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Etiology, diagnosis, and demographic analysis of maxillofacial trauma in elderly persons: A 10-year investigation

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ABSTRACT

Purpose: The aim of this study was to investigate etiologies and diagnoses of maxillofacial trauma in emergency services in Brazil over a period of 10 years. Additionally, associations among sex, age, accident location, and dependent variables were analyzed. Understanding the epidemiology of trauma and the physiology of aging is important in maintaining health and bettering service for the elderly population. **Materials and methods:** The primary mode of investigation was analysis of medical records from 2003 to 2013. These researchers recorded the diagnosis and etiology of the trauma, the location where the accident occurred, and the sex and age of the participants. Variable categories were compared using Chi-squared distribution, and logistic regression was used to analyze the associated factors.

Results: Of the 677 individuals analyzed, the female sex was predominant (57.61%) and the most prevalent age ranges were between 60 and 69 years (40.18%) and between 70 and 79 years (35.16%). Chi-squared distribution showed that men suffered more fractures (18.47%, $p = 0.028$) and women suffered more contusions (21.54%, $p = 0.028$). With regard to the various etiologies related to the traumas, traffic accidents (17.77%, $p < 0.001$) and aggression (17.42%, $p < 0.001$) were more frequent in males, and falls (83.03%, $p < 0.001$) were more frequent in females. The primary etiologies for maxillofacial trauma in the elderly population were falls, and the primary diagnoses were fractures.

Conclusion: A deeper understanding of the physiological changes associated with aging, and preventive action to reduce falls, traffic accidents, and aggression in this population could be beneficial with regard to quality of life for elderly persons.

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1. Introduction

Advances in healthcare in recent years are one of the decisive factors in increased longevity. The number of elderly individuals has grown, and these individuals are ever more active in their daily lives. The age considered to be “elderly” by the World Health Organization is established based on the socioeconomic status of each nation. In developing nations, someone is considered elderly from age 60 onward, while in developed nations a person is considered

elderly from age 65 onward. In many developing countries, particularly those in Latin America and Asia, an increase of 300% in the elderly population is expected by the year 2025. In 2050, the population of elderly individuals is expected to be 2 billion, with 80% of this population living in developing countries (World Health Organization, 2002). The aging process of such a large percentage of the population is the most important demographic transformation in today's society (Dias et al., 2001). In Brazil, individuals over 60 years of age represent more than 10% of the population, and this number is expected to double between 2000 and 2020, growing from 13.9 to 28.3 million, and by 2050 to 64 million (IBGE, 2009).

Due to the growing elderly population and the increase in life expectancy, many elderly individuals are adopting a more active lifestyle in search of increased health and well-being. This change

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directly results in more frequent maxillofacial trauma (Marciani et al., 1999; Chrcanovic et al., 2010; Li et al., 2015; Toivari et al., 2014). Maxillofacial trauma is a public health concern that can easily be avoided with proper understanding of its causes and consequent adoption of adequate means of prevention and treatment. In Brazil, elderly individuals consume 60% more government resources than younger adult and pediatric participants because of a high prevalence of comorbidity, typically after a traumatic incident. Maxillofacial trauma increases the probability of serious disability and is the fifth largest cause of death in this segment of the population. Various factors, such as weakness or lack of general physical conditioning resulting from chronic illness, loss of visual acuity and balance, unstable gait, reduced reaction time, and cognitive deficiency, can contribute to the increase of traumatic incidents in elderly persons (Gassner et al., 2003; Bonne and Schuerer., 2013; Thompson et al., 2006; Keller et al., 2012).

Many studies present data about and discuss therapies for treating maxillofacial trauma, but few deal with trauma in the aging population (Toivari et al., 2014). Epidemiological understanding of maxillofacial trauma is essential for bettering the management of aging populations, accident prevention, increasing quality of life, and reducing public spending on possible consequences. Thus, the objective of this study was to investigate etiologies and diagnoses of maxillofacial trauma in emergency services in Brazil over a period of 10 years. Additionally, associations among sex, age, accident location, and dependent variables were analyzed. The hypothesis tested is that there is no relation between the exposure variables (sex, age, and location) and the dependent variables (etiology and diagnosis).

2. Materials and methods

This cross-sectional study was approved by the Ethical Research Committee (protocol 14/2013). Two independent researchers accessed the medical and dental records of all subjects with maxillofacial trauma who sought emergency care in Pelotas, Rio Grande do Sul, Brazil, between February 2003 and February 2013. All records were analyzed ($n = 13,715$), but only records with complete data belonging to participants over age 60 years with maxillofacial trauma were considered for this study ($n = 677$). Data were analyzed from the following categories: age, sex, cause of the accident, diagnosis, and location where the accident occurred. Age was grouped in the following categories: 60–69 years, 70–79 years, and ≥ 80 years. Causes of the trauma were classified as traffic accident, fall, aggression, and other (accidents with animals, exercise- or work-related injury, collision with an object, and firearm injury). Diagnoses were classified as maxillofacial fracture, laceration or blunt injury, contusion, and other (hematoma, edema, and abrasion). Maxillofacial fractures were also evaluated via radiological examinations or computed tomography scans, according to the severity of the case, at the admission to the emergency service. They were classified according to the following anatomic regions: orbit, zygomatic–maxillary complex, nose, mandible, maxilla and facial polytrauma.

Descriptive and statistical analyses were performed using Stata 12.0 software (StataCorp LP, College Station, TX, USA). Chi-squared distribution was used to compare the categorical variables, and logistic regression (crude and adjusted) was used to determine associated factors and control for confounding variables. Variables were chosen using forward selection, and only variables with $p \leq 0.20$ were included in adjusted models. In the final model, variables with $p \leq 0.05$ were considered statistically significant, and odds ratios were included as measurements of the effect size.

3. Results

Analysis of the emergency services' records showed that 4.94% ($n = 677$) of the total demand was made up by elderly persons. The youngest participant in this study's demographic focus was 60 years old, and the oldest was 101 years old. The average age was 73.05 years ($SD = 9.157775$). Female participants' records were more prevalent ($n = 390$), making up 57.61% of the sample. Registries comprised 272 individuals (40.18%) between the ages of 60 and 69 years, 238 individuals (35.16%) between the ages of 70 and 79 years, and 167 individuals (24.67%) age 80 or older.

Descriptive analysis of the results showed that falls were the most common cause of maxillofacial trauma ($n = 463$, 68.39%), followed by "other" ($n = 76$, 11.23%), traffic accidents ($n = 73$, 10.78%) and aggression ($n = 65$, 9.6%). The most common diagnosis was laceration or blunt injury ($n = 396$, 58.49%), followed by contusion ($n = 127$, 18.76%), fractures ($n = 101$, 14.92%), and "other" ($n = 53$, 7.83%). The maxillofacial fractures (Fig. 1) that were most frequently observed were nose fractures ($n = 73$, 72.27%), followed by the zygomatic–maxillary complex ($n = 19$, 18.81%). Fractures of greater severity, as facial polytrauma, had less occurrence ($n = 3$, 2.98%). All of these cases required initial outpatient care that included, for example, sutures when there was laceration or blunt injury and medication prescription. For cases in which the fracture needed surgical intervention, the subjects were either admitted in service for fracture reductions or referred to the specialized hospitals when complex surgical intervention was required. In relation to the location where the accident occurred, place of residence (home, care home) was registered as the most common site ($n = 260$, 38.40%), followed by the street ($n = 217$, 32.05%). In 200 files (29.54%) no location was recorded.

Table 1 shows the association between exposure variables and resulting etiologies ($p \leq 0.001$). In this sample, men suffered more traffic accidents (17.77%) and aggression (17.42%), whereas women suffered more falls (83.03%). In relation to age, the population from 60 to 69 years of age was more affected by traffic accidents (15.44%), "other" factors (18.01%), and aggression (15.07%), whereas the oldest category, 80 years and older, suffered more falls (85.63%). On the street, traffic accidents (29.49%) and aggression (12.44%) were the most common etiologies, whereas in the place of residence, falls were more common (80.77%).

Table 2 shows the association between the dependent variable (diagnosis) and the exposure variables, with special regard to sex ($p = 0.028$), etiology ($p = 0.042$), and location where the accident occurred ($p = 0.019$). There were no statistical associations between diagnosis and age ($p = 0.194$). Men suffered more fractures (18.47%) and women suffered more contusions (21.54%). Traffic accidents (24.66%) and the street as the location of the accident (19.35%) were the etiologies responsible for most of the fractures.

Crude analysis of dependent variables through cross-sectional regression (Table 3) showed that females (odds ratio [OR] = 0.28, 95% confidence interval [CI] = 0.16–0.47), age range 70–79 years (OR = 0.50, 95% CI = 0.28–0.88) and 80 years and older (OR = 0.39, 95% CI = 0.19–0.77), and street location (OR = 8.88, 95% CI = 3.43–9.20) were associated with traffic accidents. In the adjusted analysis, female sex and street as location remained associated with traffic accidents. Crude analysis also showed that female sex (OR = 0.19, 95% CI = 0.10–0.34; OR = 5.23, 95% CI = 3.68–7.43) and age groups 70–79 years (OR = 0.43, 95% CI = 0.24–0.78; OR = 2.93, 95% CI = 2.00–4.28) and 80 years and older (OR = 0.25, 95% CI = 0.11–0.56; OR = 5.62, 95% CI = 3.43–9.20) were associated with the exposure variables aggression and falls, respectively. Additionally, place of residence (OR = 1.71, 95% CI = 1.11–2.65) and street (OR = 0.43, 95% CI = 0.28–0.64) were associated with falls in the crude analysis. All

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