

THE EFFECT OF THE USE OF ALCOHOL AND DRUGS ON MOTORCYCLICAL TRAUMAS WITH SURGICAL TREATMENT FRACTURES: EPIDEMIOLOGY

O EFEITO DO USO DE ÁLCOOL E DROGAS EM TRAUMAS MOTOCICLÍSTICOS COM FRATURAS DE TRATAMENTO CIRÚRGICO: EPIDEMIOLOGIA

FERNANDO ARAUJO PIRES¹ , JOÃO BAPTISTA GOMES DOS SANTOS¹ , RENATO HIROSHI SALVIONI UETA¹ , FLÁVIO FALOPPA¹ , VINICIUS YNOE DE MORAES¹ , MARCEL JUN SUGAWARA TAMAOKI¹ 

1. Universidade Federal de São Paulo, Escola Paulista de Medicina (EPM-Unifesp), Orthopedics and Traumatology Department, São Paulo, SP, Brazil.

ABSTRACT

Objective: To verify the prevalence of patients who were victims of motorcycle trauma who were under the influence of alcohol and drugs. **Methods:** The study was observational and prospective, with patients hospitalized to the Orthopedics and Traumatology Ward of Hospital São Paulo (UNIFESP), from March 2015 to March 2016. The study included patients of all genders, over 18 years old, hospitalized due to motorcycle trauma and who needed orthopedic surgical treatment. **Results:** During the research, 282 patients were hospitalized, of which 23.8% were victims of motorcycle trauma. Of these, 49.3% motorcyclists reported the use of alcohol and drugs before the accident, while 50.7% denied their consumption. In the analysis of alcohol and drug consumption in patients with motorcycle injuries, the results showed that: 65% used only alcohol; 16% used both alcohol and drugs; and 19% used only illicit drugs. **Conclusion:** The incidence of patients who suffered motorcycle accidents under the influence of alcohol and drugs was 49.3%. **Level of Evidence IV, Prospective Case Series.**

Keywords: Epidemiology. Traffic Accidents. Alcoholism. Motorcycles.

RESUMO

Objetivo: Verificar a prevalência de pacientes vítimas de trauma motociclístico que estavam sob efeito de álcool e drogas. **Métodos:** Estudo observacional e prospectivo, com pacientes internados na Enfermaria de Ortopedia e Traumatologia do Hospital São Paulo (Unifesp), de março de 2015 a março de 2016. Foram incluídos pacientes de ambos os sexos, idade superior a 18 anos, internados por trauma motociclístico e que necessitavam de tratamento cirúrgico ortopédico. **Resultados:** Durante a pesquisa, foram internados 282 pacientes, dos quais 23,8% eram vítimas de trauma motociclístico. Desses, 49,3% motociclistas referiram o uso de álcool e drogas previamente ao sinistro, enquanto 50,7% negaram o consumo. Na análise do consumo de álcool e drogas nos pacientes de traumas motociclísticos, foi observado que 65% estavam sob efeito apenas de álcool, 16% estavam sob efeito de álcool e drogas, e 19% sob efeito de drogas ilícitas. **Conclusão:** A incidência de pacientes que sofreram acidentes motociclísticos sob efeito de álcool e drogas foi de 49,3%. **Nível de Evidência IV, Série de Casos Prospectivos.**

Descritores: Epidemiologia. Acidentes de Trânsito. Alcoolismo. Motocicletas.

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INTRODUCTION

Traffic accident is any unintentional and avoidable event that involves a vehicle on public road. In the International Classification of Diseases (ICD), traffic accident is included in the division of External Causes, which involve the pedestrian, cyclist, motorcyclist, occupant of automobile, truck, and heavy transport vehicle.¹ Traffic accidents are among the main causes of trauma, representing an important public health problem worldwide that impact both economic

and social spheres.² Annually, traffic accidents injure 50 million people and cause 1.3 million deaths worldwide, and these numbers are more concentrated in middle- and low-income countries.³

Studies indicate that, in 2020, traffic accidents will be the second cause of premature death. Mortality from land traffic accidents varies by gender, age group and geographic distribution.⁴ Traffic accidents affect mainly people between five and 49 years old, with higher prevalence in productive age group, causing emotional, physical, and social changes in the individual and in the family nucleus.^{4,5}

All authors declare no potential conflict of interest related to this article.

The study was conducted at The Orthopedics and Traumatology Ward of Hospital São Paulo – Unifesp.

Correspondence: Fernando Araujo Pires. Borges Lagoa Street, 778, São Paulo, SP, Brazil, 04038030. drfernandopires@gmail.com

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The 1998 Brazilian Traffic Code improved vehicle safety and increased electronic surveillance. However, the changes could not reduce mortality from traffic accidents significantly.⁶ In this scenario, motorcyclists stand out as vulnerable groups.⁶⁻⁹ If compared to car drivers, motorcyclists have 9.3 times higher risk of death, injury, and involvement in accidents. When compared with pedestrians, motorcyclists have 8.4 times higher possibility of death,⁹ more than 50% of these deaths occurring in the traffic. Traffic accidents are responsible for causing physical disabilities and sequelae in this group, especially affecting young males.¹⁰ Alcohol consumption associated with land transport accidents is responsible for deaths of more than one million people per year worldwide.¹¹ In 2007, Brazil registered 37,407 deaths caused by land accidents associated with alcohol consumption, and 82% of these deaths were men and young people, aged between 20 and 29 years old.¹¹ This is an important subject in Brazil, although data related to motorcyclists driving under influence of alcohol and illicit drugs are scarce. Thus, our study aims to evaluate the frequency of motorcycling accidents, and to verify the incidence of the effect of alcohol or illicit drugs on motorcyclists involved in accidents hospitalized in a quartile hospital.

MATERIALS AND METHODS

This is an observational and prospective study conducted with patients hospitalized from March 1, 2015, to March 1, 2016 in the orthopedics and traumatology ward of a quaternary hospital with reference in orthopedics and traumatology, located in the municipality of São Paulo. The research was approved by the Research Ethics Committee and used the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).¹² Patients of all genders, over 18 years old, hospitalized for trauma and requiring orthopedic surgical treatment were included in this study. Patients who had a non-traumatic diagnosis and electively hospitalized were excluded.

All these hospitalized trauma victims were evaluated, and the following data were collected in an attached form: name, age, gender, fractures suffered, and occurrence of associated open fracture.

To minimize the risks of leaking information from medical records, patients were identified only with their initials. Age was placed numerically in years. After the patient's hospitalization, the researcher conducted the alcohol and drug consumption investigation. Fractures were classified according to topography in the upper limb, lower limb, and trunk. Only patients who presented trauma due to motorcycle accidents were directly questioned about the use of licit (alcohol) or illicit drugs (marijuana, cocaine, and crack) immediately before the start of motorcycle driving. The questions were asked with the patients in bed, without the presence of companions or hospital staff, and the patients were informed that their answers would be confidential and would not be used for judicial purposes.

Sample estimation

The 50% value was used as reference since this value allows obtaining the largest possible sample size for the study of proportions, with a 5% significance.

All data collected were placed in a spreadsheet for subsequent analysis of mean age, gender prevalence, mechanism of trauma and prevalence of open fractures. Initially, all variables were analyzed descriptively. For the quantitative variables, the minimum and maximum values were observed, as well as the estimates of means. For the comparison of group means, the analysis of variance to one factor was used, while for the rejection of the hypothesis normality of data, Kruskal-Wallis nonparametric test was used.

To evaluate homogeneity between proportions, the Chi-square test or Fisher's exact test was performed. Pearson's correlation coefficient or Spearman correlation coefficient (when the assumption of data normality is rejected) was used to study correlations between variables. For static analyses, the GraphPad Prism 5.0 program (Software Inc. USA) was used, considering a 5% significance level as statistically significant. In this statistical analysis, the programs SPSS V20, Minitab 16 and Excel Office 2010 were used (Figure 1).

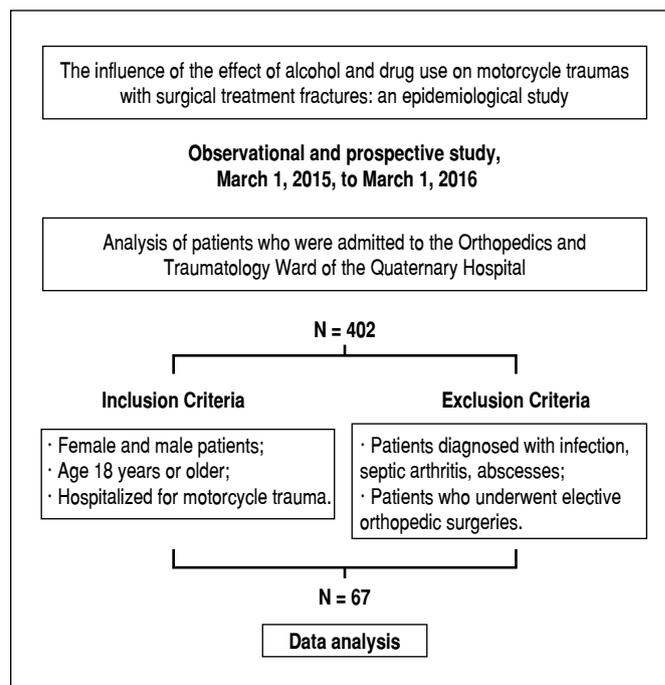


Figure 1. Flowchart of the methodology adopted.

RESULTS

This study analyzed 402 hospitalized patients, of which 282 (76.2%) were victims of trauma, from March 1, 2015, to March 1, 2016. Of these, 67 (23.8%) patients were victims of motorcycle accident, showing a statistically significant difference (Table 1).

Regarding age, the mean of 32 years old was observed, with a minimum of 18 and a maximum of 56 years old. Regarding gender, we can observe that males were more prevalent with 66 (98.5%) patients, obtaining a statistical difference.

In the motorcycle trauma group, we observed that 33 (49.3%) patients were in the alcohol and drug use group (ADG) and 34 patients (50.7%) were in the no alcohol and drug use group (WADG), and this difference was not statistically significant, since the distribution was homogeneous.

In the analysis of alcohol and drug consumption in motorcycle trauma patients (n = 33), it was observed that 22 (66.7%) were only under the effect of alcohol, five (15.2%) were under the influence of alcohol and drugs, and six (18.2%) were only under the effect of illicit drugs (Table 2).

Closed fractures were more frequent in patients with motorcycle trauma; however, no significant difference was observed between the groups with and without alcohol and drug use (Table 3).

According to the topography of the fractures, 46 (68.7%) patients showed fractures only in the lower limb, seven (10.4%) in the upper and lower limb and 14 (20.9%) in the upper limb. Fractures in the trunk were not found. No statistical difference was observed in the groups alcohol and drug use (ADG) and no alcohol and drug use (NADG).

Comparing motorcycle accidents and other causes of trauma, the rate of open fracture in the group other traumas was 17.2%. This index was lower than in the group of motorcyclists using alcohol and drugs (39.4%), and in the group without alcohol and drug use, which showed 41.2% of open fractures. Statistical differences were observed between the other trauma group and the ADG and NADG groups; however, no statistical differences were observed between the ADG and NADG groups, as previously reported (Table 4).

Regarding the topography of fractures, we found no statistical difference when we compared the groups (Table 5).

Table 1. Prevalence of trauma mechanism.

Trauma	N	%	P
Motorcycles	67	23.8%	<0.001
Other	215	76.2%	
Total	282		

Table 2. Prevalence of alcohol and drug use in the motorcycle trauma group.

Motorcycles ADG	N	%
Only Alcohol	22	66.7%
Alcohol and drugs	5	15.2%
Only drugs	6	18.2%
Total	33	

ADG: Alcohol and Drug Use Group.

Table 3. Prevalence of open fractures according to the group in motorcycle trauma.

	Open		Closed		P
	N	%	N	%	
WADG	14	41.2%	20	58.8%	0.146
ADG	13	39.4%	20	60.6%	0.085
Total	27	40.3%	40	59.7%	0.025

NADG: No Alcohol and Drug Use Group; ADG: Alcohol and Drug Use Group.

Table 4. Distribution of groups according to fracture characteristics.

	Open		Closed	
	N	%	N	%
ADG	13	39.4%	20	60.6%
WADG	14	41.2%	20	58.8%
OT	37	17.2%	178	82.8%

NADG: No Alcohol and Drug Use Group; ADG: Alcohol and Drug Use Group; OT: Other Traumas.

Table 5. Distribution of fracture topographies according to groups.

	Lower limb		Upper limb		Upper and Lower Limb	
	N	%	N	%	N	%
MOTORCYCLE ADG	23	69.7%	7	21.2%	3	9.1%
MOTORCYCLE NADG	23	67.6%	7	20.6%	4	11.8%
OT	156	72.6%	54	25.1%	5	2.3%

NADG: No Alcohol and Drug Use Group; ADG: Alcohol and Drug Use Group; OT: Other Traumas.

DISCUSSION

Anjos et al.¹³ concluded that the motorcycle accident causes a change in the individual's behavior, disabling him temporarily or permanently. These events change family dynamics, cause psychological and affective traumas, compromise leisure, besides negatively affecting the family economic situation.

Data from the Traffic Engineering Company of São Paulo show that, in 2012, the rates of motorcycle accident deaths increased over the weekend and that 67% were at night. In 2016, 5,727 deaths occurred in São Paulo. Of these, motorcycling accidents led the number of deaths, corresponding to 30% of fatalities (1,718 deaths), followed by pedestrians and car drivers representing 26% and 25% of fatalities, respectively.¹⁴

Alcohol in the bloodstream causes several neuropsychomotor changes, such as false perception of speed, reduction of attention and peripheral vision, as well as increased euphoria and drowsiness.^{5,15,16}

Moura et al.¹⁷ published that alcoholism is relevant in the occurrence of trauma. The authors verified a direct correlation between alcohol and the number of traffic accidents.

In our study, we verified 23.8% of hospitalizations for motorcycle trauma. This rate is much lower than the results found by Modelli, Pratesi and Tauil¹⁸, and Jaña et al.¹⁹, with rates of 70% and 57%, respectively. This difference can be related to distinct locations and hospital characteristics, leading to a higher or lower prevalence of this type of trauma.

The results showed that almost half of our patients were under use of alcohol and/or drugs. In our study, alcohol and drug use were self-reported. Therefore, our data may have been underestimated, and we believe that this rate may be higher. A better method of measurement, such as toxicological tests, would demonstrate the prevalence of drivers using alcohol and drugs more accurately.

In 2008, the law popularly known as "Dry Law" was promulgated, introducing legal provisions that inhibit the consumption of alcoholic beverages by the driver of a motor vehicle. Thus, the identification of any concentration of alcohol in the blood imposes penalties on the driver, such as fine, suspension of the driver's license and seizure of the vehicle.²⁰

Paixão et al.²¹ showed that 55% of deaths by traffic accident from 2008 to 2010 had positive toxicological tests. The non-reduction in the number of victims of traffic accidents in the period after "Dry Law" was also mentioned by Oliveira et al.,²² who stress, however, the importance of the law on a permanent character, since it is a strong tool to prevent traffic accidents in the country. Despite these data, few studies have shown the association of alcohol consumption and the use of illicit drugs with motorcycle accidents.²³

In the U.S., Brady and Li in 2012 reported that more than half of drivers who died in a traffic accident were under the influence of alcohol or drugs, and 20% of them were under the influence of more than one drug.²⁴

In Brazil, Albuquerque et al.²⁵ reported that, in Recife, 60.8% of the motorcyclists, who were victims of trauma, were under the influence of alcohol, and 16.8% of illicit drugs.

Our result differs from the Brazilian study of Malta et al.,¹¹ who reported a reduction in the frequency of adults who drive drunk in Brazilian capitals after the approval of the "Dry Law". Moreover, our prevalence is higher than the study by Andrade et al.,¹⁰ who reported alcohol consumption in 39.2% in trauma patients. Methodological, geographical, and socioeconomic differences^{9,26,27} can justify the divergent results.

Considering that 7,207 compensations to Personal Injuries Caused by Land-based Automotive Vehicles (DPVAT) for motorcycle accidents were registered in 2015 and 2016¹⁴ in São Paulo and, in our study, 50% of the patients used alcohol or drugs, we can estimate that 3,603 motorcyclists could be under the influence of alcohol and illicit drugs. Maybe these accidents could have been prevented with a greater combat against the use of narcotics targeted at motorcycle drivers.

This study demonstrates the high prevalence of alcohol use in motorcyclists and that more than one third of them were

under the effect of illicit drugs during driving, data few reported in the literature. The association between licit/illicit drugs and the driving of cars and motorcycles is a severe problem in Brazil and worldwide, leading us to believe that additional actions to "Dry Law," such as advertising measures and toxicological detectors, should be introduced to combat drug driving.

Studies show that males are 22 times more likely to be involved in traffic accidents⁵ and that the incidence of fractures in orthopedic services is extremely higher in males than in females.²⁸

The predominance of males may be associated with the greater number of male drivers, characteristics related to age, immaturity, overestimation of capacity and limits, lack of experience and ability to drive reduced by alcohol and other drugs consumption.^{5,28}

Thus, the measures against motorcycle accidents should reach mainly this population at risk – young males.

The risk of an exposed fracture is associated with the protection that the vehicle offers, since the lack of protection causes grave bodily injury and, sometimes, severe multiple injuries and death. Our study showed similarity in these data, however, although we did not find statistical difference in relation to the groups of motorcyclists with the variable use of alcohol and drugs.

Despite the differences in incidences in these populations studied, the data indicate a higher incidence of fractures in the lower limbs, a fact easily explained by the lack of protection and, consequently, greater vulnerability of this anatomical region to direct trauma in the event of an accident.

Our study has limitations, which include the absence of sociodemographic information, follow-up, and outcome of victims in the hospital environment, such as death, time of hospital discharge and the need for the rehabilitation service for the victims.

Our main point was the high prevalence of patients who suffered motorcycling accidents under alcohol and drug use, a question few analyzed in the literature. We also show the higher incidence of injuries in the lower limbs, as well as the prevalence of males and young adults, although the use of alcohol and/or drugs was not related to the higher incidence of open fractures.

Thus, the results contribute to increase the knowledge of the prevalence of alcohol and drug use by motorcyclists, which should provide prevention policies to reduce trauma caused by motorcycle accidents and draw attention of emergency care services to the possible toxicological changes of the injured person.

CONCLUSIONS

Our study showed a close association (49%) between motorcycle trauma and the use of alcohol and/or drugs. Among the patients who admitted the use of these substances, 67% used only alcohol, 15% used other illicit drugs and 18% used both alcohol and drugs. Most patients hospitalized due to motorcycle trauma were male, with a mean age of 32 years and had lower limb fractures and closed fractures.

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REFERENCES

1. Barbosa MQ, Abrantes KSM, Silva WR Jr, Casimiro GS, Cavalcanti AL. Motorcycle accident: characterization of victims rescued by the mobile emergency care service (Samu). *Rev Bras Cienc Saude*. 2014;18(1):3-10.
2. Marinho F, Passos VMA, França EB. Novo século, novos desafios: mudança no perfil da carga de doença no Brasil de 1990 a 2010. *Epidemiol Serv Saude*. 2016;25(4):713-24.
3. World Health Organization. Global status report on road safety 2013 [Internet]. Geneva: World Health Organization; 2013 [accessed on 2017 Nov 26]. Available from: https://apps.who.int/iris/bitstream/handle/10665/44122/9789241563840_eng.pdf;jsessionid=CE84C1AF068E35395E3C811EBF7FFB28?sequence=1
4. Gomes SL, Santos YA, Dourado SBPB, Coêlho DMM, Moura MEB. Perfil das vítimas de acidentes motociclísticos admitidas nas terapias intensivas de um hospital público. *Rev Enferm UFPE on line*. 2014;8(7):2004-12.
5. Araújo DC, Pinheiro FGMS, Menezes MGV, Lima SGS, Tavares CSS, Vaez AC. Profile and factors associated with trauma in victims of traffic accidents attended by emergency mobile service. *Arq Cienc Saude*. 2017;24(2):65-70.
6. Barros AJD, Amaral RL, Oliveira MS, Lima SC, Goncalves EV. Traffic accidents resulting in injuries: underreporting, characteristics, and case fatality rate. *Cad Saude Publica*. 2003;19(4):979-86.
7. Horswill MS, Helman S. A behavioral comparison between motorcyclists and a matched group of non-motorcycling car drivers: factors influencing accident risk. *Accid Anal Prev*. 2003;35(4):589-97.
8. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, et al. World report on road traffic injury prevention. Geneva: World Health Organization; 2004.
9. Babajanpour B, Asghari Jafarabadi M, Sadeghi Bazargani H. Predictive ability of underlying factors of motorcycle rider behavior: an application of logistic quantile regression for bounded outcomes. *Health Promot Perspect*. 2017;7(4):230-37.
10. Andrade LM, Lima MA, Silva CH, Caetano JA. Acidentes de motocicleta: características das vítimas e dos acidentes em hospital de Fortaleza – CE, Brasil. *Rev Rene*. 2009;10(4):52-9.
11. Malta DC, Soares Filho MA, Montenegro MMS, Mascarenhas MSM, Silva MMA, Lima CM, et al. Mortality analysis of traffic accidents before and After Brazil's Dry Law, from 2007 to 2009. *Epidemiol Serv Saude*. 2010;19(4):317-28.
12. Von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP, et al. The strengthening of reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol*. 2008;61(4):344-9.
13. Anjos KC. Implicações sociais e econômicas nos pacientes vítimas de acidentes com motocicleta internados no IOT-HCFMUSP [Master's thesis]. São Paulo: Universidade de São Paulo; 2012.
14. Companhia de Engenharia de Tráfego [Internet]. São Paulo: CETSP; [date unknown] [accessed on 2021 Dec 20]. Available from: <http://www.cetsp.com.br>
15. De Boni R, Von Diemen L, Duarte PCAV, Bumaguin DB, Hilgert JB, Bozzetti MC, et al. Regional differences associated with drinking and driving in Brazil. *Rev Bras Psiquiatr*. 2012;34(3):306-13.
16. Martins ET, Boing AF, Peres MA. Mortalidade por acidentes de motocicleta no Brasil: análise de tendência temporal, 1996-2009. *Rev Saude Publica*. 2013;47(5):931-41.
17. Moura EC, Moraes Neto OL, Malta DC, Moura L, Silva NN, Bernal R, et al. Vigilância de fatores de risco para doenças crônicas por inquérito telefônico nas capitais dos 26 estados brasileiros e no Distrito Federal (2006). *Rev Bras Epidemiol*. 2008;11:20-37.
18. Modelli MES, Pratesi R, Tauil PL. Alcoolemia em vítimas fatais de acidentes de trânsito no Distrito Federal, Brasil. *Rev Saude Publica*. 2008;42(2):350-2.
19. Jana Neto FC, Canal MP, Alves BA, Ferreira PM, Ayres JC, Alves R. Análise das características dos pacientes com fratura exposta de tíbia grau III de Gustilo e Anderson. *Rev Bras Ortop*. 2016;51(2):143-9.
20. Nunes MN, Nascimento LFC. Análise espacial de óbitos por acidentes de trânsito, antes e após a Lei Seca, nas microrregiões do estado de São Paulo. *Rev Assoc Med Bras*. 2012;58(6):685-90.
21. Paixão LMMM, Gontijo ED, Drumond EF, Friche AAL, Caiiffa WT. Traffic accidents in Belo Horizonte: the view from three different sources, 2008 to 2010. *Rev Bras Epidemiol*. 2015;18(1):108-22.
22. Oliveira FMRL, Fernandes MGM, Barbosa KTF, Pereira MA, Santos KFO, Nunes TB. Caracterização do trauma em idosos atendidos em serviço de atendimento móvel de urgência. *Rev Rene*. 2013;14(5):945-50.
23. Ponce JC, Leyton V. Illegal drugs and the traffic: a problem rarely discussed in Brazil. *Rev Psiq Clin*. 2008;35:65-9.

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24. Brady JE, Li G. Prevalence of alcohol and other drugs in fatally injured drivers. *Addiction*. 2013;108(1):104-14.
25. Albuquerque ALM, Sousa Filho PGT, Braga MB Jr, Cavalcante Neto JS, Medeiros BBL, Lopes MBG. Epidemiologia das fraturas em pacientes do interior do Ceará tratadas pelo SUS. *Acta Ortop Bras*. 2012;20(2):66-9.
26. Aitken SA, Rodrigues MA, Duckworth AD, Clement ND, McQueen MM, Court-Brown CM. Determining the incidence of adult fractures: how accurate are emergency department data. *Epidemiol Res Int*. 2012;2012:1-7.
27. Graziano PA, Reid A, Slavec J, Paneto A, McNamara JP, Geffken GR. ADHD symptomatology and risky health, driving, and financial behaviors in college: the mediating role of sensation seeking and effortful control. *J Atten Disord*. 2015;19(3):179-90.
28. Misra P, Majumdar A, Misra MC, Kant S, Gupta SK, Gupta A, et al. Epidemiological study of patients of road traffic injuries attending emergency department of a trauma center in New Delhi. *Indian J Crit Care Med*. 2017;21(10):678-83.