RESEARCH

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Prevalence and factors associated with frailty in non-institutionalized older adults

Prevalência e fatores associados à fragilidade em idosos não institucionalizados

Prevalencia y factores asociados a la fragilidad en ancianos no institucionalizados

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ABSTRACT

Objective: to investigate the prevalence and factors associated with frailty in non-institutionalized older adults living in northern Minas Gerais, Brazil. **Method:** data were collected in their homes, in 2013, based on a census cluster sampling. Demographic and socioeconomic variables, morbidities, utilization of health care services, and scores on the Edmonton Fragility Scale were analyzed. The adjusted prevalence ratios were obtained using the Poisson regression multiple analysis with robust variance. **Results:** the prevalence of frailty was 41.3%. The variables associated with frailty were: female gender, very old age, education of less than four years, not having been hospitalized in the last 12 months, having a caregiver, falling in the prior year, diabetes mellitus, cardiac disease, and osteoarticular disease. **Conclusion:** the prevalence of frailty was high. Some factors consist of modifiable conditions, which should encourage health actions aimed at this group.
Descriptors: Aged; Health Vulnerability; Frail Elderly; Prevalence; Health of the Elderly.

RESUMO

Objetivo: verificar a prevalência e os fatores associados à fragilidade em idosos não institucionalizados residentes ao norte de Minas Gerais, Brasil. **Método:** a coleta de dados ocorreu no domicílio em 2013, a partir de uma amostragem censitária por conglomerado. Foram analisadas variáveis demográficas e socioeconômicas, morbidades, utilização de serviços de saúde e o escore da Escala de Fragilidade de Edmonton. As razões de prevalências ajustadas foram obtidas por análise múltipla de regressão de Poisson com variância robusta. **Resultados:** a prevalência de fragilidade foi 41,3%. As variáveis associadas à fragilidade foram: sexo feminino, idosos longevos, escolaridade inferior a 4 anos, não ter sido internado nos últimos 12 meses, presença de cuidador, queda no último ano, diabetes *mellitus*, doença cardíaca e doença osteoarticular. **Conclusão:** a prevalência de fragilidade mostrou-se elevada. Alguns fatores representam condições modificáveis e devem estimular ações de saúde destinadas a esse grupo.
Descritores: Idoso; Vulnerabilidade em Saúde; Idoso Fragilizado; Prevalência; Saúde do Idoso.

RESUMEN

Objetivo: determinar la prevalencia y factores asociados a la fragilidad en ancianos no institucionalizados residentes en el norte de Minas Gerais, Brasil. **Método:** los datos fueron recolectados en los hogares en 2013 a partir de un muestreo por conglomerados por sectores censitarios. Se analizaron variables demográficas y socioeconómicas, morbilidad, utilización de los servicios de salud y la puntuación de la Escala de Fragilidad de Edmonton. Se obtuvieron los cocientes de prevalencia ajustados mediante análisis múltiple de regresión de Poisson con varianza robusta. **Resultados:** la prevalencia de fragilidad fue 41.3%. Las variables asociadas con la fragilidad fueron sexo femenino, edad más avanzada, escolarización menor de 4 años, no haber sido hospitalizado en los últimos 12 meses, tener un cuidador, caída en el año anterior, diabetes mellitus, enfermedades del corazón y enfermedad osteoarticular. **Conclusión:** la prevalencia de fragilidad fue alta. Algunos factores son modificables y deben fomentar acciones de salud dirigidas a este grupo.
Descriptores: Anciano; Vulnerabilidad en Salud; Anciano Frágil; Prevalencia; Salud del Anciano.

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INTRODUCTION

Aging provides gradual and inevitable changes in humans. During this process, some conditions are capable of triggering progressive functional impairment. The changes observed over the years can cause increased vulnerability and increased susceptibility to disease[1].

The particularities of aging have a greater relevance due to the increase in the proportion of older adults observed in the general population worldwide. These demographic changes are associated with important social and economic transformations. They also cause changes in the epidemiological profile, especially due to the increase in non-communicable diseases (NCDs), which are more common in older age groups[2-3].

In most developing countries, health care service professionals do not seem to have the necessary preparation to adequately meet the increasing elderly population[4-5]. In Brazil, the rate of population aging also identifies new challenges for the health sector, including the lack of qualified professionals[6].

Assessment of functional capacity is an important component of health care for the elderly, in order to investigate their ability and independence in performing certain activities [4]. It is defined as the process of measuring the ability to perform activities of daily living directly related to self-care and social participation. This is a proposal that is directly related to the concept of frailty, a condition that can affect this population group[7].

Frailty consists of a multidimensional syndrome that involves the interaction of biological, psychological and social factors. It is associated with an increased risk of adverse outcomes, such as decline in functional capacity, falls, delirium, institutionalization, and death. Frailty can be found in those with a state vulnerable to low resolution of homeostasis. A disruption of homeostasis due to the aging process occurs when acute physical, social or psychological events are able to lead to increased deleterious effects on different organ systems of the frail older adults. It promotes a change of great proportion to one's health status after the occurrence of stressful events: moving from independent to dependent, mobile to immobile, a condition of postural stability to a propensity to falls, lucidity to delirium[6,8-10]. The conditions associated with frailty in the elderly remain understudied and poorly known in Brazil; therefore it is relevant to investigate its prevalence and associated factors in this population. In addition, this study could help guide public policies that are specific to this particular population. This study aimed to determine the prevalence and factors associated with frailty in a population-based sample of non-institutionalized older adults.

METHOD

This is a quantitative, analytical, cross-sectional study performed with non-institutionalized older adults living in the city of Montes Claros, northern Minas Gerais, Brazil. The city has a population of approximately 385,000 inhabitants and is the main regional urban pole.

The probabilistic sampling process used was a two-stage cluster sample. In the first stage, the census tract was used as the sampling unit; 42 census tracts were randomly selected among 362 urban areas of the municipality, according to the Brazilian Institute of Geography and Statistics (IBGE). In the second stage, the number of households was identified according to the population density of individuals aged equal to or greater than 60 years. At this stage, more households were allocated to the sectors with the highest number of older adults in order to produce a more representative sample.

This study is part of a comprehensive analysis of the health conditions of the elderly in the municipality. For the total number of older adults allocated to the study, a conservative prevalence of 50% for the studied events was considered, along with an estimated population of 30,790 older adults (according to IBGE data), an error margin of 5%, and a confidence level of 95%. Because this was a cluster sampling, the identified number was multiplied by a correction factor (*deff*) of 1.5 plus 15% for possible losses. The minimum number of people for the study defined by the sample size calculation was 656.

For the analysis of frailty, the object of this study, only the population aged equal to or greater than 65 years was included, since the instrument used was validated for people in this age group. The older adults whose caregivers/family refused to participate in the study were excluded. Losses were considered to be those older adults who were not available to participate in at least three visits on different days and times, despite prior appointments.

Data were collected in the older adults' households between May and July of 2013. Interviewers (nurses), previously trained and standardized, moved along the census tracts from a point previously defined in each census tract to perform the interviews. The data collection instrument used was based on similar population-based studies and was previously tested in a pilot study in a census tract especially raffled, whose data were not included in the final work.

The dependent variable was the record of frailty in the older adults. It was measured using the Edmonton Frail Scale (EFS), culturally adapted and validated in Portuguese[11]. The EFS evaluates nine domains: cognitive, general health, functional independence, social support, medications used, nutrition, mood, continence and functional performance, distributed in 11 items with scores ranging from 0 to 17. The EFS score can vary from 0 to 4, indicating no presence of frailty; 5-6, apparently vulnerable to frailty; 7-8, mild frailty; 9-10, moderate frailty; and 11 or more, severe frailty[12].

For data analysis in this study, the results of the dependent variable were dichotomized into two levels: without frailty (final score ≤ 6) and frailty (score > 6). The independent variables were: sex, age (65-79 years and ≥ 80 years), self-reported skin color (white and non-white, including in non-white mixed, black, yellow and indigenous), marital status (with partner, including married and common-law marriage, and without a partner, including single, widowed and divorced), condition of living alone or with others, education (up to four years of study, and more than four years of study), reading, religious practice, one's own income, monthly family income (up to one time the minimum wage and higher than one minimum wage), smoking, presence of chronic morbidities (hypertension, diabetes mellitus, heart disease, osteoarticular

diseases), caregiver presence, falls in the prior year, medical appointments and hospitalization in the prior year.

Prevalence ratios (PR) were calculated to investigate the associations between the independent variables and frailty. The adjusted prevalence ratios were obtained using the Poisson regression multiple analysis with robust variance, considering the independent variables that were most strongly associated with frailty in the bivariate analysis (up to a significance level of 0.20). In the final analysis, a final significance level of 0.05 was considered ($p < 0.05$).

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 17.0 (SPSS for Windows, Chicago, USA). All participants were informed about the research and gave their consent by signing the Terms of Free and Informed Consent Form. The research project was approved by the Research Ethics Committee of the State University of Montes Claros.

RESULTS

Six hundred eighty-six older adults, aged over 60 years, were allocated to the study. Among the total number of elderly patients, 175 were excluded because they were aged below 65 years, according to criteria of the instrument used to assess the condition of frailty, which was only validated for the elderly over 65 years. Five hundred eleven older adults were aged 65 or more years and were evaluated for frailty. The predominant age group was between 65 and 79 years, representing 79.3% of the study population. The mean age of the group was 74 years (SD ± 7.14). Most respondents were female (64.0%), lived with a partner (88.1%), reported non-white skin (66.3%), and had studied up to four years (80.4%).

The prevalence of frailty was 41.3%, and was higher for women (45.9%) compared to men (33.1%). A greater prevalence of frailty in older age groups (34.0% between 65 and 79 years and 68.9% aged 80 or more) was noticed.

Other group characteristics showed that 79.6% did not have a caregiver. A medical appointment in the prior 12 months was reported by 89.6%, and hospitalization (with a stay over 24 hours) was reported by 19.6% of the older adults. Investigated morbidity aspects showed that 29.0% of the older adults experienced a fall in the prior year, 72.2% were hypertensive, 35.6% reported osteoarticular disease, 28.0% had osteoporosis, 25.6% had heart disease, and 22.3% were diabetic (Table 1).

Table 1 – Demographic, social and economic characterization of non-institutionalized older adults, Montes Claros, Minas Gerais, Brazil, 2013 (N = 511)

Variables	n	%
Gender		
Female	327	64.0
Male	184	36.0
Age group		
≥ 80 years	106	20.7
65-79 years	405	79.3
Self-reported skin color		
Non-white	339	66.3
White	172	33.7
Marital status		
With partner	253	49.5
Without a partner	258	50.5
Family arrangement		
Lives alone	61	12.0
Does not live alone	450	88.0
Education		
0-4 years	411	80.4
> 4 years	100	20.6
Able to read		
No	169	33.1
Yes	342	66.9
Religious practice		
No	97	19.0
Yes	414	81.0
Own income		
No	28	5.5
Yes	483	94.5
Monthly family income		
< R$ 678.00*	149	29.2
> R$ 678.00*	362	70.8
Smoking		
Yes	208	40.7
No	303	59.3
Hypertension		
Yes	369	72.2
No	142	27.8
Diabetes mellitus		
Yes	114	22.3
No	397	77.7
Cardiac disease		
Yes	131	25.6
No	380	74.4
Osteoarticular disease		
Yes	182	35.6
No	329	64.4
Osteoporosis		
Yes	143	28.0
No	368	72.0
Has a caregiver		
Yes	104	20.4
No	407	79.6
Falls in the last 12 months		
Yes	148	29.0
No	363	71.0
Medical appointment in the last 12 months		
Yes	458	89.6
No	53	10.4
Hospitalization in the prior year		
Yes	411	80.4
No	100	19.6

To be continued

Table 1 (concluded)

Notes: (*) Current minimum wage = US$ 346.82.

The bivariate analysis of frailty and other variables are shown in Tables 2 and 3. The variables associated with frailty in non-institutionalized older adults, to the level of 20% ($p < 0.20$), were evaluated together using the Poisson regression with robust variance.

The variables that remained statistically associated with frailty after multivariate analysis were female gender, aged 80 years old, zero to four years of study, not having been hospitalized in the prior 12 months, having a caregiver, falls in the prior year, diabetes mellitus, heart disease, and osteoarticular disease (Table 4).

Table 2 – Results of the bivariate analysis of frailty and demographic, social and economic conditions of non-institutionalized older adults, Montes Claros, Minas Gerais, Brazil, 2013 (N = 511)

Independent variables	Frailty						
	Yes		No				
	n	%	n	%	PR	95% CI	*P* value
Gender							
Female	150	71.1	177	59.0	1.096	1.02-116	0.005
Male	61	28.9	123	41.0	1		
Age group							
≥ 80 years	73	34.6	33	11.0	1.260	1.18-1.34	0.000
65-79 years	138	65.4	267	89.0	1		
Self-reported skin color							
Non-white	143	67.8	196	65.3	1.019	0.95-1.08	0.566
White	68	32.2	104	34.7	1		
Marital status							
With partner	92	43.6	161	53.7	0.933	0.87-0.99	0.024
Without a partner	119	56.4	139	46.3	1		
Family arrangement							
Lives alone	26	12.3	35	11.7	1.011	0.92-1.10	0.822
Does not live alone	185	87.7	265	88.3	1		
Education							
0-4 years	190	90.0	221	73.7	1.209	1.12-1.30	0.000
> 4 years	21	10.0	79	26.3	1		
Knows how to read							
No	121	57.3	221	73.7	1.132	1.06-1.20	0.000
Yes	90	42.7	79	26.3	1		
Religious practice							
No	159	75.4	255	85.0	1.110	1.03-1.19	0.005
Yes	52	24.6	45	15.0	1		
Own income							
No	11	5.2	17	5.7	0.985	0.86-1.12	0.825
Yes	200	94.8	283	94.3	1		
Monthly family income							
< R$ 678.00*	73	34.6	76	25.3	1.079	1.01-1.15	0.022
> R$ 678.00*	138	65.4	224	74.7	1		

Notes: (*) Current minimum wage = US$ 346.82; PR – Prevalence Ratio; CI – Confidence interval.

Table 3 – Result of bivariate analysis of frailty, morbidity and use of health care services in non-institutionalized older adults, Montes Claros, Minas Gerais, Brazil, 2013 (N = 511)

Independent variables	Frailty						
	Yes		No				
	n	%	n	%	PR	95% CI	*P* value
Smoking							
Yes	85	40.3	123	41.0	0.995	0.93-1.05	0.871
No	126	59.7	177	59.0	1		
Hypertension							
Yes	168	79.6	201	67.0	1.117	1.04-1.19	0.001
No	43	20.4	99	33.0	1		
Diabetes mellitus							
Yes	64	30.3	50	16.7	1.139	1.06-1.21	0.000
No	147	69.7	250	83.3	1		
Cardiac disease							
Yes	85	40.3	46	15.3	1.238	1.16-1.31	0.000
No	126	59.7	254	84.7	1		
Osteoarticular disease							
Yes	94	44.5	88	29.3	1.119	1.05-1.18	0.000
No	117	55.5	212	70.7	1		
Osteoporosis							
Yes	78	37.0	65	21.7	1.135	1.06-1.21	0.000
No	133	63.0	235	78.3	1		
Has a caregiver							
Yes	80	37.9	24	8.0	1.338	1.26-1.41	0.000
No	131	62.1	276	92.0	1		
Falls in the prior 12 months							
Yes	85	40.3	63	21.0	1.169	1.09-1.24	0.000
No	126	59.7	237	79.0	1		
Medical appointment in the prior 12 months							
Yes	198	93.8	260	86.7	1.150	1.04-1.26	0.009
No	13	6.2	40	13.3	1		
Hospitalization in the prior year							
Yes	69	32.7	31	10.3	1.256	1.17-1.33	0.000
No	142	67.3	269	89.7	1		

Notes: PR – Prevalence Ratio; CI – Confidence Interval.

Table 4 – Factors associated with frailty in non-institutionalized older adults, Montes Claros, Minas Gerais, Brazil, 2013 (N = 511)

Independent Variables	PR	95% CI	*P* value
Gender			
Female	1.058	1.00-1.11	0.046
Male	1		
Age group			
≥ 80 years	1.113	1.04-1.19	0.001
65-79 years	1		
Gender			
Female	1.112	1.03-1.18	0.002
Male	1		
Hospitalization			
in the prior year	1.173	1.10-1.24	0.000
No	1		
Yes			
Has a caregiver	1.225	1.15-1.30	0.000
Yes	1		
No			
Falls in the prior 12	1.085	1.02-1.15	0.006
Yes	1		
No			
Diabetes mellitus	1.105	1.04-1.17	0.001
Yes	1		
No			
Cardiac disease	1.107	1.04-1.17	0.001
Yes	1		
No			
Osteoarticular disease	1.071	1.03-1.13	0.013
Yes	1		
No			

Notes: PR – Prevalence Ratio; CI – Confidence Interval.

DISCUSSION

This study identified a high prevalence of 41.3% of frailty in non-institutionalized older adults and helped identify some associated factors. A systematic review on the subject showed a marked variation in the prevalence of frailty in elderly residents aged 65 or more (between 4.0% and 59.1%) in the community[13].

The prevalence of frailty can vary in the same population of older adults, depending on the instrument used. A study in northern Taiwan, for example, showed a slight difference in the prevalence of frailty in older adults, aged 65 to 79 years, using different instruments: the prevalence of frailty was 11.3% (95% CI: 7.6- 15.0) using the Fried Frailty Index and 14.9% (95% CI: 10.7 to 19.1) using EFS[14]. The prevalence of frailty in this study

was higher than that found in the same age group, using the EFS. This suggests that other conditions can influence the variation in prevalence of frailty in the elderly, in addition to the instruments. The study that validated the EFS in Brazil identified a prevalence of 31.4%, lower than that reported in this study[11].

The disparities in the prevalence of frailty can be justified by several factors, including methodological standardization. The difficulties in establishing a uniform concept of the frail condition provide diverse ways for diagnosis. Several instruments with various parameters, associated with differences in the composition of the sample in relation to ethnicity and nationality, undermine a comparison of studies[8,13,15].

While there are various tools related to frailty in the elderly, assessment of reliability and validity was not performed in most of them. Among the 27 instruments used in 150 studies selected in a systematic review, between 1948 and May of 2011, only two, including EFS, followed the Standards for Educational and Psychological Testing, guidelines describing best practice in the development of complex measures such as frailty in the elderly. Both instruments showed acceptable reliability and good concurrent and predictive validities[16].

The variables of income per capita, religious practice, education, marital status, age and sex, shown in Table 2, were significantly associated with greater or lesser frailty of the elderly.

The literature reported that the prevalence of frailty increases with age[17] and is higher in females[8-9,13,15]. The results of this study are consistent with this information. Similar results were found in studies that investigated frailty in older Brazilian adults living in the community, using the EFS[11,18-19]. Among other factors that were associated with frailty in this study are lower educational levels, falls in the prior year, and the presence of some NCDs. Other national and international studies have also shown some of these associations. In Peru[20], there was no association between frailty and old age and falls in the prior year. In Brazil, researchers from Rio de Janeiro also found an association of frailty with advanced age, the presence of morbidities, and lower educational level[21]. A study performed in Ribeirão Preto (SP) showed that there was a greater chance of falling among the frail elderly, using EFS to diagnose the condition[22].

In this study, frailty was also associated with older people who had not been hospitalized in the prior 12 months. No other studies addressing this variable were identified. Although it is a more complex variable to evaluate, one can infer some degree of compromised access for this population to health care services. However, this aspect was not addressed in the study and requires more specific analyses.

This study also showed an association between frailty in the elderly and having a caregiver. Probably the function and availability of a caregiver are required for frail older adults who exhibit a probability for developing adverse conditions. Another study that also used the EFS found a correlation between frailty and the caregiver burden of frail elderly living at home. The higher the level of frailty, the greater the caregiver burden[23].

Non-chronic diseases associated with frailty in older adults in this study were: heart disease, diabetes mellitus, and osteoarticular disease. In elderly patients with cardiovascular disease, frailty is approximately three times more prevalent. Researchers demonstrated that the presence of frailty associated with heart disease is a predictor of mortality and hospitalization[24]. Given the above, the American Heart Association and the Society of Geriatric Cardiology recommend understanding the relationship between these two conditions. Frailty appears to be a condition capable of estimating the risk for patients with cardiovascular disease. Evaluation of frailty in elderly patients with heart disease is important, both because of its prognostic value as well as the possibility of proposing early interventions that could change the unfavorable outcome of the relationship between the two conditions. Therefore, there is a need to perform studies to determine whether early recognition and proper treatment of frailty can reduce hospitalizations and mortality in elderly patients with heart disease[24].

Glucose intolerance, insulin resistance and diabetes are also associated with frailty. It has been shown that hyperglycemia is independently associated with the frailty condition, after adjusting for all confounding variables including body mass index and levels of pro-inflammatory cytokines[25]. The diagnosis of diabetes mellitus was associated with frailty and with a two-fold increase in the risk of progression to disability. Frail, diabetic older adults are at increased risk of falls, and increased risk of fracture after a fall[25].

One study showed that the elimination of NCDs and also falls in the elderly in the prior year could lead to an increase in an expected disability-free life for men and women, both at 60 and at 75 years of age. In the study, heart disease stood out as the one that would mostly promote a gain of years free of disability, in both sexes, if it were eliminated. Among women, diabetes mellitus, hypertension and falls were second, third and fourth, respectively. Arterial hypertension, chronic lung disease and falls in the prior year were among the four major morbidities for men[2].

Frailty can be avoided, delayed, and even treated when diagnosed early, especially if interventions are applied. A multidisciplinary approach for prevention, evaluation and treatment is required. Physical activity, adequate nutritional status, morbidity control, and changes in lifestyle and in the environment and can delay the pathway from frailty to inability, and thus to early mortality in the elderly[25].

Frailty generates a financial impact as well as other demands on health services, leading to the need to reorganize care models to meet the health care needs of this population group[8]. The reduction of the prevalence of frailty, and the level of frailty, can benefit individuals, their families, and society. Several approaches have been investigated in clinical trials. Frail elderly who were admitted to specialized geriatric care units, with geriatric assessment, were more likely to return home, are less likely to have cognitive or functional decline and have lower in-hospital mortality rates than those who are admitted to a general medical ward[8].

The results of this study should be interpreted in the light of some limitations. Although losses or refusals were compensated by adding new older adults, more active older adults who were probably without frailty were not found at home during the established contacts. This can limit the generalizability of the data. Moreover, the scale used evaluates cognitive aspects related to

education, which proved to be low for the population studied.

It is noteworthy, however, that this is a study with a representative sample, which allowed for the enhancement of the usefulness of the EFS, and the identification of factors that deserve greater attention from new studies. It should be noted that causes and effects certainly vary throughout life. Because this is a cross-sectional study, it cannot establish a temporal relationship among the observed associations.

Knowledge of the prevalence and factors associated with frailty in older adults enables the establishment of goals to promote the health of this population, and prevention strategies for other health problems. This aspect is particularly important for a country with an accelerated aging process. The results can alert health care professionals for timely identification of modifiable risk factors for frailty, which is clearly important for the prevention of the condition.

CONCLUSION

This study identified a high prevalence of frailty in non-institutionalized older adults and helped identify some associated factors, such as: female gender, very old age, education of less than four years, not having been hospitalized in the prior 12 months, having a caregiver, falling in the prior year, diabetes mellitus, cardiac disease, and osteoarticular disease. Knowledge of the prevalence and factors associated with frailty in older adults enables the establishment of goals to promote the health of this population and prevention strategies for other health problems. This aspect is particularly important for a country that has an accelerated aging process. The observed results can alert health professionals to the timely identification of modifiable risk factors for frailty, which is clearly important for the prevention of the condition.

REFERENCES

1. Ciosak SI, Braz E, Costa MFBNA, Nakano NGR, Rodrigues J, Alencar RA, Rocha ACAL. Senescence and senility: the new paradigm in primary health care. Rev Esc Enferm USP [Internet]. 2011[cited 2014 Mar 31];45(Suppl2):1763-8. Available from: http://www.scielo.br/pdf/reeusp/v45nspe2/en_22.pdf
2. Campolina AG, Adami F, Santos JLF, Lebrão ML. The health transition and changes in healthy life expectancy in the elderly population: possible impacts of chronic disease prevention. Cad Saúde Pública [Internet]. 2013[cited 2014 Mar 31];29(6):1217-29. Available from: http://www.scielo.br/pdf/csp/v29n6/a18v29n6.pdf
3. Lima-Costa MF, Facchini LA, Matos DL, Macinko J. Changes in ten years of social inequalities in health among elderly Brazilians (1998-2008). Rev Saúde Públ [Internet]. 2012[cited 2014 Mar 31];46(Suppl1):100-7. Available from: http://www.scielo.br/pdf/rsp/v46s1/ao4207.pdf
4. Veras RP. Chronic disease management: mistaken approach in the elderly. Rev Saúde Públ [Internet]. 2012[cited 2014 Mar 31];46(6):929-34. Available from: http://www.scielo.br/pdf/rsp/v46n6/en_01.pdf
5. Veras RP. Disease prevention in the elderly: misconceptions in current models. Cad Saúde Pública [Internet]. 2012[cited 2014 Mar 31];28(10):1834-40. Available from: http://www.scielo.br/pdf/csp/v28n10/03.pdf
6. Lacas A, Rockwood K. Frailty in primary care: a review of its conceptualization and implications for practice. BMC Med [Internet]. 2012[cited 2014 Mar 31];10(1):10-4. Available from: http://bmcmedicine.biomedcentral.com/articles/10.1186/1741-7015-10-4
7. Del DGF, Silva MC, Hallal PC. Disability relating to basic and instrumental activities of daily living among elderly subjects. Rev Saúde Públ [Internet]. 2009[cited 2014 Mar 31];43(5):796-805. Available from: http://www.scielo.br/pdf/rsp/v43n5/en_653.pdf
8. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet [Internet]. 2013[cited 2014 Mar 31];381(2):752-62. Available from: http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2812%2962167-9/abstract
9. Vieira RA, Guerra RO, Giacomin KC, Vasconcelos KSS, Andrade ACS, Pereira LSM, et al. Prevalence of frailty and associated factors in community-dwelling elderly in Belo Horizonte, Minas Gerais State, Brazil: data from the FIBRA study. Cad. Saúde Pública [Internet]. 2013[cited 2014 Mar 31];29(8):1631-43. Available from: http://www.scielo.br/pdf/csp/v29n8/v29n8a15.pdf Portuguese.
10. Perez M, Lourenço RA. [FIBRA-RJ Network: frailty and risk of hospitalization in the elderly in Rio de Janeiro, Brazil]. Cad Saúde Pública [Internet].2013[cited 2014 Mar 31];29(7):1381-91.Available from: http://www.scielo.br/pdf/csp/v29n7/12.pdf Portuguese
11. Fabrício-Wehbe SCC, Schiaveto FV, Vendrusculo TRP, Haas VJ, Dantas RAS, Rodrigues RAP. Cross-cultural adaptation and validity of the "Edmonton Frail Scale - EFS" in a Brazilian elderly sample. Rev Latino-Am Enfermagem [Internet]. 2009[cited 2014 Mar 31];17(6):1043-9. Available from: http://www.scielo.br/pdf/rlae/v17n6/18.pdf
12. Rolfson DB, Majumdar SR, Tsuyuki RT, Tahir A, Rockwood K. Validity and reliability of the Edmonton Frail Scale. Ag Ageing. 2006;35(1):526-9.
13. Collard RM, Boter H, Schoevers RA, Oude VRC. Prevalence of frailty in community-dwelling older persons: a systematic review. J Am Geriatr Soc [Internet]. 2012[cited 2014 Mar 31];60(8):1487-92. Available from: http://onlinelibrary.wiley.com/doi/10.1111/j.1532-5415.2012.04054.x/abstract
14. Chang CI, Chan DC, Kuo KN, Hsiung CA, Chen CY. Prevalence and correlates of geriatric frailty in a northern Taiwan community. J Formos Med Assoc [Internet]. 2011[cited 2014 Mar 31];110(4):247-57. Available from: http://www.jfma-online.com/article/S0929-6646%2811%2960037-5/abstract
15. Tribess S, Oliveira RJ. [Biological fragility syndrome in the

elderly: systematic review]. Rev Salud Pública [Internet]. 2011[cited 2014 Mar 31];13(5):853-64. Available from: http://www.scielosp.org/pdf/rsap/v13n5/v13n5a14.pdf Portuguese.

16. Bouillon K, Kivimaki M, Hamer M, Sabia S, Fransson EI, Singh-Manoux A, et al. Measures of frailty in population-based studies: an overview. BMC Geriatr [Internet]. 2013[cited 2014 Mar 31];13(1):60-4. Available from: http://bmcgeriatr.biomedcentral.com/articles/10.1186/1471-2318-13-64

17. Amaral FLJS, Guerra RO, Nascimento AFF, Maciel ACC. Social support and the frailty syndrome among elderly residents in the community. Ciênc Saúde Colet [Internet]. 2013[cited 2014 Mar 31];18(6):1835-46. Available from: http://www.scielo.br/pdf/csc/v18n6/34.pdf

18. Fernandes HCL, Gaspar JC, Yamashita CH, Amendola F, Alvarenga MRM, Oliveira MAC. Frailty assessment in the elderly assisted at a Family Heath Unit. Texto Contexto Enferm [Internet]. 2013[cited 2014 Mar 31];22(2):423-31. Available from: http://www.scielo.br/pdf/tce/v22n2/en_v22n2a19.pdf

19. Fhon JRS, Diniz MA, Leonardo KC, Kusumota L, Haas VJ, Rodrigues RAP. Frailty syndrome related to disability in the elderly. Acta Paul Enferm [Internet]. 2012[cited 2014 Mar 31];25(4):589-94. Available from: http://www.scielo.br/pdf/ape/v25n4/en_aop1812.pdf

20. Runzer-Colmenares FM, Samper-Ternent R, Snih SA, Ottenbacher KJ, Parodi JF, Wong R, et al. Prevalence and factors associated with frailty among Peruvi an older adults. Arch Gerontol Geriatr [Internet]. 2014[cited 2014 Mar 31];58(1):69-73. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3808461/pdf/nihms519788.pdf

21. Moreira VG, Lourenco RA. Prevalence and factors associated with frailty in an older population from the city of Rio de Janeiro, Brazil: the FIBRA-RJ Study. Clinics [Internet]. 2013[cited 2014 Dec 16];68(7):979-85. Available from: http://www.scielo.br/pdf/clin/v68n7/1807-5932-clin-68-07-979.pdf

22. Fhon JRS, Rosset I, Freitas CP, Silva AO, Santos JLF, Rodrigues RAP. Prevalence of falls among frail elderly adults. Rev Saúde Públ [Internet]. 2013[cited 2014 Mar 31];47(2):266-73. Available from: http://www.scielo.br/pdf/rsp/v47n2/en_0034-8910-rsp-47-02-0266.pdf

23. Stackfleth R, Diniz MA, Fhon JRS, Vendruscolo TRP, Fabrício-Whebe SCC, Marques S, et al. Burden of work in caregivers of frail elders living at home. Acta Paul Enferm [Internet]. 2012[cited 2014 Mar 31];25(5):768-74. Available from: http://www.scielo.br/pdf/ape/v25n5/en_19.pdf

24. Von HS, Anker SD, Doehner W, Morley JE, Vellas B et al. Frailty and heart disease. Int J Cardiol [Internet]. 2013[cited 2014 Mar 31];168(1):1745-7. Available from: http://www.internationaljournalofcardiology.com/article/S0167-5273%2813%2901279-5/abstract

25. Heuberger RA. The frailty syndrome: a comprehensive review. J Nutr Gerontol Geriatr [Internet]. 2011[cited 2014 Mar 31];30(4):315-68. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22098178