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CORRELATION BETWEEN USE OF OPEN FOOTWEAR AND INCIDENCE OF OPEN FOOT FRACTURES IN BRAZILIAN BIKERS: A CASE-CONTROL STUDY

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ABSTRACT

Background: The rising number of motorcycle accidents is a major cause of death and disability, especially in the lower limbs. Objectives To study the influence of footwear type in the occurrence of open fractures. **Patients and Methods:** A case-control study. We interviewed 54 patients cared for at the Getúlio Vargas Hospital, a tertiary reference orthopedics center that underwent care for fractures of the foot. We aimed to compare the incidence of open fractures between patients who wore closed footwear at the time of the accident and those that did not. **Results:** There was a statistically significant correlation between the use of open footwear and the open fractures (p=0,006) **Conclusions:** The utilisation of closed footwear by motorcycle bikers can be considered a protective factor against open fractures, and its use should be encouraged and enforced by government agencies.

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INTRODUCTION

Motor vehicle analysis in Brazil points out that over 40% of victims are users of motorcycles (18). Motorcycle accident victims are young males who exhibit a single pattern of lesions with greater vulnerability of the head and lower limbs (10) (14). Despite these data, the use of motorcycles as a means of transport has increased worldwide (9) (10). In a study by 387 patients who were victims of motorcycle accidents, 16% were found to have fractures of the bones of the foot and less than 10% used boots as protective equipment (4). These accidents are determinants for a series of losses for the public economy such as high medical and hospital expenses; sequelae; excessive number of Disability Adjusted Life Years (DALY); etc. Despite this, trauma surgeons have initially given little attention to foot injuries (15). There is a need for a better understanding of injury mechanisms and their correlation with the use of appropriate footwear in order to support the creation of laws for self-protective equipment for motorcycle users.

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This study aims to verify if there is a correlation between the non-use of closed shoes and the occurrence of exposed fractures in motorcycle drivers.

MATERIALS AND METHODS

This is an analytical cross-sectional case-control study. The research was carried out by interviewing patients who were victims of accidents with motorcycles attended at the emergency care unit of a tertiary referral hospital in the Brazilians Unified Health System (SUS) and who suffered some type of fracture in bones of the foot. The study population was divided into two groups, one case group and one control group. These groups were divided according to the presence or absence of a nominal variable: the use of closed shoes.

Case-group: Patients who used some type of closed footwear at the moment of the trauma. Closed footwear was defined as footwear that provides coverage of the foot as a whole (forefoot, hindfoot and midfoot) both on the plantar and dorsal foot surfaces, regardless of the material it was made of.

The control group consisted of patients who were barefoot or used partially closed footwear, that is, that provided only partial coverage of the foot, revealing any region of the forefoot, hindfoot or midfoot. Footwear type evaluation was performed through the *in loco* observation of the footwear type used at hospital admission. Patients who had already been unclothed by the primary care team were subjected to questions about footwear type. Risk of recall bias was mitigated by asking the patient to describe the footwear worn at the time of the accident. After data collection, both case and control groups were subjected to comparison for the analysis of the association with the type of footwear, estimating the strength of association of the groups with the hypothesis in question. Patients who had suffered from trauma due to causes other than motorcycles, patients with cutaneous lesions prior to foot trauma, patients with cognitive deficits that rendered them incapable of understanding and correctly answering the data collection questionnaire were excluded from the study. The present study was approved by the local Research Ethics Committee, filed under protocol number 60203516.1.0000.5200. This study was carried out in accordance with the declaration of Helsinki, the subjects having all signed terms of informed consent.

RESULTS

We utilised Student's t-test in the comparison of the biological and clinical characteristics between patients with closed and open footwear. The analysis of the age variable, and the mean and standard deviation measures were presented. The Kolmogorov-Smirnov test was used to test the normality hypothesis. For the other categorical variables, the descriptive statistics presented were the absolute and percentage frequency measurements and the differences between groups. Those were tested by Pearson's Chi-Square test. In the analysis of the association of the presence of exposed fracture with the use of closed footwear, the measure of association was estimated Odds Ratio with its respective confidence intervals. Statistical significance was set at 5% ($p < 0.05$) and the statistical software used data analysis was STATA version 12.0. The study included 54 patients, 85% of which were male. The mean age was 32.8 years with a minimum age of 18 and a maximum of 71 years. 79.6% of the patients suffered from open fractures (Table 1). We found no statistically significant difference between groups regarding mean age or sex. In contrast, we found a significant association between the use of open footwear and the occurrence of open fractures, as well as

Table 1. Characteristics of patients suffering fractures

Characteristics	Frequency
Biological	
Age	32.8 ± 10.3
Gender	
Male	47 (87.0%)
Female	7 (13.0%)
Clinical characteristics	
Open fracture	
Yes	43 (79.6%)
No	11 (20.4%)
Fracture site	
Forefoot	49 (90.7%)
Midfoot	1 (1.9%)
Hindfoot	4 (7.4%)

[a] Mean ± standard deviation
[b] 11 patients with no classification information

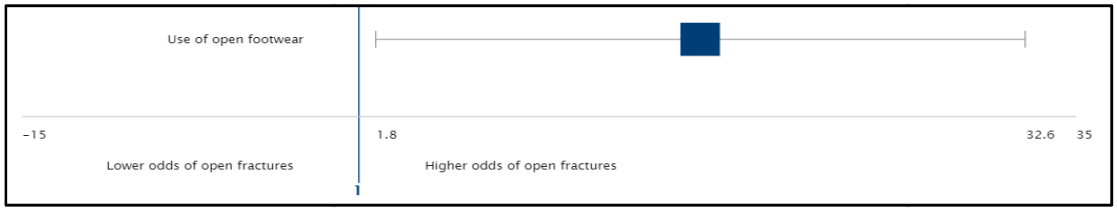

Figure 1. Correlation Between Use of Closed Fractures and footwear type

Table 2. Association of biological and clinical factors related to the condition of the driver is with footwear closed at the time of the accident

Features	Use Closed footwear		OR (95% CI)	p-value
	not use (n = 39)	use (n = 15)		
Biological				
Age	33.2 ± 11.7	31.9 ± 6.1	1.01 (0.95 - 1.07)	0.698
Female	4 (10.3%)	3 (20.0%)	Reference	-
Male	35 (89.7%)	12 (80.0%)	2.19 (0.43 to 11.2)	0,348
Clinical				
Exposed fracture				
No	4 (10.3%)	7 (46.7%)	Reference	-
Yes	35 (89.7%)	8 (53.3%)	7.66 (1.80 - 32.6)	0.006
Place of foot				
Midfoot / Hindfoot	2 (5,1%)	3 (20,0%)	Reference	-
Forefoot	37 (94,9%)	12 (80,0%)	4,65 (0,69 - 31,0)	0,0915

[a] Mean ± standard deviation[b] Median (P_{25}; P_{75})

a clear preponderance of forefoot fractures (p<0,0001). There was, however, no statistical association between use of closed footwear and site of injury (p=0,091) This lack of association might be a type 2 error due to the small sample, prompting the need for further studies. By interpreting the Odds Ratio, with a 95% confidence interval, the use of open shoes or non-footwear increased by 7.66 times the chance of exposed fracture, a statistically significant association (Table 2) (Figure 1).

DISCUSSION

Regarding the population found, motorcycle accident victims are, in general, young males (11) (15). These data were in line with the results of this study, where 85% of the male cases and the mean age were 32.8 years. After searching through databases such as PUBMED we could not find other studies regarding the association between footwear type and open fractures. Our study results underline the value of footwear type in the prevention of open fractures in motorcycle accidents. This importance must not be lost in government agencies, which could address the need for utilisation of closed footwear in motorcycle riders. The regulation or the creation of campaigns to encourage the use of closed shoes are low cost measures, but they can reduce the index of exposed fractures and contribute to the reduction of the morbidity of the victims and expenses in healthcare systems with hospitalization, medications, surgeries, rehabilitation, in addition to reducing extra-hospital costs, for permanent or temporary loss of productive capacity due to temporary or permanent incapacities, social security expenditures and labor indemnities. sAs for recognizing the limitations of the study, we recognize that one of the limitations of this study was the restricted number of patients evaluated. This number was reduced due to difficulties found in the organizational logistics of the target hospital of the study and low investment. This study, despite not having the statistical power to reflect the reality of the Brazilian population, portrays the reality of users of a tertiary hospital, a reference in traumatology, linked to SUS. Thus, the research can be replicated on a larger scale and serve as the basis for similar studies of greater scope, that accommodate a larger contingent of people and, thus, better represent the studied population.

REFERENCES

ABDMD TRAFFIC. abramet.org. [Online] .; 2007 [cited 2017 09 06. Available from: http://www.abramet.org.

Angels KC, Rezende MR, Junior RM. 2017. Social and hospital costs of patients admitted to a hospital in Brazil due to motorcycle crashes. *Traffic Injury Prevention.,* April.

Ayman MA Tadros, Hani O. Eid, Fikri M. Abu-Zidan. 2010. Epidemiology of foot injury in a high-income developing country. *Injury.*, octuber: p. 137-140.

Ayman TMA, Hani EO, Fikri MAZ. 2010. Epidemiology of foot injury in a high-income developing country. *Injury.* 41 (137-140).

Bastos YGL, Andrade SM, Soares DA. 2005. Characteristics of traffic accidents and victims treated by prehospital service in a city in southern Brazil. *Cadernos de Saúde Pública.,* p. 815-822.

Brazilian Traffic Code. Law No. 9,503. 1997 September 23.

Chichom-Mefire A, Atashili J, Tsiagadigui JG, Fon-Awah C, Ngowe-Ngowe M. 2015. A prospective pilot cohort analysis of crash characteristics and pattern of injuries in riders and pillion passengers involved in motorcycle crashes in an urban area in Cameroon : lessons for prevention. *BMC Public Health*., 15 (915).

Coben JH, Steiner CA, Owens P. 2004. Motorcycle-Related Hospitalizations in the United States, 2001. *American Journal of Preventive Medicine.,* 27 (5): p. 355-362.

Craig, GR, R. Sleet, SK Wood. 1983. Lower limb injuries in motorcycle accidents. *The British Journal of Accident Surgery.*,15 (3): p. 163-166.

Debieux P, Chertman C, Mansur SB, Dobashi E, Fernandes HJA. 2010. Injuries of the locomotive apparatus in motorcycle accidents. *Acta Ortopédica Brasileira*., 2010; 18 (6): p. 353-6.

Forman, J.L., Lopez-Valdes, F.J., Pollack K, Heir-Ordoyo R, Miller A, Mansilla A, et al. 2012. Injuries among two-wheeler users in European countries: A descriptive analysis of hospital discharge data. *Elsevier.,* 49: p. 229-236.

Gustilo RB, Anderson JT Prevention of infection in the treatment of one thousand and twenty five open fractures of long bones: retrospective and prospective analyses. *The Journal of bone and joint surgery.* 1976 June: p. 453-458.

Keall, M.D., Newstead, S. 2012. Analysis of factors that increase motorcycle rider risk compared to car driver risk. p. 23-29.

Koizumi MS, Mello-Jorge MHP. 2004. Government expenditures of SUS with hospitalizations due to external causes: analysis in the state of São Paulo, 2000. *Brazilian Journal of Epidemiology.,* Jun .; 7 (2).

Koizumi MS. 1992. Standard of injuries in motorcycle accident victims. *Revista de saúde pública de São Paulo.* p. 306-15.

MA S, RC F, MT C, GG F, RAL S. Epidemiology of severely traumatized foot. ABTPé magazine. 2008; 2 (1): p. 30-5.

Monk JP, Buckley R, Dyer D. 2009. Motorcycle-related trauma in Alberta: a sad and expensive story. *Can J Surg.,* 52 (6): p. 235-240.

MORAES CL, OLCERENKO DR. CHARACTERIZATION OF MOTORCYCLE ACCIDENTS AND THEIR VICTIMS IN THE MUNICIPALITY OF SOROCABA, SP. In 12 ° congress of scientific initiation and 6 ° show of research of the UniSa Graduate; 2009; Sao Paulo. P. 735-743.

Oliveira NLB, Sousa RMC. DIAGNOSIS OF LESIONS AND QUALITY OF LIFE OF MOTORCYCLISTS, VICTIMS OF VICTIMS OF ACCIDENTS OF TRAFFIC CIDENTS. *Revista Latino-am Enfermagem.* 2003 November; 11 (6).

Sakaki MH, Matsumura BAR, Dotta TDAG, Pontin PA, Santos ALG, Fernandes TD. 2014. EPIDEMIOLOGIC STUDY OF ANKLE FRACTURES IN A TERTIARY HOSPITAL. *Acta Ortopédica Brasileira.,* 22 (2): p. 90-3.

Santamarina-Rubio E, Perez K, Ricart I, Arroyo A, Castella J, Borrell C. 2007. Injury profiles of road traffic deaths. 2007: p. 1-5.

Trimming M, Khaji A, Karbakhsh M. 2006. Pattern of motorcycle-related injuries in Tehran, 1999 to 2000: a study in 6 hospitals. *Eastern Mediterranean Health Journal,* 12 (1/2).

Wei CJ, Tsai WC, Tiu CM, Wu HT, Chiou HJ, Chang CY. Systematic Analysis of Missed Extremity Fractures. *Acta Radiologica.* 2006; 7.

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