

Associations between the variables institutionalization, education, polypharmacy, depression and cognitive impairment in two heterogeneous groups of the elderly

*Associações entre as variáveis institucionalização,
educação, polifarmácia, depressão e
comprometimento cognitivo em dois grupos
heterogêneos de idosos*

*Asociaciones entre las variables
institucionalización, educación, polifarmacia,
depresión y deterioro cognitivo en dos grupos
heterogéneos de ancianos*

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ABSTRACT: The objective is to describe and analyze the possible associations between the variables institutionalization, education, polypharmacy, depression and cognitive impairment, in two heterogeneous elderly groups. Methods and Procedures: Subjects were 48 elderly, of whom 24 were institutionalized and 24 were non-institutionalized. The Mini-Mental State Examination (MMSE) was used to assess cognitive decline and, for depression, the Beck Depression Inventory (BDI). As a result: 8.3% of subjects presented cognitive decline and 52,1% presented depression. Among those institutionalized, there was a higher incidence of cognitive decline and depression. Age negatively influenced cognitive performance ($rS = -0.450$, $p = 0.001$). An inverse

relationship was observed between cognitive decline and depression ($r_s = -0.304$, $p = 0.036$). Older people with higher schooling had a lower rate of depression, and illiterate elderly individuals presented greater cognitive decline. There were no significant differences between illiterate and low schooling elderly. It was concluded that institutionalized elderly lacking social and cognitive stimulation are more vulnerable to cognitive decline and depression, which indicates the importance of conducting controlled research on protective factors for depression and cognitive decline in elderly populations and the establishment of public policies that aim at improving the quality of life of the elderly population, especially the most deprived elderly and the institutionalized.

Keywords: Aging; Depression; Cognitive Dysfunction; Institutionalization; Stimulation.

RESUMO: *O objetivo foi descrever e analisar as possíveis associações entre as variáveis institucionalização, educação, polifarmácia, depressão e comprometimento cognitivo em dois grupos heterogêneos de idosos. Participaram 48 idosos, sendo 24 institucionalizados e 24 não institucionalizados. O Mini-Exame do Estado Mental (MEEM) foi utilizado para avaliar o declínio cognitivo e para a depressão, o Inventário de Depressão de Beck (BDI). Como resultados: 8,3% dos indivíduos apresentaram declínio cognitivo e 52,1% apresentaram depressão. Entre os institucionalizados, houve maior incidência de declínio cognitivo e depressão. A idade influenciou negativamente o desempenho cognitivo ($r_s = -0,450$, $p = 0,001$). Foi observada relação inversa entre declínio cognitivo e depressão ($r_s = -0,304$, $p = 0,036$). Os idosos com maior escolaridade apresentaram menor índice de depressão e os idosos analfabetos apresentaram maior declínio cognitivo. Não houve diferenças significativas entre idosos analfabetos e com baixa escolaridade. Concluiu-se que os idosos institucionalizados, sem estímulo social e cognitivo, são mais vulneráveis ao declínio cognitivo e à depressão, o que indica a importância de se realizarem pesquisas controladas sobre fatores de proteção para depressão e declínio cognitivo em populações idosas e o estabelecimento de políticas públicas que visem a melhorar a qualidade de vida dos velhos, principalmente os mais necessitados e os institucionalizados.*

Palavras-chave: *Envelhecimento; Depressão; Disfunção Cognitiva; Institucionalização; Estimulação.*

RESUMEN: *El objetivo es describir y analizar las posibles asociaciones entre las variables institucionalización, educación, polifarmacia, depresión y deterioro cognitivo en dos grupos de ancianos heterogéneos. Métodos e Procedimientos: los sujetos eran 48 ancianos, de los cuales 24 estaban institucionalizados y 24 no institucionalizados. El Mini-Mental State Examination (MMSE) se utilizó para evaluar el deterioro cognitivo y, para la depresión, el Beck Depression Inventory (BDI). Resultados: 8.3% de los sujetos tenían deterioro cognitivo y 52.1% tenían depresión. Entre los institucionalizados, hubo una mayor incidencia de deterioro cognitivo y depresión. La edad influyó negativamente en el rendimiento cognitivo ($rS = -0.450$, $p = 0.001$). Se observó una relación inversa entre el deterioro cognitivo y la depresión ($rs = -0.304$, $p = 0.036$). Las personas mayores con mayor escolaridad tenían una tasa más baja de depresión, y las personas mayores analfabetas presentaban un mayor deterioro cognitivo. No hubo diferencias significativas entre los adultos mayores analfabetos y con baja escolaridad. Se concluyó que los los ancianos institucionalizados que carecen de estimulación social y cognitiva son más vulnerables al deterioro cognitivo y la depresión, lo que indica la importancia de llevar a cabo una investigación controlada sobre los factores protectores para la depresión y el deterioro cognitivo en las poblaciones de ancianos y el establecimiento de políticas públicas que tengan como objetivo mejorar la calidad de vida de la población de edad avanzada, especialmente de los más desfavorecidos e institucionalizados.*

Palabras clave: *Envejecimiento; Depresión; Disfunción Cognitiva; Institucionalización; Estimulación.*

Introduction

Aging is a process characterized by a complex set of physiological, psychological and social changes specific to each subject and may be accompanied by chronic diseases and mental disorders (Morewitz and Goldstein, 2007; Ehlers, *et al.*, 2017), greater demand for health services and medicines. The increase of dependence can be considered as one of the main factors that lead to institutionalization (Perlini, *et al.*, 2007), and the

increase in the quantity/frequency of medicines use has a negative impact on the health of individuals, especially in the elderly (Soares and Rossignoli, 2014).

An objective way to evaluate this impact is the polypharmacy criteria. According to this criteria, it is considered a minor polypharmacy when a subject uses between 2 and 4 drugs and a greater polypharmacy when consuming 5 or more drugs (Betti, *et al.*, 1999; Lucchetti, *et al.*, 2010).

In addition to the increased costs and complexity of the treatments, are pointed out the negative impacts of polypharmacy: muscle weakness, which leads to weakness and, consequently, an increase in the risk of falls (König, *et al.*, 2017); cognitive decline (Oyarzun-Gonzalez, *et al.*, 2015); depression (Yuruyen, *et al.*, 2016), among others.

Although the Long-Term Care Institutions (LTC's) seek to provide the elderly with the help and support they need (Botwinick, 2013), the institutionalization process itself can bring risks, including the development of depressive disorders (Okura, *et al.*, 2011; Turner, *et al.*, 2015), and increased cognitive impairment (Brown and Abdelhafiz, 2011). Studies indicate that elderly people living in the community have a lower prevalence of depression (14%), while the institutionalized elderly have rates ranging from 15% to 50% (Reys, *et al.*, 2006; Siqueira, *et al.*, 2009). Reynolds and Kupfer (1999) point to an average prevalence of 60% among the institutionalized elderly and 10% among community residents. Depression has been considered an important risk factor for cognitive decline and dementia (Murray and Lopez, 1997; Gatz, *et al.*, 2005; Baer, *et al.*, 2013).

According to Wilson and collaborators (2004), the degree of cognitive decline increases by an average of 5% for each symptom of depression. Data on the prevalence of cognitive decline in the elderly in Brazil are discrepant and vary between 4.9% (data collected in a sample of 350 elderly people between 2010 and 2011 in the city of Pouso Alegre, MG) (Faria, *et al.*, 2011); 20.6% (data collected in a sample of 632 elderly, between 2008 and 2009, in the city of Montes Claros, MG) (Ferreira, *et al.*, 2014); 18.7% (data collected in a sample of 310 elderly in 2014, in the city of Ibicuí, BA) (Nascimento, *et al.*, 2015); and 34.1% (data collected in a sample of 1593 elderly in 2008, in the city of Bagé, RS) (Holz, *et al.*, 2013). These studies were conducted with elderly residents of the community and used the Mini-Mental State Examination (MMSE) to assess the prevalence of cognitive impairment.

According to the authors, the analyzed samples presented the following characteristics: low schooling and low income (Faria, *et al.*, 2011, Ferreira, *et al.*, 2014, Nascimento, *et al.*, 2015, Holz, *et al.*, 2013); living alone (Nascimento, *et al.*, 2015); high age and depression (Holz, *et al.*, 2013), the high prevalence of health problems (Faria, *et al.*, 2011) and female gender (Ferreira, *et al.*, 2014; Nascimento, *et al.*, 2015; Holz, *et al.*, 2013). Several approaches relate cognitive impairment to aging and, in this perspective, consider it one of the greatest health threats in old age (Bishop, *et al.*, 2010).

Higher educational level has been associated with a lower incidence of dementia (Anstey and Christensen, 2000; Sharrett, 2012). Schneeweis, Skirbekk and Winter-Ebmer (2014) have shown that schooling has a positive impact on memory, thus constituting a protective factor for cognitive decline. Glymour, Tzourio and Dufouil (2012) in a survey of 4,480 elderly people in France between 1999 and 2001 suggest that older people with higher levels of education perform better at the baseline mean for cognitive tests (Benton Retention Test, Test B, and Mini-Mental State Examination), and slower cognitive decline. In this perspective, Sharrett (2012) considers the hypothesis that the risk of dementia can be reduced by participating in cognitive stimulating activities. In addition to social interaction and the practice of physical activities (De Wit, *et al.*, 2010; Santini, *et al.*, 2017), cognitive stimulation has been pointed out as an important therapeutic and preventive resource for cognitive decline (Schupf, *et al.*, 2004, Kelly, *et al.*, 2014); and for depression (Raes, *et al.*, 2009; Niu, *et al.*, 2010).

Based on the data presented we can observe that the aging process is accompanied by innumerable alterations that occur in different forms and rhythm for each individual. Form and rhythm depend on innumerable variables, of which we cite some essential ones to consider. Of these, with the advancement of science, the only (at least for now) independent is aging itself. The others may, largely or relatively, be controlled. In this perspective, this study aims to describe and analyze the possible associations between the variables institutionalization, education, polypharmacy, depression and cognitive impairment in two heterogeneous groups of the elderly people, as well as offer subsidies to reflect on the impact and control of these variables.

Methods

The sample consisted of 48 elderly people. 24, non-institutionalized, were participants in the Open University of the elderly, Unati, Sao Paulo State University - Unesp-Marília, SP, and, 24, institutionalized, were residents of an LTC in the same city. No matching criteria were established between the groups/samples, considering the impossibility of forming paired groups due to the multiplicity of variables that characterize the populations studied.

The number of subjects in the study was determined by considering the availability of subjects in LTC. The LTC where the research was developed counted, on the occasion of the research, with 64 elderly and the Unati with 40 elderly. Due to the characteristics of the samples and the research design, no sample calculation, control, randomization, and blinding were performed. Subjects were selected according to established eligibility criteria. Only those subjects who accepted to participate in the study were included, and among those, the ones who presented sufficient hearing and cognitive comprehension capacity to understand and respond to the tests applied. Elderly people with mental disorders that affected perceptual, discerning and language ability were not included in the study.

The overall level of cognitive impairment was assessed using the Mini-Mental State Examination (MMSE) (Folstein, *et al.*, 1975), validated for the Brazilian population by Bertolucci and collaborators (1994). The following cutoff points were used, as suggested by Almeida (1998): 24 for highly educated individuals, 18 for individuals with the complete gymnasium and 14 for the illiterate. The presence of symptoms of depression was evaluated from the Beck Depression Inventory (BDI) (Beck, 1961), in the validated Portuguese version (Gorenstein and Andrade, 1991). In this study, the following cutoff points were used to classify symptoms for depression: normal / no depression (0-9), mild depression (10-16), mild to moderate depression (17-19), moderate to severe depression (20-29) and severe depression (30-63) (Cunha, 2001).

Sociodemographic and medication use data were collected through medical records, for elderly people living in the LTC, and interviews, for elderly participants of Unati. The drugs were classified according to the Anatomical Therapeutic Chemical Code (ATC) (WHO, 2006).

Statistical analysis

The results were summarized in tables, with data of frequency, percentages, mean, standard deviation, median and interquartile range. Considering that the data collected are of a non-parametric nature, the Mann-Whitney test was used for non-parametric data; between three or more independent groups, the simple variance analysis was used and, when necessary, the Kruskal-Wallis test for non-parametric data and Spearman correlation (rs). The significance level of 5% of probability was adopted for the rejection of the null hypothesis.

Ethical Procedures

The study was conducted according to the criteria set by the declaration of Helsinki and each subject signed an informed consent before participating to the study. The research was approved by the Research Ethics Committee of Sao Paulo State University, UNESP, Faculdade de Filosofia e Ciências, FFC (Process 1198/2010). All the ethical procedures provided for in Resolution 196/96 of the National Health Council, CNS, Ministry of Health, Brazil, were followed.

Results

Of the 48 elderly participants in the study, 24 were non-institutionalized and participated in the Open University of the Elderly (Unati), and 24 were institutionalized and resided in an LTC. The sample used is characterized by being heterogeneous, as can be seen in Table 1:

Table 1: Sociodemographic description of a sample of 48 institutionalized and non-institutionalized elderly

| | Institutional Elderly n[%] | Elderly participants of Unati n[%] | Sample Total n[%] |
|----------------------------|-----------------------------------|---|--------------------------|
| Gender | | | |
| Female | 4 [8,3] | 16 [33,4] | 20 [41,7] |
| Male | 20 [41,7] | 8 [16,6] | 28 [58,3] |
| Age Group | | | |
| 59 - 69 | 6 [12,5] | 11 [22,] | 17 [35,4] |
| 70-79 | 8 [16,7] | 11 [22,9] | 19 [39,6] |
| 80 or more | 10 [20,9] | 2 [4,1] | 12 [25] |
| Marital status | | | |
| Not married | 11 [22,9] | 7 [14,6] | 18 [37,5] |
| Married | 0 [0] | 10 [20,8] | 10 [20,8] |
| Widowers | 10 [20,8] | 5 [10,5] | 15 [31,3] |
| Divorced | 3 [6,3] | 2 [4,1] | 5 [10,4] |
| Schooling | | | |
| Illiterate | 14 [29,2] | 0 [0] | 14 [29,2] |
| Elementary School | 10 [20,8] | 0 [0] | 10 [20,8] |
| Incomplete | | | |
| Complete Primary Education | 0[0] | 0 [0] | 0[0] |
| Complete High School | 0[0] | 1 [2,1] | 1 (2,1) |
| Full Higher Education | 0[0] | 23 [47,9] | 23 [47,9] |

The heterogeneities between the groups are also reflected in terms of general health, which was verified from the consumption of medicines. In relation to these, it was found that, of the elderly participants of the research, 91.53% took some type of medication of continuous use. The drugs used, according to the criteria of the Anatomical Therapeutic Chemical Code (ATC), referred to vascular systems (34.3%); central nervous system, including anxiolytics and antidepressants (19.1%); digestion/metabolism (26%); hematopoietic (11.5%) and respiratory (5.3%). The frequency of use of these drugs was higher among the institutionalized elderly (60.3%). To the institutionalized elderly were administered on average 5 medications/day, while the non-institutionalized, 2.03 medications/day. Considering the total number of subjects (n = 48), the results indicated a low rate of cognitive decline; however, a significant number presented indicative for depression (Table 2).

Table 2 - Cognitive decline and depression in a sample of 48 institutionalized and non-institutionalized elderly

| | | Description | n | % |
|---------------------------------|--|--|----|------|
| Cognitive Decline (MMSE) | | Presence of cognitive decline | 4 | 8,3 |
| | | Absence of cognitive decline | 44 | 91,7 |
| Depression (BDI) | | Absence of depression | 23 | 47,9 |
| | | With indicative of mild depression | 16 | 33,3 |
| | | With indicative of mild to moderate depression | 2 | 4,2 |
| | | With indicative of moderate to severe depression | 7 | 14,6 |

Regarding cognitive ability, according to MMSE criteria, the participants of Unati presented better cognitive performance (29,5 points on average) than the institutionalized elderly (20,5 points on average). All elderly individuals who presented cognitive decline (n = 4) were residents in the LTC.

Of the total of the elderly, 25 (52,1%) presented indicative of depression according to BDI criteria (Table 2). Of those with an indicative of depression (n = 25), 68% were institutionalized and 32% were non-institutionalized. Among the institutionalized elderly group (n = 24), 17 (70,8%) presented indicative of depression. Of this total (n = 17), 64,6% presented mild depression, 5,8% mild to moderate and 29,6% moderate to severe. Among the non-institutionalized elderly group (n = 24), 8 (33,3%) presented indicative of depression. Of this total (n = 8), 75,2% presented mild depression, 12,4% mild to moderate and 12,4% moderate to severe. In general, the elderly living in the LTC showed greater symptomatology for depression (median 11,0/BDI) than the non-institutionalized elderly (median 3,5/BDI) (Table 3).

The results of the comparison between institutionalized elderly and elderly participants of Unati, from the Mann-Whitney test, were significant for the variables: age, MMSE score and BDI score, allowing to affirm that these samples come from distributions that do not overlap.

Table 3 - Data from 24 institutionalized elderly (LTC) and 24 non-institutionalized (Unati), presented by means of number of individuals, median (lower quartile - upper quartile) according to age, MMSE score and BDI score

| VARIABLES / INSTITUTIONS | Median | | p value Test Mann-Whitney |
|--------------------------|-----------------------|-----------------------|---------------------------|
| | LTC (n=24) | Unati (n=24) | |
| Age | 77,5 (72,5 – 82,8) | 68,0 (62,8 - 71,8) | < 0,001 |
| MMSE | 20,5 (17,3 – 24,0) | 29,5 (26,3 – 30,0) | < 0,001 |
| BDI | 11,0 (7,0 – 15,0) | 3,5 (2,0 – 10,0) | 0,001 |

Regarding the age group, the elderly of the LTC had a higher median (77,5) than the elderly participants in the Unati (60,8) (Table 3). In the sample studied, age negatively influenced cognitive performance ($r_s = -0.450$; $p = 0.001$), that is, there is a proportionally inverse relationship between age and cognitive performance. Likewise, an inverse relationship between cognitive decline and depression ($r_s = -0.304$, $p = 0.036$) was observed, that is, there is a tendency for greater cognitive impairment with increased depression (Table 4).

Table 4 - Correlations between age, MMSE and BDI score in 48 elderly Unati/ LTC

| CORRELATIONS | r_s | p^1 |
|--------------|--------|-------|
| Age x MEEM | -0,450 | 0,001 |
| MMSE x BDI | -0,304 | 0,036 |

¹Values $p: p \leq 0.05$ significant result

In terms of schooling, the groups showed up heterogeneous. However, in the LTC group ($n = 24$), 58,3% ($n = 14$) were illiterate and 41,7% ($n = 10$) had incomplete primary education; 95,8% ($n = 23$) of Unati participants ($n = 24$) had completed higher education, and 4,2% ($n = 1$) of this group, complete secondary education (Table 1). Considering the educational levels, for analysis purposes, we will consider 3 distinct groups: the group (G1), composed of illiterates; the group (G2), made up of elderly people with lower levels of education (incomplete elementary education), and the group (G3) made up of

individuals with higher levels of education (complete upper and lower secondary education).

From the comparison of the groups (G1, G2 and G3), the results of the Kruskal-Wallis test were significant for all variables: age ($p = 0.005$), MMSE scores (<0.001) and BDI scores (0.007) (Table 5). In terms of age, the Kruskal-Wallis test result was significant, allowing to state that the G3 group, that is, with a higher level of schooling, presented the lowest median, 68 years ($Q3-Q1 = 12$ years), differing significantly from the groups G2, 75,5 years ($Q3-Q1 = 10,2$ years) and G1, 77 years ($Q3-Q1 = 12$ years) (Table 5). The group of illiterate elderly (G1), in terms of cognitive performance, presented a median score of 18 ($Q3-Q1 = 7$), while the G2 groups (lower level of education) score 24 ($Q3-Q1 = 6,8$) and, G3 (higher education), score 29 ($Q3-Q1 = 4$).

Therefore, there was no significant difference between G1 and G2; however, G1 and G2 differed significantly from the group with higher education (G3) regarding cognitive performance. The group of older adults with higher schooling (G3) presented, in terms of incidence of symptomatology for depression, median 5 ($Q3-Q1 = 11$). The G1 and G2 presented, respectively, symptomatology for depression, median 11,5 ($Q3-Q1 = 7$) and 15 ($Q3-Q1 = 15$); results that are significant (Table 5).

Table 5 - Description and comparison of the results of the variables age, MMSE and BDI, according to schooling, of 48 elderly

| | G1 (n 14) | | | G2 (n 10) | | | G3 (n 24) | | |
|-------------------------|--------------|------|------|--------------|------|--------------|--------------|------------------------------------|-----------|
| | Idade | MMSE | BDI | Idade | MMSE | BDI | Age | MMS E | BDI |
| Average | 78,9 | 19,1 | 13,2 | 75,4 | 23,5 | 13,5 | 69 | 28,2 | 7 |
| SD | 9,5 | 3,7 | 8,2 | 7,7 | 3,8 | 5,8 | 8,8 | 2,3 | 6,1 |
| Median | 77 | 18 | 15 | 75,5 | 24 | 11,5 | 68 | 29 | 5 |
| Q1 | 74 | 16 | 6 | 71,8 | 20,5 | 9,8 | 62 | 26 | 2 |
| Q3 | 84 | 23 | 21 | 82 | 27,3 | 18,8 | 74 | 30 | 11 |
| Minimum | 62 | 13 | 1 | 60 | 17 | 5 | 8,8 | 2,3 | 6,1 |
| Maximum | 99 | 24 | 26 | 87 | 28 | 25 | 57 | 23 | 0 |
| Kruskal-Wallis test (p) | | | | Age | | | Score MMSE | | Score BDI |
| | | | | 0,005 | | | < 0,001 | | 0,07 |
| Comment | | | | G3 < G2 = G1 | | G1 = G2 < G3 | | G3 ≤ G1 ≤ G2 G1 is intermediate | |

Evaluating the influence of schooling, the result was significant for both MMSE and BDI, suggesting that schooling influences both cognition and mental health (Table 5).

Discussion

The results of this study should be understood from the global context in which the elderly involved in the research are inserted. The elderly who participate in Unati activities have good general health conditions, live with family and friends; have good financial conditions, besides participating in activities other than those developed at Unati.

At Unati they participate in activities of cognitive stimulation and social interaction through the provision of activities distributed during the week. Among the activities offered to the elderly are: lectures and discussions with specialists on various subjects; theater workshops, reading, memory; English and computer classes and recreational activities.

The elderly living in the LTC present, due to the lack of offer of activities in the LTC, little cognitive and physical stimulation. They also have little contact with family and friends and, in general, the social interaction between them is low. Greater social interaction occurs due to visits from entities and volunteers, which occur sporadically.

Considering the criteria established by Bjerrum and collaborators (1999) and in a manner consistent with the literature's observations (Mamum, *et al.*, 2004; Lucchetti, *et al.*, 2010), institutionalized elderly people fall into the category of 'polypharmacy', and therefore, they are more exposed to the risk of complications related to the polypharmacy, considering that, among these, the frequency of drug use was greater (60,3%), as well as the number of medications/day (mean of 5 drugs/day for institutionalized against a mean of 2,03 medicines/ day for the non-institutionalized). The results are consistent with the findings of Yuruyen and collaborators (2016), who consider depression as a significant risk of polypharmacy.

From the analysis of the statistical data, it was observed that 52,1% of the elderly presented indicative of depression (33,3% = mild depression, 4,2% = mild to moderate depression, and 14,6% = moderate to severe depression).

Of the total number of elderly people who presented an indication of depression, 68% were institutionalized and 32% were non-institutionalized. The data also indicated that among the institutionalized, the prevalence of depression was 70,82%, and among the non-institutionalized 33,32%. The high prevalence of depression, among the institutionalized elderly in this study, may be associated with polypharmacy and/or institutionalization. In this perspective, it is essential that, in the clinical examination, the type and frequency of drug use and the drug interactions should be considered.

The results regarding the prevalence of depression indicate, for the sample studied, a situation in addition to that presented in the literature, which indicates that depression generally has prevalence rates between 5% and 35%, varying according to severity level and, that among the population over 65 years (Heiser, 2004), in Brazil it has a prevalence of around 15% (Blay, *et al.*, 1991). The results of this research diverge from the estimates of Reys and collaborators (2006) and Siqueira and collaborators (2009), according to which the incidence of depression in elderly people living in the community is approximately 14% and that among those residing in LTC's this index varies between 15% and 50%.

The results for this sample are also not consistent with the studies by Reynolds and Kupfer (1999), which indicate that, on average, the prevalence of geriatric depression in the institutionalized elderly is 60% and in the elderly in the community of 10%. It is important to emphasize that the surveys about the prevalence of depression in the elderly are between 10 and 20 years. More recent data also show that the prevalence of depression among nursing home residents ranged from 14,4% to 21,1% (Tiong, *et al.*, 2013).

A low rate of cognitive decline (8.3%) was observed in the sample analyzed, and of the subjects who were cognitively impaired, all (n=4) were institutionalized, corresponding to 16.7% of the elderly of the institutionalized group analyzed in this study.

The data are consistent with the survey by Faria, *et al.* (2011), which showed a prevalence of 4,9% of cognitive decline in the elderly in the city of Pouso Alegre, MG. However, it is discrepant considering the surveys carried out by Ferreira and collaborators (2014) in Montes Claros, MG (19.1%); by Nascimento and collaborators (2015) in Ibicu, BA (18.7%) and by Holz and collaborators (2013) in Bagé, RS (34,1%).

Therefore, from the analysis of the data of this research it can be affirmed that the institutionalized elderly are more vulnerable to depression and cognitive decline than the non-institutionalized ones, thus confirming the literature findings (Okura, *et al.*, 2011; Abdelhafiz, 2011; Turner, *et al.*, 2015). Likewise, the findings of this research reinforce the hypothesis that the maintenance of the elderly in the community and their participation in activities that involve cognitive stimulation and social interaction may function as protectors of cognitive decline and depression (Schupf, *et al.*, 2004; Raes, *et al.*, 2009; Niu, *et al.*, 2010; Kelly, *et al.*, 2014).

Although the results reinforce the hypothesis regarding the benefits of maintaining the elderly in the community, social interaction and cognitive stimulation, it cannot be ignored that in the analyzed samples, the LTC group consisted of 58,3% illiterate and 41,7% of individuals with incomplete elementary education, while the elderly in the Unati group was composed of 95,8% with complete higher education and 4,2% with complete secondary education.

The results of this study further reinforce the hypothesis that older individuals present worse cognitive performance (MMSE / $r_s = -0.450$; $p = 0.001$) (Bishop, *et al.*, 2010). In this perspective, it is important to note that the group of institutionalized elderly had a higher average age (76,8 years) than the non-institutionalized elderly (69,4 years). Similarly, the study showed that, with the incidence of depression, there is an increase in cognitive impairment ($r = -0.304$, $p = 0.036$), reinforcing previous studies (Murray and Lopez, 1997; Wilson, *et al.*, 2004; Gatz, *et al.*, 2005; Baer, *et al.*, 2013).

In summary, the results of this study, based on two groups of elderly individuals with heterogeneous characteristics, indicated that aging generally leads to some losses, which may vary depending on the individual context (individual and social).

The negative impacts of these losses are related to several variables, among which this study pointed to the institutionalization that, given the characteristics of the institutional environment, may be a risk factor for cognitive decline and, mainly, depression, which is associated with increased cognitive impairment. Although not statistically correlated in this study, there are indications that polypharmacy may be associated with cognitive decline and depression. It was also evident that schooling has positive impacts on the cognition and mood of elderly individuals.

Despite describing and analyzing correlations, as well as evaluating the impact of some variables related to aging in different groups, the results of this study, although indicating the institutionalization and the lack of cognitive stimulation as factors related to cognitive impairment and depression, are limited according to the number of subjects surveyed as well as the samples used. In this sense, it would be interesting to include a third sample of elderly community members who do not participate in activities of cognitive stimulation, such as those performed at Unati. Such limitations of this study reinforce the need for longitudinal studies involving a greater number of variables to better clarify the potential benefits of cognitive stimulation and social interaction, as well as the losses arising from the institutionalization process.

Conclusion

We know that aging is an individual phenomenon and that many factors, some controllable and some not, are related to the level of health, especially to mental health. For the controllable factors is the need to establish public policies for the maintenance of the elderly in the community; to provide a stimulating environment in cognitive and social terms, especially in long-term institutions. Also controllable are investments in education and quality of life because the less favored portions of the population and with fewer opportunities are those that suffer the most from the impacts of aging.

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