Head and face injuries in elderly patients victims of fall. A single trauma center analysis

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SUMMARY

Objective. The purpose of this study was to identify the profile of elderly victims of falls and the occurrence of injuries and fractures in the head and face regions.

Material and methods. Overall, 426 medical records of individuals aged 60 years or older of both genders hospitalized due to fall were analyzed. Data on gender, age group, period of occurrence, type of fall, presence of head and face injury and fracture of facial bones were collected. Data were organized with SPPS, version 20, and presented through descriptive and inferential statistics (Chi-square test). Poisson regression analysis was used ($\alpha < 0.05$).

Results. The majority of victims were women (62.4%), aged 80 years or older (45.5%). Occurrences were more frequent in the daytime period (65.6%) and falls were mostly from the self-height (93.7%). Head and face lesions were found in 14.1% and 5.9% of victims, respectively. However, the presence of facial fracture was low (1.9%). Association between gender and occurrence of head (p=0.001) and face injury (p=0.017) was observed. The presence of "head injury" was associated with variables "type of fall" (p<0.001) and "existence of bone fracture" (p<0.001).

Conclusion. Women aged 80 or over are the main victims of falls. Occurrences are common in the daytime period and due to falls from self height. Although soft tissue injuries in head and face were common, facial fractures showed low frequency.

Keywords: accidental falls, old age assistance, wounds and injuries.

INTRODUCTION

Increased longevity has been observed worldwide, including in developing countries (1, 2). In the course of the aging process, factors such as genetic composition and exposure to different physical, social and economic environments act influencing the health levels of the elderly population (3, 4).

In the context of the physical environment, the occurrence of falls is highlighted, which represent a multifactorial phenomenon that causes a significant increase in morbidity and mortality rates, especially in people of more advanced ages (5).

In this way, falls have become an important public health problem. There are numerous risk factors for their occurrence, such as loss of reflexes (5), being female, physical frailty, muscle weakness, unstable gait / balance and impaired cognition (6-80). Domestic risks are also indicated as factors that cause falls, since the functional requirements of the environment often exceed the balancing capacity of the elderly (9-13).

Falls can lead to trauma of varying magnitude in different regions of the body and face (14). In the latter site, there are soft tissue injuries and also the involvement of the main components of the facial skeleton, including mandible, maxilla, zygoma, naso-orbital-ethmoid complex and supraorbital structures (15-17). Facial fractures engender serious sequelae and can often have a significant effect on function and quality of life (18).

In view of the above, this study aimed to evaluate the presence of lesions in the head and face regions and the occurrence of fractures in the elderly victims of falls, attended at a reference hospital in a state capital located in northeastern Brazil.

MATERIALS AND METHODS

This cross-sectional study was developed at the "Senador Humberto Lucena" State Emergency and Trauma Hospital, a public reference institution for the

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emergency care of trauma victims, located in the city of João Pessoa, Brazil.

The sample consisted of 426 records of patients aged 60 years or older hospitalized due to falls [CID 10: W00-W19] (19, 20), from January to December 2011. Fall was defined as an event that results in a person coming to rest inadvertently on the ground or floor or other lower level. Falls due to assault and intentional self-harm were not included in this study (20).

Two well-trained researchers [R. M. V and M.S.A.P.] performed the data collection in the Medical and Statistical Archive Sector [SAME]. Socio-demographic information (gender and age group) was obtained, as well as information referring to the fall (period of occurrence [morning, afternoon, evening and night], type of fall [self-height and height]) and injuries (presence of head and face injury, presence of bone and facial fractures).

For the multivariate analysis (Poisson Regression with robust variance), "bone fracture" was adopted as dependent variable. Crude PR was calculated in the bivariate analysis and the adjusted PR was calculated in the multivariate analysis. The significance level was set at 5% ($p<0.05$). All statistical analyses were performed using the IBM SPSS Statistics for Windows (Version 20.0. Armonk, NY: IBM Corp.) and a 95% confidence interval was adopted.

RESULTS

Out of 426 participants, 266 (62.4%) were women and 45.6% were in the age group of 80 years and above. Mean age was 75.6 years (±9.9), being 74.5 years (±10.6) for men and 77.8 years (±9.2) for women. The ratio between the female and male genders was 1.7:1 (woman:male). Injuries occurred at different periods, with afternoon having the highest number of occurrences (37.1%). Falling episodes from self height affected the majority of victims (93.7%), while bone fractures in different regions of the body were present in 68.5% of the sample (Table 1).

The prevalence of head and face injuries was 14.1% and 5.9%, respectively. Facial fractures were not very frequent (1.9%) and the bone structures commonly affected were nasal bones (25.0%) and the zygomatic bone (37.5%) (Table 2).

Association between gender and the occurrence of head ($p=0.001$) and face injury ($p=0.017$) was observed (Table 3).

The presence of "head injury" was associated with "type of fall" ($p<0.001$). Table 4 shows the results of the Poisson regression analysis to determine factors associated with the occurrence of falls. Based on the adjusted model, it was observed that falls were more associated with head injury (PR=0.26, 95% CI=0.15-0.44, $p<0.001$).

DISCUSSION

The fragility perceived in individuals of more advanced ages is associated with social vulnerability (21) and increased mortality (22), with poor cognitive status and falls being the main determinants of this problem (23, 24). Epidemiological surveys operate as pioneers and initial tools in logistic cost-effectiveness management processes, as well as in the decision making of managers of health policies, which suggest strategies that positively impact health-related quality of life (25).

Table 1. Distribution of victims according to socio-demographic data, type of fall and bone fracture

Variables	N	%
Gender [n=426]		
Male	160	37.6
Female	266	62.4
Age (in years) [n=426]		
60-69	113	26.5
70-79	136	31.9
80 or more	177	45.6
Period [n=425]		
Morning	121	28.5
Afternoon	158	37.1
Evening	119	28.0
Night	27	6.4
Type of Fall [n=426]		
Self Height	399	93.7
Height	27	6.3
Bone Fracture [n=426]		
Yes	292	68.5
No	134	31.5

Table 2. Distribution of victims according to presence of head and face injury, occurrence of facial fracture and types of fractured facial bones

Variables	N	%
Head Injury [n=426]		
Yes	60	14.1
No	366	85.9
Face Injury [n=426]		
Yes	25	5.9
No	401	94.1
Facial Fracture [n=426]		
Yes	8	1.9
No	418	98.1
Fractured Facial Bones [n=8]		
Orbital/ Zygomatic	1	12.5
Nasal/Mandible	1	12.5
Nasal	2	25.0
Zygomatic	3	37.5
Maxilla/ Mandible	1	12.5
Bone Fracture [n=426]		
Yes	292	68.5
No	134	31.5

According to WHO, approximately 28% to 35% of people aged 65 or over are victims of falls every year and the damages resulting from these occurrences are considered a major public health problem, considering that they account for more than half of causes of hospital admissions related to injuries in the elderly (20).

When analyzing the most affected gender, it is observed that women are the main victims of falls (2, 26-28). This fact was also verified in the present study, with women representing almost two thirds of victims. In Brazil, there has been a feminization of aging, so that in 2013, the number of older women reached 14.5 million, while the number of older men totaled 11.5 million. In addition, life expectancy at birth is 78.3 years for women and 71.0 years for men. Therefore, the greater longevity of women may increase the chances of suffering events that cause some type of injury (29), especially in older ages, since it was observed that most of victims were 80 years or older, confirming previous findings (27). In this regard, the literature highlights that older women are more likely to be involved in falls, especially those with greater severity (18) due to age-related biological changes that increase fragility in the elderly (20).

Table 3. Distribution of victims according to age, soft tissue lesion, head and face injury and occurrence of bone fracture according to gender

Variables	Gender				p value
	Male		Female		
	n	%	n	%	
Age (in years)					
60 to 69	58	51.3	55	48.7	0.002
70 to 79	46	33.8	90	66.2	
≥80	56	31.6	121	68.4	
Soft Tissue Injury					
Yes	124	39.9	187	60.1	0.105
No	36	31.3	79	68.7	
Head Injury					
Yes	35	58.3	25	41.7	0.001
No	125	34.2	241	65.8	
Face Injury					
Yes	15	60.0	10	40.0	0.017
No	145	36.2	256	63.8	
Bone Fracture					
Yes	104	35.6	188	64.4	0.222
No	56	41.8	78	58.2	

Table 4. Poisson regression analysis to determine factors associated with the occurrence of falls

Variables	Bivariate		Multivariate	
	Not Adjusted PR (CI 95%)	p-value	Adjusted PR (CI 95%)	p-value
Gender				
Male	1.00	0.217	1.00	
Female	1.09 (0.95-1.25)		0.96 (0.88-1.12)	0.944
Age (Years)				
60 - 69	1.00		1.00	
70 - 79	1.22 (1.03-1.46)	0.226	1.19 (1.01-1.39)	0.030
≥ 80	1.11 (0.93-1.33)	0.226	1.05 (0.88-1.25)	0.550
Period				
Daytime	1.00		1.00	
Nocturnal	0.88 (0.76-1.02)	0.094	0.95 (0.84-1.09)	0.520
Type of Fall				
Self Height	1.00		1.00	
Height	0.85 (0.62-1.18)	0.346	-	-
Head Injury				
No	1.00		1.00	
Yes	0.26 (0.15-0.43)	<0.001	0.26 (0.15-0.44)	<0.001

Regarding the period of occurrence, this study found higher frequency of falls in the daytime period (65.6%), being in agreement with previous findings (30). This finding differs from the hypothesis once raised, since it was believed that during the night shift, falls would be more frequent, moment at which victims would be at greater risk of falling when they got up to go to the bathroom or to drink water (31). It should also be pointed out that the life context of older adults may interfere not only with the period of occurrence but also with the dynamics of the situations involved in episodes of fall and where events take place, in their homes, other places or public roads.

The literature evidences that fall from the self-height is the most common type of fall in the elderly (32, 33), a finding also identified in the present study. Loss of consciousness due to syncopation or dizziness and slipping on a smooth or wet surface frequently in bathrooms and kitchens are identified as one of the most important factors that cause falls from self height in the elderly population (26).

As a complication of falls, in the present investigation, more than two thirds of victims suffered fractures, results similar to findings described in the United Arab Emirates (32). The major underlying causes for fall-related hospital admission are hip fracture, traumatic brain injuries and upper limb injuries (20). It is noteworthy that among older women, osteoporosis is considered a risk factor for fractures and has a high incidence in this population, being, however, a diagnosable, treatable disease whose prevention in most cases is inexpensive (26).

Regarding the presence of injuries in the head and face regions, this study

revealed prevalence of 14.1% and 5.9%, respectively. The literature has shown that the frequency of head and face injuries varies from 9.8% (32) to 21% (34). In this research, the existence of head injury was associated with the type of fall and the presence of bone fracture. As for facial fractures, low occurrence was observed (1.9%), a result similar to that reported in Italy (35).

In this study, nasal and zygomatic bones were the most commonly fractured, probably due to the prominence of these bones in relation to the other components of the facial skeleton, according to previous findings (18, 35). Facial trauma leads to profound sequelae and functional deficits related to speech, swallowing, and sight, all of which may already be compromised among individuals requiring nursing home care. Mandible fractures particularly often require greater acceleration forces than injuries in some other common sites, such as nasal fractures (18). However, in the study population, the occurrence of mandible fracture was relatively low.

The information gathered and presented by this research increase the knowledge of the profile of elderly victims of fall with repercussion in the maxillofacial complex; however, the results should be interpreted with caution, considering the cross-sectional nature of the study and the fact that data come from research using secondary data. One of the difficulties of working with secondary data lies in the fact that, in many situations, the incomplete recording of information prevents the faithful transcription of findings (36, 37).

It is expected that in the near future, further research may be conducted, especially with the inclusion of other variables and other study designs for better characterization of the study population, as well as the monitoring of sequelae resulting from fall episodes. The literature indicates that a considerable proportion of these falls occurs in the own residence of victims, meaning that they are events that can be reduced through the adoption of prevention programs and measures (26).

In addition, falls may also result in post-fall syndrome that includes dependence, loss of autonomy, confusion, immobilization and depression, which may lead to further restriction in daily activities (20). Therefore, it is necessary to invest in health education strategies aimed at this population segment with a view of reducing the risk factors that lead to the occurrence of falls, thus minimizing the injuries they cause, in order to provide better quality of life for the elderly population.

CONCLUSION

Women aged 80 or over are the main victims of falls. The occurrences are common in the daytime period and due to falls from self-height. Although head and face injuries were common, facial fractures showed low frequency.

ACKNOWLEDGMENTS

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY

All relevant data are within the paper and its supporting information files.

AUTHORS' CONTRIBUTIONS

Alidianne Fabia Cabral Cavalcanti, Sabrina da Silva Sousa Formiga, Taynná Dantas de Arruda and Alessandro Leite Cavalcanti drafted the manuscript and all coauthors read and edited it. Christiane Leite Cavalcanti, Catarina Ribeiro Barros de Alencar and Sérgio d'Ávila collaborated on the interpretation of findings and writing of the manuscript. Rogéria Máximo de Lavôr and Magaly Suênia Abrantes Pinto were important contributors to background research and data collection for this paper.

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