Original Article

Institutionalized elder women's performance in the mini-mental state examination*

O desempenho de idosas institucionalizadas no miniexame do estado mental

El desempeño de adultas mayores institucionalizadas en el mini examen del estado mental

Maria Helena Lenardt[1], Tatiane Michel[2], Patrick Alexander Wachholz[3], Ângela da Silva Borghi[4], Márcia Daniele Seima[5]

ABSTRACT

Objective: To evaluate institutionalized elder women's performance in the mini-mental state examination. **Methods**: This cross-sectional descriptive study was conducted among 34 elder women who were residents in a long term facility in Curitiba, PR. Data were collected with the mini-mental state examination (MMSE) and analyzed with descriptive statistics. **Results**: Participants had a mean age of 79.82 ± 8.23 and their overall mean score on the MMSE was 16.62 ± 5.60. The mean score of performance among illiterates and literate participants were 14.90 and 19.75 points, respectively. The mean score of performance among participants aged 65 to 79 and participants aged 80 and over were 18 and 15.65 points, respectively. **Conclusion**: There were a large number of elder women (26.5%) with cognitive impairment. Lower educational level and advanced age were associated with lower scores on the mini-mental status examination.

Keywords: Homes for the aged; Aged; Disability evaluation; Old age assistance

RESUMO

Objetivo: Avaliar o desempenho, no miniexame do estado mental, de mulheres idosas residentes em uma instituição de longa permanência para idosos no município de Curitiba – PR. **Métodos:** Estudo quantitativo descritivo transversal realizado com amostra de 34 idosas residentes em instituição de longa permanência. Os dados foram obtidos mediante a aplicação do miniexame do estado mental e analisados por estatística descritiva e distribuição de freqüência. **Resultados:** A idade média foi de 79,82 ± 8,23 anos e o escore médio global de 16,62 ± 5,60. O desempenho médio no grupo das analfabetas foi de 14,90 pontos, das alfabetizadas de 19,75 pontos, daquelas com 65 a 79 anos foi de 18 pontos e nas de 80 anos ou mais de 15,65 pontos. **Conclusões:** Observou-se elevado número de idosas com declínio cognitivo segundo o miniexame na amostra estudada (26,5%). A baixa escolaridade e idades mais avançadas correlacionaram-se com menor pontuação.

Descritores: Instituição de longa permanência para idosos; Idoso; Avaliação da deficiência; Assistência a idosos

RESUMEN

Objetivo: Evaluar el desempeño, en el mini examen del estado mental, de mujeres adultas mayores residentes en una institución de larga permanencia para adultos mayores en el municipio de Curitiba – PR. **Métodos:** Se trata de un estudio cuantitativo descriptivo transversal realizado con una muestra de 34 adultas mayores residentes en una institución de larga permanencia. Los datos fueron obtenidos mediante la aplicación del mini examen del estado mental y analizados por estadística descriptiva y distribución de frecuencia. **Resultados:** La edad promedio fue de 79,82 ± 8,23 años y el escore medio global de 16,62 ± 5,60. El desempeño promedio en el grupo de las analfabetas fue de 14,90 puntos, de las alfabetizadas de 19,75 puntos, de aquellas con 65 a 79 años fue de 18 puntos y en las de 80 años o más de 15,65 puntos. **Conclusiones:** Se observó un elevado número de adultas mayores con declinio cognitivo según el mini examen en la muestra estudiada (26,5%). La baja escolaridad y edades más avanzadas se correlacionaron con una menor puntuación.

Descriptores: Hogares para ancianos; Evaluación de la discapacidad; Asistencia a los ancianos

* *Study carried out at Universidade Federal do Paraná, Curitiba (PR), Brazil.*

[1] *Senior Professor at the Nursing Graduation Program, Universidade Federal do Paraná - UFPR. Leader of the Multiprofessional Elderly Research Group (GMPI – UFPR) – Curitiba (PR), Brazil.*

[2] *Undergraduate at the Nursing Course, Universidade Federal do Paraná – UFPR. GMPI Member, Curitiba (PR) – Brazil*

[3] *Geriatrician, GMPI Member - Curitiba (PR) – Brazil.*

[4] *Professor at Faculdades Integradas do Brasil – UniBrasil. GMPI Manager- Curitiba (PR) – Brazil.*

[5] *Nurse at Hospital Cajuru. GMPI Member- Curitiba (PR) – Brazil.*

Corresponding Author: **Tatiane Michel**
R. Quinze de Novembro, 1500 - Apto. 1301 - Centro - Curitiba - PR - Brazil
Cep: 80060-000 E-mail: tatiane.michel@uol.com.br

Received article **26/09/2008** and accepted **09/03/2009**

INTRODUCTION

Functional decrease due to aging associated or not with diseases may cause an impact in the body functions necessary to maintain total independence, self care and autonomy. Some chronic diseases related to the aging process hasten these problems, leading to deep changes in the lives of affected people.

Frequent causes of cognitive decline among the elderly are dementia due to Alzheimer's and Parkinson's disease and some psychiatric disorders, such as schizophrenia and depression[1-4]. According to the data from the World Health Organization, these conditions are among the main causes of the years living with disabilities[5]. With the development of the disease, performing activities of daily living and social relations become more difficult, there are also changes in the behavior.

Among the losses associated with senescence and senility, cognitive losses are those with greater impact to the elderly, their family members and society due to their results and the lack of treatments to recover from the deficits.

Cognitive deficiency is one of the main triggering causes for the use of long term health services and institutionalization in elderly people[6]. The number of elderly people in the state of Paraná is estimated at 863,002, and 5,542 of these people live in *instituição de longa permanência para idoso* (long-stay institutions for elderly - ILPI) corresponding to approximately 0.6% of this population[7].

As many of the losses in physical and cognitive aptitude and in social support are permanent, these declines become a challenge for health professionals taking care of elderly in institutions especially with regards to assistance and care to this population to meet the specificities of elderly people.

Capacity building models proposed by the World Health Organization aim to encourage the adoption of attitudes that prolong independence as people get older[5]. Active aging, according to the same source is "the process of optimization in health opportunities, participation and safety to improve quality of life as people get older".

Active aging of elderly people living at an ILPI should be part of all care actions of health professionals, including those fragile elderly, physically disabled individuals, requiring care. Geriatric care should be based on the principle of integrality, geared to health promotion and aiming to provide active aging and better quality of life to the elderly[8].

Acknowledging the cognitive aptitudes of the elderly living at an ILPI through the application of neuropsychological tests (such as, for example, the mental state examination), allow managers and health professionals to adjust care provided to the needs and possibilities of the elderly. From this acknowledgment, we may identify the most fragile guests, exposed to risks as well as to gear efforts to maintain potential abilities and functional capacity. It is also important to obtain subsidies to use in health education and to foster and guide self care and professional care.

"The description and distribution of a health problem in a population is one of the essential sources for planning and managing actions geared to prevention, treatment and rehabilitation, both in the collective and individuals level"[9]. Situational diagnoses have the objective of showing the circumstances and the context to propose actions and possible interventions[10] bringing essential subsidies to any kind of action with the elderly population. In the state of Paraná situational diagnoses are still lacking regarding impairment associated with the aging process and with chronic diseases of the population living at ILPIs, especially those related with the cognitive impairment. Of the 251 long-stay institutions in the State of Paraná, about 40% of them have only independent elderly whereas 25% shelter semi-dependent elderly and 35% shelter elderly that are dependent to perform activities of daily living[7].

The present study aimed to assess the performance of elderly women living a long-stay institution for elderly in Curitiba – PR in the mini mental state examination.

METHODS

Qualitative, descriptive, cross-sectional study carried out in a private and philanthropic long-stay institution for elderly where there are only elderly women in the city of Curitiba – PR.

The study population was formed by 153 women living at the ILPI, from December 2007 to July 2008. Professional charts were individually assessed to select elderly eligible to take part in the study who met the following inclusion criteria: being aged 65 or over; living in the institution for over three months; agreeing to take part in the study by giving their written consent. People who were deaf, had aphasia or clinically significant mental retard according to charts, have been excluded.

Elderly considered for this study were those with age equal to or over 65, which is a parameter used by some research centers in Brazil to facilitate comparison criteria with studies carried out in other countries. Significant studies presented in the international literature in developed countries define the elderly as those aged 65 or over. For greater control of the selection of the sample, we have not considered newly admitted elderly.

After initial selection of the 153 charts, 46 elderly did not meet the age criteria, 2 were not included because they lived at the ILPI for less than three months, and 17 met the exclusion criteria, therefore, the temporary sample

had 88 elderly.

From the observation and preliminary interviews with the 88 elderly initially selected for the sample, we could notice that some of them met the exclusion criteria proposed for strong cognitive impairment due to neurological or psychiatric disorders. After their exclusion, the definitive sample was formed by 34 elderly.

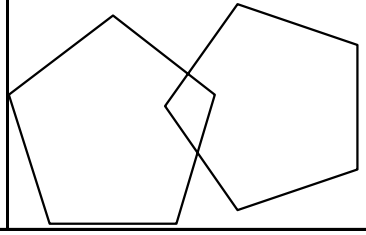
Primary data were obtained from the application of the Mini Mental State Examination (MMSE) in 34 elderly taking part of the study to establish their performance according to the scores obtained. Secondary data were collected from charts through the use of a designed instrument.

MMSE originally proposed[11], validated to Portuguese in 1994[12] and changed[13] is one of the most commonly used assessment and screening instrument of cognitive impairment by health professionals worldwide. It is formed by questions grouped into seven categories to assess a group of specific cognitive functions: temporal orientation, spatial orientation, immediate recall, attention and calculation, remote memory, language and visual memory[13].

Total MMSE score may range from zero to 30. In the present study we have used an adapted version[13] of the mini mental state examination[11] (Picture 1), and the cut-off points as proposed[12], 13 for illiterate elderly, 18 for those with low/medium education levels and 26 for elderly with high education levels.

We have chosen to use these cut-off points because this population lived in the long-stay institution for elderly was mostly illiterate, with low education level, and the application of the mini mental state examination had first a cognitive screening to select elderly cognitively able to answer a multidimensional health questionnaire

Picture 1 – Mini mental state examination (MMSE)

Temporal orientation (5 points)	What is the approximate time?
	What day of the week is it?
	What is the date today?
	What is the month?
	What is the year?
Spatial orientation (5 points)	Where are we now?
	What is this place?
	In what district are we or what is the address here?
	In which town are we?
	In which state are we?
Registration (3 points)	Repeat the following words: CAR, VASE, BRICK
Attention and calculation (5 points)	Subtract: 100-7 = 93-7 = 86-7 = 79-7 = 72-7 = 65
Remote memory (3 points)	Can you remember the 3 words you have just said?
Naming 2 objects (2 points)	Watch and pen
REPEAT (1 point)	"NO IFS, ANDS OR BUTS"
Stage command (3 points)	"Take this piece of paper with your right hand, fold it in half, and put it on the floor"
Writing a complete sentence (1 point)	Write a sentence that makes sense
Reading and obey (1 point)	Close your eyes
Copy the diagram (1 point)	Copy two pentagons with an intersection 

Fonte: Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr. 2003; 61(3B):777-81.

as the following stage of the study. Cut-off points proposed[13] were high for the cognitive screening stage, showing an 88.2% prevalence of cognitive impairment and hindering the following stage due to the reduced number of the sample.

Data collected were organized using descriptive statistics and frequency distribution, employing Epi Info program version 6.01.

Ethical issues of the study were based on Resolution # 196/96 of the Ministry of Health. The project was approved by the Research Ethics Committee of the Health Science Department at UFPR, through the Act # 475.012.08.02. Directors at the ILPI were referred and explained on the feasibility of the study and they accepted its performance.

RESULTS

The predominant age group of participants was 80 years or over (n=20; 58.8%), followed by those aged 70 to 79 (n=8; 23.5%) and then a group of younger elderly aged 65 to 69 (n=6; 17.7%).

As for time living in the institution, 19 elderly (55.9%) lived at the home for at least 10 years, and 15 (44.1%) for more than 10 years. Mean time living in the institution was not presented because some of the residents lived in the institution since youth and we have found 55 years as the longest time living at the institution.

The majority of the sample was formed by elderly with up to 2 years of formal education (n=22; 64.7%). Ten residents (29.4%) had three to ten years of schooling and two (5.9%) had more than ten years of schooling.

Of the participants of the study, six (17.6%) had MMSE score lower than 13, 13 elderly (38.2%) obtained 13 to 17 points, 12 (35.3%) had between 18 and 25 points and three (8.9%) scored 26 or over.

Table 1 presents the means calculated for items age and MMSE score in the sample, as well as the means observed in the subgroup of literates and illiterates.

Table 1 –Age, SD and MMSE score averages in the sample of institutionalized elderly according to literacy and illiteracy. Curitiba – PR, December/2007 to July/2008

Sample	Global (sd)	Literates (sd)	Illiterates (sd)
Age	79.82 (8.23)	81.75 (3.53)	78.77 (5.66)
Score	16.68 (5.60)	19.92 (6.53)	14.90 (4.21)

* SD = standard-deviation
MMSE – mini mental state examination

Among the elderly aged 65 to 79 (n=14) mean score was 18 (minimum = 9; maximum = 30) and those aged 80 or over (n=20) the mean was 15.65 (minimum = 6; maximum = 26). Table 2 shows mean scores obtained for literate and illiterate elderly according to age. Among literate elderly, mean score of those aged 65 to 79 was 25, and of those aged 80 or over, it was 18.23. Mean scores of illiterate elderly aged 65 to 79 was 16.09 and those aged 80 or over it was 13.73.

Table 2 – Mean scores and SD at MMSE of literate and illiterate institutionalized elderly scores according to age. Curitiba – PR, December/2007 to July/2008

Age	65 to 79 (sd)	80 years or over (sd)
Literate MMSE	25.00 (8.45)	18.23 (3.53)
Illiterate MMSE	16.09 (3.11)	13.73 (4.95)

* SD = standard-deviation
MMSE – mini mental state examination

Table 3 – Institutionalized elderly with cognitive decline according to age, formal education and time in the institution. Curitiba - PR, December/2007 to July/2008

Characteristics		With cognitive decline	
		n	%
Age group (years)	65-69	1	11.1
	70-79	-	-
	≥ 80	8	88.9
Formal education (years)	0 to 2	5	55.6
	3 to 10	3	33.3
	15 or over	1	11.1
ILPI (years)	1 to 10	6	66.7
	over 10	3	33.4
Total		9	100,.0

LPI – Long-stay institution for elderly

Table 3 shows the distribution of elderly classified according to cognitive decline according to individual characteristics of age, education, and time in institution. According to cut-off points used, nine elderly were classified with cognitive decline (26.5%), eight were aged 80 or over (88.9%) and only one was aged 65 and 69 (11.1%). Regarding education, five were illiterate (55.6%), three had three to ten years of formal education (33.3%) and one had a high education level (11.1%). Of the elderly with cognitive decline, six (88.9%) lived at the ILPI for up to ten years and three elderly (33.3%) lived there for over a decade.

Table 4 presents distribution of elderly according to education and score in the sub-items of the mini examination. Of the 22 illiterate elderly, 10 (45.5%) obtained between 0 and 1 in the temporal orientation, 21(95.5%) did not obtain any points either in attention and calculation or in reading and obeying, and 20 (90.9%) did not score on the sub-items writing and in the diagram.

Table 4 – Institutionalized elderly according to education and score in the sub-items of MMSE. Curitiba - PR, December/2007 to July/2008

Sub-Item	Score	Schooling (# of years)					
		0 to 2		3 to 10		15 or over	
		n	%	n	%	n	%
Temporal orientation	0-1	10	45.5	2	20.0	-	-
	2-3	8	36.4	3	30.0	-	-
	4-5	4	18.2	5	50.0	2	100.0
Spatial orientation	0-1	3	13.6	1	10.0	-	-
	2-3	8	36.4	3	30.0	-	-
	4-5	11	50.0	6	60.0	2	100.0
Registration	0-1	5	22.7	1	10.0	-	-
	2	8	36.4	2	20.0	1	50.0
	3	9	40.9	7	70.0	1	50.0
Attention and calculation	0-1	21	95.5	5	50.0	1	50.0
	2-3	1	4.5	2	20.0	-	-
	4-5	-	-	3	30.0	1	50.0
Remote memory	0-1	6	27.3	6	60.0	-	-
	2	9	40.9	-	-	1	50.0
	3	7	31.8	4	40.0	1	50.0
Naming	1	1	4.5	-	-	-	-
	2	21	95.5	10	10.0	2	100.0
Repetition	0	5	22.7	2	20.0	-	-
	1	17	77.3	8	80.0	2	100.0
Command	1	2	9.1	-	-	-	-
	2	5	22.7	4	40.0	-	-
	3	15	68.2	6	60.0	2	100.0
Writing	0	20	90.9	6	60.0	-	-
	1	2	9.1	4	40.0	2	100.0
Reading and obeying	0	21	95.5	5	50.0	-	-
	1	1	4.5	5	50.0	2	100.0
Diagram	0	20	90.9	5	50.0	2	100.0
	1	2	9.1	5	50.0	-	-
Total		22	100.0	10	100.0	2	100.0

DISCUSSION

Results point to a worse performance at MMSE in illiterate elderly people and the groups with lowest MMSE scores (lower than 13 and 13 to 17) were mostly formed by illiterate elderly (83.5% and 76.9%, respectively). Some authors[12-15] have seen lower scores in individuals with poorer educational levels, suggesting a strong influence of education in the cognitive state of elderly.

One of the hypotheses to explain this association between dementia and low education level is the lower capacity to compensate for cognitive deficits among individuals with low schooling, whereas the neuropsychological pattern of cognitive impairment of individuals with many years of education is different, and some brain areas are more preserved than others[16].

Low education level is considered a risk factor for cognitive loss at advanced ages[15,17]. The association between low education level and greater risk for developing dementia may be related with greater exposure to environmental factors deleterious to the central nervous system such as: poor nutrition, poor psychomotor stimulation and higher exposure to poor life conditions, especially fetal life and the first years of life, hindering their development and reflecting in worse cognitive performances[18].

Several MMSE sub-items are influenced by education such as: temporal and spatial orientation, attention, reading, pentagon copying, and writing[12]. To minimize the bias of education, different cut-off points are used according to levels of formal education. However, there is a difference among authors regarding cut-off points to be used for MMSE scores. Comparison between the several studies is difficult because of the influence of sociodemographic variables such as age, education, culture, use of medications among others. Lack of further studies using the mini mental state examination in a population of elderly living in long-stay institutions for elderly hinders interpretation and comparison of the results obtained.

Other authors have opted for not determining cut-off points and have stressed that there will be different profiles in the test performance according to individuals' underlying disease. Thus, individuals with Parkinson's disease present more difficult at MMSE sub-items referring to the serial seven, in the drawing or repetition. Patients with Alzheimer's disease may present only a more evident difficulty in remembering words. Individuals with picture of mental confusion will probably present greater impairment in orientation items[13], and among depressed elderly, executive functions are those presenting greater impairment followed by attention deficit and decrease in the processing speed, as well as decreased performance in memory tests[2].

Using 13 as the cut-off point for illiterate elderly, 18 for elderly with low/medium education levels and 26 for those with high schooling[12], prevalence of cognitive decline obtained was 26.5% (n=9). This prevalence found among institutionalized elderly is high compared to other studies carried out in the community. Among elderly living in the city of Santo Antônio de Pádua – RJ[17], the prevalence of cognitive decline observed was 16.5%, whereas in the community of Viçosa – MG[14] this prevalence was 36.5%. These researchers used cut-off points higher than those used in the present study which increased sensibility and the number of cases identified by the MMSE.

The elderly at more advanced ages in the present study presented worse performance in the MMSE. The prevalence of dementia disorders increased with age, going from 1.3% in individuals aged 65 to 69 years old to 17% among those aged 80 to 84, and it is approximately 37.8% among those aged 85 or over[19].

Life expectancy of women aged 60 is higher than that of men although they are more frequently victims of domestic violence and discrimination in the access to education, wage, significant work and political power

over their lives. This means that poverty, physical and mental disabilities and other multiple health problems are commonly found in women at advanced age[5]. The characteristics of the elderly female population, such as widowhood, reduced income, greater poverty, and chronic diseases make them fragile and subject to institutionalization[20].

CONCLUSION

There was a high prevalence of cognitive decline according to MMSE in the sample studied (26.5%). Mean scores were lower among the groups with more advanced age and among illiterates. The sample was selected among elderly with better cognitive condition to take part in the study, inferring that when the total population of the institution is considered, higher levels of cognitive impairment are found. However, this instrument has limitations in the assessment of mental state in cases of advanced stages of cognitive loss because it demands participants to keep a dialog.

FINAL CONSIDERATIONS

Fostering education and learning opportunities over life are expected trends to reduce risk factors for dementia at advanced ages. When we think about aging, we should adopt habits and behaviors during our lifetime to preserve mental and physical health in order to reach active aging. When risk factors (behavioral and environmental) of chronic diseases and functional decline are kept low and protection factors are kept high, people have better quantity and quality of life, remain health and able to take care of their own lives as they get older.

When cognitive losses of elderly living in long-stay institutions are acknowledged, we see the need for actions and care of health professionals caring for this population. At the same time the elderly should be encouraged to perform daily living activities on their own and the cognitive impairment must be taken into account. Choosing the right clothes, putting on their shoes, or moving to the bedroom or dining hall even though they may be able to walk are tasks that can be very complicated to be performed without help.

Capacity building models of care acknowledge the qualities of elderly and encourage them to keep independent, small attitudes, even when they are sick or fragile. Thus, when dealing with elderly people with cognitive impairment, we should emphasize their abilities and give them the necessary time to perform their activities.

Awareness of physical disabilities and the dependence condition affects emotional and psychological domains of people involved and it may lead to additional damage, contributing to morbidity and mortality. People at advanced age with more severe cognitive impairment may lose the ability to express their feelings and needs such as thirst and pain. Professionals' work includes observing their behavior to identify changes in common patterns that can indicate alert situations.

Professionals taking care of these people may make them feel happy and useful when they take up enabling care attitudes and engage elderly in activities fostering personal satisfaction.

Some care actions promoting sensory and memory stimulation may be beneficial such as outdoor activities, chats with younger people, meetings with photographs and use of clocks and calendars in their daily living. Human touch is both a sensory stimulus and sign of warmth and concern. Assistive technologies are also useful to compensate for disabilities such as eyeglasses, cane, walker, hearing devices, and handrails which help maximize the ability of elderly.

Risk prevention may be a constant concern of professionals taking care of elderly people with cognitive decline. Environmental measures to prevent accidents should be observed, especially those related with falls, because they can hinder autonomy and independence.

The use of instruments to quantify and monitor cognitive declines offer assessment parameters and enable the adjustment of care provided, according to the real possibilities of the elderly. At early stages of the cognitive decline there will be impairment in instrumental activities of daily living which are complex and demand greater thinking, with more advanced stages, basic activities of daily living can also demand help. This negative evolvement of degenerative diseases is discouraging both for elderly and for those taking care of them. Even so, we must believe in their ability to maintain or improve their performance, encouraging them whenever possible. These situations will demand professionals to be understanding, patient, and tolerant.

In the present study, data are inferred in a confined way, limited to the context studied because of the reduced sample. When more subjects are included in this type of study, we expect that the cognitive disorder in this age group will increase.

When professionals realize the progression of cognitive decline in people at more advanced ages, especially those living in long-stay institutions, they play the meritorious role of preserving dignity, personal value, freedom, and individuality.

REFERENCES

1. Ávila R, Bottino CMC. Atualização sobre alterações cognitivas em idosos com síndrome depressiva. Rev Bras Psiquiatr. 2006;28(4):316-20.
2. Pittella JEH. Neuropatologia da doença de Alzheimer. In: Tavares A, organizador. Compêndio de neuropsiquiatria geriátrica. Rio de Janeiro: MEDSI; Guanabara Koogan; c2005.
3. de Lau LM, Schipper CM, Hofman A, Koudstaal PJ, Breteler MM. Prognosis of Parkinson disease: risk of dementia and mortality: the Rotterdam Study. Arch Neurol. 2005;62(8):1265-9.
4. Laks J, Fontenelle LF, Chalita A, Mendlowicz MV. A esquizofrenia de início tardio não evolui para demência: acompanhamento de um ano de uma série brasileira de casos. Arq Neuropsiquiatr. 2006;64(4):946-9.
5. Organização Mundial de Saúde. Envelhecimento ativo: uma política de saúde. Brasília: Organização Pan-Americana da Saúde - OPAS; 2005.
6. Finlayson M. Changes predicting long-term care use among the oldest-old. Gerontologist. 2002;42(4):443-53.
7. Camarano AM. Condições de funcionamento e infra-estrutura nas instituições de longa permanência: pesquisa IPEA [Internet]. Julho, 2008. Disponível em: www.ipardes.gov.br.
8. Hammerschmidt KSA, Zagonel IPS, Lenardt MH. Envolvimentos da teoria do cuidado cultural na sustentabilidade do cuidado gerontológico. Acta Paul Enferm. 2007;20(3):362-7.
9. Klein CH, Bloch KV. Estudos seccionais. In: Medronho RA, Carvalho DM, Bloch KV, Luiz RR, Werneck GL. Epidemiologia. São Paulo: Atheneu; 2003-2006. p. 125-50.
10. Nogueira-Martins MCF, Bógus CM. Considerações sobre a metodologia qualitativa como recurso para o estudo das ações de humanização em saúde. Saúde Soc. 2004;13(3):44-57.
11. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98.
12. Bertolucci PHF, Brucki SMD, Campacci SR, Juliano Y. O mini-exame do estado mental em uma população geral: impacto da escolaridade. Arq Neuropsiquiatr. 1994;52(1):1-7.
13. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr. 2003;61(3B):777-81.
14. Machado JC, Ribeiro RCL, Leal PFG, Cotta RMM. Avaliação do declínio cognitivo e sua relação com as características socioeconômicas dos idosos em Viçosa - MG. Rev Bras Epidemiol. 2007;10(4):592-605.
15. Diniz BSO, Volpe FM, Tavares AR. Nível educacional e idade no desempenho no Miniexame do Estado Mental em idosos residentes na comunidade. Rev Psiquiatr Clín (São Paulo). 2007;34(1):13-7.
16. Machado JCB. Doença de Alzheimer. In: Freitas EV, Py L, Neri AL, Cançado FAX, Gorzoni ML, Rocha SM. Tratado de geriatria e gerontologia. Rio de Janeiro: Guanabara Koogan; 2002.
17. Laks J, Batista EMR, Faria MEV, Figueira I, Engelhardt E. O mini exame do estado mental em idosos de uma comunidade: dados parciais de Santo Antônio de Pádua, RJ. Arq Neuropsiquiatr. 2003;61(3B):782-5.
18. Ardila A, Ostrosky-Solis F, Rosselli M, Gómez C. Age-related cognitive decline during normal aging: the complex effect of education. Arch Clin Neuropsychol. 2000;15(6):495-513.
19. Nitrini R, Caramelli P, Mansur LL, editores. Neuropsicologia: das bases anatômicas à reabilitação. São Paulo: Clínica Neurológica do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo; 1996.
20. Papaléo Netto M, Yuaso DR, Kitadai FT. Longevidade: desafio no terceiro milênio. Mundo Saúde (1995). 2005;29(4):594-607.