



Falls and self-assessment of eyesight among elderly people: A population-based study in a south Brazilian municipality



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ABSTRACT

This paper seeks to verify the association between falls and self-assessment of visual acuity in elderly people by means of a cross-sectional population-based study involving 1593 elderly people (aged 60 or over) from the urban zone of the municipality of Bagé-RS. Poisson regression was used for association analysis. Fall prevalence in the last year was 28.0% (95%CI: 25.8; 30.2), with 45.0% of these having suffered two or more falls in the same period. Elderly people self-assessing their eyesight as bad/very poor (10.0%) or regular (33.3%) showed a linear increase in fall occurrence when compared to individuals who considered their eyesight to be good/excellent. Self-assessment of eyesight showed itself to be an important factor associated with the occurrence of falls. This results entails the need to make progress with tracing elderly people with eyesight difficulties and its possible impact on actions to prevent the occurrence of falls.

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1. Introduction

Falls are important factors as causes of increased levels of dependency among the elderly and are considered by the literature to be one of the main causes of death, illness and disability among the elderly, having detrimental effects on quality of life and high costs for health services (Campbell, Diep, Reinken, & MacCosh, 1985; Deandrea et al., 2010, 2013; Gawryszewski, 2010; Gawryszewski, Jorge, & Koizumi, 2004; Nascimento, Duarte, Antonini, & Borges, 2009; WHO, 2005).

In Brazil external causes account for 15.5% of total deaths among the elderly (Brazil, 2011). Falls come in first place among these causes and account for 31.8% of deaths, followed by road traffic accidents, physical violence and suicide (Brazil, 2011; Gawryszewski, 2010). The Centers for Disease Control and Prevention (CDC), a United States public health agency, estimates

that approximately one third of the world's population aged over 65 has had at least one fall in the last 12 months (Stevens, 2010).

Studies conducted in the United States and China indicate fall prevalence among the elderly of 22.1% and 18.1%, respectively (Shumway-Cook et al., 2009; Yu et al., 2009). In Latin America prevalence varies from 27.0% in Uruguay to 34.0% in Chile and Mexico City (Reyes-Ortiz, Al Snih, & Markides, 2005). In Brazil it oscillates between 30.0% and 38.7% (Branco, Cavalcanti, Silva, & Huf, 2010; Couto & Perracini, 2012; Cruz et al., 2012; Perracini & Ramos, 2002; Siqueira et al., 2007).

Factors associated with the occurrence of falls can be classified as being extrinsic or intrinsic. Intrinsic factors include diseases such as diabetes, pathological conditions arising from senility and physiological alterations owing to increased age, such as visual function deterioration. Eyesight, together with the vestibular system and proprioception, are the physiological systems responsible for the body maintaining its balance. The visual system plays an important role in controlling balance as it provides the central nervous system with continuous information about the position and movements of the body segments in relation to the environment (Kulmala et al., 2009; Salonen and Kivelä, 2012)

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Visual impairment has been reported by the literature as an important factor associated with the occurrence of falls. Elderly people with reduced visual function have 50.0% more likelihood of having falls when compared to those without alterations to their field of vision (Menezes & Bachion, 2008). Almeida, Soldera, Carli, Gomes, and Resende (2012) describe reduced visual capacity as one of the main physiological components associated with falls in the elderly, these being explained by the reduction caused in their balance and proprioception. As such, studies have been seeking to verify the influence of the physiological decrease in visual function on the occurrence of falls among the elderly (Menezes & Bachion, 2008; Salonen and Kivelä, 2012). Notwithstanding, there is evidence, particularly in Brazil, that few population-based studies have investigated the association between falls and elderly people's individual perception of their visual acuity (Perracini & Ramos, 2002). It is our hypothesis that eyesight self-rated as poor is associated with the higher occurrence of falls.

2. Methodology

We conducted a cross-sectional population-based study with data collected from July to November 2008 with individuals aged 60 or older, resident in the primary health care service catchment area of the urban zone of the municipality of Bagé-RS. In 2008 the Family Health Strategy (FHS) had been implanted for 5 years and covered 51.0% of the urban population. The rest of the population was covered by the traditional health care model (Thumé, Facchini, Wyshak, & Campbell, 2011).

When delimiting the sample, the catchment area of each of the Primary Health Care Centres (PHC) was defined and later divided into micro-areas, with each block of buildings being identified numerically. The starting point for data collection in each of the blocks was selected randomly, whereby households on the left were eligible. One in six households were visited. All residents of these households aged 60 or older were invited to take part in the study. Interviews not conducted after three attempts on different days and times were considered to be losses/refusals.

Data collection was done by 15 interviewers coordinated by three supervisors and trained by means of theoretical explanations about the questionnaire using an instruction manual, explanations about conducting interviews, practical training in field work logistics as well as meetings during the data collection stage. The interviews were conducted using structured questionnaires with pre-coded questions administered to all the elderly in the households selected. In cases of partial incapacity – elderly people with lucid and focused communication ability but needing everyday accompaniment –, family members and main carers provided the answers. Questions requiring self-reported answers were not administered in cases of total incapacity – elderly people unable to communicate and with complete dependence on family members and/or carers.

The outcome “fall in the last year” was defined by the question: “Have you fallen at any time since <1 YEAR AGO> until now? (no/yes)”. Falls were defined as “an unintentional event which results in a change in an individual's position to a lower level in relation to their initial position” (WHO, 1994).

The exposure variables were: sex (male/female); self-reported skin color (white/black/yellow, brown or indigenous); age (60–64/65–69/70–74/75 years or over); marital status (married or living with a stable partner/widow(er)/divorced or never married); years of formal education (none/one to seven/eight or more); economic classification as per the Association of Brazilian Survey Companies (*Associação Brasileira de Empresas de Pesquisas – ABEP*) (A and B/C/D and E – poorest); self-reported medical diagnosis of hypertension or diabetes (No/Yes); self-assessment of eyesight (Excellent and Good/Regular/Bad and Very Poor); eyesight hampers activities

(No/Yes); eyesight appointment in the last year (No/Yes) and use of glasses or contact lenses (No/Yes).

Data were analyzed by using Stata version 12 (Stata Corp, College Station, TX, USA). The descriptive analyses included calculations of proportions and respective 95% confidence intervals. We used the Poisson regression to crude and adjusted analysis (Barros & Hirakata, 2003). We used the Wald test for heterogeneity and for linear trend to define significance level. Associations with p -value <0.05 were considered statistically significant.

Adjusted analysis was based on a conceptual model with four levels of determinations. We included demographic and socio-economic variables at the first level (gender, age, skin color, marital status, ABEP and years of formal education). The self-reported hypertension and diabetes variables were included at the second level, whilst the variables relating to eyesight self-assessment and activities being hampered by eyesight were included at the third level. The fourth level was comprised of the following variables: eyesight appointment in the last year and use of glasses or contact lenses. For confounder control, the effect of each variable was controlled for all other variables in the same or higher levels with p -value ≤ 0.20 .

The statistical power of the study was 99.3% and 99.9% respectively when comparing occurrence of falls among the elderly who reported regular and bad/very poor eyesight with those who self-assessed their eyesight as good/excellent (reference group).

The participants signed a statement of informed consent and the study received approval from the institutional ethics committee at Federal University of Pelotas (Protocol No. 015/2008). The authors declared that they had no conflict of interest in this study.

3. Results

We identified one thousand, five hundred and ninety three elderly household members. Losses represented 4.0% and refusals 3.0%. The proportion of elderly with partial and total incapacity was 14.0% and 5.0%, respectively.

Twenty eight percent of the elderly (95%CI: 25.8; 30.2) had suffered a fall in the last 12 months. Of these, 55.0% had suffered one fall, 18.3% two falls, 11.4% three falls and 15.3% four falls or more.

Women accounted for approximately two thirds of the respondents. Almost a third of the sample were aged 75 or older, and more than half were married or living with a steady partner. The majority of the elderly had between 1 and 7 years (54.5%) schooling. A third of the sample belonged to the highest economic class (ABEP A/B). More than half self-reported hypertension (55.3%), whilst diabetes prevalence was 15.1% (Table 1).

When we asked about visual acuity, only 10.0% self-assessed their eyesight as being very poor or bad. Around twenty-eight percent reported that their eyesight hampered the performance of everyday activities. Moreover, one fifth had seen a health professional because of visual acuity problems in the year prior to the interview and 72.2% used glasses or contact lenses (Table 1).

The crude analysis did not show statistically significant association ($p < 0.05$) between falls and the following variables: skin color, years of formal education, economic classification and use of glasses or contact lenses (Table 1).

In the adjusted analysis, falls among women were 71.0% higher compared with men. After adjustment, we observed a linear increase in the occurrence of the outcome as age increased. Falls were 30.0% higher among individuals with diabetes.

We found that those reporting regular and bad/very poor eyesight had 52.0% and 96.0% more falls respectively when compared to individuals with excellent/good self-assessment.

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