The Pietà study

Epidemiological investigation on successful brain aging in Caeté (MG), Brazil

Methods and baseline cohort characteristics

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ABSTRACT

Objectives: To present the methods and baseline characteristics of the Pietà study, a population-based survey investigating successful brain aging in the oldest-old. **Method:** The study was conducted in Caeté (MG), Brazil. In 2007, 1,251 individuals aged 75+ years were living in the city and were invited to participate. Participants responded to a general health questionnaire and were submitted to clinical, neurological, cognitive, psychiatric and functional evaluations. A subgroup was submitted to neuropsychological testing, blood tests and magnetic resonance of the skull. Individuals were classified as having cognitive impairment-no dementia, dementia, parkinsonism, psychiatric disorders or successful brain aging. **Results:** We evaluated 639 individuals (51.1% of the target population; 64% women), aged 81.4±5.2 years and with 2.7±2.6 years of schooling. Almost 30% of the elderly were illiterates and 82.1% belonged to middle/middle-low socioeconomic levels. Almost 50% were widows, but only 14.3% were living alone. **Conclusion:** The Pietà cohort is representative of the oldest-old Brazilian population. We believe the results of the study may contribute to increase our knowledge about healthy and pathological brain aging in the oldest-old.

Key words: aging, epidemiology, brain, cognitive impairment, dementia, depression.

Estudo Pietà: investigação epidemiológica sobre envelhecimento cerebral bem sucedido em Caeté (MG), Brasil. Métodos e características de base da coorte

RESUMO

Objetivos: Apresentar os métodos e as características sociodemográficas do projeto Pietà, estudo de base populacional que investiga o envelhecimento cerebral bem sucedido em uma coorte de idosos muito idosos. **Método:** O estudo foi conduzido em Caeté (MG). Em 2007, 1.251 indivíduos com 75+ anos residiam no município e foram convidados a participar. Os idosos responderam a um questionário de saúde geral e foram submetidos à avaliação clínica, neurológica, cognitiva, psiquiátrica e funcional. Um subgrupo realizou avaliação neuropsicológica, exames laboratoriais e ressonância magnética de crânio. Os participantes foram classificados em grupos com comprometimento cognitivo-não demência, demência, parkinsonismo, transtornos psiquiátricos ou envelhecimento cerebral bem sucedido. **Resultados:** Foram avaliados 639 idosos (51,1% da população-alvo; 64% mulheres), com idade 81,4±5,2 anos e escolaridade 2,7±2,6 anos. Quase 30%

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eram analfabetos e 82,1% pertenciam às classes sócio-econômicas média/média-baixa. Aproximadamente 50% eram viúvos, mas somente 14,3% viviam sozinhos. **Conclusão:** A coorte do estudo Pietà é representativa da população idosa muito idosa brasileira. Esperamos que os resultados do estudo contribuam para incrementar o conhecimento sobre envelhecimento cerebral normal e patológico em idosos muito idosos.
Palavras-chave: envelhecimento, epidemiologia, cérebro, comprometimento cognitivo, demência, depressão.

The rapid growth of life expectancy together with the marked reduction in fertility rate observed in the last decades in Brazil led to a significant increment of the absolute and relative number of elderly individuals in the country[1]. The proportion of individuals aged 60 years and older rose from 6% in 1975 to 7.9% in the year 2000, and is estimated to reach 15.4% by 2025[2]. Of particular note is the growth of the population aged 75 years and older, that can be called "oldest-old" in developing countries[2].

One of the natural consequences of this fast process of demographic transition is the increased occurrence of disability, partly imposed by the higher prevalence of chronic-degenerative conditions during aging. Among these, rank neurological and psychiatric disorders which commonly affect the elderly, such as cognitive impairment and dementia, parkinsonism and depression.

Three population-based epidemiological surveys conducted in Brazil offer more precise information with this regard. In the first study, 1,656 individuals aged 65 years and older living in the urban area of Catanduva (São Paulo state) were submitted to cognitive and functional evaluation, with 7.1% of them fulfilling diagnostic criteria of dementia, 55.1% of whom receiving clinical diagnosis of Alzheimer's disease (AD)[3]. The second study investigated the prevalence of parkinsonism and Parkinson's disease (PD) among 1,186 subjects aged 65 years and older from Bambuí (Minas Gerais state). The prevalence of parkinsonism was 7.2% and of PD, 3.3%[4]. Prevalence of dementia and parkinsonism increased significantly with age in both these studies. The third epidemiological survey assessed the prevalence of depression morbidity in 7,040 elderly (60 years and older) living in the state of Rio Grande do Sul and found a prevalence rate of 22%[5]. Hence, these three studies reveal that dementia, parkinsonism and depression – neurological and psychiatric conditions which generate variable degrees of disability over their clinical course – are very prevalent in the Brazilian elderly population, especially among the oldest individuals.

The World Health Organization published in 2002 the International Classification of Functioning, Disability and Health, in which a wider concept of disability is presented. This definition integrates medical, psychological and social perspectives of human health, and also takes into account environmental factors. Accordingly, diseases are not only analyzed as medical conditions, but also in relation to the impairment, functional limitation and to the potential social restriction they might cause[6].

There is no question that the neurological and psychiatric disorders mentioned above promote variable degrees of disability in the elderly. On the other hand, the aging process free from any cognitive, behavioral and motor impairment allows a greater and better integration of the elderly with the social milieu and surrounding environment. Although we already have some epidemiological data on these neurological and psychiatric conditions in Brazil, we still do not have studies investigating successful or disease-free brain aging in our population, particularly in oldest-old individuals. Moreover, data about factors related to healthy aging in developing countries, such as life habits (for example, physical activity, diet patterns and leisure activities), are still scarce.

With this scenario as a background, we designed a population-based research project, the Pietà study, in order to investigate several aspects related to brain aging in an oldest-old cohort (≥75 years). The aim of the present report is to present in detail the methods of the study and the baseline sociodemographic characteristics of the elderly cohort.

METHOD

Setting and target population

This is a cohort study conducted in the town of Caeté (Minas Gerais state, southeast region of Brazil), bordered by the mountain *Serra da Piedade* (Pietà mountain), in the metropolitan region of Belo Horizonte, capital of the state (Figure). Caeté was founded in 1714 and in 2006 the Human Development Index (HDI) was 0.789.

The reference date for this study was October 1st, 2007. According to the Brazilian Institute of Geographic and Statistic (IBGE)[7], 39,039 persons lived in the municipality of Caeté by 2007, with more than 85% living in urban areas. Elderly individuals aged 75 years or older, targeted in this study, were 1,251 (3.2% of the total population), being 769 (61.4%) women and 482 (38.6%) men. This population group increased 43% from the year 2000.

Since a complete and updated list of these elderly individuals was not readily available, an active search was

Figure. Geographical location of Caeté (MG), Brazil.

Source: www.wikipedia.org.

undertaken. We contacted family health program agents from the municipal government and the municipality health department; announcements on local radios and newspapers were also strategically posted. As for institutionalized elderly, the two existing institutions in town were visited by the research team.

Study design and methods

The study was conducted in three phases. On phase I, six previously trained interviewers visited the elderly individuals in their homes, explained in detail the nature of the survey and invited them to participate. In the case of acceptance, the participant signed a written informed consent and answered a detailed and structured questionnaire including: Identification and sociodemographic information, socioeconomic level (from A=higher to E=lower[8]), quality of life evaluation (WHOQOL-OLD protocol[9]), global functional information[10], mobility, current and previous physical activity (Baecke Habitual Physical Activity Questionnaire[11] and additional questions), leisure activities (reading habits, games, manual work, participation in social groups and meetings) both currently and in the past, information on religious beliefs and attendance of religious cults (currently and in the past), smoking and drinking habits (currently and in the past; including the four questions from the CAGE[12]), sleep habits, nutritional information (semi-quantitative assessment of weekly consumption frequency of meat, carbohydrates, fruits, vegetables, cereals, dairy products, candies and coffee), and self-reported information on hearing and visual function. Whenever possible, information was quantitatively assessed.

On phase 2, all interviewed elderly were invited to be examined by the clinical team in previously scheduled dates and times at the municipal social assistance institution for the elderly. The participants were submitted to a second structured evaluation that included: brief clinical history (focusing on neurological and psychiatric symptoms), previous and current medical diagnoses, addi-

tional medical information (current medications in use with specific dose regimens, frequency of attendance to medical consultation or hospitalizations in the previous 12 months, previous surgeries, falls or fractures), general physical examination (weight and height, blood pressure and heart rate assessment, cardiac and cervical auscultation), measurement of the brachial-ankle index (using a doppler device), neurological examination including the motor part of the Unified Parkinson's Disease Rating Scale (UPDRS-part III[13]), brief cognitive evaluation (Mini-Mental State Examination[14] and Brief Cognitive Screening Battery[15]), functional evaluation administered to a close relative (Pfeffer Functional Activities Questionnaire[16]), functional staging (Functional Assessment Staging-FAST[17]), depression screening questionnaire (Geriatric Depression Scale-GDS[18]) and to a structured psychiatric evaluation (Mini International Neuropsychiatric Interview-MINI[19]), assessing symptoms of major depression, dysthimia, mania, psychosis, anxiety, alcohol abuse and dependence. The clinical evaluation was conducted by team composed of 10 physicians: five board certified neurologists, four board certified geriatricians and one board certified psychiatrist, all of them with at least three years of experience in neurological and psychiatric assessment of elderly subjects. Training sessions in order to standardize the clinical procedures were previously carried out by the group. Ten medical students (from grades 4th to 6th) also participated in data collection, being responsible for identification, general medical information, blood pressure and brachial-ankle index measurements.

After medical examination, all participants with suspected cognitive impairment and a subset of cognitively healthy individuals were referred to neuropsychological and functional evaluations with the following instruments: Mattis Dementia Rating Scale[20], Rey Auditory Verbal Learning Test[21], naming and praxis tests from the CERAD (Consortium To Establish A Registry For Alzheimer's Disease) protocol[22], phonemic verbal fluency tasks (FAS), Frontal Assessment Battery[23], Physical and Instrumental-Self Maintenance scale[24] and Clinical Dementia Rating[25]. Individuals with dementia were also assessed with the Cornell Scale for Depression in Dementia[26]. Neuropsychological and functional assessments were conducted by a team of three neuropsychologists, one speech pathologist and one occupational therapist, all with at least three years of experience in the assessment of elderly subjects.

On phase 3, all participants were invited to provide a blood sample for laboratory tests, namely, complete blood count, creatinine, cholesterol (total, VLDL, LDL and HDL fractions), triglycerides, TSH, ALT, AST, GGT, albumin, cortisol, B12 vitamin, VDRL, peripheral inflam-

Table 1. Distribution of the Pietà cohort participants by age, years of education and gender (Caeté, MG, Brazil, October 2007).

		Female n (%)	Male n (%)	Total n (%)
Age	75-79 years	196 (47.9)	107 (46.5)	303 (47.4)
	80-84 years	125 (30.6)	64 (27.8)	189 (29.6)
	85-89 years	56 (13.7)	34 (14.8)	90 (14.1)
	90+ years	32 (7.8)	25 (10.9)	57 (8.9)
	Total	409 (64)	230 (36)	639 (100)
Educational level	Illiterates	121 (29.9)	54 (25)	175 (27.6)
	1-3 years	154 (38)	89 (38.7)	243 (38.3)
	4-7 years	108 (26.7)	69 (30)	177 (27.9)
	8+ years	22 (5.4)	18 (7.8)	40 (6.3)
	Total	405 (63.4)	230 (36.2)	635* (100)

90+ years: age equal or above 90 years-old; 8+ years: educational level equal or above 8 years. *Educational level was not available for 4 women.

matory markers and DNA extraction for specific genotyping (apolipoprotein E and other genetic polymorphisms). Moreover, a subset of 200 individuals from the cohort was invited to come to the capital state city, Belo Horizonte, to be submitted to a magnetic resonance of the skull in a 3.0 Tesla device.

These three phases allowed establishing the clinical, functional, neurological and psychiatric status of the participants. For the Pietà study, the following conditions were of special interest, defined according to standard diagnostic criteria: cognitive impairment-no dementia (CIND)[27], dementia[28], parkinsonism and Parkinson disease[29], psychiatric disorders[28] and successful brain aging. The latter was defined as absence of any neurological or psychiatric disturbance and on presence of functional independence, based on clinical, neuropsychological and functional evaluations.

The study was approved by the Ethics Committee of the Federal University of Minas Gerais and all participants or their legally acceptable representatives signed the written informed consent.

Statistical analysis

Descriptive tables and measures were used to establish a demographic, educational and socioeconomic profile of the Pietà study volunteering participants.

RESULTS

We fully evaluated 639 individuals, being 409 (64%) women and 230 (36%) men, aged 81.4±5.2 years (range 75 to 99 years), with educational level of 2.7±2.6 years (from 0 to 17 years of education). This sample corresponds to 51.1% of the total target population living in Caeté in 2007, according to the IBGE.

Table 2. Socioeconomic level distribution for the Pietà community-dwelling cohort (Caeté, MG, Brazil, October 2007).

Socioeconomic level	n	%
A	8	1.4
B	38	6.6
C	169	29.3
D	304	52.8
E	57	9.9
Total	576*	100

*Socioeconomic information was not available for 63 subjects.

Table 1 depicts data on age and years of education distribution according to gender for the whole sample. These data show similar age distributions in women and men: 77% were aged 75 to 84 years and 23% were aged 85 years or older. Only 35% of the participants presented 4 years or more of education; a high proportion of illiterates (around 30%) still holds in this generation under study. Illiteracy was more frequent in women than in men, positively correlated with older age groups.

From the 639 elderly individuals, only 30 (4.7%) were living in institutions, being 17 women and 13 men, aged 81.8±6.0 years old and, on average, with 1.5 years of education.

Table 2 displays the socioeconomic distribution for the community-dwelling elderly, as defined by the Brazilian Association for Market Research Institutes scale. More than 80% of the individuals were classified as being at C or D levels, corresponding to middle and middle-low socioeconomic levels, respectively.

In this cohort, only 402 (62.9%) declared themselves as retired; 207 were non retired, although only nine sub-

jects declared to be still at work, while 30 (4.7%) did not answer or could not declare their retirement status. Time of retirement was 20.4±5.9 years.

Information on marital status was available for 637 individuals: 312 (49%) were widows, 256 (40.2%) were married or were living in a stable couple situation, 62 (9.7%) were single and seven (1.1%) were separated or divorced.

Among the community-dwelling participants, two-hundred and fifty two individuals (42.8%) were living with their daughters or sons, 103 (17.5%) were living only with their spouses, 102 (16.8%) were living with other first-degree relatives, 84 (14.3%) were living alone, 68 (11.2%) were living with other individuals (non relatives) and 48 (8.15%) declared other living arrangements.

In summary, this sample of 639 elderly is composed by 64% of women and 36% of men, 75% aged 75 to 84 years, mostly illiterate or with little formal education, classified at middle or middle-low socioeconomic levels and retired, as expected. Widows and widowers living with daughters or sons was the most frequent family arrangement.

DISCUSSION

The rapid aging process of the Brazilian population represents a major current and future challenge to the country's public health system. Of special note is the significant increment in the number of individuals aged 75 and older, an age group that is at great risk to develop chronic diseases and frailty. Among the different conditions that arise within this age range, neurological and psychiatric disorders rank high both in terms of prevalence and incidence. Cognitive impairment and dementia, parkinsonism and depression, among others, are common health problems that can lead to significant disability and impairment of quality of life.

Several well-designed population-based studies have been conducted in Brazil focusing on mental health disorders or assessing common neurological problems in elderly individuals[3-5,10,30-34]. Characteristically, the evaluated cohorts were composed of individuals aged 60-65 years or older.

The Pietà study presents two distinctive aspects: [1] It was designed to specifically target individuals aged 75 years or more, which can be named "oldest-old" when taking into account the current Brazilian life expectancy; [2] The major research focus is successful brain aging, aiming to investigate sociodemographic, clinical and genetic aspects related to a healthy neurological and mental conditions. However, it will also allow determining prevalence rates of different neurological and psychiatric disorders in an oldest-old cohort, thus producing original data for Brazilian population, which may

provide relevant information for planning public health initiatives and programs for this specific age range. The methodology combines detailed and systematic neurological, psychiatric, cognitive and functional evaluations, preferentially using validated instruments and administered by a team of interdisciplinary health care professionals with good experience in the clinical assessment of elderly subjects.

The baseline sociodemographic characteristics of the cohort described here are in line with other Brazilian epidemiological studies on aging that have already been published[3,5,10,30-32,34]. Women represent around two thirds of the total sample and educational level is low (mean of 2.1 years), with 27.6% of the individuals being illiterate. Moreover, most participants belong to middle or middle-low socioeconomic levels and only nine of them reported to be still working, an expected feature given the high age of the population. Most subjects live with one or more family relatives and almost half of them were widows.

The Pietà cohort comprises 51.1% of the individuals aged ≥75 years living in Caeté and, as far as we can judge, these subjects are representative of the total population within this age group living in the city. Unfortunately, detailed information on age and gender distribution of the town's elderly population in 2007 (reference year of our study) is not available. However, in 2000, according to the Brazilian census, women represented 62.1% and men, 37.9%, of subjects aged 75+ years living in Caeté, while in the Pietà cohort women are 64% and men, 36%. Hence, gender distribution is very similar. As for age, in 2000, the proportion of individuals within the age intervals 75-79, 80-84, 85-89 and 90+ years were 52.4%, 28.1%, 16.3% and 3.2%, respectively. In our cohort, the corresponding proportions for these same age groups are 47.4%, 29.6%, 14.1% and 8.9%. The increase in the relative number of persons with more advanced ages seems consistent with the rapid growth of life expectancy and of the oldest-old population that occurred in Brazil in the last decade.

Formal education is another important parameter to be analyzed, although information for the specific age group evaluated is not available, neither for Caeté or Brazil. However, when taking into account reports from the IBGE for the year 2008[35], the mean educational level for the population aged 60 years and older was 4.1 years for the whole country and 4.9 years for the Southeast region. The lower schooling level (2.7 years) of our cohort is probably related to the higher age of the selected population. Although we shall recognize the significant sociodemographic, economic and cultural heterogeneity which characterize the different regions of our country, we believe that the Pietà cohort may be representative of a significant part of the Brazilian oldest-old population, especially within the Southeast region.

In conclusion, we report here the baseline general characteristics of the Pietà cohort and we plan to report soon the initial results related to the main objectives of the study, which we hope may contribute to increase our knowledge about healthy and pathological aging brain in the oldest-old.

APPENDIX (List of participants of the The Pietà Study Group, in alphabetical order) – Ana Paula Santos, Anne Marise Köenig, Antônio Lúcio Teixeira Jr., Cerise Frade Azeredo Coutinho, Clarissa Vilela Moreira, Débora Palma Maia, Elisa de Paula França, Emília Sakurai, Etelvina Lucas dos Santos, Francisco Eduardo Costa Cardoso, Hellen Drummond Marra, Henrique Cerqueira Guimarães, João Carlos Barbosa Machado, Karoline Carvalho Carmona, Maira Tonidandel Barbosa, Marcelo Pellizzaro Dias Afonso, Mariana Alves de Almeida, Mauro César Quintão e Silva Cunningham, Natali Farias Dezontini, Paulo Caramelli, Patrícia Paes Araújo Fialho, Pedro Henrique Reis Caldeira Brant, Rogério Gomes Beato, Simone Rios Fonseca Ritter, Thais Helena Machado, Viviane Amaral Carvalho.

REFERENCES

1. Chaimowicz F. Os idosos brasileiros no século XXI: demografia, saúde e sociedade. Belo Horizonte, Postgraduate, 1998.
2. Del Popolo F. Características sociodemográficas y socioeconómicas de las personas de edad en América Latina. Centro Caribeño y Latino Americano de Demografía (CELADE), 2001.
3. Herrera Jr. E, Caramelli P, Silveira ASB, Nitrini R. Epidemiological survey of dementia in a community-dwelling Brazilian population. Alz Dis Assoc Disord 2002;16:103-108.
4. Barbosa MT, Caramelli P, Maia DP, et al. Parkinsonism and Parkinson's disease in the elderly: a community-based survey in Brazil (the Bambuí study). Mov Disord 2006;21:800-808.
5. Blay SL, Andreoli SB, Fillenbaum GG, Gastal FL. Depression morbidity in later life: prevalence and correlates in a developing country. Am J Geriatr Psychiatry 2007;15:790-799.
6. World Health Organization. International Classification of Functioning, Disability and Health (http://www3.who.int/icf/onlinebrowser/icf.cfm).
7. Instituto Brasileiro de Geografia e Estatística (IBGE)(http://www.ibge.gov.br/cidadesat)
8. Associação Brasileira de Empresas de Pesquisa (ABEP). Critério de Classificação Econômica Brasil - 2003 (http://www.abep.org).
9. Fleck MP, Chachamovich E, Trentini C. Development and validation of the Portuguese version of the WHOQOL-OLD module. Rev Saude Publica 2006; 40:785-791.
10. Ramos LR, Toniolo J, Cendoroglo MS, et al. Two-year follow-up study of elderly residents in S. Paulo, Brazil: methodology and preliminary results. Rev Saude Publica 1998;32:397-407.
11. Florindo AA, Latorre MRDO. Validação do questionário de Baecke de avaliação da atividade física habitual em homens adultos. Rev Bras Med Esporte 2003;9:121-128.
12. Masur J, Monteiro MG. Validation of the "Cage" alcoholism screening test in a brazilian psychiatric inpatient hospital setting. Braz J Med Biol Res 1983; 16:215-218.
13. Fahn S, Elton RL, UPDRS Development Committee: Unified Parkinson's Disease Rating Scale. In: Fahn S, Marsden CD, Calne DB, Goldstein M (Eds). Recent developments in Parkinson's disease. Florham Park: MacMillan, 1987:153-163.
14. Brucki SM, Nitrini R, Caramelli P, Bertolucci PH, Okamoto IH. Sugestões para o uso do Mini-Exame do Estado Mental no Brasil. Arq Neuropsiquiatr 2003; 61:777-781.
15. Nitrini R, Lefèvre BH, Mathias SC, et al. Testes neuropsicológicos de aplicação simples para o diagnóstico de demência. Arq Neuropsiquiatr 1994; 52:457-465.
16. Pfeffer RI, Kurosaki TT, Harrah CH, Chance JM, Filis S. Measurement of functional activities in older adults in the community. J Gerontol 1982;37: 323-329.
17. Reisberg B. Functional assessment staging (FAST). Psychopharmacol Bull 1988;24:653-659.
18. Almeida OP, Almeida SA. Confiabilidade da versão brasileira da escala de depressão em geriatria (GDS) versão reduzida. Arq Neuropsiquiatr 1999; 57:421-426.
19. Lecrubier Y, Sheehan D, Weiller E, et al. The Mini International Neuropsychiatric Interview (M.I.N.I.), a short diagnostic interview : reliability and validity according to the CIDI. Eur Psychiatry 1997;12:232-241.
20. Porto CS, Fichman HC, Caramelli P, Bahia VS, Nitrini R. Brazilian version of the Mattis dementia rating scale: diagnosis of mild dementia in Alzheimer's disease. Arq Neuropsiquiatr 2003;61:339-345.
21. Malloy-Diniz LF, Lasmar VA, Gazinelli Lde S, Fuentes D, Salgado JV. The Rey Auditory-Verbal Learning Test: applicability for the Brazilian elderly population. Rev Bras Psiquiatr 2007;29:324-329.
22. Bertolucci PH, Okamoto IH, Brucki SM, Siviero MO, Toniolo Neto J, Ramos LR. Applicability of the CERAD neuropsychological battery to Brazilian elderly. Arq Neuropsiquiatr 2001;59:532-536.
23. Beato RG, Nitrini R, Formigoni AP, Caramelli P. Brazilian version of the frontal assessment battery (FAB): preliminary data on administration to healthy elderly. Dement Neuropsychol 2007;1:59-65.
24. Lawton MP, Brody EM. Assessment of older people: Self maintaining and instrumental activities of daily living. Gerontologist 1969;9:179-185.
25. Chaves ML, Camozzato AL, Godinho C, et al. Validity of the clinical dementia rating scale for the detection and staging of dementia in Brazilian patients. Alzheimer Dis Assoc Disord 2007;21:210-217.
26. Carthery-Goulart MT, Areza-Fegyveres R, Schultz RR, et al. Versão brasileira da Escala Cornell de Depressão em Demência (Cornell Depression Scale in Dementia). Arq Neuropsiquiatr 2007;65:912-915.
27. Graham JE, Rockwood K, Beattie BL, et al. Prevalence and severity of cognitive impairment with and without dementia in an elderly population. Lancet 1997;349:1793-1796.
28. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 3rd ed. Washington, DC: American Psychiatric Association, 1987.
29. Hughes AJ, Daniel SE, Kilford L, Lees AJ. Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinico-pathological study of 100 cases. J Neurol Neurosurg Psychiatry 1992;55:181-184.
30. Lima-Costa MFF, Uchoa E, Guerra HL, Firmo JOA, Vidigal PG, Barreto SM. The Bambuí health and ageing study (BHAS): methodological approach and preliminary results of a population-based cohort study of the elderly in Brazil. Rev Saude Publica 2000;34:126-135.
31. Scazufca M, Menezes PR, Araya R, et al; São Paulo Ageing & Health Study. Risk factors across the life course and dementia in a Brazilian population: results from the São Paulo Ageing & Health Study (SPAH). Int J Epidemiol 2008;37:879-890.
32. Bottino CM, Azevedo D Jr., Tatsch M, et al. Estimate of dementia prevalence in a community sample from São Paulo, Brazil. Dement Geriatr Cogn Disord 2008;26:291-299.
33. Barcelos-Ferreira R, Pinto JA Jr., Nakano EY, Steffens DC, Litvoc J, Bottino CM. Clinically significant depressive symptoms and associated factors in community elderly subjects from Sao Paulo, Brazil. Am J Geriatr Psychiatry 2009;17:582-590.
34. Veras RP, Coutinho E. Estudo de prevalência de depressão e síndrome cerebral orgânica na população de idosos, Brasil. Rev Saude Publica 1994; 28:209-217.
35. Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa Nacional por Amostra de Domicílios, 2008.