Cognitive and functional impairment in an older community population from Brazil: The intriguing association with frequent pain

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ABSTRACT

Objective: This cross-sectional community-based epidemiologic survey aimed to investigate the prevalence of cognitive and functional impairment (CFI) and its distribution in relation to socio-demographic and clinical factors in an older community sample in Florianópolis, Brazil.
Materials and methods: The population was a representative sample aged 60 and older; the cluster sample strategy was performed. CFI, a syndromic category that does not exclude dementia, was defined according to the combination of low MMSE (Mini-Mental State Examination) score and moderate/severe dependence in a scale that measured activities of daily living. The data were submitted to multiple regression analysis using the Poisson regression method.
Results: A sample of 1705 subjects was interviewed; the mean age was 70.6 years (60–104 years; SD: 8.0); 63.9% were female and 43.7% had up to 4 years of schooling. CFI was detected in 325 subjects, resulting in a raw prevalence of 19.2% (95% CI: 17.3–21.0). Older age, presence of diabetes, heart disease, stroke, urinary incontinence, arthritis, frequent pain and depression were significantly associated with CFI ($p < 0.05$).
Conclusion: In addition to the diversity of factors associated with CFI, the present study indicated the need to investigate the role of frequent pain in the development and progression of cognitive impairment and dementia.

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1. Introduction

Cognitive impairment is quite common in the elderly population. It encompasses several syndromic clinical conditions in addition to dementia, including *aging-associated cognitive decline (AACD)* (Levy, 1994), *cognitive and functional impairment (CFI)* (Lopes et al., 2007), *cognitive impairment no dementia (CIND)* (Graham et al., 1997), *vascular cognitive impairment (VCI)* (Hachinski and Bowler, 1993) and *mild cognitive impairment* (Petersen et al., 1999), which is the most well-known and studied condition.

In spite of different concepts, criteria and methods, the prevalence of cognitive impairment as a broad syndromic entity has varied in people aged 60/65 years and over, from 6.4% in the USA (Johnson et al., 1997) to 22.4% in Malaysia (Sherina, Rampa, & Mustaquim, 2004), with intermediate rate of 7.7% in China (Lim,

Lim, Anthony, Yeo, & Sahadevan, 2003). When functional impairment has been combined with cognitive impairment, the rates have been more uniform. Specifically, two studies that were conducted in Brazil (Lopes et al., 2007; Hototian et al., 2008) and one that was conducted in Spain (Rodríguez-Sánchez et al., 2011) found a prevalence in the range of 16–19.4%; the exception was one study from Brazil, that used a very low MMSE cut-off point for cognitive impairment and found the low rate of 3.4% (Lebrão & Laurenti, 2005). In resume, approximately 1 in every 5 older people has been affected by cognitive impairment. The consequence is an increasing burden in their daily living and clinical outcomes. Higher risk for falls (Muir, Gopaul, & Odasso, 2012) and hip fractures (Seitz, Adunuri, & Gill, 2011) and greater length of hospital stay (Fulop, Strain, Fahs, Schmeidler, & Snyder, 1998) have been associated with cognitive impairment, decreasing the elderly population's quality of life.

Epidemiological (Qiu, Xu, & Fratiglioni, 2010) and physiological findings (vascular mechanisms, oxidative damage and inflammation) (De la Torre, 2012) have been proposed to explain the occurrence of major diseases that accompany cognitive impairment, particularly Alzheimer's disease, and offer information

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to guide prevention. However, nutritional approaches and the control of vascular risk factors have not evidently decreased the rates of cognitive impairment and dementia (Rocca et al., 2011). Hence, the investigation of factors that are associated with cognitive impairment must be expanded. Additional epidemiological studies conducted with large samples and a wide set of conditions investigated should make an essential contribution to successfully approach elderly population at risk of developing cognitive impairment and dementia. The present study aimed to investigate the prevalence of cognitive and functional impairment (CFI) and its distribution in relation to socio-demographic and clinical factors in an older community sample in Florianópolis, Brazil. The purpose of investigating CFI, a syndromic and comprehensive category, was to allow the inclusion of all clinical conditions that impair cognition and functional performance in older people.

2. Methods

2.1. Study design and population

The data were drawn from the EPIFLORIPA IDOSO study, a cross-sectional community-based epidemiologic survey on the health of older people (aged 60 years and older) from Florianópolis, Brazil. The study was conducted between 2009 and 2010. The sampling strategy was published previously (Medeiros et al., 2012). Briefly, Florianópolis had a population of approximately 400.000. According to the 2010 census, 10.8% of these people were aged 60 years and older (FIBGE, 2010). The cluster sample strategy was initially based on the average monthly income of the head of the family from 420 census tracts, of which 80 were systematically selected. Sixty houses were further drawn from each census tract, and all older people in those houses were invited to participate. The population's sample size was calculated using Epi-Info-6.04 software. The result was multiplied by two (to account for the cluster sampling) and then increased by 20% for attrition and 15% for multivariable analysis adjusting, leading to a sample of 1599 older people. The parameters were as follows: population of 44.460 older individuals, unknown prevalence (50%), sampling accuracy or error (d) of 4.0% and confidence level of 95%. Due to the multiple objectives of the EPIFLORIPA IDOSO study and the availability of financial resources, the sample size was increased to 1911 individuals.

2.2. Instruments and procedure

Data were collected using a standard questionnaire that was completed by trained research assistants, who interviewed the elderly and a relative, if necessary. The questionnaire included instruments that measured CFI (dependent variable), socio-demographic and clinical items (both assessed through the elderly or relative direct report; depression and alcohol consumption, specifically, were assessed through scales). The main purpose was to compare participants with CFI and participants without CFI (controls) in relation to socio-demographic and clinical characteristics.

The instruments that were used to measure CFI are as follows:

- Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975): a well-known cognitive assessment that was originally created to quantify cognitive deficit and has been widely used to screen for dementia.
- Activities of Daily Living scale (ADL scale) (Fillenbaum, 1984): this scale assesses functional performance and dependence/disability in seven basic and eight instrumental activities of daily living, resulting in a classification of absent/mild dependence in

ADL (partial or total disability in 0–3 activities) and moderate/severe dependence in ADL (partial or total disability in 4–15 activities). The basic daily activities are as follows: getting in and out of bed, eating, grooming, walking on a leveled surface, bathing or showering, dressing, using the toilet on time and climbing one set of stairs. The instrumental daily activities include the following: taking medications on time, walking nearby home, shopping, preparing meals, cutting toe nails, taking buses or taxis and cleaning up the house. This classification was adapted from the study by Rosa, Benício, Latorre, and Ramos, (2003).

CFI was defined according to the combination of low MMSE score and moderate/severe dependence in ADL scale. The strategy of combining cognitive and functional instruments to screen for probable cases of dementia has been used previously (Bottino et al., 2009), demonstrating increased accuracy. In the present study, the cut-off scores that were used to define low MMSE were based on years of schooling, as follows: <20 for illiterate; <25 for 1–4 years of schooling; <27 for 5–8 years of schooling; <28 for ≥9 years of schooling. These cut-off points were adapted from Brucki et al.'s study (Brucki, Nitrini, Caramelli, Bertolucci, & Okamoto, 2003) and used in the present study to increase the sensitivity of the instrument and include subjects with dementia, principally, and other clinical conditions that affect cognition but are not dementia (Bottino et al., 2009). Moreover, two previous studies that used CFI as screening procedure for dementia diagnosis (two-phases studies) (Bottino et al., 2008; Lopes, Ferrioli, Nakano, Litvoc, & Bottino, 2012) observed sensitivity of 94.4% and 98.5% to identify dementia cases, respectively.

The Geriatric Depression Scale (GDS) was used to detect depression. A score of >5 points, from a total of 15, was defined as positive for depression (Sheikh & Yesavage, 1986). The Alcohol Use Disorders Identification Test (AUDIT) was used to investigate alcohol consumption (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The first two questions were utilized to assess frequency and number of doses in a typical day, resulting in a classification of abstinence (no alcohol use), mild/moderate alcohol use (1–7 doses weekly) and heavy alcohol use (≥8 doses weekly). The socio-demographic variables were age (60–64, 65–69, 70–74, 75–79, 80–84, ≥85), gender, marital status (married, single, divorced, widow), education (measured as years of schooling: illiterate, 1–4 years, 5–8 years, ≥9years) and familial per capita income in quartiles. The other clinical variables included self-reported chronic morbidities (hypertension, diabetes, heart disease, stroke, bronchitis, tuberculosis, liver cirrhosis, chronic renal failure, gastric ulcer, arthritis, tendinitis, spinal problems, fibromyalgia and cancer), symptoms (urinary incontinence and pain) habit (smoking) and use of analgesic medications. Pain was categorized as diffuse pain (self-reported pain in several parts of the body in the last month) and frequent pain (any pain on most days). Smoking history was categorized as never, past and current smokers. The use of analgesic medications (only continued use) was assessed from a list of all medications, which were previously collected and organized according to the Anatomical Therapeutic Chemical classification system (World Health Organization). In resume, this set of clinical variables was chosen to globally assess the health of older people in the EPIFLORIPA IDOSO study.

2.3. Statistical analysis

Comparisons between the frequency of CFI cases and controls in relation to the socio-demographic and clinical variables were carried out using Poisson regression (bivariate analysis).

Multiple regression analysis was performed using the Poisson regression method to evaluate the relationship between the