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Risk of drug-related falls among noninstitutionalized older adults

Uso de medicamentos asociados al riesgo de caídas en ancianos no institucionalizados

Uso de medicamentos associados ao risco de quedas em idosos não institucionalizados

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ABSTRACT

Objective: To determine the number of drugs taken per day, which represents a risk factor for falls among noninstitutionalized older adults with a history of falls in the last year. **Method:** This was a descriptive study that used random sampling and the following measurement instruments: the WHO questionnaire for the study of falls in older adults, gait scale and geriatric depression scale and gait and balance. Univariate and bivariate analysis, nonparametric chi-squared test, and binary logistic regression were performed using the SPSS statistical program version 21.0. **Results:** 214 individuals participated in the study. Those who took ≥ 4 drugs presented higher risk of falling, p=0.010 OR=4.034. The same was not true for individuals who took ≤ 3 drugs, p=0.006 OR=0.335. **Conclusion:** The use of four or more drugs per day was considered a risk factor for falls among older adults.

DESCRIPTORS

Aged; Accidental Falls; Drug Utilization; Gait; Postural Balance; Geriatric Nursing.

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INTRODUCTION

Population aging is an evident global phenomenon, and up to the present, the use of drugs has been the most common therapeutic tool used to relieve symptoms and to improve functional status and the quality of life of the older adult population[1].

An important element when determining risk of falls in older adults is the use of medication, considered a risk factor for future falls when the intake is high[2]. Approximately 25%-38% of community-dwelling older adults fall at least once a year[3-4], generating numerous repercussions at the physical (with fractures as the most serious consequence), psychological (fear of new falls, anxiety, depression) and social (isolation from social relations) levels[5], leading to increased frailty and disability[6]. Disease prevention and health promotion are important tools to reduce the occurrence of these events and minimize the secondary complications of falls[7-8].

The term "polypharmacy" has not yet been officially defined, and some authors establish it as the concomitant use of five or more drugs[9-10]. A greater number of prescribed drugs has been shown to substantially increase the possibility of adverse effects; however, an exact number has not been determined[11-12]. In the scientific literature, the use of four or more drugs per day has been considered a risk factor for falls among the older adult population[13].

Some studies have examined the incidence of falls among older adults taking certain types of medications, but few authors have correlated the number of drugs with the risk of falls, and even fewer have targeted populations with a history of falls[14-15]. The goal of the present investigation was to determine and establish the number of drugs taken per day that represents a risk factor for falls among noninstitutionalized adults with a history of falls in the year prior to the interview.

METHOD

Study design

This was a descriptive cross-sectional study conducted in two social senior centers in Zaragoza, Spain, between May and July 2015. For sample collection, random sampling was used.

Senior Living Centers are affiliated with the Zaragoza city council. They provide older adults with spaces in which they can gather and socialize, providing noninstitutionalized individuals with services and activities suited to their needs and interests. They form a network of equipment and services that allow for involvements, gatherings, socialization, and leisure time. This network offers several activities suited to the interests of older adults, support for personal and social development, and opportunities for participation and engagement.

Sample sizing and type

The sample size was calculated using a formula to estimate the proportion for a study population of (N) 472 individuals ≥ 65 years old, with a level of confidence (1-α) of 95%, precision at (d) ±0.5 and heterogeneity, 50%. This resulted in a sample size of (n) 213 people ≥ 65 years old. All those who met the established inclusion criteria and who wished to participate were included.

Selection criteria

The study included individuals ≥ 65 years who had suffered at least one fall in the year prior to the study, attended the selected senior centers, noninstitutionalized, did not present cognitive impairments (assessed using the Spanish version of the Pfeiffer Short Portable Mental Status Questionnaire – PSMSQ)[16] and who signed informed consent forms.

Variables and measurement instruments

Sociodemographic variables: gender, age, marital status, and living alone.

Other variables and measurement instruments

The World Health Organization (WHO) questionnaire about older adult falls[17], which assesses aspects related to the history of falls, was employed. This questionnaire does not provide a numeric score. In the present study, the following variables were investigated: physical exercise, assessed in individuals with a minimum of one hour per week, the use of walking aids, urinary incontinence, fear of falling, number of falls in the last year (1 fall or ≥ 2 falls). The dependent variable was the number of drugs taken daily (≤3 drugs/day and ≥ 4 drugs/day).

Risk of falls was assessed using Tinetti Gait and Balance Instrument[18], which determines risk for falls with the total maximum of 28 points, 12 for gait and 16 for balance. The sum of both scores results in the risk of an individual falling or not. The higher the score, the lower the risk, and total scores ≤ 24 indicate a risk for falls.

Depression was assessed using the Spanish version of the Geriatric Depression Scale by Yesavage[19]. The scale determines the presence of depression among the geriatric population. Total overall score is 15 points: scores between 0 and 4 are considered lack of depression, while scores between 5 and 15 indicate the presence of depression.

Data collection

All the participants were contacted by phone to schedule the interviews. Semi-structured interviews were conducted individually at the individual's senior center of reference.

Statistical analysis

Coding, data processing, and statistical analysis were performed with SPSS version 21. The main estimators presented a 95% level of confidence, a 5% margin of error and a statistical significance of p=<0.05. Univariate and bivariate statistical analyses were conducted with the nonparametric chi-square (X^2) test. Bivariate logistic regression analysis analyzed the independent variables that were significantly associated with the number of drugs taken per day (≤ 3 drugs and ≥ 4 drugs).

Ethical aspects

Prior to the study implementation, this study was submitted to and approved by the Aragon Clinical Research Ethics Committee (CEICA). All participants provided their written informed consent at the beginning of the interviews.

RESULTS

The sample consisted of 213 individuals (men and women), and their sociodemographic characteristics are shown in table 1. Women comprised 79.3% of the participants, and men, 20.7%. Mean age was 78 years (ranging from 65 to 97 years) with SD±6.999. At least one drug per day was taken by 95% of the participants, and the mean number of drugs per day was 5.38, SD± 3.501, ranging between 0 and 17.

Bivariate analysis revealed that 65.3% took ≥ 4 drugs per day, while 34.7% took ≤ 3, and a greater number of drugs was found among the 76- to 86-year-old age group. Of the total sample, 31.9% presented risk of falling, and among the group that took ≥ 4 drugs, this figure was 41.7%, compared with 13.5% of those who took ≤ 3. Half of those who took ≥ 4 drugs per day were widowed, while among those who used ≤ 3, half were married. One third of those who took ≥ 4 drugs used technical walking aids. Of the older adults who lived alone, 67% took ≥ 4 and 33% took ≤ 3. Urinary incontinence also had a higher prevalence among people who took ≥ 4 drugs 69.7% and 30.3% for those who took ≤ 3. A great number of individuals exercised, but when the sample was divided into the number of drugs taken per day, the prevalence remained the same.

Three out of four individuals had suffered more than one fall in the last year, and fear of falling was highly prevalent among this population, regardless of the number of drugs taken. Considering the general population, approximately one-third presented depression, and when analyzed by number of drugs taken, 78.3% of those with depression took ≥ 4 drugs, compared with 21.7% of those who took ≤ 3 drugs.

Using the nonparametric X^2 test and a CI of 95%, all the independent variables were run against the dependent variables (≥ 4 drugs and ≤ 3 drugs). Statistically significant associations were found between the use of ≥ 4 drugs and age, the use of walking aids, physical activity, risk of falls, and depression variables (Table 1). In the group that took ≤ 3 drugs, significant associations were found for urinary incontinence p=0.041, physical activity p=0.029, and risk of falls p=0.001.

Table 1 – Univariate analysis, bivariate analysis and X^2 test for the use of ≥ 4 drugs per day – Zaragoza (Spain), May – July 2015.

VARIABLES	≤ 3 drugs n= 74 (34,7%)	≥ 4 drugs n= 139 (65,3%)	TOTAL n= 213 (100%)	p (<0.05)
Gender				
Men	14 (18.9)	30 (21.6)	44 (20.7)	0.647
Women	60 (81.1)	109 (78.4)	169 (79.3)	
Age				
[65 to 75]	41 (55.4)	52 (37.5)	93 (43.7)	0.041
[76 to 86]	27 (36.5)	75 (53.9)	102 (47.9)	
[87 to 97]	6 (8.1)	12 (8.6)	18 (8.4)	
Marital status				
Single	6 (8.1)	10 (7.2)	16 (7.5)	0.402
Married	32 (43.2)	52 (37.4)	84 (39.4)	
Widowed	29 (39.2)	71 (51.1)	100 (46.9)	
Separated	1 (1.4)	1 (0.7)	2 (0.9)	
Divorced	6 (8.1)	5 (3.6)	11 (5.1)	
Walking aids				
Yes	10 (13.5)	40 (28.8)	50 (23.5)	0.012
No	64 (86.5)	99 (71.2)	163 (76.5)	
Lives alone				
Yes	31 (41.9)	63 (45.3)	94 (44.1)	0.631
No	43 (58.1)	76 (54.7)	119 (55.9)	
Urinary incontinence				
Yes	27 (36.5)	62 (44.6)	89 (41.8)	0.253
No	47 (63.5)	77 (55.4)	124 (58.2)	
Physical activity				
Yes	59 (79.7)	81 (58.3)	140 (65.7)	0.002
No	15 (20.3)	58 (41.7)	73 (34.2)	
Falls in the last year				
1 fall	19 (25.7)	35 (25.2)	54 (25.3)	0.937
≥ 2 falls	55 (74.3)	104 (74.8)	159 (74.6)	

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Fear of falling				
Yes	47 (63.5)	82 (59.0)	129 (60.5)	0.520
No	27 (36.5)	57 (41.0)	84 (39.4)	
Risk of falls/Tinetti				
= < 24[a]	10 (13.5)	58 (41.7)	68 (31.9)	<0.001
= > 25b[b]	64 (86.5)	81 (58.3)	145 (68.0)	
Depression/Yesavage				
= > 5[c]	13 (17.6)	47 (33.8)	60 (28.1)	0.012
= < 4[d]	61 (82.4)	92 (66.2)	153 (71.8)	

CI: 95%. [a] Risk of falls. [b] No risk of falls. [c] Depression. [d] No depression.

Binary logistic regression analysis introduced all the independent variables associated with the use of ≥ 4 drugs and the results showed that taking ≥ 4 drugs was associated with the risk of falls among noninstitutionalized older adult populations and with a history of falls in the 12 months prior to the study p=0.010 OR=4.034 (Table 2). This association was inverted among individuals who took ≤ 3 drugs p=0.006 OR=0.335, with OR <1, representing a protection factor (Table 3). This shows that the use of at least 4 drugs was a risk factor for people already at risk of falling. For example, in this scenario, a widowed 84-year-old woman, who takes ≥ 4 drugs per day, lives alone, uses no walking aids, presents urinary incontinence, does not exercise, is afraid of falling, and who has suffered more than one fall in the last year and was depressed presents a 99.5% chance of falling again.

Table 2 – Binary logistic regression analysis of all the variables that presented a statistically significant association in the X^2 test with the use of ≥ 4 drugs per day – Zaragoza (Spain), May – July 2015.

	B	Sig.	Exp(B)	95% CI for EXP(B)	
				Min.	Max.
Age	.110	.697	1.116	.642	1.940
Walking aids	-.347	.533	.707	.237	2.104
Physical activity	-.694	.056	.499	.245	1.017
Depression	.155	.710	1.168	.515	2.648
Risk of falls	1.395	.010	4.034	1.393	11.681
Constant	.610	.268	1.841	-----	-----

Exp(B): Odds ratio. Sig.: Significance level. CI: Confidence interval.

Table 3 – Binary logistic regression analysis of all the variables with a statistically significant association in the X^2 test for the use of ≤ 3 drugs per day – Zaragoza (Spain), May – July 2015.

	B	Sig.	Exp(B)	95% CI for EXP(B)	
				Min.	Max.
Physical activity	.347	.341	1.415	.693	2.890
Risk of falls	-1.093	.006	.335	.153	.734
Urinary incontinence	-.535	.101	.586	.309	1.111
Constant	-.595	.104	.552	-----	-----

Exp(B): Odds ratio. Sig.: Significance level. CI: Confidence interval.

DISCUSSION

Most of the studies found in the scientific literature analyzed the incidence of falls among individuals taking certain types of drugs. Few have correlated the number of drugs with the risk of falls, and even less have targeted populations with a history of falls in the last year[14-15]. The present study considers that this population is at a greater risk of repeated falls, and therefore, should be examined in terms of the influence of the number of drugs taken daily. Other studies have shown that taking a greater number of drugs increases the risk of falls, more so than the class of medication taken[20-21], that is, the more drugs are used, the higher the probability of falling. Significant associations were found between depression and risk of falls[20]; however, in the present study, this association was not found. This finding may be explained by the fact that the studied population was not institutionalized.

A unique finding of the present study was the statistically significant association between the risk of falls and the use of ≥ 4 drugs, considered a risk factor for this type of population. In contrast, the use of ≤ 3 drugs was not significant. These findings are consistent with those of another study published in 2012, although the results were not

as statistically significant as the present study (p=0.027 OR:1.14 n=116). This discrepancy can be explained by differences in sample size and data collection procedures, as the data in the other study were collected by reviewing patient clinical history[2]. Another study also analyzed the association between the number of drugs taken and risk of falls; however, significant associations were found at ≥ 5 drugs per day, regardless of the type of medication[22]. A study conducted with hospitalized individuals investigated the importance of drug-related falls and reported similar findings, with one out of three individuals suffering recurring falls every year. In that study, 77.1% of the analyzed population took 5 or more drugs, with a mean of 7.4 drugs per day, higher than that in the present study. However, the sample consisted of people of all ages. Of the 214 analyzed individuals, 88.8% were older than 60 (190 individuals), and a direct correlation was found between age and susceptibility to future falls. Significant associations were found between the risk of falls and the occurrence of recurrent falls and greater use of drugs (p=0.0001). In the present study, significant associations were found with the use of ≥ 4 drugs taken per day[23]. The sample consisted of noninstitutionalized functional older adults above the age of 65, but age was not associated with the risk of falls. The only associated variable was the use of ≥ 4 drugs per day.

The results of the present study are important and clinically relevant, indicating that the use of ≥ 4 drugs per day was a risk factor for falls. These findings should serve as a reminder to health professionals, especially those in primary care, to weigh the benefits of drug therapy against the risk of potential falls among more susceptible individuals. Most studies found associations between the number and type of drugs taken with falls.

This study indicates that risk factors should be investigated before falls actually occur. Further studies should focus on detecting risk of falls, allowing for the analysis of possible associated risk factors. This would help improving fall prevention protocols and care actions in relation to falls. The risk of falls needs to be assessed more frequently, as it is an important indicator of frailty, enabling the prevention of future falls among this population, possibly delaying dependency and disability, and justifying the ongoing need to explore this phenomenon.

Limitations

Limitations of the present study include the impossibility of studying patient adherence to the pharmacological treatment.

CONCLUSION

Taking four or more drugs per day was considered a very relevant risk factor among noninstitutionalized older adults who had suffered a fall in the year prior to the study and who were at risk of falling.

RESUMEN

Objetivo: Determinar qué número de medicamentos consumidos diariamente es influyente en el riesgo de caídas en ancianos no institucionalizados y con historial de caídas en el último año. Método: Estudio descriptivo mediante muestreo aleatorio con la utilización de los siguientes instrumentos de medida: cuestionario de la OMS para el estudio de caídas en el anciano, escala de marcha y escala depresión geriátrica y escala de marcha y equilibrio. El análisis univariante, bivariante con prueba no paramétrica de Chi-cuadrado y regresión logística binaria se ellevó a cabo con el programa estadístico SPSS versión 21.0. Resultados: Participaron del estudio 213 personas. El consumo ≥ a 4 medicamentos se comportan para el riesgo de caída p=0,010 OR=4,034. Esto mismo no sucede para personas con un consumo ≤ a 3 medicamentos p=0,006 OR=0,335. Conclusión: Un consumo a partir de cuatro o más medicamentos diarios se considera un factor de riesgo para las personas ancianas que se encuentren en riesgo de caídas.

DESCRIPTORES

Anciano; Accidentes por Caídas; Utilización de Medicamentos; Marcha; Balance Postural; Enfermería Geriátrica.

RESUMO

Objetivo: Determinar o número de medicamentos consumidos diariamente que influencia o risco de quedas em idosos não institucionalizados e com histórico de quedas no último ano. Método: Estudo descritivo mediante amostragem aleatória com a utilização dos seguintes instrumentos de medida: questionário da OMS para o estudo de quedas no idoso, escala de marcha, escala de depressão geriátrica e escala de marcha e equilíbrio. A análise univariante, bivariante, com prova não paramétrica de qui-quadrado e regressão logística binária foi realizada com o programa estatístico SPSS versão 21.0. Resultados: Participaram do estudo 213 pessoas. O consumo ≥ a 4 medicamentos comporta-se como um fator de risco de queda p=0,010 OR=4,034. O mesmo não acontece para pessoas com um consumo ≤ a 3 medicamentos p=0,006 OR=0,335. Conclusão: Um consumo a partir de quatro medicamentos diários é considerado um fator de risco para as pessoas idosas que se encontrem em risco de quedas.

DESCRITORES

Idoso; Acidentes por Quedas; Uso de Medicamentos; Marcha; Equilíbrio Postural; Enfermagem Geriátrica.

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