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## Falls in the elderly: Prevalence and explanatory factors in Kinshasa: Democratic Republic of Congo

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### Abstract

**Introduction:** The fall of the elderly is a real fact and affects many elderly people at home. The objective of this study is to contribute to the prevention of falls in the elderly at home in the Democratic Republic of Congo.

**Methods:** This is a descriptive cross-sectional study of 115 elderly people living at home in the city of Kinshasa. Data were collected in December 2021. The relationships between the prevalence of falls, the extrinsic or intrinsic characteristics of the elderly and the risk factors for falls were analysed by multivariable logistic regressions.

**Results:** Analyses were performed on 115 seniors, more than 60% of whom were aged 75 years and over. The prevalence of falls was 41.7%. It was higher in patients who used psychotropic drugs with a sleep disorder (ORa= 9 [2.9-31.3];  $p<0.001$ ) and those with comorbidity (ORa=2.7[1.2-5.9];  $p<0.001$ ). The use of technical aids was found to be a protective factor (ORa=0.2 [0.1-0.9];  $p<0.039$ ).

**Conclusion:** Falls of elderly people at home are frequent in the Democratic Republic of Congo due to the lack of appropriate care institutions. In a context marked by the ageing of the population, a monitoring and supervision programme for the elderly and systematic screening to identify the risk factors for falls in the elderly living at home is essential if we want to significantly reduce its prevalence and consequences.

**Keywords:** Falls, elderly people, risk factors, Kinshasa, RD. Congo

### Introduction

Falls in the elderly are a geriatric syndrome with significant morbidity and mortality, recognised as a public health problem and, more recently, also as an independent marker of frailty, and are associated with increased morbidity and mortality, which are not only explained by the aftermath of the incident, but which make it a geriatric syndrome in its own right <sup>[1]</sup>.

According to the World Health Organisation (WHO), falls are a major public health problem worldwide. An estimated 646,000 fatal falls occur each year, which is the second leading cause of unintentional injury death, after road traffic injury deaths. More than 80% of fall-related deaths occur in low- and middle-income countries, including more than 60% in the WHO Western Pacific and South-East Asia Regions. In all regions of the world, the highest death rate is among people over 60 years of age <sup>[2]</sup>.

The incidence of falls is estimated to reach about one third of people over 65 per year in the United States <sup>[3]</sup> and the United Kingdom, and to affect more intensely people in institutions <sup>[4]</sup>. In France, according to the Baromètre santé, in 2005, 24% of people aged 65 to 75 fell in the past year. According to the 2010 edition, more than one in five people in the 55-85 age group (21.6%) reported having fallen in the last 12 months <sup>[5]</sup>.

The incidence in Belgium has been estimated at 2.2/1000 in women aged 65-74 years and 12/1000 in women aged 75-84 years <sup>[6]</sup>. There are about 11250 hip fractures per year resulting in 12000 hospital admissions with an average duration of 34 days. The annual cost is estimated to be between 3.5 and 4.5 billion per year.

In Africa, there is not yet a mastery of the care pathway of the elderly to build adapted care models to improve their management <sup>[7]</sup>. The Democratic Republic of Congo is not spared from this situation.

Many factors contribute to the explanation of falls among the elderly and can be classified as intrinsic and extrinsic factors [7]. One third of falls are attributed to external factors related to the environment of the elderly.

The risk of falling again is twenty times higher after a first fall, and the risk of death increases four times in the year following the fall [8].

Ageing is accompanied by a decrease in the body's functional capacities. In general, this impairment is most evident in situations that put functional reserves at risk (exertion, stress, acute illness). Falls are known to be the main cause of addiction. It is curious that few studies have been conducted in the Democratic Republic of Congo. Notwithstanding the serious consequences of falls in the elderly, we do not have enough surveys on falls and risk factors in the Democratic Republic of Congo, mainly in its capital city of Kinshasa. However, as a major public health problem, the prevalence and associated risk factors need to be continuously updated to ensure active prevention. The objective of this rare study in our setting is to contribute to the improvement of the quality of life of elderly people at home in the city of Kinshasa.

## Materials and Methods

### Setting of the study

Our study is conducted in the provincial city of Kinshasa, in the Democratic Republic of Congo. The province of Kinshasa is one of the 26 provinces of the Democratic Republic of Congo; it is the capital city and seat of the country's institutions.

The province of Kinshasa is one of the 26 provinces of the Democratic Republic of Congo; it is the capital city and seat of the country's institutions. It is in the west of the DR Congo and covers an area of 9,965 km<sup>2</sup> with 12.1 million inhabitants in 2016 who could reach inhabitants in 2016 which could reach 19.9 million inhabitants in 2030 according to the United Nations (UN) in its report on the world's cities in 2016.

The peripheral commune of the city of Kinshasa, the commune of Kisenso, was used as a place for data collection. Kisenso is a commune in the south of the city of Kinshasa in the Democratic Republic of Congo. It is one of the new settlements, located in the hilly area south of Lemba and Matete. It is bounded to the west by the Matete River, to the east by the Ndjili River and to the south by the Kwambila River. We chose this commune because of the precarious conditions of access to health care.

### Population and type of study

This is a descriptive cross-sectional study conducted in December 2021. The population of our study is composed of 115 elderly people living at home in 8 neighbourhoods of the commune of Kisenso during the above-mentioned period. We conducted a household survey and the household with a person aged 65 years and over was selected. Only those aged 65 and over who were present at the time of the survey were selected for this study.

### Data collection.

The data were collected by nursing students in the 8 neighbourhoods selected at random from the 17 neighbourhoods of the municipality by means of a household survey using a pre-established form that served as a data collection instrument. This instrument consisted of

four parts: The first part was devoted to the identification of the elderly person, the second part consisted of questions on clinical information, the third part dealt with questions related to the fall, the number, the time of the fall, the circumstances, and the post-fall consequences, the fourth part was devoted to the treatment and care after the fall.

The following variables were collected: age, sex, height, weight, clinical data (different pathologies), history, use of technical aids, use of medication if chronic diseases were present and their number was determined. Depressive symptoms were assessed with the Geriatric Depression Scale 15-point (GDS-15). Cognitive status was assessed using the Mini Mental State Examination (MMSE), due to the lack of geriatric facilities and accurate diagnosis of dementia in DRC. If the MMSE was less than 18, the elderly person had behavioural disorder and. Assessment of nutritional status using the MNA scale: Mini Nutritional Assessment. If the MNA was below 17, the elderly person had undernutrition. The Mini Nutritional Assessment is scored out of 30 points: - an MNA score of less than 17 points corresponds to a poor nutritional status; - an MNA score of between 17 and 23.5 indicates a risk of malnutrition; - an MNA score of 24 or more indicates a satisfactory nutritional status. The MNA is organised in two stages: 6 questions to screen for the patient's symptoms (appetite, weight, motor skills, etc.), followed by a score and 12 questions for an overall assessment of nutrition (number and quality of meals, autonomy in taking meals, etc.).

We also identified elderly people with several associated pathologies (comorbidity).

### Statistical analysis and processing

All data was encoded using EXCEL software and analysed using STATA 12 software.

Proportions and averages will be used for the description of the sample.

In univariate analysis, the chi-square test or exact Fisher's test was used when the chi-square test conditions were not met. And odds-ratios and their 95% confidence intervals were used among the measures of epidemiological associations.

In Multivariate Analysis, a degressive step-by-step multiple logic regression was used to study the factors associated with the fall of seniors and the adjusted odds-ratios derived from the final model, were also presented. The Hosmer Lemeshow fit test was used for the fit of the model. All variables with a p-value less than 0.10 were introduced into the model. The statistical significance threshold has been set at 5%.

### Ethical considerations

All information collected has been kept with respect for the privacy of individuals. We guaranteed anonymity and no privacy information was disclosed. Respondents had consented to participate in the study.

## Result

### Description of the sample

Our study involved 115 people, of average age (Mean±DS) equal to 69±4.5, of whom 62.6% were over 65 years of age. The majority were female (70.4%), sex ratio woman to male of 2.4. The prevalence of fall in 2021 was 41.7%. The average number of falls was 3±2.3 with a minimum of one fall and maximum of 6 falls in the last 6 months of 2021.

More than 50% of seniors consumed more than 3 drugs per day with an average number of drugs of 7.0±4.1. Elderly people on psychotropic drugs accounted for more than half of seniors and 90% were on cardiovascular drugs. According to the nutritional status of seniors, 25.2% were

undernourished according to the MNA. 21% of seniors had depressive symptoms according to GDS-15 (Table 1 and 2). In this study, 40% of the elderly had more than two associated pathologies (comorbidity).

**Table 1:** Socio-demographic characteristics, treatment and number of falls reported by respondents.

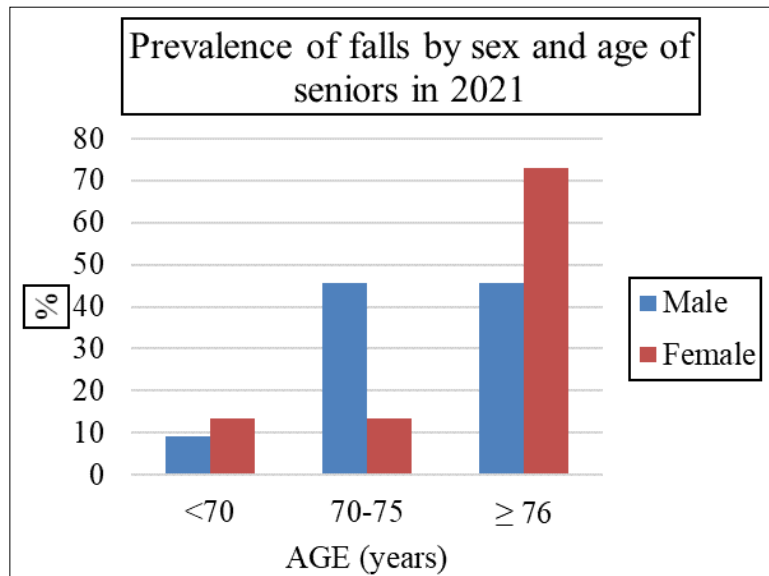
Parameters	Effective	%
<b>Age (years)</b>		
< 70	24	20.9
70-75	19	16.5
≥ 76	72	62.6
<b>Sex</b>		
Male	34	29.6
Female	81	70.4
<b>Number of drugs</b>		
<3	28	24.4
3-5	65	56.5
≥6	22	19.1
<b>Recent change in treatment &lt; 15 days</b>		
Yes	38	33.1
No	77	66.9
<b>Psychotropic</b>		
Yes	51	55.7
No	64	44.3
<b>Cardiovascular</b>		
Yes	104	90.4
No	11	9.6
<b>Number of falls</b>		
0	67	58.3
1	18	15.6
>1	30	26.1

GDS-15: Geriatric Depression Scale

**Table 2:** Clinical characteristics and nutritional status

Parameters	Effective	%
<b>Musculoskeletal conditions</b>		
Yes	11	9.6
Not	104	90.4
<b>Sensory disorders</b>		
Yes	6	5.2
Not	109	94.8
<b>Neurological conditions (Parkinson's)</b>		
Yes	26	22.6
Not	89	77.4
<b>Depressive symptoms (GDS-15)</b>		
≥5	25	21.7
<5	90	78.3
<b>Urinary Incontinence</b>		
Yes	6	5.2
Not	109	94.8
<b>Hypertension</b>		
Yes	104	90.4
Not	11	9.6
<b>MNA &lt;17</b>		
Yes	29	25.2
Not	86	74.8
<b>Use technical assistance</b>		
Yes	46	40.0
Not	69	60.0

MNA: Mini Nutritional Assessment,



**Fig 1:** Prevalence of Falls by Sex and Age of Seniors

The prevalence of falls differed by sex and age of the senior, (p=0.073) (Figure 1), although the difference was not statistically significant

**Table 3:** Factors associated with the fall of seniors in univariate analysis by sociodemographic characteristics, number of drugs and their types.

Parameters	Falls N (%)	OR (IC95%)	p
<b>Age (years)</b>			
<70	6(31.6)	1	
70-75	10(41.7)	1.5(0.4-5.4)	0.498
≥ 76	32(44.4)	1.7(0.6-5.1)	0.315
<b>Sex</b>			
Female	37(45.6)	1.8(0.8-4.1)	0.188
Male	11(32.4)	1	
<b>Number of Drugs</b>			
<3	8(28.6)	1	
3-5	27(41.5)	1,7(0.7-4.6)	0.239
≥6	13(59.1)	3,6(1.1-11.8)	0.033
<b>Psychotropic</b>			
Yes	31(60.8)	4.2(1.9-9.4)	<0.001
Not	17(26.6)	1	
<b>Cardiovascular</b>			
Yes	11(100.0)	NA	NA
Not	37(35.6)		
<b>Recent change of treatment &lt; 15 days</b>			
Yes	15(39.5)	0.9(0.4-1.9)	0.729
Not	33(42.9)	1	
<b>GDS</b>			
≥5	39(43.3)	0.7(0.3-1.8)	0.511
<5	9(36.0)	1	

The results of the univariate analysis present the factors associated with the fall of the elderly person in this study. The risk of falling was 3 times for elderly people who

consumed more than 6 drugs per day. Plus 4 times for those who took the psychotropic drugs. No differences were found by sex and age of the elderly (Table 3).

**Table 4:** Factors associated with the fall of the elderly in univariate analysis according to pathologies, nutritional status, use of technical assistance.

Parameters	Falls N (%)	OR (IC95%)	p
<b>Musculoskeletal conditions</b>			
Yes	4(36.3)	0.8(0.2-2.8)	0.704
Not	44(42.3)	1	
<b>Sensory disorders</b>			
Yes	6(100.0)	NA	NA
Not	41(38.5)		
<b>Neurological conditions</b>			
Yes	36(40.5)	0.8(0.3-1.9)	0.604
Not	12(46.2)	1	
<b>GDS</b>			
≥5	39(43.3)	0.7(0.3-1.8)	0.511
<5	9(36.0)	1	
<b>Comorbidity</b>			
Yes	33(52.4)	2.7(1.2-5.9)	0.001
Not	15(28.9)	1	
<b>Hypertension</b>			
Yes	12(41.4)	0.9(0.4-2.3)	0.964
Not	36(41.9)	1	
<b>MNA &lt;17</b>			
Yes	15(51.7)	1.7(0.7-4.1)	0.207
Not	33(38.4)	1	
<b>Use technical assistance</b>			
Yes	12(26.1)	0.3(0.1-0.7)	0.005
Not	36(52.2)	1	

Depending on clinical factors, the risk of falling was greater for seniors who had comorbidity, 2.7 times higher. On the other hand, the proper use of technical assistance was found to be a protective factor of fall, the risk was 3 times less than the others. For the other factors, we found a statistically significant difference (table 4).

**Table 5:** Factors associated with the fall of seniors in multivariate analysis.

Parameters	Adjusted OR (95% CI)	p
<b>Psychotropic</b>		
Yes	9(2.9-31.3)	<0.001
Not	1	
<b>Use technical assistance</b>		
Yes	0.2(0.1-0.9)	0.039
Not	1	

Combined with the results of the univariate analysis, elderly people who took psychotropic drugs were 9 times more likely to fall. On the other hand, the use of technical assistance was a protective factor for some seniors. The risk of falling was 5 times less for seniors who used their technical aids wisely compared to others (Table5). The model with associated pathologies highlighted comorbidity as a risk factor for falling, all other things being equal, the risk was 3 times more like falling (ORa=2.7[1.2-5.9]; p<0.001).

**Discussion**

Our study aims to contribute to the improvement of the quality of life of the elderly in the Democratic Republic of Congo, which does not have geriatric structures, or a health policy focused on the disease of the third age. To do this, it is necessary to know the prevalence and risk factors that suggest that a fall is possible. Falls as one of the reasons for disability and death, should not be observed with a high frequency at home without the appropriate measures. The

prevalence of falls in 2021 in Kinshasa's Kisenso neighbourhoods was 41.7%.

Our results showed that the elderly was predominantly female. Women were more likely than men to be at risk of falling. Several authors have shown that women are more at risk than men. Although statistically the difference was not significant in this study, the unobserved difference by sex would be explained by the small sample size, which would explain the lack of power to observe the differences as put by these authors. A study with a large sample size would remove this ambiguity.

The link between the consumption of 6 or more drugs was not a surprise. Several authors have demonstrated this relationship which confirms the consumption of 6 or more drugs as a good fall preacher in the elderly. He found an odds ratio of 1.86 [1.34-2.57]. In our series, we found an odds ratio of 3.6(1.1-11.8). These results confirm that the consumption of 6 or more drugs is a predictor of falls in seniors [16], although in our study this difference was not observed in multivariate analysis.

Regarding psychotropic drugs, Kelsey *et al.* [16] showed that psychotropic drugs are influential factors in the fall among seniors, they found an odds ratio of 1.53 [1.14-2.06]. In our study, we were able to confirm this because we found an odds ratio of 4.2(1.9-9.4), which proves that psychotropic drugs are predictors of falls for the elderly. Selon Rossat, the risk of falling is increased when taking psychotropic drugs (of the order of 1.7 to 2 times) [17]. Psychotropic drugs contribute to the risk of falling through direct and indirect mechanisms such as sedation, feelings of dizziness, decreased cognitive and motor performance, balance disorders, parkinsonism, visual disorders. They contribute to the occurrence of orthostatic hypotension [16]. This association between the use of psychotropic drugs and the risk of falling is particularly strong in dependent elderly populations, the consumption of psychotropic drugs being very high. This confirms our results.



Regarding Impairment of cognitive faculties and dementias, Bernard PETIT has already shown an association between cognitive function and the fall of the elderly. The existence of cognitive decline is a risk factor for falls in patients even if cognitive impairment is moderate [18]. On the other hand, in our series, we did not find a difference, the lack of diagnosis of certainty in Africa, where geriatric structures are struggling to develop would explain this result.

According to certain characteristics of subjects in our sample, more than 50% of seniors who had at least one fall had a higher frequency of comorbidity. In the study by Kelsey *et al.*, comorbidity is a factor associated with falling in seniors. He found an odds ratio of 1.17 [1.08-1.27] [16]. For Espolio Desbaillet, comorbidity is identified as a major risk factor for falls, a risk that increases linearly with the number of comorbidities such as Parkinson's disease, osteoarthritis, cognitive disorders, orthostatic hypotension to name only the most important. In our study, we were also able to demonstrate this association. We found an odds ratio of 2.7 (1.2-5.9) [1]. These results confirm that comorbidity is a predictor of falls in seniors.

The fall of the elderly is a multifactorial problem [20]. The use of a technical walking aid adapted to the locomotor disorder is among the recommendations to prevent falls. In our study, older people who used the assistive devices were 5 times less likely to fall, compared to others.

### Limits

Given the place of data collection, the context in a country where geriatrics is not developed, it is not possible to study all the factors likely to be related to the risk of falling (fear of falling, the history on the fall ...) and the consequences, the duration that the elderly person remained on the ground.

### Conclusion

The fall of the elderly is frequent and is accompanied by an increased risk of loss of autonomy. The assessment of risk factors makes it possible above all to detect high-risk patients, but also to develop an adapted individual management program, which should contribute to the prevention of falls and / or to the increased reduction of prevalence in this target group. However, the implementation of sustainable actions requires the development of a program of screening and care of the elderly, based on the revision, if possible, of the prescription of drugs, especially when the person takes more than four drugs a day and / or psychotropic drugs and analyses other factors both intrinsic and extrinsic. Focusing on the medicine of the elderly in the Democratic Republic of Congo is an imperative. The health system must be able to organize the care of any person regardless of age. This work is a plea for this often-forgotten category of the person.

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