)	87(24.3)
	Ignored or not informed	4(0.0)	5(0.0)	1(15.4)
Municipality of Rio de Janeiro				
Total deaths of older people		12,325(100)	19,348(100)	7,023(57)
Place of occurrence	Hospital	8,749(71)	13,070(67.6)	4,321(49.4)
	Another health facility	1,575(12.8)	2,805(14.5)	1,230(78.1)
	Home	1,760(14.3)	3,135(16.2)	1,375(78.2)
	Public areas	13(0.1)	28(0.1)	15(115.4)
	Others	227(1.8)	307(1.6)	80(35.4)
	Ignored or not informed	2(0.0)	3(0.0)	1(80)

Source: SMS/SUBPAV/SVS/CAS/GTDV - Mortality Information System (SIM). Data subject to review. The data used refer to April to June.

When comparing the difference between the state and municipality of Rio de Janeiro, it is observed that the municipality had an increase of 78.2% in home deaths in 2020 compared to the average of the previous triennium. This growth was 54.3% in the State. Regarding deaths in another healthcare facility, the difference in the period was 78.1% in the municipality and 46.5% in the State.

Table 2 shows the home deaths of people aged 60 years and older in the city of Rio de Janeiro according to the cause of death. Mortality in 2020 increased for all groups of causes (percentage difference of 78%). The cause of mortality with the greatest absolute difference in deaths in the period was hypertension, going from 153 to 364 deaths in 2020, excess mortality of 137%. Another cause with a significant increase in the number of home deaths was diabetes, with 91.7% more than the previous period.

The main causes of home death from June to April of the triennium 2017-2019 were diseases of the circulatory system, neoplasms, diabetes, and diseases of the respiratory system. This scenario does not change in 2020. Nevertheless, it is possible to observe a great increase in deaths from infectious and parasitic diseases (725%), besides the record of 76 deaths related to diseases due to unspecified localization viruses (which in the months analyzed between 2017 and 2019 did not present cases). Among the diseases of the circulatory system which increased by 12%, there is a 400% increase in respiratory failure not classified elsewhere.

Table 2. Number, proportional distribution, and percentage and absolute difference of older people home deaths in the city of Rio de Janeiro according to groups of causes of ICD-10 in April to June of the triennium 2017-2019 and 2020.

Cause groups (ICD-10)	Total deaths		Excess mortality in 2020		Ratio	
	Average (2017-2019)	2020	Absolute Difference	Percent Difference	Average (2017-2019)	2020
Total Deaths	1760	3135	1375	78.1	100.0	100.0
I. Some infectious and parasitic diseases	12	99	87	725.0	0.7	3.2
B34 Virus diseases of unspecified location	0	76	76	*	0.0	2.4
II. Neoplasms (tumors)	152	330	178	117.1	8.6	10.5
C18 Colon malignant neoplasm	10	21	11	110.0	0.6	0.7
C34 Malignant neoplasm of bronchi and lungs	23	43	20	87.0	1.3	1.4
C50 Neoplasia maligna da mama	13	30	17	130.8	0.7	1.0
C61 Neoplasia maligna da próstata	16	46	30	187.5	0.9	1.5
III. Diseases of the blood and hematopoietic organs and some immune disorders	4	10	6	150.0	0.2	0.3
D50; D53; D62; D64 Anemias	3	9	6	200.0	0.2	0.3
IV. Endocrine, nutritional, and metabolic diseases	133	252	119	89.5	7.6	8.0
E14 Unspecified diabetes mellitus	96	184	88	91.7	5.5	5.9
V. Mental and behavioral disorders	18	46	28	155.6	1.0	1.5
F03 Unspecified dementia	7	13	6	85.7	0.4	0.4
F10 Mental and behavioral disorders due to alcohol use	3	14	11	366.7	0.2	0.4
VI. Nervous system disorders	87	139	52	59.8	5.0	4.4
G20 Parkinson's Disease	16	26	10	62.5	0.9	0.8
G30 Alzheimer's Disease	59	99	40	67.8	3.4	3.2
IX. Diseases of the circulatory system	956	1274	318	33.3	54.3	40.6
I10; I11 Arterial hypertension	153	364	211	137.9	8.7	11.6
I21 Acute myocardial infarction	469	560	91	19.4	26.6	17.9
I50 Cardiac insufficiency	32	90	58	181.3	1.8	2.9
I64 Cerebrovascular accident not specified as hemorrhagic or ischemic	34	63	29	85.3	1.9	2.0
X. Diseases of the respiratory system	146	164	18	12.3	8.3	5.2
J43 Emphysema	11	17	6	54.5	0.6	0.5
J44 Other chronic obstructive pulmonary diseases	17	24	7	41.2	1.0	0.8
J96 Respiratory failure not elsewhere classified	5	25	20	400.0	0.3	0.8
XI. Diseases of the digestive system	33	38	5	15.2	1.9	1.2
XII. Diseases of the skin and subcutaneous tissue	5	12	7	140.0	0.3	0.4
XIII. Diseases of the musculoskeletal system and connective tissue	5	15	10	200.0	0.3	0.5
XIV. Diseases of the genitourinary system	18	39	21	116.7	1.0	1.2

to be continued

Continuation of Table 2

Cause groups (ICD-10)	Total deaths		Excess mortality in 2020		Ratio	
	Average (2017-2019)	2020	Absolute Difference	Percent Difference	Average (2017-2019)	2020
XVIII. Symptoms, signs, and abnormal clinical and laboratory findings not elsewhere classified	152	662	510	335.5	8.7	21.1
XX. External causes of morbidity and mortality	37	55	18	48.6	2.1	1.8
Y34 Unspecified facts or events and undetermined intent	9	26	17	188.9	0.5	0.8

*Ratio related to Covid-19

Source: SMS/SUBPAV/SVS/CAS/GTDV - Mortality Information System (SIM). Data subject to review. The data used refer to April to June.

Table 3. Number, ratio, and percentage difference of general deaths and home deaths between April and June in the triennium 2017-2019 and 2020 according to the sociodemographic characteristics in the city of Rio de Janeiro.

Variables and categories	Home deaths			All deaths		
	Average (2017-2019)	2020	Difference	Average (2017-2019)	2020	Difference
	N(%)	N(%)	%	N(%)	N(%)	%
Total	**1,760(100)**	**3,138(100)**	**78.3**	**12,324(100)**	**19,501(100)**	**58.2**
Gender						
Male	807(45.9)	1,529(48,7)	89.4	5,607(45.5)	9,748(50)	73.9
Female	952(54.1)	1,609(51,3)	69.0	6,718(54.5)	9,753(50)	45.2
Race/color						
White	1,172(66.6)	2,038(64.9)	73.9	7,569(61.4)	11315(58)	49.5
Preta	170(9.7)	356(11.3)	109.0	1,391(11.3)	2587(13.3)	86.0
Amarela	3(0.2)	5(0.2)	66.7	19(0.2)	40(0.2)	114.3
Brown	406(23.1)	722(23)	77.7	3.251(26.4)	5393(27.7)	65.9
Indigenous	1(0.1)	0(0)	-100.0	4(0)	3(0)	-18.2
Not reported	8(04)	17(0.5)	121.7	91(0.7)	163(08)	79.1
Marital Status						
Single	395(22.4)	629(20)	59.2	2,409(19.5)	3640(18.7)	51.1
Married	4961(28.2)	906(28.9)	82.5	4,061(33)	7050(36.2)	73.6
Widow/er	677(38.5)	1,210(38.6)	78.8	4,529(36.8)	6546(33.6)	44.5
Legally divorced	162(9.2)	281(9)	73.5	1,082(8.8)	1734(8.9)	60.2
Consensual union	10(0.6)	43(1.4)	330.0	85(0.7)	205(1.1)	140.2
Not reported	3(0.2)	6(0.2)	80.0	45(0.4)	83(0.4)	85.8
Ignored	16(0.9)	63(2)	285.7	113(0.9)	243(1.2)	115.7
Education						
None	106(6)	216(6.9)	103.1	811(6.6)	1163(6)	43.4
1-3 years	387(22)	757(24.1)	95.6	3,567(28.9)	4960(25.4)	39.0
4-7 years	375(21.3)	503(16)	34.0	2,582(21)	3825(19.6)	48.1
8-11 years	386(22)	705(22.5)	82.5	2,707(22)	4871(25)	80.0
12 years and older	235(13.4)	453(14.4)	92.5	1,478(12)	2689(13.8)	82.0
Not reported	29(1.6)	43(1.4)	48.3	109(0.9)	315(1.6)	189.0
Ignored	240(13.7)	461(14.7)	91.8	1,070(8.7)	1678(8.6)	56.8

Source: SMS/SUBPAV/SVS/CAS/GTDV - Mortality Information System (SIM). Data subject to review. The data used refer to April to June.

Deaths whose cause was recorded as chapter XVIII (symptoms, signs, and abnormal findings of clinical and laboratory examinations not elsewhere classified) went from 8.7% in the months analyzed of the previous triennium to 20.1% in 2020. In absolute numbers, the average months considered in the previous triennium had recorded a total of 152 deaths, which increased to 662 in 2020; an increase of 335.5%.

Table 3 shows the number, ratio, and percent difference of general deaths and home deaths from April to June of the triennium 2017-2019 and 2020 according to the sociodemographic characteristics. As for home deaths and in other places, a higher percentage increase was observed among men compared to women. Regarding race/color, it was observed that the black old population had higher excess mortality at home than the white population in the period, with 109% and 73.9%, respectively. The excess home deaths of brown older people in 2020 were similar to that of older people identified as white, being slightly higher (77.7%).

It is also noteworthy the significant increase in deaths without race/color reported, especially in home deaths.

Regarding marital status, there was a more significant increase in the number of widow/er home deaths (78.8%) compared to deaths in all places of occurrence (44.5%). The same can be observed, although on a smaller scale, among the divorced ones, with an increase of 73.5% of home deaths and 60.2% of places of occurrence. Again, the sharp growth of deaths with ignored sociodemographic information, especially at home (285.7%), is emphasized.

Regarding education, there was a sharp percentage increase in home deaths among people with lower education, especially in the categories "No education" (percentage increase of 103.1%) and "1 to 3 years of study" (95.6%) compared to deaths in all places of occurrence, which increased 43.4% and 39.0%, respectively. The information of "ignored" or "uninformed" education is high both in home deaths and in other places.

DISCUSSION

The ratio of home deaths of older people increased significantly in April to June 2020 when compared to the average of these months in the previous triennium, especially the group of 80 years and older both in the State and in the Municipality of Rio de Janeiro. Although the main causes of home deaths are not altered, we can notice relevant proportional increases of both hypertension and diabetes. There was also a sharp increase in deaths from infectious and parasitic diseases. Among the diseases of the circulatory system, there is an increase in respiratory failure not classified elsewhere. Deaths due to ill-defined causes had a proportional increase of 335.5%. Regarding the sociodemographic characteristics of home deaths in the municipality, there was a higher percentage increase among men, population with declared black race/color, widow/er, and people with low education.

One hypothesis that may explain the excess of home deaths is the pandemic which increased the demand for public hospital beds. Other studies on home deaths in the general population work with a similar explanatory hypothesis[3,4,9]. Due to the incipient provision of care from the public healthcare system in the state and municipality of Rio de Janeiro, many patients likely returned to their homes without the necessary care. Primary Health Care (PHC) faces the same problem.

The search for beds and public care services may have been hindered by the worsening of coverage indicators in Rio de Janeiro. According to Martins et. al. (2019), the problems of access and quality of the public hospital network have intensified in the State, alerting to a crisis stage in hospital care[13]. Studies show that the situation in the municipality is similar, where there was a reduction in the population covered by the PHC[14,15], in the procedures, as well as human resources and essential materials such as beds and family healthcare teams[15].

In addition to this factor, the increase in home deaths can also be linked to the reduction in

regular care resulting from social distancing. The pandemic involved changes in the functioning of the healthcare system, including the interruption of non-essential or elective activities. Along with the fear of contamination by patients, this would have caused important changes in the dynamics of hospital care services[16]. These changes would have caused a decrease in the flow of patients in hospitals, including those with an indication for emergency care, which could be contributing to the increase in home deaths[9,17]. The finding of excess mortality among the older age groups is corroborated by national and international studies[18–20], and explained by the greater vulnerability of this age group.

The increase in deaths due to hypertension and diabetes is also a cause for concern since both are considered preventable causes of mortality[21] and hospitalization[22]. It is known that high PHC coverage is associated with a decrease in preventable deaths[23]. Also, with adequate PHC the population has greater access to the prevention and treatment of various conditions which would possibly prevent most of the home deaths. Even with the challenges that the pandemic brought to the health system[17], it is expected that in a scenario with articulated action between family healthcare teams with sufficient CHWs and social assistance, it would be possible to have avoided a copious number of older people deaths, regardless of their place of occurrence.

In 2020, the percentage difference of deaths from infectious and parasitic diseases compared to the previous triennium stands out. The number that used to be 12 deaths reaches almost one hundred, an increase of 702%.

Another important issue raised in the results is the increase in mortality due to ill-defined causes. The lack of knowledge of the basic cause of death may be related to the lack of Covid-19 tests and the lack of an adequate care service for severe cases. As in much of the country, the city of Rio de Janeiro suffered from the incipient amount of tests to detect the new coronavirus, and even when the patients were tested, many died before having their results[24]. Thus, it is possible and probable that a great part of the deaths reported as ill-defined causes can be attributed to Covid-19.

Also, it is important to note that Covid-19 is a systemic disease that can affect several organs of the human body, and whose interactions have not yet been fully understood and studied. Thus, the increase in deaths caused by Covid-19 may be mixed with other causes[25].

The results pointing to a higher ratio of death for men go in the same direction as recent studies in several countries[26–28] showing a higher lethality among men even when adjusted by age and comorbidities.

Old widows/ers had a higher ratio of home deaths than those with another marital status. This may be due to the smaller social support network of these people. Therefore, further studies are needed to understand the reasons for the greater risk for this population group.

The higher percentage of increase in home deaths in the old black population compared to other skin colors can be explained by the strong racial inequalities in the country. Structural racism has historically been reflected in worse indicators of access to services and health status, which consequently makes the impact of the pandemic especially strong for this group[29]

A higher ratio of home deaths was found for people with less education. This finding is similar to those of other studies both in Brazil and abroad[20,26,27,30]. Several articles have already pointed out that a lower level of education is a barrier to access to healthcare services, both because this population in general lives in regions with a low infrastructure of basic services[20,31] and because it can reduce the understanding of the system, hinder the recognition of risk situations, and consequently reduce the use of healthcare services[20].

For the old population, the impacts of socioeconomic differences are enhanced. Social inequalities in health and living conditions make vulnerable groups - mainly indigenous, black and low-income people - experience an aging process with overlapping risks, which make them more vulnerable[20,32]. In Brazil, the Covid-19 pandemic has exposed the impact of these differences and the challenges of managing the healthcare system in this context.

An important limitation of the present study is the impossibility of determining whether home death occurred in a private or collective residence. Brazilian health information systems do not have disaggregated data on this type of residence, since they are related to social assistance and not to health. No official data on mortality were found in LTCF, either from Covid-19 or other causes. Another limitation refers to the possible underreporting of deaths. However, this does not compromise the quality of the study, since the SIM has high coverage in the municipality of Rio de Janeiro.

LTCFs are internationally acknowledged as a high-risk space for transmission and mortality by Covid-19. Studies carried out in countries with adequate epidemiological surveillance show that half of the deaths attributed to Covid-19 occur in these institutions[7]. In general, this is because they are crowded with individuals of advanced age who are more vulnerable and already have other morbidities. In Brazil, despite the guidelines and prevention strategies against Covid-19 in the LTCF[33-35], it has not yet been possible to assess its developments.

CONCLUSION

The increased home deaths found in the city of Rio de Janeiro may be associated with the effects of the Covid-19 pandemic, as pointed out in the literature. Besides, the increase in deaths due to ill-defined causes may be associated with the Covid-19 pandemic due to the lack of tests and difficulty in accessing health services.

The analysis showed that home deaths by Covid-19 is related to males, widowers, from an older age group. Although the greatest vulnerability among older people is known, further studies are important to understand the differences in gender and marital status.

The data also showed a link between the black race/color and a lower level of education and a higher chance of home deaths during the Covid-19 pandemic. This is due to an overlap of risks during the life cycle, so people in these social groups age more vulnerably. However, supplementary studies on work and employment and housing conditions for these individuals would be important so that we could better understand the mechanisms behind home deaths during the Covid-19 pandemic.

Despite the relevance of the debate on the LTCF in the context of the pandemic, the invisibility of the topic in information systems prevented its analysis from being further investigated in this study. Although it was not possible to identify the type of household where the death occurred (private or collective), the distribution of deaths by demographic, socioeconomic variables, and causes of death are presented.

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Vulnerability and Functional Decline in older people in Primary Health Care: a longitudinal study

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Abstract

Objective: To assess the association between vulnerability and functional decline for Instrumental Activities of Daily Living (IADL) in older people treated in Primary Health Care (PHC) units in the municipality of Várzea Grande (MT), Brazil. *Method*: A longitudinal study was carried out with 304 older people with a 24-month follow-up. The main exposure variable vulnerability was measured at baseline using the Vulnerable Elders Survey (VES-13). The dependent variable was "functional decline in IADL" defined as the decrease of at least one point in the score of functional capacity assessed by the Lawton and Brody Scale between baseline evaluation and the end of follow-up. The associations between the functional decline in IADL and vulnerability, health conditions, sociodemographic factors, self-rated health, lifestyle, and adverse health events were estimated using the Odds Ratio (OR) with binary logistic regression. *Results*: A decline in functional capacity in IADL was observed in 35,20% of the cohort members. In the final model, functional decline was associated with the interaction between vulnerability and physical inactivity (OR = 3.12, 95%CI, 1.42-6.86), dissatisfaction with life (OR = 2.23, 95%CI, 1.09-4.56), and hospitalization (OR = 2.01, 95%CI, 1.18-3.41). *Conclusion*: Functional decline in IADL was greater in vulnerable older people who were physically inactive, in those dissatisfied with life, and those who were hospitalized during the follow-up period. These conditions must be identified early so that actions to prevent functional decline could be implemented in addition to programs to encourage older people to exercise.

Keywords: Health of the Elderly. Frailty. Longitudinal Studies. Primary Health Care.

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INTRODUCTION

Functional capacity is an important indicator of how independent the older person is. Population-based studies generally assess functional capacity through the ability to perform Basic Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL), with the Katz Index and the Lawton and Brody scale being the most used instruments for the respective assessments[1].

National studies on the subject are mostly cross-sectional[2-8]. However, longitudinal studies are needed to assess changes in the functional capacity of the older person over time so that longevity with greater independence, autonomy, and quality of life can be achieved[9].

In Brazil, few longitudinal studies with older people living in the community addressed the risk factors for functional decline in basic and/or instrumental activities of daily living[10-12]. Among the risks identified are being 80 years old and over, low education, no professional activity, physical inactivity, not having a partner, presenting symptoms of depression, and using psychotropic drugs.

Although functional decline is mostly linked to the aging process, it cannot be related to normal aging, but to the most frequent disabilities in the older person, such as cognitive disability, postural instability, lack of mobility, incontinence, communicative disability, and iatrogenesis[13]. These disabilities are predictors of mortality, hospitalization, and institutionalization in older people[13]. Based on this premise, the Vulnerable Elders Survey (VES-13)[14] was developed. It is a simple and effective tool to identify vulnerable older persons with an increased risk of functional decline or death in two years.

The VES-13 is the instrument recommended by the Ministry of Health (MoH) to assess older people and is part of the Health Record Booklet of the Older Person[15], with the advantage of being short and easy to apply[14]. In Brazil, the original version of the VES-13[14] underwent a cross-cultural adaptation[16] and validation[17]. Although the condition of vulnerability predicts adverse health events including functional decline, none of the aforementioned studies[10-12] assessed the association between physical vulnerability and functional decline, and no longitudinal studies were found in the Brazilian context discussing this association with a follow-up greater than six months.

Considering the use of the VES-13 instrument recommended by the MoH, and due to the importance of monitoring vulnerable older people for adverse health outcomes, the present study aimed to assess the association between vulnerability and functional decline for Instrumental Activities of Daily Living (IADL) of older people treated in Primary Health Care (PHC) units in the municipality of Várzea Grande (MT).

METHOD

A longitudinal study with a 24-month follow-up of older people registered in PHC units in the municipality of Várzea Grande, MT, Brazil. Baseline data were collected from March to June 2016, and the follow-up period was from July to October 2018. Várzea Grande (MT) is the second-largest city in the state with an estimated population of 287,526 inhabitants in 2020[18]. In 2016, the municipality had 15 PHC units, and 11 of them were selected to comprise the study sample as they offer curricular internships in public health.

In the baseline, a two-stage cluster sampling was adopted: I) PHC units; II) older people selected in proportion to the size of the population of people aged 60 or over registered in each unit. The sample size followed the procedures proposed for finite populations using a confidence level of 0.95, a tolerable sampling error of 0.05, and an assumed prevalence of vulnerability of 0.50; 10% were added to compensate for possible losses totaling 377 older people. More details on baseline sampling and data collection can be found in the publication of the initial study[19].

Of the 377 older people in the baseline, 304 participated in the follow-up. The losses during the follow-up were due to the older person not being found after 3 visits to their home at different times and unsuccessful telephone contact (n=49), and deaths (n=24) during the follow-up period. Confirmatory data referring to deaths were collected

in the records of the Mortality Information System (SIM) made available by the Municipal Health Department of Várzea Grande.

To test the power of the follow-up sample (n=304), a post-hoc test was carried out considering an Odds Ratio of 2.3, and an exposure ratio of 0.5 and 0.3 between the comparison groups and the significance level of 0.05; the study sample showed a power of 91.2%.

The exclusion criteria from the baseline study[19] were older persons who presented cognitive impairment detected by the application of the Mini-Mental State Examination (MMSE) and cases of severe impairment of sight and hearing or severe sequelae of Cerebrovascular Accident (CVA) preventing the older person from responding to the questionnaire. In cases of refusal, when the older person was not at home at the moment of the interview, or when they had a cognitive deficit, they were replaced by the nearest resident older person who was also registered in the PHC units.

The participants were interviewed at home by trained interviewers guided by the Interviewer's Manual after carrying out a pilot study and a calibration process. In the baseline, older people were accessed during the visit of the Community Health Agent, and they were invited to voluntarily participate in the research. In case they accepted, they were interviewed by the interviewer; if it was not possible at that moment, it was scheduled for another time. The follow-up was based on the address list and the identification of the older people participating in the baseline, and the interviewers visited their homes to invite them to participate again in the research.

The study response variable was assessed by the functional capacity in IADL measured at the baseline and in the follow-up by the Lawton and Brody Scale adapted for the Brazilian population[20]. The functional decline (yes, no) was defined as a decrease of at least 1 point in the score of the functional capacity in IADL between the baseline collection and the follow-up regardless of the degree of dependence of the older person in the baseline[21].

The scale assesses eight activities such as using the telephone, using means of transportation, shopping, tidying the house, cooking meals, doing the laundry, controlling money, and taking medication. Each question has three possible answers, and each answer generates a score from 1 to 3: 1 point for those who do not perform the said activity (dependent); 2 points for those who perform the activity with assistance (partially dependent), and 3 points for those who perform the activity without assistance (independent). The final score is the sum of the eight domains and can vary from 8 to 24 points; the higher the score, the more independent is that individual[21].

The main exposure variable of the study was vulnerability (yes; no) measured only at the baseline by the instrument Vulnerable Elders Survey (VES-13) adapted and validated to use in the Brazilian population[16,17]. The instrument comprises 13 items including age, self-reported health, physical capacity, and functional capacity. The score varies between 0 and 13 points, with a score equal to or greater than three (3.0) being considered as the cutoff point to classify the individual as vulnerable[14].

The covariables related to health conditions were assessed at the baseline and are explained in the initial study[19]: The Geriatric Depression Scale 15 (GDS-15)[22] used to assess depressive symptoms (score ≤5 points without depressive symptoms, and score ≥6 points with depressive symptoms), the Reduced Mini Nutritional Assessment (MNA)[23] to assess the nutritional status. The sum of the scores obtained in each MNA item is used to classify individuals into three categories (malnutrition: 0 to 7 points; at risk of malnutrition: 8 to 11 points; and good malnutrition: 12 to 14 points). In the present study, we combined the categories of malnutrition and at risk of malnutrition. The Cumulative Illness Rating Scale - Geriatric (CIRS-G)[24] was used to assess comorbidity (without comorbidity of severity level 3 or 4; with comorbidity of severity level 3 or 4), and the instrument Tilburg Frailty Indicator (TFI)[25] was used to assess frailty (yes: ≥ 5 points; no: <5 points), in addition to polypharmacy (yes; no) that is considered as the continuous use of 5 or more medications.

Other covariables in the study were sociodemographic conditions, self-rated health, lifestyle, and adverse health events collected in

the follow-up. Sociodemographic conditions: a) gender (male; female); b) age group (60 to 69 years; 70 years and over); c) marital status (lives without a partner, lives with a partner); d) education (illiterate; literate); per capita income (up to ½ minimum wage; >½ minimum wage). Self-rated health: positive assessment (self-reported good or very good health), and negative assessment (self-reported regular, bad, or very bad health). Lifestyle: a) satisfaction with life (no; yes); b) smoking (yes for those who currently smoke or have already smoked, no for those who have never smoked); c) drinking alcohol (yes for those who currently drink alcohol or have already had this habit, no for those who have never drunk alcohol); d) regular exercise in the 12 months before data collection (no; yes). Adverse health events: a) refer at least one morbidity (yes; no); b) severe illness in the last 12 months before data collection (yes; no); c) hospitalization, falls, and fractures in the last 24 months before data collection (yes; no).

The Odds Ratio (OR) (with 95%CI for OR) was used to measure the associations between the dependent variable (functional decline) and the independent variables: vulnerability, health and sociodemographic conditions, self-rated health, lifestyle, and adverse health events and were estimated by Logistic Regression. The covariables presenting *p*-value <0.20 in the bivariate analysis were included in the multiple analysis. The stepwise backward model was used, in which variables that were not statistically significant were progressively removed from the model, with variables with *p*-value <0.05 being maintained in the final model. The main exposure variable vulnerability and the adjustment variables gender and age group were maintained in the multiple models, regardless of statistical significance. The interactions between vulnerability and the covariables of the final model were tested.

The present study was submitted and approved by the Research Ethics Committee of Universidade do Estado de Mato Grosso under number 2,771,193 and followed all the recommendations of Resolutions 466/2012, 510/2016, and 580/2018 of the Brazilian National Health Council.

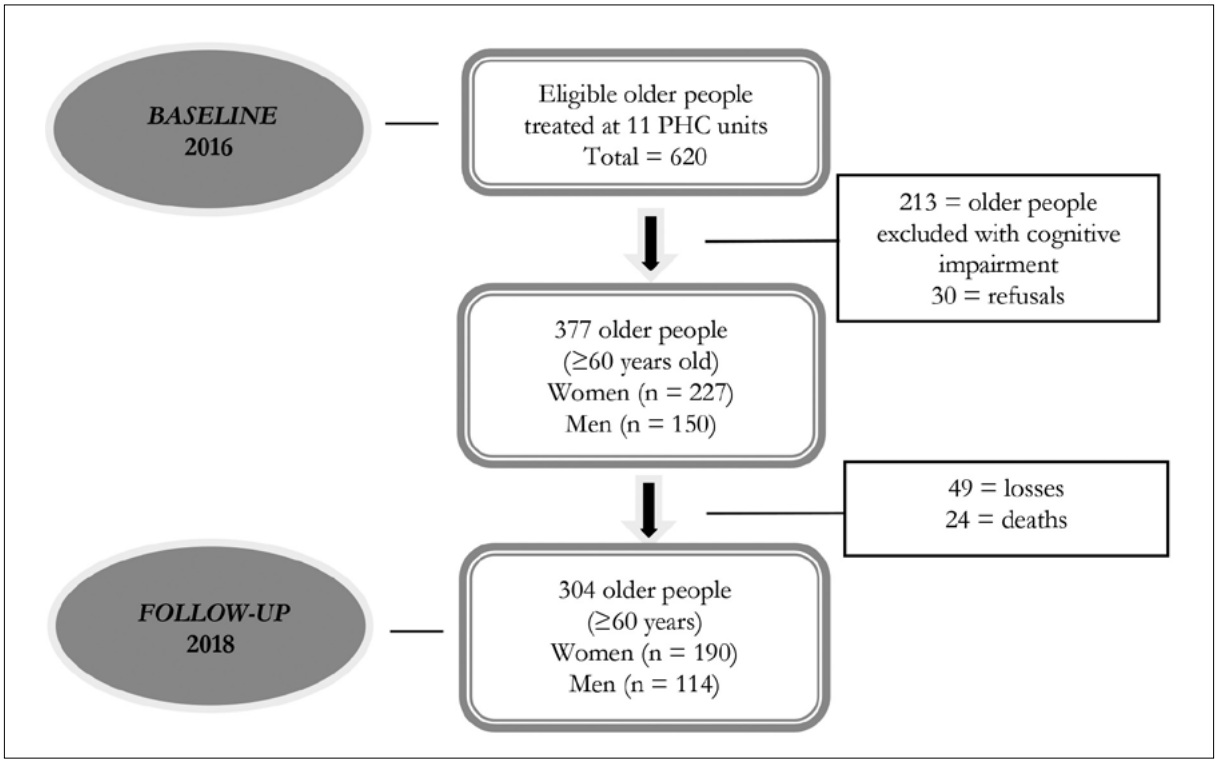

Figure 1. Flowchart of older people participating in the longitudinal study (2016/2018). Várzea Grande (MT), 2020.

RESULTS

The study had the participation of 304 older people, and in the baseline 62.30% of them were dependent for IADLs and 49.07% were vulnerable. In the follow-up, 62.50% were dependent on IADLs and the decline in functional capacity for IADL corresponded to 35.20%. As for the sociodemographic profile, the majority were females (62.50%) aged 70 years and over (53.29%) with an average of 71.79 years and a median of 70 years (SD±7.42); 78.62% self-declared black and brown; 55.92% had a partner (married or were in a common-law marriage); 66.12% attended elementary school; 53.95% had a monthly income per capita >½ minimum wage.

The crude analysis of sociodemographic variables, self-rated health, and lifestyle showed a functional decline of older people who reported being dissatisfied with life (OR =2.43, 95%CI, 1.21-8.8) and who did not exercise (OR =2.50, 95%CI, 1.40-4.44) (Table 1).

In the crude analysis none of variables related to health conditions showed a statistically significant association (Table 2).

The crude analysis of the variables related to adverse health events showed a functional decline in older people who had some serious illness during the follow-up (OR =2.10, 95%CI, 1.23-3.61), were hospitalized (OR =1.96, 95%CI, 1.17-3.27), suffered falls (OR =1.67, 95%CI, 1.03-2.71) or fractures (OR =2.80, 95%CI %, 1.03-7.58) (Table 3).

The variables that remained with a statistically significant association with functional decline in the final model were the interaction between vulnerability and physical inactivity (OR = 3.12, 95%CI, 1.42-6.86), being dissatisfied with life (OR = 2.23, 95%CI, 1.09-4.56) and having been hospitalized in the 24 months before the follow-up data collection (OR = 2.01, 95%CI, 1.18-3, 41) (Table 4).

Table 1. Functional decline in Instrumental Activities of Daily Living of older people according to sociodemographic variables, self-rated health, and lifestyle, measured in the follow-up. Várzea Grande, MT, Brazil, 2020.

Variables	Functional decline				
	n/N	%	OR	95%CI	*p*-value
Gender					
Male	38/112	33.93	1	0.67-1.78	0.724
Female	69/192	35.94	1.09		
Age group (years)					
60 a 69	56/167	33.53	1	0.73-1.89	0.502
70 and over	51/137	37.23	1.18		
Marital status					
Lives with a partner	62/170	36.47	1	0.55-1.42	0.601
Lives without a partner	45/134	33.58	0.88		
Education					
Literate	68/195	34.87	1	0.64-1.70	0.874
Non-literate	39/109	35.78	1.04		
Per capita income (in minimum wages)					
Up to 1 minimum wage	34/96	35.42	1	0.59-1.64	0.957
≥1 minimum wage	73/208	35.10	0.99		
Self-rated health					
Positive rating	26/95	27.37	1	0.99-2.85	0.055
Negative rating	81/209	38.76	1.68		

to be continued

Continuation of Table 1

Variables	Functional decline				
	n/N	%	OR	95%CI	*p*-value
Satisfaction with life					
Yes	87/267	32.58	1	1.21-4.88	**0.012**
No	20/37	54.05	2.43		
Smoking					
No	48/147	32.65	1	0.76-1.96	0.409
Yes	58/157	37.18	1.22		
Drinking alcohol					
No	53/145	36.55	1	0.56-1.43	0.637
Yes	54/159	33.96	0.89		
Physical Activity					
Yes	19/88	21.59	1	1.40-4.44	**0.002**
No	88/216	40.74	2.50		

OR: *Odds Ratio*; 95%CI: 95% Confidence Interval; Minimum Wage: 954,00 BRL.

Table 2. Functional decline in Instrumental Activities of Daily Living for older people according to variables of health conditions measured in the baseline. Várzea Grande, MT, Brazil, 2020.

Variables	Functional decline				
	n/N	%	OR	95%CI	*p*-value
Vulnerability (VES-13)					
Not vulnerable	49/156	31.41	1	0.88-2.26	0.156
Vulnerable	58/148	39.19	1.41		
Comorbidity level 3 or 4 (CIRS-G)					
No	66/183	36.07	1	0.56-1.47	0.697
Yes	41/121	33.88	0.91		
Nutrition (MNA)					
No nutritional risk	57/166	34.34	1	0.68-1.74	0.731
Malnutrition and at risk	50/138	36.23	1.09		
Depression (GDS-15)					
No depressive symptoms	74/212	34.91	1	0.63-1.74	0.872
With depressive symptoms	33/92	35.87	1.04		
Fragility (TFI)					
Not frail	38/105	36.19	1	0.57-1.53	0.792
Frail	69/199	34.67	0.94		
Polypharmacy*					
No	76/218	34.86	1	0.60-1.89	0.823
Yes	24/66	36.36	1.07		

OR: *Odds Ratio*; 95%CI: 95% Confidence Interval. * Use of ≥5 medications.

Table 3. Functional decline in Instrumental Activities of Daily Living of older people according to variables of adverse health events measured in the follow-up. Várzea Grande, MT, Brazil, 2020.

Variables	Functional decline				
	n/N	%	OR	95%CI	*p*-value
Refers to at least one morbidity					
No	2/11	18.18	1	0.53-11.85	0.244
Yes	105/293	35.84	2.51		
Severe illness					
No	72/232	31.03	1	1.23-3.61	**0.007**
Yes	35/72	48.61	2.10		
Hospitalization					
No	67/218	30.73	1	1.17-3.27	**0.010**
Yes	40/86	46.51	1.96		
Falls					
No	60/194	30.93	1	1.03-2.71	**0.039**
Yes	47/110	42.73	1.67		
Fractures					
No	97/287	33.80	1	1.03-7.58	**0.043**
Yes	10/17	58.82	2.80		

OR: *Odds Ratio*; 95%CI: 95% Confidence Interval.

Table 4. Results of the adjusted Logistic Regression between the independent variables and the functional decline (dependent variable). Várzea Grande, MT, Brazil, 2020.

Variables		OR Adjusted	(95%)CI	*p*-value
Gender				
Male		1	0.60-1.62	0.857
Female		0.95		
Age group (years)				
60 to 69		1	0.73-1.97	0.481
70 and over		1.20		
Interaction between Vulnerability and Physical Activity				
Not vulnerable	Active	1		
Not vulnerable	Inactive	2.22	0.99-4.90	0,049
Vulnerable	Active	1.23	0.43-3.54	0,695
Vulnerable	Inactive	3.12	1.42-6.86	**0,005**
Satisfaction with life				
Yes		1	1.09-4.56	**0.029**
No		2.23		
Hospitalization				
No		1	1.18-3.41	**0.010**
Yes		2.01		

OR: *Odds Ratio*; 95%CI: 95% Confidence Interval.

DISCUSSION

This is a longitudinal study with a 24-month follow-up of older people registered in PHC units in the municipality of Várzea Grande (MT). The study findings showed positive association between functional decline and the interaction between vulnerability and physical inactivity, along with positive associations between functional decline and dissatisfaction with life and hospitalization in the 24 months before the follow-up data collection.

The functional decline ratio among the older people surveyed was high when compared to other studies carried out with older people living in communities who also used the Lawton and Brody scale in the assessment[5,6]. However, comparison with other studies is made difficult by the variety of functional capacity measurement scales used, different definitions of functional decline, types of study, and target populations. In Brazil, longitudinal studies on the functional decline for the IADLs are still scarce, especially among older people living in the community[11].

A longitudinal study[26] carried out with institutionalized Brazilian older people living in nursing homes in the city of Natal (RN) analyzing the probability of maintaining the functional capacity for Basic Activities of Daily Living (ADL) showed an incidence of functional decline of 54% in two years. The longitudinal study[11] carried out in Lafaiete Coutinho (BA) with older people living in the community who were initially independent for ADL showed that the incidence of functional decline was 15.3% in a three-year follow-up. A population-based longitudinal study[12] with data from the cohort of older people from the Bambuí Project (MG) between the years 1998 and 2011 with independent older people for IADL and ADL at the baseline showed an incidence of functional decline of 58% for IADL, and 44.5% for ADL. The discrepant results of the incidence of functional decline for ADLs were probably due to the target population in the first study[26] being of institutionalized older people who are physically more vulnerable when compared to older people living in the community in the second study[11], and with the longest follow-up period in the Bambuí cohort[12].

Vulnerability was associated with functional decline among inactive older people. A cohort study[27] monitoring 635 older people in the Primary Health Care in the city of Rio de Janeiro (RJ) using VES-13 to assess vulnerability and the Lawton and Brody scale to assess the functional capacity in IADL identified that the functional decline was greater among vulnerable individuals in a six-month follow-up (OR =1.95; 95%IC 1.49–2.54).

Vulnerability and physical inactivity in represented a greater risk for the development of functional decline in IADL. This association can be explained by the fact that physical inactivity worsens the condition of vulnerability and makes the older person stop improving their cardiorespiratory and muscular fitness, bone and functional health[28]. The World Health Organization (WHO) encourages the practice of physical activities, which includes activities for recreation or leisure, transportation (walking or cycling), occupation (if the older person still works), housework, sports or planned exercises within the scope of daily, family, and community activities[28].

The more the older person practice physical activities, the lower the risk to develop disabilities in the ADL and IADL[28,29]. According to the new WHO Guidelines (2020) on physical activity and sedentary behavior resulting from a comprehensive systematic review, there is strong evidence of an inverse dose-response relationship between the amount of aerobic activity and the risk of functional physical limitations of the older people[28].

Population-based research following multiple cohorts and assessing risk factors for functionality loss in older people concluded that those with low socioeconomic status and the presence of risk factors such as chronic diseases, physical inactivity, high alcohol and tobacco consumption, in addition to obesity, had a greater loss of functional capacity[9].

Two cohorts of older people living in the community were monitored, one with 403 Italian older people and the other with 395 Dutch older people aged 60 to 70 years and assessed the functional decline in a 9-year follow-up period using some items from the ADL and IADL. Most older people reported having no functional decline in the baseline[30]. The

predictors for functional limitations in men were fear of falling and alcohol consumption, whereas in women the predictors were age, physical activity, living alone, economic satisfaction, gait speed, Body Mass Index, and cardiovascular diseases[30].

Studies carried out with Brazilian older people living in the community found an association between lower level of physical activity and functional disability in the IADL[7,10]. However, physical inactivity alone does not always explain disability, as evidenced in the longitudinal study[11] in a municipality of Bahia with non-institutionalized older people showing no association between functional decline and insufficient physical activity.

The fact that the older person is dissatisfied with life was also associated with functional decline, which corroborates the findings of Nunes et. al.[5] showing that the more the older person is satisfied with life, the lower the prevalence of functional disability. This positive association between greater satisfaction with life and independence in IADLs is justified by the fact that functionality is related to better maintenance of health and quality of life of the older person, and therefore greater satisfaction with life during aging[31].

A study assessing depression in older people living in the community in southern Brazil found a strong association with dissatisfaction with life indicating that this variable is a good marker for tracking depressive symptoms in older people[8]. In turn, good economic conditions, high education, absence of physical disabilities, positive self-rated health, cognitive ability, and access to healthcare services are aspects to explain higher levels of satisfaction with life[32]. Functional disability in ADL and IADL was also associated with the use of benzodiazepines, antidepressants, and antipsychotics, drugs used for mood and behavioral disorders[12].

Hospitalization of the older person in the period between baseline and the follow-up data collection was associated with functional decline in IADL. Hospitalization of older people leads to functional decline, disability, morbidity, and mortality[33]. Hospitalization is a risk for the older population, with increased chances for the development of adverse events, with the most important one being functional decline. The main risk factors for functional decline associated with hospitalization are age, immobility, cognitive impairment, and functional status before hospitalization[34]. Admi et. al.[33] found disagreements in the studies regarding the timing of the functional decline, pointing out that it may occur at pre-admission, admission, during hospitalization, and even after hospital discharge. A cohort of hospitalized older people showed a worsening of functionality after hospital discharge[35].

One of the advantages of our study was the longitudinal 24-month follow-up of the older people. However, the loss of participants during the follow-up may represent a limitation for this type of study. Interviews carried out by trained staff may have minimized both losses and information bias due to the standardization of data collection. Another probable limitation of the present study was that the information on functional capacity was self-reported, and it was not possible to assess the risk of developing a functional decline since there was already a high ratio of older people with disabilities in the baseline.

The follow-up study of this population was important for a better understanding of the conditions associated with functional decline of older people treated in the PHC units. The results of the present study reinforce the importance of the early identification of events that could cause functional decline of the older person in order to intervene and prevent the development of dependence.

CONCLUSION

The functional decline of older people treated in the PHC units was associated with the interaction between vulnerability and physical inactivity, dissatisfaction with life, and hospitalization in a two-year follow-up period.

These results show the importance of knowing the condition of vulnerability of older people in the community because it can indicate adverse health conditions such as functional decline, which can lead to the social isolation of the older person, dependence on care, financial dependence and physical limitations, among others.

It is suggested that longitudinal studies must follow independent older people for Instrumental Activities of Daily Living at the baseline for a longer period to favor a more extensive assessment of the outcomes related to vulnerability and its predicting factors, besides assessing the effect of physical activity in reversing vulnerability. It would also be important to develop a gerontological care plan identifying the vulnerable older people living in the community, and subsequently make a multidimensional geriatric assessment to investigate the causes and intervene on them, thus preventing functional decline and/or reversing it. Besides, programs to encourage the practice of physical activities should be implemented, thus favoring the improvement of functional capacity, quality of life, and autonomy of these older people.

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Spatiotemporal analysis of the HIV epidemic in older people in a Brazilian Amazon state

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Abstract

Objective: To analyze spatiotemporally the incidence of the human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) among older people in the State of Pará, Brazil, from 2007 to 2018. *Method:* An ecological study of HIV/AIDS case notifications in older people from the Brazilian Information System on Notifiable Diseases. The HIV/AIDS incidence rate was temporally analyzed by the joinpoint method, and spatially by the Moran autocorrelation of scanning and spatial regression techniques. *Results:* 2,639 notifications of HIV/AIDS were eligible for the study, with 1,725 (65.4%) being in men and 914 (34.6%) in women. During the study period, there was an increase of 2,422.5% in the HIV incidence rate in men and 1,929.8% in women, with the opposite being observed for the AIDS incidence rate, which increased 77.6% in women and 40.7% in men. The joinpoint method showed an increasing trend for the HIV incidence rate (APC=30%, p=0.00) and stability for the AIDS incidence rate (APC=3.0%, p=0.2). The most impacted municipalities by the HIV epidemic were those in the south-eastern part of Pará, with a moderate association (R^2=0.65) with its population growth. The spatiotemporal scanning analysis pointed to Belém as a risk zone for HIV/AIDS (RR=3.93, p=0.00; 2017-2018). *Conclusion:* While the incidence of AIDS among older people from Pará remained stable from 2007 to 2018, that of HIV tended to grow. The greatest impact of the epidemic occurred in southeastern Pará municipalities, and it was associated with the population growth; Belém presented a spatiotemporal risk for HIV/AIDS.

Keywords: Spatial Analysis. HIV. Health of the Elderly.

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INTRODUCTION

About 38 million people are living with the human immunodeficiency virus (HIV) worldwide. Although progress has been made in fighting it, 1.7 million people were diagnosed with the virus in the year 2019[1]. In this scenario, people aged 50 years and over stand out as the number of newly reported cases has been increasing. Around 100,000 people in this age group are diagnosed every year with HIV in developing countries[2]. However, this phenomenon still occurs in developed countries as well. In Canada, the ratio of new HIV diagnoses in people aged 50 years and over went from 15.1% to 22.8% of all reported cases between 2008 and 2017[3]. The same happened in the European Union, with the HIV notification rate (x100 thousand inhabitants) increasing in the same age group between 2004 and 2015 from 3.5 to 4.8 in men and from 1 to 1.2 in women[4]. In the United States, one in every six HIV diagnoses in 2018 was of a person aged 50 years and over[5]. In Brazil, the age group of 50 years represented 9.34% of the total number of new HIV/AIDS cases notified in 2008, rising to 12.42% in 2018[6].

Most studies on the HIV epidemic deal with young people and adolescents. However, although the sexual activity decreases with age, many older people remain sexually active but with little knowledge on the modes of transmission and prevention of HIV and underestimating the risk of infection, which makes them more vulnerable[7,8]. Given this situation, the worldwide phenomenon of population aging is a concern. It is estimated that in 2050 people over 65 years of age will represent 16% of the entire world population[9].

The spatial dynamics of the HIV epidemic must be considered when fighting it, as it is directly influenced by sociopolitical and economic factors[10]. In this context, spatial analysis studies stand out for allowing the identification of areas of greatest epidemiological pressures and association with territorial factors. On the other hand, temporal analysis studies allow us to assess the annual impact of public policies aimed at fighting the epidemic[11]. Only three spatial analysis studies involved people aged 50 years and over, two in China[12,13] and one in Brazil[14]. China showed a higher incidence of HIV/AIDS in people aged 50 years and over in provinces belonging to the illicit drug trafficking circuit[12,13]. A higher incidence of HIV/AIDS was observed in the state of Paraíba, Brazil, in the municipalities with a population of over 100,000 inhabitants, with epidemic expansion in coastal municipalities and into the countryside of the state[14].

Although the average HIV/AIDS detection rate in Brazil decreased between 2008 and 2018, it increased by 21.8% in the Northern region of the country. In 2019, Pará was ranked as the fifth Brazilian state with the highest HIV/AIDS detection rate, and the capital Belém was the second capital among other Brazilian capitals. Belém, Marituba, and Ananindeua were respectively the second, third, and ninth places among the 100 Brazilian municipalities with more than 100,000 inhabitants and the highest HIV/AIDS detection rates[1]. Besides the low coverage of the Family Health Strategy (FHS)[15], there are only 32 antiretroviral (ARV) dispensing units for the 144 municipalities in Pará (http://azt.aids.gov.br), of which only two located in Belém providing Pre-Exposure Prophylaxis (PreP) [1].

Pará is ranked 24th in terms of the Human Development Index (HDI) among the 27 federative units of Brazil, despite its diversified fauna and mineral resources [16]. Besides the low investment in urban infrastructure and low FHS coverage [15,17], the countryside municipalities in Pará are undergoing an accelerated urbanization process due to the development of the mineral extractive industry and, attracting many migrants in search of jobs and better living conditions [18], a favorable scenario for the transmission of sexually transmitted infections (STIs).

The objective of the present study was to analyze the HIV epidemic among older people in Pará, Brazil with the use of spatial and temporal analysis techniques.

METHODS

An ecological study carried out with secondary data from the Brazilian Information System on Notifiable Diseases (SINAN) provided by the Pará State Department of Public Health (SESPA).

Pará is the second Brazilian state with the largest territorial area (1,245,870,798 Km^2) and a population of 8,175,156 people, and it is estimated that the age group of 50 years and over is greater than 1,231,570 inhabitants representing 15.06% of the total population [19].

The records of HIV and AIDS among people aged 50 and over notified to the Brazilian Information System on Notifiable Diseases (SINAN) and provided by SESPA were consulted. According to the Joint United Nations Programme on HIV and AIDS (UNAIDS), every person living with HIV aged 50 and over is considered an older person[20]. Only notifications with home addresses in Pará were included in the study; information in duplicate and those without municipality of residence were excluded.

Data were collected from January to February 2020. Data were collected from the following variables: age, gender, date of diagnosis, type of diagnosis (HIV or AIDS), and the municipality of residence. To calculate the annual municipal incidence of HIV/AIDS, the number of notifications was divided by the population of people aged 50 years and over, and the result was multiplied by 100,000. The population projections for each year obtained from the website of the Brazilian Institute of Geography and Statistics (IBGE) were used here. The 2018 population projection was subtracted from the 2007 projection to obtain the percentage of population growth. The result was then divided by the 2007 population projection and multiplied by 100.

Temporal analysis

Although the HIV diagnosis has become a mandatory notification only as of 2014[21], the HIV and AIDS incidence rates were analyzed separately in the temporal analysis to verify the behavior of the incidence rate of each one of them separately. The annual incidence rates underwent a temporal regression using the Joinpoint model[22] to calculate the annual percentage change (APC). The APC is calculated based on the inflection points in a historical series where lines from multiple segments are tested to see if they better explain the behavior of the series than just a straight line. The annual trend value is calculated based on the combination of straight lines on a logarithmic scale. The trend is increasing or decreasing depending respectively on a positive or negative APC and a p-value≤0.05. Otherwise, the trend is considered stationary.

Distribution and spatial autocorrelation of the HIV/AIDS incidence rate

For the spatial analysis, the incidence of HIV/AIDS per quadrennium (2007-2010, 2011-2014, 2015-2018) was used to avoid annual fluctuations. The incidence rate was calculated based on the population mean of each municipality for each of the quadrenniums. After that, the spatial distribution of the incidence rate was analyzed and the global Moran spatial autocorrelation was used. The global Moran index (I) ranges from -1 to 1, with negative values and p-value ≤0.05 indicating the inverse self-correlation, municipality with high incidence rate surrounded by municipalities with low incidence rate, or vice versa (high-low or low-high incidence grouping, respectively). When the value of I is positive and p-value ≤0.05, direct autocorrelation occurs (low-low and high-high grouping incidence). Otherwise, the random distribution is considered. Both analyzes were performed using ArcGIS software (10.6.1).

Moran's global analysis points to whether or not there is spatial aggregation. However, it does not show the location of the clusters. For this, we used the local Moran analysis with the method of local indicator of spatial association (LISA), with the first-order contiguity matrix of the queen type and the p-value obtained with 999 permutations.

Spatial scan analysis

To identify the risk areas for the HIV epidemic, spatial scanning was applied using the SaTScan software (Version 9.6.1), a method proposed by Kulldorff and Nagarwalla[23]. In summary, SaTScan employs circular or elliptical windows to calculate the spatial clusters, while for spatiotemporal clusters the windows are elliptical with a circular base, the base corresponding to space, and the height to time.

The windows move in space and time to search for risk clusters, always comparing the risk inside and outside the window. For each change found, the program calculates the log-likelihood ratio (LLR) and the statistical significance value with Monte Carlo permutations. The window with the highest LLR and with p≤0.05 is considered a risk cluster. Our study used the discrete Poison model to identify the spatial risk clusters considering circular, non-geographically overlapping clusters, with the maximum size of each cluster not exceeding 50% of the exposed population, and 999 Monte Carlo permutations. The temporal precision in year and cluster with a maximum of 50% for the twelve years of the study were used in addition to the criteria already mentioned to identify the spatiotemporal aggregates. The estimated cluster strength was expressed by calculating the relative risk (RR). Only RRs with p≤ 0.05 were considered, in which RR≥1 indicated risk zones, while those with RR<1 were considered protection zones, that is, those with lower risk for the event to occur. Thematic maps with the RRs were generated in the ArcGIS software (10.6.1).

Spatial regression analysis

To analyze the spatial regression, the dependent variable was the incidence of HIV/AIDS for the entire period studied, and the Human Development Indexes of the municipalities were the independent variables, as well as the percentage of population growth between 2007 and 2017 in addition to the FHS coverage rate. First, Pearson's correlation analysis was applied to verify the collinearity between the independent variables in the IBM SPSS® software version 23. Then, the stepwise technique was applied in the Geoda software (version 1.14.0) to obtain the best model of ordinary least squares (OLS). The best model was found to be the one with the lowest Akaike value (Aic), the highest R^2 and R^2 adjusted, the variance inflation factor (VIF) less than 10, and the lowest p-value. Then, the global Moran analysis was applied to discard the spatial dependence of the model residues in the ArcGIS software, and only then the residues were analyzed using the geographically weighted regression (GWR) with the Kernel adaptive radius for better adjustment to the chosen model. In the end, the spatial dependence of the residues of the final GWR model was tested again, followed by the creation of choroleptic maps to visualize the correlations.

All maps were generated in the Datum Horizontal SIRGAS-2000 geographic coordinate system, longlat projection system EPSG 4674. All results with p≤0.05 were considered statistically significant.

The present study is part of the macro-research project "Situational Diagnosis of Sexually Transmitted Infections in the Amazon Context: Geospatial Analysis, Tracking and Development of Care-Educational Technologies", and was approved by the Research Ethics Committee of the Health Sciences Institute of Universidade Federal do Pará under opinion number 3,488,663.

RESULTS

From 2007 to 2018, 2,679 cases of HIV/AIDS in people aged 50 and over in Pará were notified to SINAN, of which 40 notifications were excluded due to incompleteness in the notification forms. Among the 2,639 eligible cases, 1,725 (65.4%) were in men and 914 (34.6%) in women. During the study period there was an increase of 2,203.85% in the incidence rate of HIV (2007: 0.78, 2018: 17.97) and of 48.50% of AIDS (2007: 7.71; 2018: 11.45). The HIV incidence rate increased 2,422.5% in men and 1,929.8% in women (Men: 2007=0.89, 2018=22.45; Women: 2007=0.67, 2018= 13.6) when analyzed separately by gender. However, in the AIDS incidence rate, women showed an increase of 77.57% and men 40.69% (Men: 2007=11.63, 2018=16.29; Women: 2007=3.79, 2018=6.73).

Table 1 shows the temporal regression analysis using the joinpoint method of annual incidence rates for the entire population aged 50 and over and separated by gender - male and female. For the general population, both males and females, the AIDS incidence rate tended to remain stable throughout the study period, while the HIV incidence rate tended to grow.

Table 1. Time regression analysis of incidence rates by gender for HIV and AIDS in people aged 50 years and over in Pará in the period from 2007 to 2018. Pará, 2020.

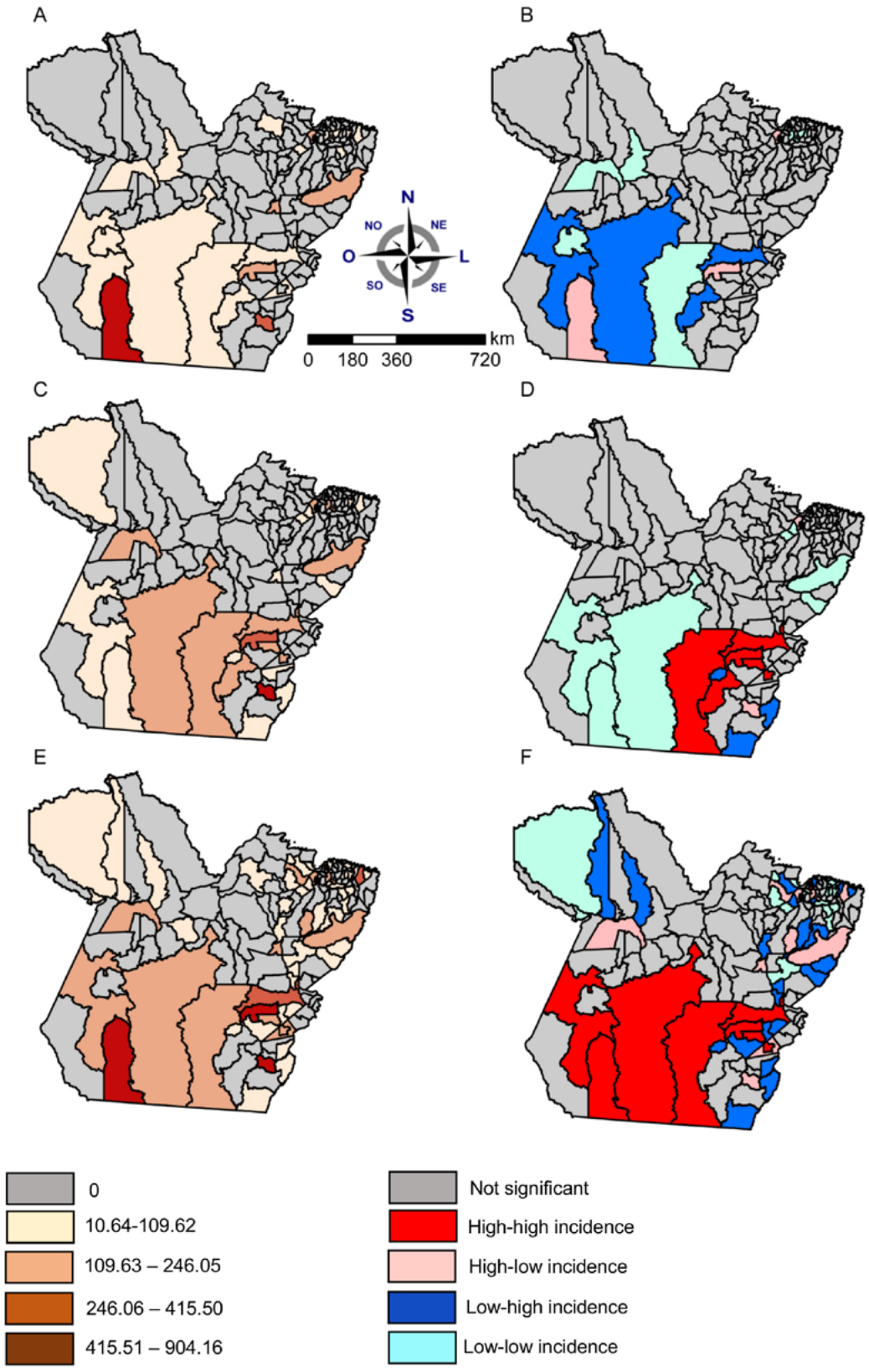
Period	HIV			Aids		
	APC	(95%CI)	*p*-valor	APC	(95%CI)	*p*-valor
Male/Female						
2007-2018	30	(22.4-38.1)	*p*<0.001	3	(-2.1-8.4)	0.2
Male						
2007-2018	31.8	(21.7-42.8)	0.04	3.2	(-2.3-9.1)	0.2
Female						
2007-2018	24.7	(18.6-31)	*p*<0.001	2.7	(-2.8-8.4)	0.3

Figure 1 shows the maps of the spatial distribution of HIV/AIDS incidence, in which the municipalities of southern and southwestern meridional Pará have the highest rates. Although the global Moran's analysis did not present statistical significance in any of the four-year years evaluated (2007-2010: *I*=-0.18. *p*=0.80; 2011-2014: *I*=-0.11. *p*=0.67; 2015-2018: *I*=0.05. *p*=0.27), the local Moran analysis indicated a low-low incidence cluster in the southwest meridional (Altamira, Itaituba and Novo Progresso) and another high-high incidence cluster in the southeast (São Félix do Xingu, Canaã dos Carajás, Parauapebas, Marabá and Ourilândia do Norte) in the quadrienium 2011-2014. In the quadrienium 2015-2018 there was only one high-high incidence cluster formed by the municipalities of Altamira, Itaituba, Novo Progresso, São Félix do Xingu, Canaã dos Carajás, Parauapebas and Marabá.

The scanning analysis showed two regions of spatial risk for HIV/AIDS, with the highest (RR=2.73, p=0.00) being observed in the southwestern meridional municipalities (São Félix do Xingu, Tucumã, Canaã dos Carajás, Parauapebas, Marabá, Ourilândia do Norte, Xinguara, Rio Maria, Redenção, Pau D'Arco, Bannach and Água Azul do Norte) and the other in the municipality of Belém (RR=2.69, p=0.00). The spatiotemporal scan indicated only Belém as the municipality at risk in the period from 2017 to 2018 (RR=3.93, p=0.00) (Figure 2).

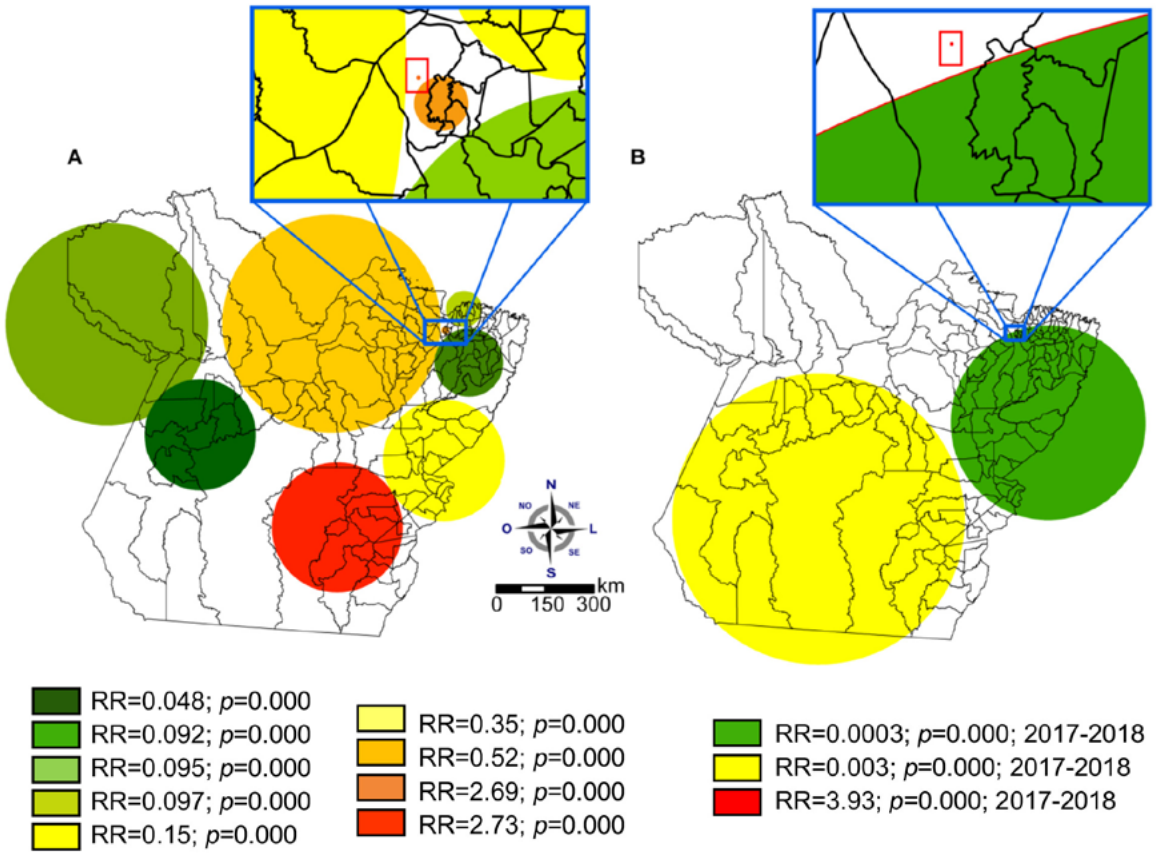
For spatial regression, Pearson's correlation showed statistical significance between the dependent variable (incidence of HIV/AIDS) with the variables of percentage population growth (r=0.028, p=0.00) and with the HDI-m (r=0 .41, p=0.00). However, in the construction of the OLS model, the explanatory model of percentage population growth was chosen as it presents VIF less than 10 (VIF=1.40) (Table 2).

The GWR analysis proved to be the best explanatory model for model 2 than for OLS, which explains 65% of the model chosen (R^2=0.65, R^2 adjusted=0.51, and AIC=1 845.73), with the residues generated not showing spatial autocorrelation (I=0.04, p=0.46). Figure 3C shows the direct correlation between the GWR coefficients and the highest rates observed in the southern meridional municipalities in Pará Cumaru do Norte, Santa Maria das Barreiras, Santana do Araguaia, Bannach, Redenção, Concórdia do Pará, Santana do Araguaia, Rio Maria).



A, C, E: Spatial distribution of the HIV/AIDS incidence rate; B, D, F: MAPAS LISA; A,B: 2007-2010; C, D: 2011-2014; E,F: 2015-2018.

Figure 1. Spatial distribution of the HIV/AIDS incidence rate. Pará, 2020.

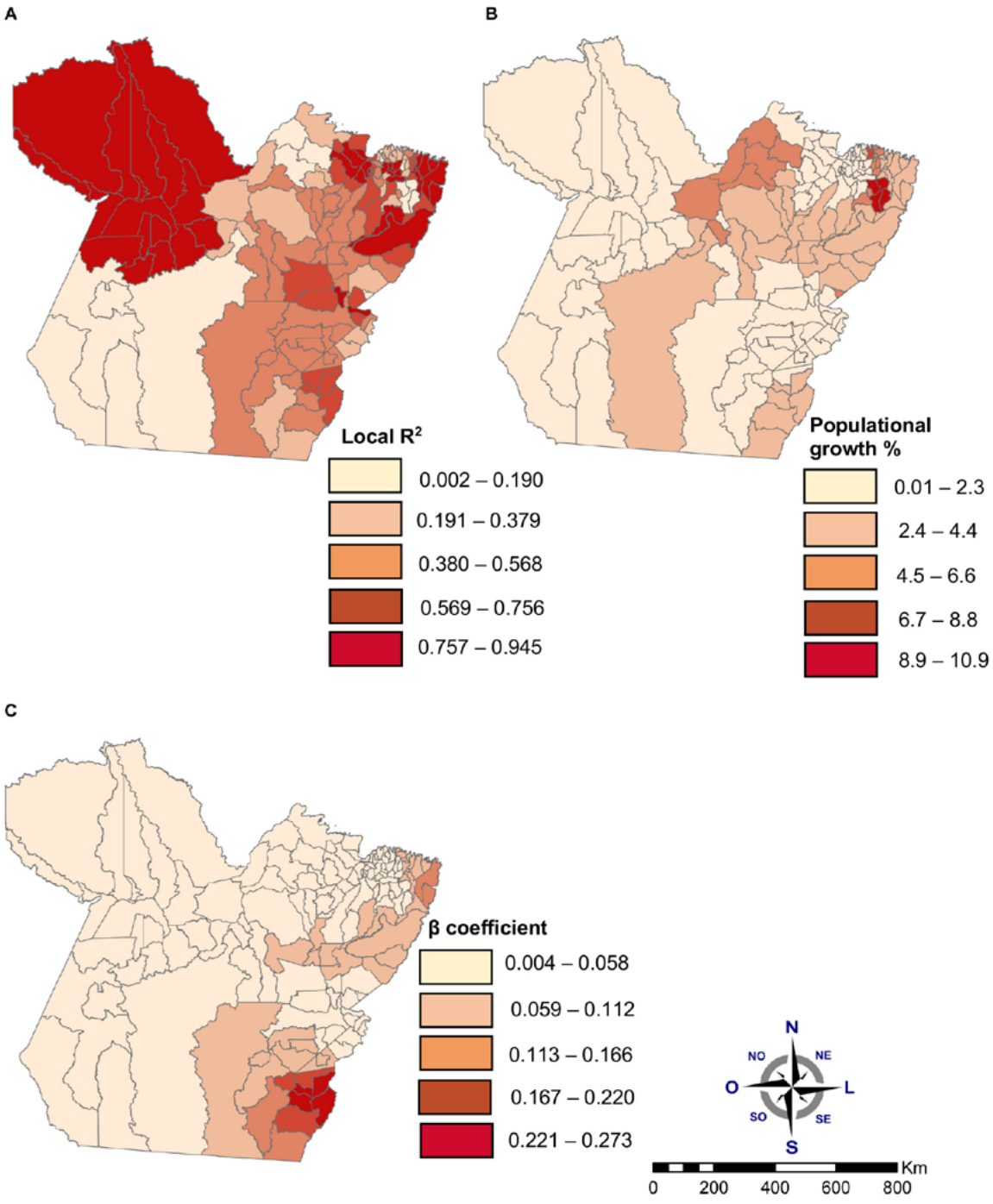


(A) Space risk; (B) Spatiotemporal risk for HIV/AIDS; The red rectangle delimits the circle indicating Belém as a region of spatial and spatiotemporal risk for HIV/AIDS.

Figure 2. Spatial scan analysis for HIV/AIDS. Pará, 2020.

Tabela 2. Multiple linear regression (OLS) of the percentage of municipal population growth and HDI-m with the HIV/AIDS incidence rates. Pará. 2020.

Variables	Estimate	Standard Error	p-value
Model 1			
Constant	-551.15	160.15	p<0.001
Percent population growth	1067.25	277.77	p<0.001
HDI-m	0	0	0.08
R^2: 0.17; Adjusted R^2: 0.16; AIC: 1889.71; Multicollinearity: 23.91			
Model 2			
Constant	61.51	15.63	p<0.001
Percent population growth	0.01	0	p<0.001
R^2: 0.08; Adjusted R^2: 0.07; AIC: 1,902.05; Multicollinearity: 1.40			
Model 3			
Constant	-658.88	148.85	p<0.001
HDI-m	0.01	0	p<0.001
Multiple R^2: 0.15; Adjusted R^2: 0.14; AIC: 1,890.79; Multicollinearity: 20.89			



A: % of municipal population growth; B: R2 location adjusted; Ç: Coefficient ß of the percentage of municipal population growth with the HIV/AIDS incidence rate.

Figure 3. Geographically Weighted Regression mapping of percentage municipal population growth with the HIV/AIDS incidence rate. Pará, 2020.

DISCUSSION

The results of the present study showed that while the incidence of HIV tends to grow in the population aged 50 years and over in Pará, the incidence of AIDS tends to stabilize. The spatial analysis showed that the municipalities in southeastern and southwestern Pará have the highest incidences of HIV/AIDS, with the highest spatial risk zones formed by municipalities in southeastern Pará and Belém, while the spatiotemporal analysis showed that Belém was the highest risk region in the years 2017-2018. Spatial regression showed that the high incidence of the HIV epidemic in southeastern Pará was strongly associated with the population growth in these municipalities.

It was also evident that while the AIDS diagnosis remained stable throughout the period the HIV diagnosis tended to grow. This fact may be related to the mandatory notification of HIV diagnosis from 2014 onwards, and the decentralization of screening tests for the virus that are performed by the ESFs[21]. However, unlike what has been observed in the African continent after the universalization of anti-HIV testing and antiretroviral treatment with a reduction in the virus transmission, Aids, and mortality from Aids in all age groups [2324], the present study showed an increase in the HIV incidence rate and stability in the AIDS rate.

Besides the need to expand testing and antiretroviral treatment in Pará, it is necessary to implement public policies to raise awareness about the forms of transmission and prevention of HIV specifically for this age group studied. A study carried out in South Korea with people over 65 years of age showed that those sexually active, and especially men, had multiple sexual partners and did not use condoms. However, those who were aware of the risks of sexually transmitted infections (STIs) practiced safer sex[6].

The gender disparity observed in our study, in which the AIDS incidence rate showed the highest percentage increase in women, was also evidenced in the previous studies[2,12]. The incidence of HIV/AIDS in men aged 50 years and over decreased in the United States between 2014 and 2018, remaining stable among women[2]. In China, the ratio of HIV cases reported in women over 50 years went from 17.83% in 2010 to 38.10% in 2016[12]. Gender inequality resulting from biological, social, cultural, economic, and religious factors puts women in a situation of greater vulnerability to STIs.

The spatial analysis showed that the municipalities in southeastern and southwestern Pará were the most impacted by the HIV epidemic, a phenomenon that is directly associated with population growth. The municipalities in southeastern and southwestern Pará present an intense urbanization process promoted by the expansion of the mining industry, cattle-raising activity, and the construction of hydroelectric plants. The population growth of these municipalities has been taking place in an accelerated, disorganized way and without the proportional monitoring of investment in urban infrastructure[18,19]. In sub-Saharan Africa, the high mobility of the population in search of better living conditions has been identified as a catalyst for the HIV epidemic[25]. Population growth and density are directly associated with the expansion of STI, being directly influenced by social, educational, and per capita income inequality[26].

Categorized as the second-highest spatial risk for HIV, Belém is the city in Pará with the highest demographic density[16]. These results are consistent with a study carried out with older people in Rio de Janeiro, in which the most populous cities in the state, Rio de Janeiro and Niterói, had the highest incidence of AIDS[27].

Low investment in health can also contribute to the scenario of the HIV epidemic in Pará, a state with one of the lowest FHS coverage in Brazil (54.5%), most of them located in urban areas, which makes it difficult to access inhabitants in the countryside of Pará due to the geographic characteristics of the region and the high level of poverty of the inhabitants[15,28]. The FHS plays a leading role in the fight against HIV/AIDS with actions ranging from the promotion of sexual health, prevention of STIs, diagnosis and monitoring of patients[29]. Testing for HIV was intensified in Belém at the end of 2016 with the decentralization of tests for FHSs[30]. This fact is consistent with the results of the spatiotemporal scan pointing to Belém as the region of greatest risk in the period from 2017 to 2018.

As this is an ecological study, causality between HIV transmission and race or skin color, immigration, or other social phenomena cannot be inferred due to the confounding factors omitted in this type of analysis. Additionally, the study was limited by the forms with incomplete data, but they were in small numbers and did not affect the analysis.

CONCLUSION

The present study showed that while the incidence of AIDS in people aged 50 years and over remained stable from 2007 to 2018 in Pará, the incidence of HIV tended to increase among women and men. The spatial analysis revealed the greatest impact of the epidemic on this age group in the southern meridional municipalities in Pará, with a strong association with its population growth. The spatiotemporal analysis showed that Belém is the municipality with the highest risk, which may be associated with the intensification of public policies to fight HIV as of December 2016 by the Health and Environment Secretariat of Belém.

Given the above, there is a need for greater investment in public health policies in southeastern and southwestern Pará, Brazil, to fight HIV, contemplating not only the expansion of coverage of the Family Health Strategy but also investment in infrastructure following urban development to entitle citizens with their universal right to health.

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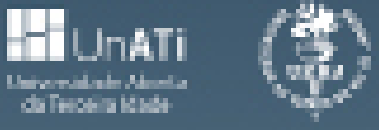
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