

Hierarchical Model of Factors Associated with Falls in Older Brazilian Community-Dwelling Women

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Abstract

Objective: To estimate the prevalence of falls in a group of older women and to measure the influence of risk factors associated with age.

Methods: Longitudinal study with a representative probability sample of the AGEQOL study (Aging, Gender and Quality of Life). This article is based on 1226 older Brazilian community-dwelling women. Participants were interviewed on falls in past 12 months, demographic and socioeconomic characteristics, health status, functional ability and access to and use of health services. Poisson regression was used to confirm the association of decline in women with possible determinants, separated by age (60-74 years and ≥ 75 years).

Results: Overall, 250 women (54.2%) had a single fall, and the prevalence of falls was significantly different between age groups ($p < 0.001$). Women aged less than 75 years old who smoked, drank, and reported nausea and imbalance had a higher prevalence of falls. Among the oldest women, a dose-response relationship was present between falls and functional capacity of ADL.

Conclusions: The prevalence of falls differed in each age group of women. For older women aged 60-74 years, the prevalence of falls was associated with self-reported health status and the type of health services used. In addition to performing ADL, worse health conditions, surgeries, and higher education were risk factors associated with a higher prevalence of falls in older women.

Introduction

Population aging is an important global phenomenon in public health. This new population profile requires the adoption of public and social solutions to develop policies [1].

In Brazil, there are approximately 25 million people aged 60 or older (10.8% of the population). Projections for 2030, estimate a life expectancy in Brazil around 77.4 years. In 2050 almost 30% of the Brazilian population will be 60 years and older, placing Brazil as one of the countries with the largest absolute number of older people worldwide [2].

However, ageing in Latin American countries is occurring even in the context of health inequalities, with high rates of poverty, relative low coverage and quality of health and pension systems [3].

In the older adults, health cannot be measured by the presence or absence of disease but by the degree of preservation of functional capacity (i.e., the ability to take care of oneself and to determine and perform Activities of Daily Living (ADL) with autonomy and independence, even with morbidities) [3].

Falls and fractures are major causes of morbidity and mortality in older adults [4-6]. Epidemiological studies show that approximately 30% of the population over the age of 65 suffer at least one fall per year [7,8]. This rate rises to 50% in people over 80 years old and those who are institutionalized [9].

The multifactorial etiology factors associated with falls, and recurring injuries, determined have been widely studied and reported in the literature [10-12]. Falling is not a normal event in the aging process.

In the present, evidence-based interventions can be used in clinical or community settings to reduce fall risk [13,14]. Additionally, secondary prevention programs for falls and fractures are highly needed by identifying risks, performing environmental reorganization, and identifying functional rehabilitation factors [4,15].

In Brazil, most studies are epidemiological, observational, and few studies involved significant and representative sample of elderly living in communities. Risk factors for falls need to be further investigated so that preventive actions and public policies are proposed in the near future.

Age and female gender are major risk factors for falls in the older adults [16], but they are not the only ones. We believe that association between falls and functional limitation, influenced by other factors is even more significant among older women. This study aimed to estimate the prevalence of falls in a group of older women and to examine the influence of factors associated with age.

Materials and Methods

Participants

“Aging, Gender and Quality of Life (AGEQOL)” is a cohort study in Sete Lagoas, Minas Gerais and Brazil with a representative sample of 1226 community-dwelling women, between the ages of 60 and 106 years (mean age of 71.03 ± 8.35 years).

A complex sampling design was adopted for this study and consisted of a combination of probabilistic sampling methods for selecting a representative sample of the population. For this sampling, the following two calculations were performed: an estimation of the number of older adults and an estimation of the number of households to be visited.

The sampling process was conducted in two stages: in the first, census tracts were selected and in the second, households within each sector were selected. In each household, all residents aged 60 years or more of both genders, regardless of your marital status or kinship were interviewed.

Data collection was conducted in the homes of the older adults between January and July 2012 and involved household interviews and examinations conducted by three examiners and three annotators. All persons 60+ years in the selected households were informed of the study and were asked to sign an informed consent form that had been previously approved by the Ethical Committee of the Federal University of Minas Gerais (CAAE-0413.0.203.000-11). The interviews lasted 40 to 60 minutes. At the end of the interviews, each subject in the city received guidance regarding health care and activity options as well as the personal contact information of the researcher responsible for the questionnaire. Additional details of the methodology are described in Campos et al. [17].

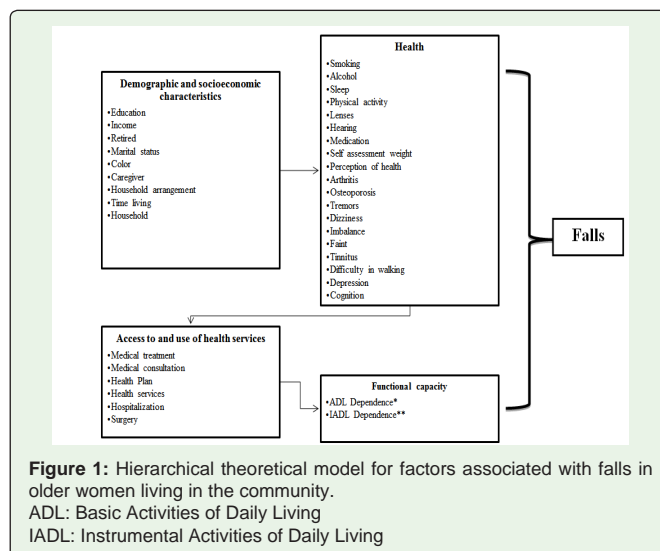
Measurements

The definition of a fall used in this study was “an unintentional event that results in the change of position of the individual to a lower level relative to its initial position, with inability to fix in a timely manner” [10]. The dependent variable was a dichotomous question about recent falls: “Last year, (a) Mr. (a) has fallen?” The group that did not report falls (falls = no) was defined as the reference category. For women who responded positively, we also asked about the recurrence (more than one fall) and the occurrence of bone fracture resulting from the fall.

The independent variables were grouped according to an

adapted form of the hierarchical model proposed by Cruz et al. [18], in which the levels of assessment of the relationships between groups of variables include distal, intermediate, and proximal factors (Figure 1). The block was formed by the following distal variables of socioeconomic information: marital status (married, single/widowed/divorced), self-reported color (white, black, other), retirement (yes, no), education (illiterate, literate), median income (≤US\$300, >US\$300), caregiver (yes, no), living arrangement (live alone, live together), time of residence in the same home in years (≤ 24 years, >24 years), and household (alone, relatives/other).

The health of the women was assessed by subjective aspects (self-reported conditions and self-reported health) and goals (diagnostic tests and screening). The self-reported conditions investigated were the following: smoking (yes, no), alcohol (yes, no), trouble sleeping at night (yes, no), physical activity (yes, no), use of corrective lenses



(yes, no), use of hearing aids (yes, no), medication use (yes, no), use of controlled medication (yes, no), health perception (very poor/poor/fair, good/very good), self-assessment of weight (underweight, normal, overweight), self-reported diagnosis of arthritis (yes, no), and self-reported diagnosis of osteoporosis (yes, no). Common symptoms related to aging were investigated by self-report, such as tremors (yes, no), dizziness (yes, no), imbalance (yes, no), fainting (yes, no), tinnitus (yes, no), and difficulty walking (yes, no).

To measure cognitive ability, the Mini Mental State Examination (MMSE) validated in Portuguese [19] was used. This instrument consists of questions grouped into seven categories, each designed with the objective of assessing orientation, immediate memory and recall, concentration, calculation, and language.

The Geriatric Depression Scale short validated in Portuguese version with 15 items (GDS-15) is specifically targeted toward women and was used to assess mood and level of depression [20]. The scores of each instrument were dichotomized to evaluate cognitive impairment (yes, no) and depression (yes, no).

To measure access to and use of health services, we used the following variables: medical treatment (yes, no), medical consultation in the last 6 months (yes, no), health insurance (yes, no), type of

health service most used (public/plan/private), hospitalization in the past year (yes, no), and surgery in the past year (yes, no).

In this study, functional ability was analyzed separately by two instruments. The Katz index is an instrument used to measure independence in the performance of the following six ADL: bathing, dressing, toileting, transferring, continence, and feeding [21]. The Lawton - Brody Index (ILB) evaluates the patient's ability to perform instrumental activities of daily living (IADL) [22]. ADL and IADL dependence was classified as total dependence, moderate dependence, or independence.

Data Analysis

All analyses were performed separately by age group using a cutoff defined by the World Health Organization (WHO) for developing countries [23]. The sample was divided into two groups: 60-74 years (n=842) and ≥75 years (n=384).

Descriptive analyses included the calculation of the prevalence of falls, recurrence of falls, and bone fracture by age as well as association with the chi-square test. We used a significance level of 5%. In the crude analysis, the prevalence of falls was calculated for each group of independent variables. The selection of variables that constituted the blocks in the multivariate analysis was obtained by adopting a critical level of significance equal to 0.20. Multivariate analysis was performed using Poisson regression with robust variance calculation of adjusted odds ratios, 95% confidence intervals, and significance level using the Wald test for heterogeneity and linear trend.

The effect of the complex sample design was considered in all analyses. Statistical analysis was performed using the SPSS statistical software version 19.0 (SPSS Inc., Chicago, USA).

Results

Overall, 250 women (54.2%) had a single fall, and the prevalence of falls was significantly different between age groups ($p < 0.001$). The recurrence rate was higher in women under 75 years of age (46.5%) and older women with fractures (27.3%) (Table 1).

In the crude analysis for the group aged 60-74 years, only lifestyle (smoking, alcohol, and use of hearing aids), health (imbalance and fainting), and the most widely used type of health service were associated with the occurrence of falls, at a significance level of 5% (Table 2).

Table 3 shows the crude analysis between falls and associated factors in women aged 75 years or older. The use of hearing aids, a diagnosis of osteoporosis, and a health plan were not associated with the outcomes. However, the variables achieved enough statistical significance ($p \leq 0.20$) to be included in the adjusted model.

Table 4 shows the prevalence rate of falls (confidence interval 95%) of the independent variables in the subgroups stratified by age. Only variables with a significant association in the sample are described in the final model. Women aged less than 75 years old who smoked, drank, and reported nausea and imbalance had a higher prevalence of falls. Among the oldest women, a dose-response relationship was present between falls and functional capacity of ADL.

Table 1: Distribution of women residents in the community according to the occurrence of falls, recurrence and bone fracture by age group.

Variables	Age						p
	60-74 years (n=842)		≥75 years (n=384)		Total (n=1226)		
	n	%	n	%	n	%	
Falls							
Yes	303	36.0	158	41.1	461	37.6	<0.001
No	539	64.0	226	58.9	765	62.4	
Recurrence							
Yes	141	46.5	70	44.3	211	45.8	0.972
No	162	53.5	88	55.7	250	54.2	
Bone fracture							
Yes	60	19.8	43	27.2	103	22.3	0.069
No	243	80.2	115	72.8	358	77.7	

Discussion

This study showed a high prevalence of falls in Brazilian women, especially among older women. These results are similar to other Brazilian studies [5,17,23], Latin American studies [24], and studies from other countries [10,11,25].

In the present study, the risk of falling was 1.08 times higher in women aged 75 years and older than in younger women (41.1%). The percentage is particularly high compared to data from the SABE study (Salud, Bienestar y Envejecimiento) that was conducted in Sao Paulo with younger women (33.0%) and women over 75 years of age (36.9%) [26].

The literature reveals that a higher incidence of falls is associated with advanced age [2,6,17]. A qualitative study explored why older women No seek care after a fall. Some women No seek help because they believe that their fall-related injury or fall is not serious enough to go to a healthcare provider. These data highlight the importance of the theme of this study because this prevalence may be higher [27].

Of the 461 women who suffered falls in the previous year, 45.7% had more than one fall, and 22.3% suffered a bone fracture. However, no statistically significant differences were found between age groups. Other studies have shown fall recurrence rates between 30% and 45% and a prevalence of bone fracture between 12% and 19% [6,11,17,23].

These results show that certain age groups are at high risk. Recurrent falls are often associated with minor injuries, whereas a lack of recurrent falls may have greater consequences [11,14]. In this study, women who had a single fall had a lower prevalence of bone fracture compared with those who experienced two or more falls in the previous year, but the difference was not statistically significant.

Chronic diseases [28,29], including depression [28-30], osteoporosis [17], and arthritis [28], are known risk factors to increase the probability of falling [31]. In this study, these variables were not associated with outcomes, suggesting that these factors No explain the differences in prevalence between younger and older women. A possible explanation for these findings is the low prevalence of these diseases in the women in this study.

Table 2: Crude analysis of the prevalence of falls in women 60-74 years of age, associated with demographic and socioeconomic characteristics, lifestyle, health conditions, access and use of health services, and functional capacity.

Variables	Falls				Crude model		
	Yes		No		PR	IC 95% (PR)	<i>p</i>
Demographic and socioeconomic characteristics	n	%	n	%			
Education							
Non-literate	64	33.3	128	66.7	1.07	0.97-1.19	0.191
Literate	239	36.8	411	63.2	1.00		
Income							
≤R\$622.00	214	35.6	387	64.4	1.05	0.95-1.16	0.370
>R\$622.00	89	36.9	152	63.1	1.00		
Retired							
Yes	199	39.1	310	60.9	0.97	0.89-1.05	0.435
No	104	31.2	229	68.8	1.00		
Marital status							
Married	139	36.1	246	63.9	1.06	0.97-1.16	0.189
Single/widowed/divorced	161	35.5	293	64.5	1.00		
Self-reported color							
White	102	36.7	176	63.3	1.08	0.98-1.18	0.131
Brown/ Black	50	36.5	87		1.01	0.89-1.15	0.849
Other	148	35.2	272	64.8	1.00		
Caregiver							
Yes	47	42.3	64	57.7	1.03	0.92-1.15	0.620
No	256	35.0	475	65.0	1.00		
Living arrangement							
Living alone	45	35.4	82	64.6	0.96	0.84-1.09	0.511
resides accompanied	257	36.0	457	64.0	1.00		
Residence time							
≤ 24 years	138	31.8	296	68.2	1.05	0.96-1.14	0.311
> 24 years	165	40.4	243	59.6	1.00		
Household							
Own	289	35.7	521	64.3	1.13	0.91-1.41	0.272
Relatives/other	14	43.8	18	56.3	1.00		
Health conditions							
Smoke							
Yes	20	30.3	46	69.7	1.14	1.03-1.26	0.013
No	283	36.5	493	63.5	1.00		
Alcohol							
Yes	37	39.8	56	60.2	0.84	0.74-0.94	0.003
No	266	35.5	483	64.5	1.00		
Trouble sleeping the night							
Yes	156	41.9	216	58.1	0.97	0.91-1.04	0.441
No	147	31.3	323	68.7	1.00		
Practice physical activity							
Yes	88	34.8	165	65.2	0.91	0.84-0.98	0.016

No	215	36.5	374	63.5	1.00		
Corrective lenses							
Yes	219	36.6	385	63.7	1.04	0.96-1.13	0.297
No	84	35.3	154	64.7	1.00		
Use hearing aid							
Yes	10	47.6	11	52.4	0.85	0.73-1.00	0.051
No	293	35.7	528	64.3	1.00		
Use of medication							
Yes	75	41.9	4	58.1	1.02	0.94-1.10	0.623
No	228	34.4	435	65.6	1.00		
Prescription drug use							
Yes	242	37.2	408	68.2	0.95	0.88-1.02	0.165
No	31	3.8	131	68.2	1.00		
Self-assessment of weight							
Overweight	123	40.1	184	59.9	0.97	0.85-1.10	0.612
In normal weight	149	32.0	316	68.0	1.05	0.93-1.18	0.456
Underweight	31	44.3	39	55.7	1.00		
Self-rated health							
Very bad/poor/fair	189	43.5	245	56.5	0.99	0.91-1.07	0.724
Very good / good	114	27.9	294	72.1	1.00		
Arthritis							
Yes	104	40.9	150	59.1	0.95	0.87-1.03	0.222
No	191	33.4	381	66.6	1.00		
Osteoporosis							
Yes	74	43.0	98	57.0	0.93	0.85-1.02	0.127
No	220	33.8	430	66.2	1.00		
Tremors							
Yes	71	53.8	61	46.2	1.00	0.89-1.14	0.945
No	191	31.2	422	68.8	1.00		
Dizziness							
Yes	115	48.5	122	51.5	0.97	0.85-1.10	0.638
No	173	30.0	404	70.0	1.00		
Imbalance							
Yes	119	53.8	102	46.2	0.85	0.76-0.96	0.010
No	184	29.9	432	70.1	1.00		
Fainting							
Yes	40	60.6	26	39.4	0.86	0.75-0.99	0.040
No	263	34.0	510	66.0	1.00		
Tinnitus							
Yes	116	48.3	124	51.7	0.97	0.87-1.08	0.615
No	187	31.2	412	68.8	1.00		
Difficulty walking							
Yes	67	54.9	55	45.1	1.04	0.94-1.16	0.417
No	232	32.5	482	67.5	1.00		

No	215	36.5	374	63.5	1.00		
Corrective lenses							
Yes	219	36.6	385	63.7	1.04	0.96-1.13	0.297
No	84	35.3	154	64.7	1.00		
Use hearing aid							
Yes	10	47.6	11	52.4	0.85	0.73-1.00	0.051
No	293	35.7	528	64.3	1.00		
Use of medication							
Yes	75	41.9	4	58.1	1.02	0.94-1.10	0.623
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Yes	115	48.5	122	51.5	0.97	0.85-1.10	0.638
No	173	30.0	404	70.0	1.00		
Imbalance							
Yes	119	53.8	102	46.2	0.85	0.76-0.96	0.010
No	184	29.9	432	70.1	1.00		

ADL: Basic Activities of Daily Living

IADL: Instrumental Activities of Daily Living

Table 3: Crude analysis of the prevalence of falls in women aged 75 and older associated with demographic and socioeconomic characteristics, lifestyle, health conditions, access and use of health services, and functional capacity.

Variables	Falls				Crude model		
	Yes		No		PR	IC95% (PR)	p
Education							
Non-literate	63	42.9	84	57.1	0.77	0.65-0.92	0.003
Literate	95	40.1	142	59.9	1.00		
Income							

Variables	Falls				Crude model		
	Yes		No		PR	IC95% (PR)	<i>p</i>
Education							
Non-literate	63	42.9	84	57.1	0.77	0.65-0.92	0.003
Literate	95	40.1	142	59.9	1.00		
Income							
≤R\$622.00	111	40.2	165	59.8	1.00	0.88-1.15	0.946
>R\$622.00	47	43.5	61	56.5	1.00		
Retired							
Yes	121	39.0	189	61.0	1.01	0.84-1.21	0.924
No	37	50.0	37	50.0	1.00		
Marital status							
Married	31	36.9	53	63.1	0.96	0.79-1.18	0.715
Single/widowed/divorced	127	42.3	173	57.7	1.00		
Self-reported color							
White	57	39.9	86	60.1	0.98	0.85-1.13	0.797
Brown/ Black	15	29.4	36	70.6	1.20	1.02-1.41	0.026
Other	85	45.9	100	54.1	1.00		
Caregiver							
Yes	68	44.4	85	55.6	1.20	1.06-1.37	0.005
No	90	39.0	141	61.0	1.00		
Living arrangement							
Living alone	23	32.4	48	67.6	1.11	0.95-1.30	0.194
resides accompanied	134	4.1	177	56.9	1.00		
Residence time							
≤ 24 years	71	41.3	101	58.7	1.03	0.89-1.19	0.718
> 24 years	87	41.0	125	59.0	1.00		
Household							
Own	144	41.0	207	59.0	1.05	0.74-1.50	0.771
Relatives/other	14	42.4	19	57.6	1.00		
Health conditions							
Smoke							
Yes	5	31.3	11	68.8	1.19	1.02-1.40	0.027
No	153	41.6	215	58.4	1.00		
Alcohol							
Yes	12	36.4	21	63.6	0.95	0.79-1.15	0.612
No	146	41.6	205	58.4	1.00		
Trouble sleeping the night							
Yes	67	44.7	83	55.3	1.05	0.96-1.15	0.311
No	91	38.9	141	61.1	1.00		
Practice physical activity							
Yes	33	43.3	43	56.6	0.82	0.72-1.15	0.004
No	125	40.6	183	59.4	1.00		
Corrective lenses							
Yes	94	41.2	134	58.8	1.14	1.03-1.15	0.010

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Retired							
Yes	121	39.0	189	61.0	1.01	0.84-1.21	0.924
No	37	50.0	37	50.0	1.00		
Marital status							
Married	31	36.9	53	63.1	0.96	0.79-1.18	0.715
Single/widowed/divorced	127	42.3	173	57.7	1.00		
Self-reported color							
White	57	39.9	86	60.1	0.98	0.85-1.13	0.797
Brown/ Black	15	29.4	36	70.6	1.20	1.02-1.41	0.026
Other	85	45.9	100	54.1	1.00		
Caregiver							
Yes	68	44.4	85	55.6	1.20	1.06-1.37	0.005
No	90	39.0	141	61.0	1.00		
Living arrangement							
Living alone	23	32.4	48	67.6	1.11	0.95-1.30	0.194
resides accompanied	134	4.1	177	56.9	1.00		
Residence time							

ADL: Basic Activities of Daily Living
 IADL: Instrumental Activities of Daily Living

We observed that physical activity helped to prevent falls in women of both age groups. However, this association did not remain in the final model. A plausible explanation may be the small number of women who reported some physical activity and experienced no decline in our study (27.2%).

A way to minimize the loss of balance due to aging is the practice of physical activities [6,32]. The results from the three-year Longitudinal Aging Study Amsterdam (LASA) suggest that the relationship between physical activity and recurrent falling differs by type of activity and is modified by physical performance [32].

In the older group of women, poor visual acuity represented by the use of corrective lenses was associated with a fall ratio of 1.14 (p=0.10). The decrease in visual acuity with increasing age may lead directly to falls because of decreased postural stability or indirectly because of reduced mobility and physical function [15].

The risk model of falls for women aged 60-74 years old was formed by self-report fainting, nausea, and imbalance, which are common symptoms of aging. These variables are related to weakness of the muscles and joints and reduced lower limb strength and functional mobility that are common in this stage of life [29]. These changes may

cause difficulty in adapting to an environment and predispose women to falling [17].

Younger women who used public services had a lower incidence of falls compared with those who attended private practices. A similar study indicated a lower incidence of falls in women who were assisted by the Brazilian public service, but according to these authors, no statistically significant association between falls and health services was found [17].

Considering that approximately 40% of the women over 75 years of age were illiterate, our results should be interpreted with caution. Regarding the caregiver, we must understand this association as a direct reflection of the loss of autonomy and independence that is common in this age group. A low educational level and lack of a caregiver are risk factors for increased incidence of falls in women.

Women over 75 years old who used prescription drugs had a 26% increase in the prevalence of falls. Previous studies [6,11,28] show that higher use of medications increases falls. These findings indicate the need for reductions in the number and dosage of prescription drugs and a medication review of women who have suffered a fall to prevent a recurrence [6,28].

The prevalence rate of falls in women who have difficulty walking was 1.37 times higher compared with the women without any limited

Table 4: Final model of multiple hierarchical Poisson regression of the relationship between falls and the independent variables organized by age.

60-74 years old			
Variables	PR	95% CI (PR)	p-value
Health service			
Public	0.92	0.87-0.98	0.011
Plans	0.96	0.90-1.10	0.113
Private	1.00		
Nausea			
Yes	1.10	1.10-1.18	0.005
No	1.00		
Imbalance			
Yes	1.12	1.07-1.18	0.001
No	1.00		
Fainting			
Yes	1.11	1.01-1.21	0.024
No	1.00		
≥ 75 years			
Variables	PR	95% CI (PR)	p-value
Education			
Illiterate	0.85	0.76-0.96	0.007
Literate	1.00		
Caregiver			
Yes	1.14	1.03-1.26	0.014
No	1.00		
Smoking			
Yes	1.37	1.20-1.56	0.001
No	1.00		
Controlled medication			
Yes	1.25	1.12-1.41	0.001
No	1.00		
Difficulty walking			
Yes	1.37	1.21-1.55	0.001
No	1.00		
Surgery in last year			
Yes	1.16	1.04-1.29	0.007
No	1.00		
ADL dependence			
Total	1.26	1.09-1.46	0.002
Moderate	1.29	1.16-1.43	0.001
Independent	1.00		

motion, a result similar to another study [17]. Changes in gait pattern and difficulties in walking and climbing stairs are common consequences of the loss of flexibility and hardening of the joints [29]. However, we could not investigate these specific aspects related to gait in this epidemiological study.

A statistically significant association was present between smoking and falls in the women, a result also found in another Brazilian study [33].

In the oldest old, surgeries due to falls and fractures are common [34]. The types of surgeries women had undergone were investigated in this study. In this context, the relationship between the prevalence of falls in women who had surgery and fractures is unclear.

A fall greatly impacts the lives of women with regard to ADL functioning [23,25,34,36]. Total and moderately ADL-dependent women had a prevalence of falls 26% and 29% higher than the fully independent women, respectively. In, other Brazilian study showed that poor physical performance is associated with more advanced age, more illnesses and less functional independence among older adults fallers [35].

In Project Epidoso - Epidemiology of Aging, which was conducted in Sao Paulo with 1667 older adults using the Brazilian Version of the Multidimensional Functional Assessment Questionnaire (BOMAFQ), the authors observed a direct relationship between female ADL difficulty and incidence of falls [7]. The relationship between falls and functional capacity using the same questionnaires were investigated by other study [17]. Although most independent women had not fallen, this association did not remain in the adjusted model. This relationship needs to be investigated further because studies have suggested that functional capacity can be a causal determinant as a consequence of the fall [11], especially in older women.

Limitations

Given that various female populations are different from each other; epidemiological studies comparing age groups represent an important advantage for advancing scientific knowledge of the aging process. However, better standardization of age groups for greater power is needed to compare studies.

In this study, the use of the hierarchical theoretical model that includes a proximal functional capacity factor allowed us to analyze the influence of factors on each block and to compare the direct and indirect effect on measures of association for each age group.

We recommend replicating this statistical model considering the number of falls as the dependent variable and other independent variables including nutrition, lifestyle, and the environment. Moreover, the results create a baseline for studies investigating active aging. We were unable to determine whether a temporal relationship exists between the occurrence of falls and other variables. The type of shoes and environmental characteristics at the time of the fall [11], fear of falling [5,11,36], chronic pain [30], and need for medical care [11] are important risk factors that were not investigated in this study. The fall site is another risk factor in various age groups. Falls that occur outdoors are more common in people younger than 75 years, which suggests that these people are more active. In contrast, falls within the domicile occur more often in the most vulnerable, usually the older women [11,37].

Finally, it is important to discuss the data collection methodology. The prevalence of falls was estimated by interviews and could have been directly influenced by memory, the physical and psychological characteristics of the interviewees, and contextual and cultural aspects of each population group.

The results of this study represent older adult home residents in a Brazilian city. The findings may not be applicable to the entire Brazilian older adult population. In this study, we chose female participants. In future studies adding male participants in an equally large sample-base could be effective in determining gender differences in the prevalence of falls. Furthermore, we hope to be able to determine if there is a temporal relationship between the occurrence of falls and other variables.

Conclusion

Despite these limitations, base line AGEQOL study confirmed that the prevalence of falls differed between the two age groups. For women aged 60-74 years, the prevalence of falls was associated with self-reported health status and the type of health services used. Ability to perform ADL, worse health conditions, surgeries, and higher education were risk factors associated with higher prevalence of falls in older women.

Others studies are needed to confirm these associations, but our results provide evidence for public policies to address these risk factors to preserve functional independence and autonomy, especially in older women.

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