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Cognitive impairment in old people living in the community

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ABSTRACT

Cognitive impairment has a high prevalence in the elderly, especially in the oldest old, and it is a major concern for autonomous old people living in the community and their families. Any possible intervention will benefit from early detection of cognitive decline related signs. The Portuguese version of the mini-mental state examination (MMSE) was used to assess cognitive impairment in a sample of 1266 old community-dwellers in Portugal, mean age 70.3 ± 8.7 years. A standard questionnaire was also used including measures on social network, psychological distress, functionality, perceived health status, and socio-demographic variables. We recorded education levels and illiteracy by using different cut points to select people with and without cognitive impairment and results showed a 9.6% prevalence of positive cases. In general, cognitive impairment is higher in women, older people, widows(ers), and people with negative self-perception of health and with difficulties in basic and in instrumental activities of daily living (ADL and IADL). Cognitive impairment was found to be predicted by gender, age and psychological distress, explaining 18% of variance. Findings are discussed considering available literature and possible interventions for community residents.

1. Introduction

Cognitive impairment is one of the most relevant issues in clinical aging studies. The association between the increasing aging population and the wide-ranging of neurological conditions has lead to a high prevalence of cognitive impairment in the elderly, especially in the oldest (St John et al., 2002; Arthanat et al., 2004). At least, 10% of persons older than 65 years and 50% of those older than 85 years have some form of cognitive impairment, ranging from mild deficits to severe dementia (Jorm and Jolley, 1998).

Based in a systematic review of cognitive decline in the general elderly population, Park et al. (2003) showed that some degree of cognitive impairment was almost universal and could be expected in the majority of the oldest old, and that the prevalence of cognitive impairment and the rate of decline increased with age though the intra and inter-individual variation was great. The Cambridge Project for Later Life (Brayne et al., 1992) illustrates the proportion of participants whose cognition was unchanged (15%), with a further 28% improving over the mean of 28 months follow-up. In the Baltimore Epidemiologic Catchment Area Study, 32% of the participants did not change their cognitive function over a period of 11.6 years follow-up (Lyketsos et al., 1999). If the cognitive decline seems normative, its extension and temporal limits are not, as we could see along a vast number of reviewed papers.

Old people themselves fear cognitive decline, and experience ageism based in stereotypes concerning memory loss, difficulties in problem solving, and in the belief that any minor sign of cognitive impairment will progress to dementia. However, the progression of cognitive impairment to dementia is neither clear nor mandatory according to evidence from longitudinal studies. Hong et al. (2003) examined participants from the larger OCTO-Twin study and found that mild cognitive impairment (MCI) was rated at baseline but neither set of criteria predicted subsequent dementia. The failure to confirm subsequent dementia suggests that there may be many sources of MCI in very late life besides incipient dementia, and once again the progress is not unidirectional. Howieson et al. (2003) examined the occurrence and outcome of cognitive decline in healthy, community-dwelling old–old people who at entry had no cognitive impairment and were followed for up to 13 years. Three outcomes of aging were determined: intact cognition, persistent cognitive impairment without progression to dementia, and dementia. Whereas 49% remained cognitively intact, 51% developed cognitive decline. The old are at high risk for developing cognitive decline but many will not progress to dementia in the next 2–3 years or even beyond.

The identification of risk factors associated with cognitive decline is critical, since it may lead to prevention or intervention strategies. Presently, there are several conditions that may

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interfere with cognition, as deliriums, psychiatric disorders, social isolation and poor intellect (Graham et al., 1997), and some studies suggest that even nutritional risk may be associated with cognitive impairment in the elderly (e.g., Lee et al., 2009). The strong and consistent cross-sectional associations between disability and cognitive impairment in elderly people has been demonstrated, and a number of studies on predictors of physical disability included cognitive impairment among the dependent variables (Bassett and Folstein, 1991; Moritz et al., 1994; Aguero-Torres et al., 1998).

On the Basset and Folstein's research (1991), in a sample of 3841 subjects ranging from 19 to 89 years of age, no linear effect of age on cognitive performance (MMSE) was found, controlling for disease status and education. In another study, higher age was related to lower performance in all cognitive measures, except synonyms and in some cognitive tests (digit span forward, symbol digit, and general cognitive ability tasks), and there was an interaction between sex and age, with greater deficits in the performance of women compared with those of men at higher ages (Read et al., 2006). McGinnis and Zelinski (2003) found that there is a subgroup of older adults who experience verbal processing and comprehension deficits and a subgroup that does not. The size of the verbal deficit subgroup increases with age. The Lund 80+ study reports cognitive decline with advancing age regardless of the health status of the individuals (Svensson et al., 1993). Literacy was strongly age-related and the impairment was greater in people aged 80 years or over. The trend for literacy impairment increase with age is evident even when controlling for education level.

Variables as social network, functionality or wealth were also studied in their association with cognitive decline but evidence is controversial. Bassuk et al. (1999) and Fratiglione et al. (2000) found evidence of an association between shortage of social contacts and cognitive decline or dementia but other studies found no evidence of such association (Seeman et al., 2001; Glei et al., 2005). Recently, Green et al. (2008) studied the influence of social network characteristics on cognition (MMSE) and functional status with aging. These authors concluded that there was no evidence of a longitudinal association (10.9 years follow-up) between social networks and cognition or IADLs, although there was a cross-sectional association. They suggest the emergence of social isolation in individuals declining in cognition and functioning rather than a protective effect of social networks.

As for the association of wealth with cognitive impairment, wealthy individuals seem to have better cognitive performance in all measures, except on speed of processing (Huppert et al., 2006). Finally, it is well known that limitations in ADL in the elderly are usually accompanied by cognitive impairment, and scores on brief cognitive function tests can be used to forecast the possible onset of ADL limitations (Moritz et al., 1995). In a 3 years study, Nikolova et al. (2009) found that substantial functional deterioration over time was observed for the participants with what they called catastrophic cognitive decline. It seems that the rapid cognitive decline influenced performance in IADLs and in a less proportion in ADLs.

In summary, some degree of cognitive impairment is almost universal, rises with age and can be expected in the majority of the old–old; nevertheless its extension and temporal limits widely vary (Paúl, 2007). There is no agreement about predictors of cognitive decline in old age and more research is needed in this particular field. The objectives of this study are (i) to determine the prevalence of cognitive impairment in different cohorts of autonomous old people living in the community; (ii) to analyze which variable are associated with cognitive impairment and (iii) to obtain evidence based knowledge to plan community interventions to prevent or delay cognitive decline.

2. Subjects and methods

2.1. Subjects and data collecting process

Data from a cross-sectional survey of adults aged 50+ years and living in the community in Portugal were used. The sample consists of 1268 participants, mean age 70.3 ± 8.7 years, and 70.4% women. Subjects were recruited through announcements in local newspapers, local agencies (e.g., seniors clubs) and using the snowball method by which participants indicate other persons with similar conditions. The study ran in different Portuguese regions including the islands of Madeira and Azores. The survey was conducted by trained interviewers, using a structured questionnaire format. The interviews took place either in community facilities (e.g. parish hall) or in the participants' home. Informed consents were obtained from the subjects.

2.2. Measures

Cognitive impairment was measured with MMSE (Folstein et al., 1975). The scale is well known and widely used in screenings of cognitive state of old people discriminating between subjects with and without cognitive impairment. We used the Portuguese version adapted to different education levels and illiterate people (Guerreiro et al., 1994). The general health questionnaire (GHQ-12; Goldberg and Hillier, 1979) was used as a single index of psychological distress (mostly depression) and we used a cut point of 4 to select cases with psychological distress. Social network was measured through the Lubben social network scale (LSNS; Lubben, 1988) using a cut-off score of 20 to qualify elderly at greater risk of extremely limited social network. Functional status (ADL and IADL) was measured by considering 18 activities and selecting people with at least one difficulty in ADL and people with at least one difficulty in IADL. Along with MMSE, GHQ, LSNS and ADL and IADL assessment, the questionnaire also integrated health related questions as the perceived health status and the number of health problems, along with socio-demographic variables (gender, age, marital status, living arrangements and educational level).

2.3. Data analysis

We first analyzed subjects' distribution by cognitive impairment (MMSE), and next we used logistic regression models with MMSE as dependent variable and selected explanatory variables. The explanatory variables considered were: age groups (50–64; 65–74; 75–84; 85+ years); gender; marital status (single; married; widow/er); social network variables (Lubben score ≥ 20); living arrangement (with partner, with children or living alone); number of health problems (0 health problems; 1 health problem; 2–3 health problems and 4+ health problems); psychological distress (GHQ-12 score >4); functionality (people with at least one difficulty in ADL and people with at least one difficulty in IADL).

3. Results

The distribution of percentages of cognitive impairment by potential explanatory variables is shown in Table 1. The prevalence of cognitive impairment was 9.6%. There was an increase with age, beginning with 1.6% in the age group 50–64, 7.5% in the 65–74 age group, 15.5% in the 75–84 age group and 32.4% in the 85+ age group. The percentage of cognitive impairment was higher in women (11.4%) than in men (5.2%). Married people reported a rate of 6.1% of cognitive impairment, single people had 12.1% and the widows(ers) showed the highest percentage of cognitive impairment (16.3%). The percentage of people with cognitive impairment

Table 1
Associations of explanatory variables with cognitive impairment.

Variables	*n*	Cases in cognitive impairment, *n* (%)	OR (unadjusted) (95% CI)	OR (adjusted) (95% CI)[a]
Gender				
Male	363	19 (5.2)		
Female	862	98 (11.4)	0.43 (0.6–0.7)**	0.5 (0.3–0.9)*
Age, years				
50–64	307	5 (1.6)	1	1
65–74	533	40 (7.5)	4.1 (1.7–9.7)**	3.6 (1.5–8.9)*
75–84	316	49 (15.5)	9.2 (3.9–21.9)**	6.6 (2.7–16.3)**
85+	68	22 (32.4)	24.1 (9.3–62.5)**	15.3 (5.3–43.5)
Married	704	41 (6.1)	1	1
Single	11	13 (12.1)	1.5 (0.9–3.0)	1.2 (0.6–2.2)
Widow/widower	442	60 (16.3)	3.1 (2.0–4.7)**	1.3 (0.8–2.2)
Without psychological distress	941	61 (6.5)		
With psychological distress	275	53 (19.3)	3.4 (2.3–5.1)**	2.4 (1.6–3.6)**
Without difficulties in ADL	667	41 (6.1)		
With at least 1 difficulty in ADL	558	76 (13.6)	2.4 (1.6–3.6)**	1.1 (0.7–1.9)
Without difficulties in IADL	660	37 (5.6)		
With at least 1 difficulty in IADL	565	80 (14.2%)	2.8 (1.8–4.2)**	1.5 (0.8–2.5)
Good and very good health	363	25 (6.9)	1	1
Regular heath	565	54 (9.6)	1.5 (0.9–2.4)	0.9 (0.5–1.5)
Poor and very poor health	289	38 (13.1)	2.1 (1.2–3.6)*	0.7 (0.3–1.3)

[a] Model adjusted for variables in all other domains reported in the table.
* $p \leq 0.05$.
** $p \leq 0.001$.

increased in the group with psychological distress (19.3%) comparatively to those without psychological distress (6.5%). The percentage of people with cognitive impairment did not differ between social network conditions, neither between self-perception of health or with the number of health problems.

Using the MMSE index as an outcome in a logistic regression model, the unadjusted odd ratios showed that gender, age, marital status, psychological distress, self-perception of health and difficulties in ADL and in IADL were associated with cognitive impairment. When adjusting for all the variables used in the model, marital status, functionality (ADL and IADL) and self-perception of health lost their contribution to the model. There were associations between cognitive impairment and being women (OR = 0.5, 95% CI = 0.28–0.87); being 65–74 years old (OR = 3.6, 95% CI = 1.5–8.9) and being 75–84 years old (OR = 6.6, 95% CI = 2.7–16.3). Those with psychological distress are more likely to report cognitive impairment (OR = 2.6, 95% CI = 1.6–4.2). The amount of variation in MMSE explained by the model, estimated by Nagelkerke R^2 (Nagelkerke, 1991) statistic, was 18%.

4. Discussion

Our findings show that 9.6% of old people living in the community and participating on an autonomous and voluntary base in our study, presented cognitive impairment. The number of people with cognitive impairment rises with age and was higher in women. This confirms the trend presented by previous studies (Svensson et al., 1993; Read et al., 2006).

We did not find any association between cognitive impairment and social networks. Although widows(ers) in our study showed a higher percentage of cognitive impairment than married or single people, marital status differences were not relevant in our logistic regression models. Similarly, functional status and self-perception of health lost their explanatory power in the logistic regression models, after controlling for other variables, corroborating evidence resulting from several longitudinal studies (e.g., Seeman et al., 2001; Glei et al., 2005; Green et al., 2008). The present study demonstrates that gender, age and psychological distress predict cognitive impairment. However, a gradient effect or a different cut points in the cognitive test score was not investigated. It might be interesting to evaluate possible threshold effects in the future.

The amount of illiterate people in our sample is high (18.7%) primarily among the oldest groups, due to the education policy implemented by the dictatorship regime existing in Portugal during 50 years until the "Carnation Revolution" in 1974 (Instituto Nacional de Estatística, 2000, 2002). The rate of illiteracy reinforces the association between cognitive impairment and age. According to Huppert et al. (2006) study findings, literacy is strongly age-related and the impairment is greater in people aged 80 years or over. The trend for literacy impairment to increase with age is evident even when controlling for education level by using different cut points to determine cognitive impairment as suggested by Guerreiro et al. (1994).

People showing psychological distress (depressed) had 2.6 more probability of having cognitive deficit than non-depressed ones. Due to the cross-sectional nature of this study, it is impossible to observe the direction of the association. Maybe people are depressed and then perform poorly at the cognitive level or maybe people with cognitive impairment become depressed. More research is needed to understand the paths between depression and cognitive impairment, mainly through longitudinal studies. Nevertheless this finding is very relevant for intervention. People with signs of depression must be considered at risk for cognitive impairment and treated accordingly. Despite depression being a common mental health problem in old age, responsible for immense suffering amongst individuals and families, and for healthcare system expenditures, it is a reversible condition. As depressed old people consult general practice more often than non-depressed ones, health professionals have the opportunity to identify and treat depression in primary care (Anderson, 2001).

In parallel with intervention to treat depression we suggest the use of both physical and cognitive activities as they proved to be related to better cognitive performance. We corroborate Newson and Kemps (2006a) suggestion that both physical and cognitive stimulation are useful in protecting against cognitive impairment with age and that fitness was a strong predictor of cognition and

accounted for more variance in processing resources than in higher order functions and also that cardio-respiratory fitness may have a selective protective effect against age-associated cognitive impairment (Newson and Kemps, 2006b). Interventions that reinforce social participation opportunities, and emphasize the regaining of quality of life in old age are probably also efficient to revert or delay cognitive impairment.

Conflict of interest statement

None.

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