

MOTORCYCLE ACCIDENTS: CHARACTERISTICS AND SUSPECTED ALCOHOL USE

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ABSTRACT: The present study aimed to analyze the relationship between the characteristics of motorcycle accidents and suspected alcohol use. Descriptive and cross-sectional study with 110 patients involved in motorcycle accidents assisted at an emergency hospital in a large city (state capital) in Northeastern Brazil. Data was collected in November-December 2016 and analyzed through descriptive statistics and inferential tests. Significant associations were found between alcohol consumption and injury severity, licensed or unlicensed drivers, time of the accident (night or day) and helmet use. Most victims of motorcycle accidents were not using a helmet and had consumed alcoholic beverages. The findings call attention to the need for a direct, effective and sustainable traffic crash surveillance system by the responsible bodies, given the lack of effective preventive measures.

DESCRIPTORS: Traffic accidents; Motorcycles; External causes; Wounds and injuries; Accident prevention.

ACIDENTES COM MOTOCICLETAS: CARACTERÍSTICAS DA OCORRÊNCIA E SUSPEITA DO USO DE ÁLCOOL

RESUMO: Objetivou-se analisar a relação entre as características dos acidentes motociclísticos e a suspeita do uso de álcool. Estudo descritivo e transversal, realizado com 110 pacientes vítimas de acidentes de motocicleta atendidos em hospital de referência em urgência em uma capital do nordeste do Brasil, cujos dados foram coletados em novembro e dezembro de 2016, e analisados por meio da estatística descritiva, aplicando-se testes inferenciais. Verificou-se associações significativas entre o uso de álcool e a condição da vítima no veículo, habilitação, turno do acidente e uso de capacete. Vítimas sem capacete e que consumiram bebidas alcoólicas apresentaram prevalência maior dentre os acidentados. Os dados alertam sobre a relevância de uma fiscalização direta, efetiva e contínua por parte dos órgãos de trânsito, levando-se em consideração a insuficiência de medidas preventivas para acidentes.

DESCRIPTORIOS: Acidentes de trânsito; Motocicletas; Causas externas; Ferimentos e lesões; Prevenção de acidentes.

ACCIDENTES EN MOTOCICLETA: CARACTERÍSTICAS DEL SUCESO Y SOSPECHA DE CONSUMO DE ALCOHOL

RESUMEN: Se objetivó analizar la relación entre las características de accidentes motociclísticos y la sospecha de consumo alcohólico. Estudio descriptivo, transversal, realizado con 110 pacientes víctimas de accidentes en motocicleta atendidos en hospital de referencia en emergencias de una capital del noreste de Brasil. Datos recolectados en noviembre y diciembre de 2016, analizados mediante estadística descriptiva, aplicándose tests inferenciales. Se verificaron asociaciones significativas entre consumo de alcohol y la condición de la víctima en el vehículo, habilitación, turno del accidente y uso de casco. Las víctimas sin casco y que consumieron alcohol presentaron mayor prevalencia entre los acidentados. Los datos alertan sobre la relevancia de una fiscalización directa, efectiva y continúan por parte de los organismos de tránsito, tomándose en consideración la insuficiencia de medidas preventivas para accidentes.

DESCRIPTORIOS: Accidentes de Tránsito; Motocicletas; Causas Externas; Heridas y Lesiones; Prevención de Accidentes.

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● INTRODUCTION

External causes are traumas, injuries or other health problems – whether intentional or not – of sudden onset and immediate consequences of violence or other exogenous causes. This group includes injuries caused by transportation accidents, homicides, assaults, falls, drowning, poisoning, suicides, burns, injuries related to mudslides or floods, and other events caused by environmental conditions ⁽¹⁾.

They have become a major public health problem due to their high morbidity and mortality rates and because of the increase in the number of deaths of younger individuals, which increased public sector spending ⁽²⁾.

Trauma resulting from traffic accidents have already been the eighth leading cause of death in the world and the leading cause of death among young people aged 15-29. Globally, the total number of traffic deaths is very high: more than 1.2 million people die every year in traffic accidents, particularly in poor or developing countries, and half of these deaths are of motorcyclists (23%), pedestrians (22%) and bicycle riders (5%) ⁽³⁾.

From 2000 to 2010, there was a 19.1% increase in hospital admission rates in Brazil due to external causes. Of these, it is worth stressing the 243.1% increased risk of hospitalization for motorcycle accidents, which rose from 1.1 hospitalization per 10 thousand inhabitants to 3.7 hospitalizations for 10 thousand inhabitants ⁽⁴⁾.

Road traffic accidents occur more commonly amongst motorcyclists in the country. According to the map of violence related to traffic accidents in Piauí, the number of deaths between 2001 and 2011 more than doubled, reaching a growth of 126.1%. In 2001, the state of Piauí ranked 20th in Brazil, with a mortality rate of 15.3 per 100 thousand inhabitants, and in 2011 it was the fourth Brazilian state in traffic fatalities. The state has also the highest fatality rates for motorcyclists, with 21.4 per 100,000 inhabitants ⁽⁵⁾.

In an attempt to reduce morbidity and mortality from external causes, in 2001 the Ministry of Health launched the National Policy for the Reduction of Morbidity and Mortality from Violence and Accidents (PNRMAV), approved by Decree No. 737/GM, on May 16, 2001. This policy stressed the role of the health sector in coping with traffic accidents and violence in Brazil, through the development of a set of coordinated and systematized actions and guidelines ⁽⁶⁻⁷⁾.

Most victims of motorcycle accidents are young males, and the number of victims of these accidents tend to increase in the weekends, during the night. This fact is related to possible alcohol ingestion that impairs the vision of drivers. They also take longer to respond to stimuli and may experience a feeling of euphoria that stimulates them to drive at a faster speed and lose control of the motorcycle ⁽⁸⁾.

This behavioral profile is associated with morbidity and mortality from external causes, considered the leading cause of death among men of working age, especially assaults and traffic accidents, which are a serious public health problem, due to the high social and economic costs involved in the treatment and rehabilitation of these victims ⁽³⁾.

In view of the aforementioned, the present study aimed to analyze the relationship between the characteristics of motorcycle accidents and suspected alcohol use.

● METHODOLOGY

Cross-sectional descriptive study conducted at an emergency hospital located in the city of Teresina, state of Piauí, that provides health services exclusively under the Unified Health System (SUS) and has 368 beds.

The study population consisted of all motorcycle accident victims treated at the emergency hospital. In the period of January-June 2016 there were 5,703 cases of accidents involving motorcycles. The sample comprised all motorcycle accident victims treated at the referred hospital during the months

of November and December 2016, totaling 110 participants.

The following inclusion criterion was adopted in the study: patients aged 18 years and over, of both genders, treated at the emergency hospital because of motorcycle crash injuries. Critically ill patients who were disoriented or comatose were excluded from the study.

Data was collected through interviews with patients who had motorcycle accidents admitted to the emergency hospital. The instrument used was a questionnaire on sociodemographic data of victims of motorcycle accidents developed by the researchers aimed to identify the anatomical regions affected by the motorcycle accidents according to ICD-X. Patients' records were also assessed.

Each form included a control number. Respondent anonymity was maintained, with document blinding. Data was collected in the months of November and December 2016, during daytime. The participants were previously informed on the objectives and the strategy of data production.

Data were coded and transcribed using Microsoft Excel spreadsheets, according to a previously elaborated data dictionary. They were processed using the Statistical Package for Social Sciences software from International Business Machines (IBM SPSS) version 21.0. Descriptive statistics was used for quantitative data (mean, standard deviation, minimum and maximum), and frequencies for qualitative variables. For inferential analysis, Pearson Chi-Square Test was used to verify associations between the characteristics of motorcycle accidents and suspected alcohol use. If Pearson's assumptions were not met, the variables were dichotomized for Fisher's Exact Test. For significant associations, prevalence ratio and its confidence interval were calculated. All analyzes were performed at a significance level of 5%.

The research project was approved by the Research Ethics Committee of the emergency hospital where the study was conducted and subsequently by the Research Ethics Committee of the Universidade Federal do Piauí, under No. 1,806,561. The conducts adopted during the study met the guidelines of Resolution No. 466/2012 of Brazil's National Health Council⁽⁹⁾.

● RESULTS

The victims of motorcycle accidents: 110 (100%) were characterized according to socioeconomic aspects (Table 1).

Table 1 - Socioeconomic characterization of victims of motorcycle accidents (n=110). Teresina, PI, Brazil, 2016 (continues)

Characteristic	M	SD	Variation	n	%
Age (years)	36.6	12.8	[18; 71]		
18 to 35				56	50.9
36-45				33	30
46 to 59				14	12.7
60 or more				7	6.4
Gender					
Male				96	87.3
Female				14	12.7
Marital status					
Single				45	40.9
Married				58	52.7
Separated/Divorced				6	5.5
Widowed				1	0.9

Education		
Non-literate	6	5.5
Primary education	54	49.1
Secondary education	47	42.7
Higher education	3	2.7
Family income		
Less than 1 MW (minimum wage)	24	21.8
1 to 3 MW	81	73.6
4 to 5 MW	4	3.6
Above 5 MW	1	0.9
Total	110	100

Legend: M: mean; SD: standard deviation; MW: minimum wage (R\$ 880,00, as of January 01, 2016)

The mean age of motorcycle accident victims was 36.6 (SD = 12.8) years, with a minimum of 18.1 and a maximum of 71.2 years, and a predominant age range of 18-35 years (50.9 %). Ninety-six (87.3%) were males, married 58 (52.7%), who had completed primary education 54 (49.1%) and family income ranging from one to three minimum wages 81 (73.6% %), as shown in Table 1.

The most frequent occupations of the patients were: retail work 37 (33.6%), rural works, 20 (18.2%); construction work, 17 (15.5%); self-employed, eight (7.2%); industrial work, seven (6.4%); domestic work, six (5.5%); individuals who used motorcycle at work, as follows: motorcycle taxi drivers (55.6%) and four motoboys (44,4%). Three participants were retired and three were students, accounting for 2.7% each.

Regarding the characteristics of motorcycle accidents, according to the aspects involved in the occurrences (Table 2), motorcycle riders accounted for 93 (84.5%); unlicensed, 58 (52.7%); involved in crashes 56 (50.9%); nonspecific, 54 (49.1%); in the urban area, 73 (66.4%); on weekends, 64 (58.2%); during the night, 50 (45.5%); using helmets, 61 (55.5%); not drunk, 65 (59.1%) and not using mobile phones, 106 (96.4%).

Table 2 - Characteristics of motorcycle accidents according to the aspects involved in the occurrences (n = 110). Teresina, PI, Brazil, 2016 (continues)

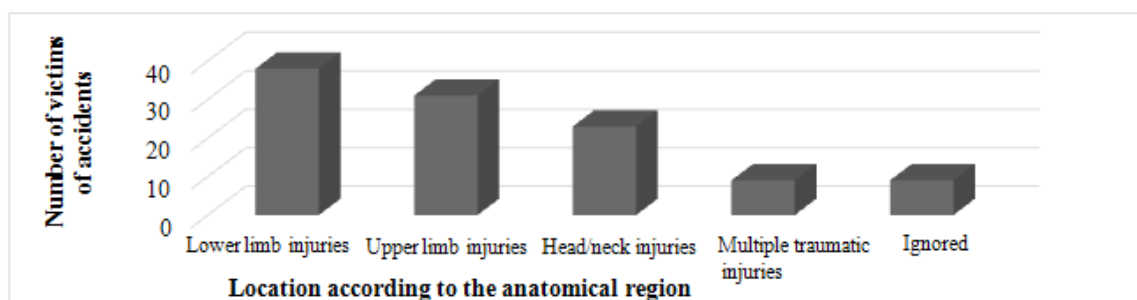
Characteristic	N	%
Position of patient		
Rider	93	84.5
Passenger	17	15.5
Licensed rider *		
Yes	35	31.8
No	58	52.7
Type of accident		
Crash	12	10.9
Collision	56	50.9
Traffic jam	2	1.8
Fall	39	35.5
Ignored	1	0.9
Type of collision		
Front	15	13.6
Lateral	24	21.8

Transverse	13	11.8
Rear	4	3.6
Ignored	54	49.1
Site of the accident		
Urban area	73	66.4
Countryside	37	33.6
Day of the week of the accident		
Weekend	64	58.2
Working days	46	41.8
Time of the accident		
Morning	31	28.2
Evening	28	25.5
Night	50	45.5
Ignored	1	0.9
Use of helmet		
Yes	61	55.5
No	48	43.6
Ignored	1	0.9
Alcohol consumption		
Yes	43	39.1
No	65	59.1
Ignored	2	1.8
Mobile use		
Yes	2	1.8
No	106	96.4
Ignored	2	1.8
Total	110	100.0

Legend: *: n = 93

Injuries were detected in 109 (99.1%) victims of motorcycle accidents: 38 (34.5%) consisted of lower limb injuries, 31 (28.2%) upper limb injuries, 23 (20.9%) head and/or neck injuries, and nine (8.2%) were multiple traumatic injuries. No information was found on nine (8.2%) victims (Graph 1).

Chart 1 - Anatomical region of traumas in victims of motorcycle accidents, according to the International Classification of Diseases (n = 110). Teresina, PI, Brazil, 2016



Significant associations were found between alcohol use and the victim's position in the motorcycle ($p = 0.024$), license ($p = 0.006$), time of accident ($p < 0.001$) and helmet use ($p < 0.001$). Riders 41 (38.0%) showed a 5.1 times higher prevalence of alcohol use (95% CI = 1,1-24.0) compared to passengers, two (1.9%). Unlicensed riders showed a 2.1 times higher prevalence of alcohol consumption (95% CI = 1.2-3.9) and accidents involving victims who consumed alcohol were more frequent at night, 29 (27.1%); with a 2.6-times higher prevalence (95% CI = 1.6-4.5) than in the morning or evening (12.1%) (Table 3).

Table 3 - Associations between characteristics of motorcycle accidents and suspected alcohol use (n=110). Teresina, PI, Brazil, 2016

Characteristic	Alcohol use						P value
	Yes		No		Total		
	n	%	n	%	n	%	
Position of patient							0,024 ^a
Rider	41	38	52	48.1	93	86.1	
Passenger	2	1.9	13	12	15	13.9	
Licensed motorcycle rider *							0.006 ^a
No	32	34.4	26	28	58	62.4	
Yes	9	9.7	26	28	35	37.6	
Time of the accident							<0.001 ^b
Night	29	27.1	20	18.7	49	45.8	
Morning/Evening	13	12.1	45	42.1	58	54.2	
Use of helmet							<0.001 ^a
No	29	27.1	18	16.8	47	43.9	
Yes	13	12.1	47	43.9	60	56.1	
Anatomical location							<0.001 ^b
Head and neck	18	20	5	5.6	23	25.6	
Limbs/ multiple traumatic injuries	19	21.1	48	53.3	67	74.4	
Total	43	39.8	65	60.2	108	100.0	

Legend: *: n = 93; a: Pearson's Chi-Square Test; b: Fisher's Exact Test

Victims of motorcycle accidents who were not using a helmet and drank alcoholic beverages 29 (27.1%) had a 2.8 times higher prevalence (95% CI = 1.7-4.8) of suffering this type of accident. Regarding the anatomical location, a 2.8 times higher prevalence (IC95% = 1,8-4,3) of alcohol use was identified in victims of motorcycle accidents who had head and neck injuries, 23 (25.6%);, and five of them (5.6%) did not drink alcohol (Table 2). There were no significant associations between alcohol use and type of collision ($\chi^2 = 3.32$, $p = 0.068$), site of the accident ($\chi^2 = 3.79$, $p = 0.052$), day of the week ($\chi^2 = 0.58$, $P = 0.445$), use of mobile phone ($p = 0.156$), use of motorcycle at work ($p = 0.312$).

● DISCUSSION

Traffic accidents have become a major concern worldwide due to the high number of victims as well as the resulting socioeconomic and personal impacts. Motorcycles have become popular for several reasons: people get to destination faster, cheaper to purchase than cars, less fuel consumption and more affordable to maintain, easy parking, among others⁽¹⁰⁾.

The socioeconomic data of the participants is similar to data obtained in a study conducted in a local hospital in the city of Imperatriz, in the state of Maranhão, with 112 victims of motorcycle accidents where most victims were male individuals (89.19%) in working age, ranging from 16-30 years (66.07%), who had completed primary education (50%) and with predominant family income of 1 to 3 minimum

wages (55.36%)⁽¹¹⁾.

Men are more involved in motorcycle accidents because of some relevant sociocultural issues, such as: most motorcycle riders are men; and as they perceive themselves as better riders than women they tend to be careless and take too many risks, while women are more cautious and avoid risks⁽¹²⁾.

Regarding the age range, individuals aged 18-35 years old (50.9%) were the most involved in these accidents, and there are several reasons to explain why young people are more involved in motorcycle crashes, such as inexperience, poor hazard perception ability; as well as their desire for risk and adventure that lead them to drive at faster speed⁽¹³⁾.

There was a small percentage of elderly people who were also victims of motorcycle accidents (6.4%). According to the literature, traffic accidents involving elderly are increasing due to the current traffic conditions, especially in urban centers. Elderly are more vulnerable to these events because of the limitations inherent to aging and inadequate urban planning, among other factors⁽¹⁴⁾.

Regarding the occupations of individuals involved in motorcycle accidents, an integrative literature review identified the following professional profile of victims of motorcycle accidents in Brazil: individuals with low educational level and who used motorcycle at work. This finding contrasts with those of the present study where only 8.2% of people who used a motorcycle at work; and most people involved in motorcycle accidents were retail workers (33.6%), agricultural workers (18.2%) and construction workers (15.5%)⁽¹⁵⁾. This discrepancy can be related to the peculiarities of the state of Piauí, where most employment opportunities are available in the tertiary sector (services) and in family farming activities.

In the present study, the group of motorcycle riders is the most involved in traffic accidents (84.5%). A similar finding was obtained in a study conducted in an emergency service in the city of Picos, Piauí: (83.7% of the victims). This can be explained by the fact that these individuals are more vulnerable to traffic accidents because they are at higher risk of being killed in motor vehicle collisions. The referred study also corroborated the present study in one important risk variable, namely, most motorcycle riders were not licensed to operate a motorcycle (73.7%)⁽¹⁶⁾.

Unlicensed drivers are one of the main factors that contribute to increase the number of traffic accidents. The fact that most of them are very young and, inexperienced drivers without the minimum age for driving is a matter of concern, as it may lead to a significant number of fatalities. Furthermore, some experts believe that drivers with less than five years of driving experience are at greater risk for getting involved in traffic accidents. The inexperience of newly licensed drivers shows that strict regulations of the Brazilian Traffic Code such as the one that establishes that individuals who pass the driving test must apply for a provisional driving license during the first year failed to ensure that only well-trained drivers obtain driving licenses⁽¹⁷⁾.

Regarding the days of the week with the highest prevalence of motorcycle accidents, a study conducted in Teresina, Piauí that aimed to characterize traffic accidents in 2007 and 2013, obtained consistent results, showing that most accidents occurred in the weekends because parties and/or any other leisure events occur mainly on these days of the week. Therefore, many people ride motorcycles after drinking in these gatherings and are involved in accidents⁽¹⁸⁾.

The increased risk for traffic accidents during the night can be explained by issues associated to activities performed in the night period such as adverse lighting conditions and physiological factors, such as increased consumption of alcohol and other drugs, faster driving, reduced visibility and fatigue at the end of the day⁽¹⁹⁾.

Concerning the most affected anatomical region, the prevalence of injuries in the lower extremities has already been detected in another study focused on the characteristics of motorcycle accidents that identified this region as the most affected by injuries (43.75%). This is due to the vulnerability of motorcyclists to injury because their vehicles provide little or no protection to upper and lower extremities. The helmet, the main personal protective equipment (PPE) required by law, protects only the head⁽¹¹⁾.

Regarding alcohol use, a study conducted in the capital cities of three Brazilian states, in 2007,

revealed suspected alcohol use in 18.1% of victims of motorcycle accidents, that is, a low percentage of affirmative responses. Our findings also showed that few respondents reported the use of alcohol (39.1%)⁽²⁰⁾.

The effect of alcohol on motorcycle riders has been documented as one of the most frequent causes of injuries and fatal accidents. The number of deaths of motorcyclists in road accidents is very high compared to fatalities involving drivers of passenger cars and vans. A study conducted in Norway on the use of alcohol or other drugs related to fatal accidents reported that more than one out of four motorcyclists killed in road accidents had blood alcohol content above the legal limits of a legislation enacted in 2012 in that country⁽²¹⁾.

The enactment of Law No. 11,705/2008, known as 'Dry Law', had impact on the Brazilian figures related to traffic accidents. A technical note published in 2010 on the impact of restrictive alcohol legislation on morbimortality by land transportation accidents in Brazil, reported the reduction in the number of hospital admissions due to traffic accidents in all Brazilian capitals and in the Federal District. This fact corroborates the importance of this law in the prevention of these accidents and the need for more enforcement measures, communication and continuing education⁽²²⁻²³⁾.

Nonuse of helmet is directly related to the occurrence of traumatic brain injuries (TBI) in motorcyclists. This finding was reported in a documentary research with 270 victims of TBI caused by motorcycle accidents and admitted to a public hospital between 2013-2014 in Ceará. In the referred study, 86% of the sample reported no use of helmet at the time of the accident⁽²⁴⁾.

According to a systematic review with meta-analysis, the hospital cost of a patient that had been in a motorcycle crash with no helmet is \$ 12,239 higher than that of a patient who was using a helmet. Also, the former needs more post-discharge interventions and public health coverage⁽²⁵⁾.

The limitations of this study concerned data not provided by the respondents either because they concerned questions not answered in the interviews or because the referred data was not found in the records and charts, and the size of the sample. The data obtained has drawn attention to the need for direct, effective and permanent traffic crash surveillance, given the lack of effective prevention measures.

● CONCLUSIONS

The present study with 110 victims of motorcycle accidents found that the most frequent sociodemographic characteristics were men of working age, married, with low educational level and who earned one to three minimum wages. The main occupations were retail work, rural work and construction work.

Regarding the characteristics of motorcycle accidents, according to the aspects involved in the occurrences, most victims were unlicensed riders involved in some type of collision in the urban area, on weekends, during the night who were using helmets, had not drunk alcohol and were not using the mobile phone.

There were significant associations between alcohol use and the victim's position in the vehicle, driver's license, time of the accident and helmet use. Most victims of these accidents had no helmet and had consumed alcohol, and the most affected anatomical region in patients who drank alcohol was the head and neck.

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