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Original Article

Maxillofacial Trauma Resulting from Physical Violence against Older Adults: A 4-year Study in a Brazilian Forensic Service

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Abstract

Objective: To evaluate the prevalence of maxillofacial trauma resulting from physical violence against older adults, describe patterns and identify factors associated with its occurrence. **Material and Methods:** This is a cross-sectional study conducted from the assessment of 7,132 reports of victims of violence who sought a Brazilian Service of Forensic Medicine and Dentistry, during the period from January 2008 to December 2011. Descriptive statistics, Pearson's chi-test square test and Poisson's univariate and multivariate regression (with robust variance) were performed using SPSS software version 20.0. The significance level was set at $p < 0.05$. **Results:** A total of 259 older adults suffered physical violence. The occurrence of maxillofacial trauma was observed in 42.9% of the sample. Lesions in soft tissue (90.1%) affecting more than one region of the face (40.4%) were the most frequent. The prevalence of maxillofacial trauma was more frequent among individuals older than 66 years (PR = 1.166; 95% CI = 0.865-1.572), males (PR = 1.119; 95% CI = 0.807-1.550), victims of violence occurred within the community (PR = 1.431; 95% CI = 0.951- 2.153), during the night shift (PR = 1.226; 95% CI = 0.911-1.651) and weekends (PR = 1.279; 95% CI = 0.955-1.714) performed without using blunt instrument (PR = 1.311; 95% CI = 0.932-1.846). **Conclusion:** The prevalence of maxillofacial trauma resulting from physical violence against older adults was high and soft tissue lesions affecting more than one face region were predominant.

Keywords: Violence; Elder Abuse; Maxillofacial Injury.

Introduction

External causes (accidents and violence) are of substantial importance in public health, given their magnitude and impact on people's lives, particularly in developing countries [1-3]. Traffic accidents and physical violence are major causes of death among young adults. However, studies have shown that these causes also deserve attention among older adults [4,5].

The problem of violence against older people has gained greater social visibility due to the increasing aging of the population that characterizes modern society. Over the past decade, interpersonal violence has been among the main etiological factors of maxillofacial traumas [6]. In addition, injuries resulting from interpersonal violence are difficult to investigate due to several factors, such as legal underreporting, since facial aggression generates fear, shame, low self-esteem and a sense of powerlessness in older adults [7].

In Brazil, the approval of the National Policy for Reduction of Morbidity and Mortality from Accidents and Violence (PNRMAV) represented a major achievement on the challenge of minimizing the impact of these events on the health indicators of the population [8]. Considering accidents and violence as public health problems, PNRMAV covers not only medical and biomedical issues, but also those related to lifestyles and to socioeconomic, historical and environmental factors, in which Brazilian society lives, works, relates and projects its future [9].

The identification of risk populations, the needs of health services and the development of prevention programs and clinical trials for the treatment of maxillofacial trauma directly depend on the knowledge of its distribution in different social, demographic, economic and cultural contexts. Considering the magnitude and significance of violence against older adults, the construction of new research objects that can serve to expose the problem in a comprehensive and detailed form is needed [5-7].

One way to advance in the understanding of the occurrence of trauma resulting from physical violence against older adults is through the analysis of reports issued by medico-legal and forensic services, since in their practice, forensic physicians and dentists not only produce reports, but a set of data that when appropriately arranged and interpreted in epidemiological studies can be useful for the development of public policies aimed at prevention, health promotion and specific assistance to victims [3,5-7].

In developing countries like Brazil, many studies of maxillofacial trauma resulting from physical violence against older adults were conducted in hospitals, usually for short periods of time [10,11]. Studies in medical-legal and forensic services are very few and can provide important information to guide decision making related to the management and prevention of these injuries.

Given the above, this study aimed to identify the prevalence of maxillofacial trauma resulting from physical violence against older adults, describe patterns and identify factors associated with its occurrence.

Material and Methods

This is a cross-sectional study that evaluated 7,132 cases of men and women who sought a Brazilian Service of Forensic Medicine and Dentistry to conduct forensic examination after suffering facial and / or body trauma due to interpersonal violence. Of this total, 259 cases were related to physical violence against adults aged 60 years or older.

In Brazil, people who are victims of physical violence and report the abuse to the police are referred to centers like this for performing forensic examination, which main objective is to assess the extent and patterns of trauma [12]. Data were related to cases registered for four consecutive years (January 2008 to December 2011). The study included records of nonfatal victims living in urban, suburban and rural areas of the metropolitan area of Campina Grande, Paraiba, Brazil, which has an estimated population of approximately 685,000 inhabitants.

Records were made by skilled professionals of the service that performed the function of medical expert and dental expert. Due to the fact that the service does not have a computerized system to manage the database, many records are filled freehand. Therefore, reports considered illegible or incomprehensible were considered an exclusion criterion.

Before the performance of the research, a pilot study and calibration procedures were carried out in order to correct any failures and standardize the form of interpretation.

For the organization of information, a form has been structured according to the information available in the records. Variables studied related socio-demographic profile of victims, patterns of maxillofacial trauma, characteristics of aggressors and the context in which the attacks occurred were assessed.

The variables were categorized as follows: victim's age dichotomized by the median (≤ 66 years /> 66 years), victim's sex (male / female), victim's area of residence (urban / suburban / rural), victim's marital status (without partner, i.e., single / widowed / separated, and with a partner, i.e., married / in a stable relationship), victim's schooling (≤ 8 years of study or > 8 years of study), aggression circumstance (residence / community), relationship between offender and victim (known people, such as family and partners, and strange people), and offender's sex (female / male). The aggression mechanism was categorized as: without the use of blunt instruments (such as slaps, punches, hair pulling, pushing and kicking) and with the use of firearm or some blunt instrument (such as knife, dagger, sickle) [13].

The time of day was categorized as diurnal (between 6:00 AM and 5:59 PM) or nocturnal (between 6:00 PM and 5:59 AM) and the day that the violence occurred was categorized as weekday (Monday–Friday) or weekend (Saturday and Sunday), respectively. The type of maxillofacial trauma was classified as soft tissue injury of the face (edema, bruising, lacerations), and bone fracture. Finally, the anatomical location of the maxillofacial trauma was classified as frontal, nasal, orbital, zygomatic, mandible, chin, buccal, lip, teeth and more than one region of the face.

Initially, the descriptive statistical analysis was performed, which corresponded to the calculation of absolute and relative frequencies for categorical variables, as well as central tendency measures (mean, median) and dispersion measures (standard deviation, minimum, maximum) for

continuous variables. Pearson's chi-square test ($p < 0.05$) was used to identify associations between the occurrence of maxillofacial trauma and independent variables (related to socio-demographic data of the victims, offender's characteristics, and aggression circumstances).

Independent variables with a p-value < 0.20 using the Pearson's chi-square test were incorporated into the regression analysis. Data analysis in cross-sectional epidemiological studies with binary outcomes usually involves binary logistic regression. However, it has been suggested that for cross-sectional studies of binary outcome with high frequency, the prevalence ratio (PR) obtained through the Poisson regression is more recommended, since the odds ratio (OR) obtained by binary logistic regression tends to be overestimated in these situations [14]. Therefore, univariate and multivariate Poisson regression analysis (with robust variance) were performed. The level of significance was set at 5%. All statistical analyses were performed using SPSS version 20.0, considering a 95% confidence interval.

The study was approved by the Ethics Committee of the State University of Paraíba (Opinion No 0652.0.133.203-11). All the rights of the victims were protected and the national and international precepts of research ethics with human participants were followed. Moreover, the checklist of the "STROBE Statement" was followed for the outlining and presentation of the observed results.

Results

Agreements were estimated by the Kappa test, obtaining K = 0.85-0.90, considered very good. Table 1 shows the sample distribution according to patterns of maxillofacial trauma. A total of 111 older adults (42.9%) showed maxillofacial trauma and the most common type of injury was soft tissue injury (90.1%). Regarding the affected region of the face, cases where more than one region is affected (40.4%) were predominant, followed by isolated trauma situations in the orbital (19.3%) and frontal region (14.7%).

Table 1. Distribution of victims according to the patterns of maxillofacial trauma.

Variables	n	%
Maxillofacial trauma [259]		
Present	111	42.9
Absent	148	57.1
Type of maxillofacial trauma [111]		
Soft tissue injury	100	90.1
Bone fracture	11	9.9
Anatomical location of trauma [111]		
Frontal	16	14.7
Nasal	5	4.6
Orbital	21	19.3
Zygomatic	8	7.3
Mandible	2	1.8
Chin	1	0.9
Buccal	4	3.7
Lip	7	6.4
Teeth	1	0.9
More than one region of the face	44	40.4

The average age of victims was 68.4 years (standard deviation = 7.6, minimum value = 60, maximum value = 92) and median of 66 years. Table 2 shows the distribution of maxillofacial trauma occurrence according to sociodemographic variables among Brazilian adults aged 60 years or older victims of physical violence. The proportion of maxillofacial trauma was higher among individuals aged over 66 years (47.6%), males (47.4%), living in the suburban area (45.2%), who were married or in stable union (46.5%), retired (46.1%) and with up to 8 years of schooling (40.7%). Sociodemographic variables with p <0.20 subsequently included in the regression analysis were: victim's age (p = 0.132) and sex (p = 0.067).

Table 2. Distribution of maxillofacial trauma occurrence according to the sociodemographic data.

Variables	Maxillofacial trauma						p-value*
	Present		Absent		Total		
	n	%	n	%	n	%	
Victim's age [259]							0.132
≤ 66 years	51	38.3	82	61.7	133	100.0	
> 66 years	60	47.6	66	52.4	126	100.0	
Victim's sex [259]							0.067
Female	37	35.9	66	64.1	103	100.0	
Male	74	47.4	82	52.6	156	100.0	
Victim's area of residence [259]							0.857
Urban	54	41.2	77	58.8	131	100.0	
Suburban	28	45.2	34	54.8	62	100.0	
Rural	29	43.9	37	56.1	66	100.0	
Victim's marital status [248]							0.265
Without partner	41	39.4	63	60.6	104	100.0	
With partner	67	46.5	77	53.5	144	100.0	
Victim's employment status [226]							0.532
Worker	52	41.9	72	58.1	124	100.0	
Unemployed	47	46.1	55	53.9	102	100.0	
Victim's schooling [175]							0.412
≤ 8 years of study	61	40.7	89	59.3	150	100.0	
> 8 years of study	8	32.0	17	68.0	25	100.0	

Table 3 shows the distribution of maxillofacial trauma occurrence according to variables related to the circumstances of aggressions and characteristics of aggressors of Brazilian elderly aged 60 years or older victims of physical violence. The proportion of maxillofacial trauma was higher among cases occurring in the community (47.3%), in which the aggressor was not known to the victim (47.6%), males (47.1%), during the night shift (49.5%) and during the weekends (52.5%), by means of aggression without the use of blunt instruments (48.3%). The variables related to the circumstances of aggressions and the characteristics of aggressors with p <0.20, subsequently included in the regression analysis were: circumstances of aggressions (p = 0.050), time of occurrence (p = 0.194), day of the week (p = 0.056) and instrument used (p = 0.055).

Table 4 shows the results of the Poisson's univariate and multivariate regression analysis for the occurrence of maxillofacial trauma among Brazilian adults aged 60 years or older, victims of

physical violence. After multivariate analysis, adjusted prevalence ratios (PR) were obtained. The prevalence of maxillofacial trauma was more frequent among those older than 66 years (PR = 1.166; 95% CI = 0.865-1.572; p = 0.315), males (PR = 1.119; 95% CI = 0.807-1.550, p = 0.500), victims of violence occurred within the community (PR = 1.431; 95% CI = 0.951- 2.153, p = 0.086), during the night shift (PR = 1.226; 95% CI = 0.911-1.651, p = 0.179) and weekends (PR = 1.279; 95% CI = 0.955-1.714, p = 0.099) performed without using blunt instrument (PR = 1.311; 95% CI = 0.932-1.846, p = 0.120). It was observed that the end of the Poisson regression analysis, no variable included in the model remained significant considering 5% significance level.

Table 3. Distribution of maxillofacial trauma occurrence according to the variables related to the aggression circumstances and offender's characteristics.

Variables	Maxillofacial Trauma				Total		p-value*
	Present		Absent				
	n	%	n	%	n	%	
Aggression circumstance [234]							0.050
Residence	23	33.3	46	66.7	69	100.0	
Community	78	47.3	87	52.7	165	100.0	
Relationship between offender and victim [233]							0.623
Known people	83	43.5	108	56.5	191	100.0	
Strange people	20	47.6	22	52.4	42	100.0	
Offender's sex [219]							0.305
Female	19	38.8	30	61.2	49	100.0	
Male	80	47.1	90	52.9	170	100.0	
Time of occurrence [225]							0.194
Diurnal	53	40.8	77	59.2	130	100.0	
Nocturnal	47	49.5	48	50.5	95	100.0	
Day of occurrence [249]							0.056
Weekday	67	39.6	102	60.4	169	100.0	
Weekend	42	52.5	38	47.5	80	100.0	
Aggression mechanism [242]							0.055
Without the use of blunt instruments	71	48.3	76	51.7	147	100.0	
With the use of firearm or some blunt instrument	34	35.8	61	64.2	95	100.0	

Table 4. Results of univariate and multivariate Poisson regression analyses for maxillofacial trauma.

Independent variables	Univariate Analysis		Multivariate Analysis	
	Unadjusted PR* (CI 95%)	p-value	Adjusted PR* (CI 95%)	p-value
Victim's age				
≤ 66 years	1		1	
> 66 years	1.242 (0.936-1.648)	0.133	1.166 (0.865-1.572)	0.315
Victim's sex				
Female	1		1	
Male	1.321 (0.972-1.794)	0.075	1.119 (0.807-1.550)	0.500
Aggression circumstance				
Residence	1		1	
Community	1.418 (0.979-2.054)	0.065	1.431 (0.951-2.153)	0.086
Time of occurrence				
Diurnal	1		1	
Nocturnal	1.214 (0.908-1.622)	0.191	1.226 (0.911-1.651)	0.179
Day of occurrence				
Weekday	1		1	
Weekend	1.324 (1.001-1.751)	0.049	1.279 (0.955-1.714)	0.099
Aggression mechanism				

Without the use of blunt instruments	1.350 (0.983-1.853)	0.064	1.311 (0.932-1.846)	0.120
With the use of firearm or some blunt instrument	1		1	

* PR: Prevalence Ratio; CI: Confidence Interval.

Discussion

In this study, the prevalence of maxillofacial trauma resulting from physical violence against elderly Brazilians aged over 60 years was high. The etiology of maxillofacial injuries in older adults varies from one country to another and even from one region to another within the same country, being influenced by socioeconomic, cultural and environmental factors [15-17].

Traumatic events in this population are often related to intrinsic factors such as neuromuscular and cognitive impairment, balance disorders, drug use (psychotropic drugs, polypharmacy), cardiovascular risk factors and depression [18,19]. Cases of soft tissue lesion in more than one region of the face were the most frequent, followed by situations of isolated lesions in the orbital region. The high frequency of soft tissue lesions, despite suggesting less severe injuries, deserves attention because it may also have negative physical, emotional and functional consequences to the victims. A previous study that identified one of the main signs of violence refers to head injury, and often in the region of eyes [20].

Regarding age, the proportion of maxillofacial trauma was higher among older adults aged over 66 years, compared to those with less advanced age. Another study conducted at a medical forensic service of Recife, Pernambuco, Brazil, investigated the occurrence of physical violence against older adults showed high percentage of victims in the age group of 60-69 years [21]. It should also be considered that in general, older people have more trouble making a complaint or formal notification due to their physical and / or psychological weaknesses [21]. Often these individuals are dependent on caregivers who work in their homes or in nursing homes and in some cases are the actors of violent acts.

Regarding gender, there was higher proportion of cases of maxillofacial trauma in men compared to women. These findings corroborate most studies related to interpersonal violence, which show higher prevalence among men [21-23]. Most individuals live in the urban area, but the proportion of maxillofacial trauma was higher among those living in the suburban area. Other studies in literature have found that most victims of violence were residents in the urban area [5,24]. There may be underreporting due to the victim's mobility limitations to the police station and forensic service. In addition, this finding can be also understood by considering that violence and maxillofacial traumas can be influenced by issues related to lifestyle and the social and cultural context present in every geographical area.

In the marital status stratification, it was observed that the occurrence of maxillofacial trauma was higher among older adults who were married or living in a stable union. These results are consistent with those observed in another study developed in a forensic service of Recife, Brazil, where 44.2% of victims of physical aggression were married or living with a partner [21]. Regarding the victim's occupation, most of them still perform their labor activities. These findings

differ from those reported by other authors who found that most victims of physical aggression were retired or pensioners [21].

Regarding education, most victims had low educational level. Another study found that 33.1% of subjects had eight years or less of schooling [17]. The educational level of victims is an extremely important variable to be considered, given its potential to assist in the measurement of social inequalities. In relation to the context in which aggressions were experienced, it was observed that the proportion of maxillofacial trauma was higher among cases of community violence in relation to cases of violence in the victim's residence. These findings differ from most studies with older adults, indicating that aggression occurs mainly in the home environment [21,25].

Often, cases of domestic violence against older adults go unnoticed in health services and when they result in serious injuries that require emergency care, many victims are afraid to report the abuse and attribute the trauma to falls [21]. Therefore, health professionals should be able to identify signs suggestive of violence against these individuals.

Most aggressors were known to the victim. Given that population aging brings with it a higher incidence of chronic diseases, which can cause disabling sequelae, older adults tend to rely on a home caregiver [26,27]. Regarding aggression occurrence period, the proportion of face trauma was higher among cases reported in night shifts and during the weekends.

The high frequency of aggressions on weekends can be partly explained by the fact that potential aggressors tend to drink more alcohol in this period, as well because on weekends, seniors have greater contact with family, favoring clashes that could lead to the occurrence of domestic violence [21]. The association between use of alcohol by aggressors and the occurrence of violence against older adults could not be assessed, representing a potential area for future research.

In relation to the injury mechanism, there was a greater proportion of maxillofacial trauma resulting from aggression without the use of instruments. Another study analyzed non-fatal cases of interpersonal violence in an emergency unit of São Paulo, Brazil, and found that the most observed aggression mechanism was body force / beating and the head / face was the most affected region [28].

One of the study limitations refers to the use of secondary database, which not always contains complete information, making it difficult to compare this information with other cities and regions within the same country and with other countries. However, it is important to highlight the quality of the information obtained in medico-legal and social records from Brazilian Services of Forensic Medicine and Dentistry.

We must encourage society to denounce aggressors and the training of health professionals is necessary to identify the presence of such events and to perform an effective co-participation in an attempt to reduce this considerable problem for society and the health of older adults.

It should also be considered that to know the true panorama of violence against older adults, it is necessary to integrate information from the Police Station, the Elderly Council, the Public Defender, Primary, Secondary and Tertiary Health Care and Health Surveillance.

Conclusion

This study allowed assessing the characteristics of traumas resulting from physical violence against elderly Brazilians, according to a medico-legal and forensic perspective, representing a gap in the current scientific literature, substantially contributing to health surveillance events and providing valuable information to guide public policies for prevention and assistance to victims of physical violence. Events had as main feature the high prevalence of maxillofacial trauma resulting from physical violence against older adults. In addition, soft tissue lesions affecting more than one region of the face were the most frequent.

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