# VICTIMS OF MOTORCYCLE ACCIDENTS ASSISTED IN A PUBLIC TEACHING HOSPITAL

*VÍTIMAS DE ACIDENTE MOTOCICLÍSTICO ATENDIDAS EM HOSPITAL PÚBLICO DE ENSINO*

*VÍCTIMAS DE ACCIDENTES DE MOTOCICLETAS ATENDIDAS EN UN HOSPITAL PÚBLICO DE ENSEÑANZA*

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## ABSTRACT

External causes are defined as trauma, injuries or any other health damages of an intentional or unintentional nature. The objective of this study was to characterize the sociodemographic profile of victims of trauma caused by motorcycle accident and to identify the frequency of these events. It was a retrospective, quantitative and descriptive-exploratory study developed at the Clinical Hospital of a public university in Minas Gerais. The sample consisted of 64 motorcycle accident records. These patients were older than 14 years, remained hospitalized until discharge, transference or death. We used an adapted instrument covering sociodemographic variables and aspects related to the traumatic event. It was evidenced that the majority of the patients came from Uberaba, had complete primary education, was of the male gender, in the age group of 20 to 29 years, and had white skin color. The main medical diagnosis was tibial shaft fracture. The majority of the anatomical lesions affected the lower limbs, and the average hospital stay was 7.0 days. The night shift and Sundays prevailed with respect to frequency of occurrence of accidents. The months of March and July had a higher frequency of hospitalizations. According to the Rankin Scale, the victims were discharged with moderate disability. We conclude that motorcycle accidents are frequent in our country, characterizing a public health problem, with risk of death or incapacitating sequels. Studies such as this can provide subsidies for the creation of public policies, to implement health prevention and promotion measures.
Keywords: Accidents; External Causes; Motorcycles; Nursing; Accidents, Traffic; Emergency Medical Services.

## RESUMO

*As causas externas são definidas como traumatismos, lesões ou quaisquer outros agravos à saúde de natureza intencional ou não. O objetivo deste estudo foi caracterizar o perfil sociodemográfico das vítimas de trauma por acidente de motocicleta e identificar a frequência desses eventos. Tratou-se de estudo retrospectivo, quantitativo e descritivo-exploratório, desenvolvido no Hospital de Clínicas de uma universidade pública de Minas Gerais. A amostra foi composta de 64 prontuários de acidentes motociclísticos. Esses pacientes eram maiores de 14 anos, permaneceram internados até a alta hospitalar, transferência ou óbito. Foi utilizado um instrumento adaptado composto por variáveis sociodemográficas e aspectos relacionados ao evento traumático. Foi evidenciado que a maioria dos pacientes era procedente de Uberaba, com ensino fundamental completo, sexo masculino, na faixa etária de 20 a 29 anos, cor de pele branca. O principal diagnóstico médico foi o de fratura da diáfise da tíbia. A maioria das lesões anatômicas era localizada nos membros inferiores, sendo a permanência hospitalar média de 7,0 dias. Prevaleceu o período noturno e o domingo como de maior ocorrência de acidentes. Os meses de março e julho tiveram maior frequência de internação. De acordo com a Escala de Rankin, as vítimas tiveram alta com incapacidade moderada. Pode-se concluir que os acidentes motociclísticos são frequentes em nosso meio, caracterizando um problema de saúde pública, com risco de morte ou de sequelas incapacitantes. Estudos como este podem fornecer subsídio para elaboração de políticas públicas, para implementar medidas preventivas e de promoção à saúde.*
*Palavras-chave: Acidentes; Causas Externas; Motocicletas; Enfermagem; Acidentes de Trânsito; Serviços Médicos de Emergência.*

## RESUMEN

*Los traumatismos, lesiones o cualesquiera otros agravios a la salud, intencionales o no, son considerados causas externas. El objeto de este estudio fue caracterizar el perfil demográfico de las víctimas de traumatismos por accidente de motocicleta e identificar la frecuencia de dichos eventos. Se trata de un estudio retrospectivo, cuantitativo y exploratorio descriptivo, desarrollado en el hospital de clínicas de una universidad pública del estado de Minas Gerais. La muestra estaba compuesta por 64 registros de accidentes de motocicleta. Los pacientes eran mayores de 14 años, permanecieron internados hasta el alta hospitalaria, su transferencia o su deceso. Se utilizó un instrumento adaptado de variables sociodemográficas y aspectos vinculados al evento traumático. Se evidenció que la mayoría de los pacientes era de Uberaba, con enseñanza primaria completa, varones, entre 20 y 29 años y de tez blanca. El principal diagnóstico médico era fractura de diáfisis de la tibia. La mayoría de las lesiones anatómicas era en las extremidades inferiores y el promedio de permanencia en el hospital de 7 días. Los accidentes ocurrían principalmente de noche y durante los domingos. Hubo más internaciones en los meses de marzo y julio. Según la escala de Rankin, las víctimas fueron dadas de alta con incapacidad moderada. Se puede concluir que los accidentes de motocicleta son frecuentes en nuestro medio y que constituyen un problema de salud pública, con riesgo de muerte o de secuelas discapacitantes. Estudios como éste pueden contribuir a elaborar políticas públicas con miras a la implementación de medidas preventivas y de promoción de la salud.*

*Palabras clave: Accidentes; Causas Externas; Motocicletas; Enfermería; Accidentes de Tránsito; Servicios Médicos de Urgencia.*

# INTRODUCTION

External causes are defined as traumas, injuries or any other health damages of an intentional or unintentional nature, of sudden character, resulting in immediate violence or other exogenous causes. They include injuries caused by events in transportation, falls, homicides, drowning, burns, aggressions, among others.[1]

Brazil has undergone an accelerated demographic transition characterized by a decrease in the fertility rate and an increase in the indicators of population aging, particularly marked by a notable growth of external causes.[2]

About 180,000 people in the United States die each year from injuries resulting from violence related to preventable events such as traffic accidents, overdose, falls, assaults, drowning and suicide, according to numbers provided by the Center for Disease Control and Prevention (CDC). This rate indicates one death caused by injuries every three minutes.[3]

Currently, the proportional mortality in Brazil according to the causes of death shows that external causes rank as the first source of death in the country when it comes to young men. In 2015, 152,136 deaths were recorded due to external causes in Brazil. Only 35.7% of these deaths occurred in the Southeast region. In relation to hospital admissions, more than 1 million occurred due to external causes paid by the SUS (Unified Health System).[4]

Land transport accidents (LTA) are included in external causes and have a significant impact especially on the morbidity and mortality of the young and male population. Between 2005 and 2015, there were 441,244 deaths resulting from LTA in Brazil. Of these, 110,771 (25.1%) were motorcyclists, making up the largest percentage of victims, with predominance of males.[2,4]

Regarding the motorcycle fleet in Brazil, there was an increase from 3.5 million in 2000 to more than 20 million at the end of 2016, totaling 22.31% of the total number of vehicles in the country. The use of motorcycles has grown due to the ease of movement in traffic, low costs in terms of purchase, mainte-nance and fuel compared to other automobiles. From 2000 to 2010, the risk of death among motorcyclists increased by 329.2% and from 2010 to 2012, increased by 12.9%. In 2012, accidents involving motorcyclists were the first cause of death due to traffic accidents, more frequent in adolescents and young adults. Death of young individuals influences the social, economic and political structure of a country, because they are of economically active age, also modifying the country's public policies.[5-8]

Traffic accidents cause increased costs for health services. Therefore, studies in this area are necessary to ensure better attendance in emergency services and to support actions of the public power such as educational and inspection measures. Prevention and promotion actions are necessary to ensure a better quality of life for the population, requiring intersectoral work on health, education, social services, transit services, among others.[2, 6-9]

It is important to identify the population groups which are still economically active and are vulnerable to these events, because they have a strong influence on the country's economy, and such events bring damage to families and expenses to health services. The dissemination of research results is also fundamental for the planning of measures to prevent deaths from land transport accidents.[7]

In this context, the objective of this study was to characterize the sociodemographic profile of victims of trauma caused by motorcycle accidents and to identify the frequency of these events, highlighting the following variables: times, days of the week and months of the year, length of stay and condition at discharge of victims assisted in the Adult Emergency Room (AER) of a public teaching hospital in the countryside of Minas Gerais.

# MATERIAL AND METHOD

Retrospective study of quantitative methodological approach and descriptive-exploratory nature, developed in the Clinical Hospital of a public university in Minas Gerais. The hos-

pital has 302 active beds, of which 32 are first-aid beds. The hospital is of high complexity and reference to 27 municipalities that make up the South Triangle macro-region of the state of Minas Gerais. It covers 73% of all the average and high complexity of the macro-region and 100% of the high complexity in the same area, except for the treatment of cancer.[10]

The calculation of the sample size considered a motorcycle accident prevalence of 60%, accuracy of 5% and a 95% confidence interval for a finite population of 3,598 events of assistance for trauma, resulting in a sample of 335 subjects. Considering a sampling loss of 20%, the maximum number of attempts to request of maximum medical records was 419.

Inclusion criteria were patients above the age of 14 years, who had suffered a traumatic event and had been assisted at the Emergency Room and remained hospitalized until discharge, transfer or death, from January 1, 2014, to December 31, 2015.

We excluded from the research the medical records that were not found or that were incomplete and could prevent the correct filling of data. In this study, the motorcycle accident cases of the sample totaled 64 medical records.

Data collection was carried out after receiving the consent of the institution and approval by the Research Ethics Committee under Opinion of CEP 1.638.670. The ethical aspects followed the guidelines established by Resolution 466/12 of the National Health Council. The collection site was the Medical and Statistical Archive Service (MSAS) and collection was held from July to August 2016. An adapted previously validated instrument was used to collect data from the medical records, specifically sociodemographic variables: sex, age, origin, skin color and level of education. We also evaluated aspects related to the traumatic event such as trauma mechanism, anatomical lesions, complications during hospitalization, use of seatbelt and helmet, among others, and aspects related to the hospitalization, such as, for example, length of hospital stay.[11,12]

At the end of the collection, the data was entered in an electronic spreadsheet, Microsoft Excel XP® version 2013, and imported into the *Statistical Package for Social Sciences* (SPSS) for *Windows* XP®, version 2.1, for processing and analysis. Descriptive statistics were performed to provide absolute frequencies and percentages. Results are presented in tables.

## RESULTS

The initial sample consisted of 335 medical records of victims of accidents due to external causes. The majority - 74 (22.1%) - were aged over 60 years, the mean age was 43 years, ranging from 14 to 91 years, and 245 (73.1%) cases were males.

As for origin, 207 (61.8%) came from Uberaba. Regarding the educational level, 27 (8.1%) had complete primary education, but this information was missing in most of the medical

records (261 - 77.9%). Regarding the mechanism of trauma, 108 (32.2%) were caused by falls, followed by motorcycle accidents (64 - 19.1%) and car accidents (39 - 11.6%).

In this study of the initial sample of 335 victims, 64 were victims of motorcycle accidents. The sociodemographic data are presented in Table 1, showing the variables gender, age, skin color, schooling and origin.

Table 1 - Distribution of victims of motorcycle accidents according to sociodemographic variables. Uberaba. Minas Gerais. 2016 (N = 64)

| Variables | f | % |
|---|---|---|
| **Sex** | | |
| Male | 56 | 87.5 |
| Female | 8 | 12.5 |
| **Age** | | |
| 14-19 years | 11 | 17.2 |
| 20-29 years | 24 | 37.5 |
| 30-39 years | 11 | 17.2 |
| 40-49 years | 15 | 23.4 |
| 50-59 years | 2 | 3.1 |
| Over 60 years | 1 | 1.6 |
| **Skin Color** | | |
| White | 39 | 60.9 |
| Brown | 5 | 7.8 |
| Brunette | 20 | 31.3 |
| Black | 0 | 0 |
| **Education** | | |
| Complete primary education | 7 | 10.9 |
| Incomplete primary education | 3 | 4.7 |
| Complete secondary education | 7 | 10.9 |
| Incomplete secondary education | 1 | 1.6 |
| Not mentioned | 46 | 71.9 |
| **Origin** | | |
| Uberaba | 41 | 64.1 |
| Other | 21 | 32.8 |
| Not mentioned | 2 | 3.1 |

Data collection showed that 56 (87.5%) patients were male. It was verified that 24 (37.5%) and 15 (23.4%) of the individuals represented the predominant age groups in the sample, which were 20 to 29 years and 40 to 49 years, respectively. It was found that 39 (60.9%) had white skin color, seven (10.9%) had complete primary education, although in 46 (71.9%) medical records no information on education was found, and 41 (64.1%) were from Uberaba.

The main medical diagnosis found according to the International Classification of Diseases (ICD) 10 was the S82.2 tibi-

al shaft fracture, totaling 11 (17.2%) patients. The main sites of anatomical lesions are listed in Table 2, showing that the lower limbs corresponded to 40 (62%) of the cases, representing more than half of the anatomical lesions; 22 (34.4%) had lesions in the upper limbs (UL), and seven (10.9%) in the skull. There were no cases of neck or spleen injuries.

Table 2 - Distribution of victims of motorcycle accidents according to the main locations of anatomical lesions. Uberaba, Minas Gerais, 2016 (N = 64)

| Variables | f | % |
|---|---|---|
| Lower limbs | 40 | 62.5 |
| Upper limbs | 22 | 34.4 |
| Skull | 7 | 10.9 |
| Face | 2 | 3.1 |
| Spine | 2 | 3.1 |
| Chest | 2 | 3.1 |
| Abdomen or pelvic content | 2 | 3.1 |
| External surface | 1 | 1.6 |
| Spleen | 0 | 0 |
| Neck | 0 | 0 |

Hospital stay averaged 7.0 days, with a standard deviation of 12.8 days, and the length of stay varied from one to 95 days. As for complications that occurred during the hospitalization, three (4.7%) victims had surgical site infection (SSI). There were no reports of urinary tract infection, sepsis, bronchial pneumonia or pressure ulcer in the analyzed sample. At the moment of the accident, 12 (18.8%) patients were not wearing a helmet; in the other 52 medical records, there was no information on these data. The majority (23 - 35.9%) received pre-hospital care from the Emergency Mobile Service (SAMU) team, and was transported by means of an ambulance to receive hospital care regulated by the SUS easy system.

In relation to the shift in which the accident happened, the night prevailed, with 33 (51.6%) accidents, followed by the afternoon, with 19 (29.7%), and the morning, with 11 (17.2%). We verified that the day of the week with the highest incidence of accidents was Sunday, with 15 (23.4%) accidents, followed by Saturday with 12 (18.8%). Hospitalizations for motorcycle accidents were more frequent in the months of March and July, presenting nine (14.1%) cases each, and in the month of September with a lower incidence, only one case (1.6%). These data are illustrated in Table 3 below.

As for the condition at the moment of hospital discharge, the victims of motorcycle accidents had moderate disability in most cases (23, 35.9%), then slight disability, with 20 (31.3%), and three (4.7%) evolved to death, as shown in Table 4 below.

Table 3 - Distribution of victims of motorcycle accidents according to the frequency of hours, days of the week, and months of the year. Uberaba, Minas Gerais, 2016 (N = 64)

| Variables | f | % |
|---|---|---|
| **Time of admission** | | |
| 06:30 a.m. - 12:30 p.m. | 11 | 17.2 |
| 12: 31h - 18:30h | 19 | 29.7 |
| 18: 31h - 06:29h | 33 | 51.6 |
| Not mentioned | 1 | 1.6 |
| **Day of admission** | | |
| Sunday | 15 | 23.4 |
| Monday | 8 | 12.5 |
| Tuesday | 7 | 10.9 |
| Wednesday | 7 | 10.9 |
| Thursday | 8 | 12.5 |
| Friday | 7 | 10.9 |
| Saturday | 12 | 18.8 |
| **Month of admission** | | |
| January | 7 | 10.9 |
| February | 3 | 4.7 |
| March | 9 | 14.1 |
| April | 5 | 7.8 |
| May | 5 | 7.8 |
| June | 5 | 7.8 |
| July | 9 | 14.1 |
| August | 6 | 9.4 |
| September | 1 | 1.6 |
| October | 4 | 6.3 |
| November | 6 | 9.4 |
| December | 4 | 6.3 |

Table 4 - Distribution of victims of motorcycle accidents according to the condition of hospital discharge. Uberaba, Minas Gerais, 2016 (N = 64)

| Variables | f | % |
|---|---|---|
| Asymptomatic | 2 | 3.1 |
| Non-disabling symptoms | 6 | 9.4 |
| Slight disability | 20 | 31.3 |
| Moderate disability | 23 | 35.9 |
| Moderately severe disability | 6 | 9.4 |
| Severe disability | 2 | 3.1 |
| Death | 3 | 4.7 |
| Not mentioned | 2 | 3.1 |

## DISCUSSION

Among the victims of external causes, motorcycle accidents have a significant representativeness regarding the consequences to society.[8]

It was observed that the victims were predominantly male, which is a common feature of research in this area, showing that men are more often exposed because they take on activities in society that put them at risk. The predominance of the male population is also related to work activities. A study about the characterization of motorcycle accidents identified through the motorcyclists' reports the factors related to the accidents. They were aspects related to work, such as fatigue, overload, rush to complete work activities, risky ways of driving, environmental problems such as rain and mechanical problems.

Motorcycle accidents involved mostly young adults (mean age of 31 years), the majority of victims being in the age group from 20 to 29 years, as also found in other studies. Young people are exposed to the sensation of freedom, which lead them to test their limits in dangerous maneuvers, speeding and alcohol use, which can cause serious traffic accidents. Research conducted in Norway showed that the combination of young age, little experience, risky behavior and "unsafe" attitudes are significant risk factors for motorcycle accidents. As young males are economically active components of society, their mortality compromises its economic activity. Accidents also affect the age structure of the country, leading to changes in public, economic and public security policies.[6,8,15-18]

Regarding the origin, 41 (64.1%) patients came from Uberaba. It is relevant to mention that the city has a high number of cases of exposure to trauma, due to the greater number of inhabitants. An educational center and with a marked movement in its urban traffic is, therefore, important.

In the research carried out, it was possible to identify that the body parts most affected in motorcycle accidents were the lower limbs (LL) followed by upper limbs (UL), as also reported in other studies. A study on the profile of victims of trauma caused by motorcycle accidents showed that in 449 (75.5%) cases the LL were lesioned, followed by 145 (24.5%) cases where the UL were affected, corroborating the data found in the present research. These lesions can compromise mobility, occupational performance, daily relationships, and both physical and mental health, justifying the mandatory need to provide a better protection to these body parts that are commonly affected.[6,9,13,19-21]

According to Zabeu, the fragility of motorcyclists is evident in the sense that this type of vehicle does not have protection as in four-wheeled vehicles. When there is a collision, the energy of the impact is absorbed by the motorcyclist. As a result, accidents cause significant injuries and sometimes fatalities. The medical diagnosis S82.2 tibial shaft fracture was the most frequent in this study, with a total of 11 (17.2%) cases. This is in line with a research on the epidemiological profile of victims with trauma in the lower limbs, where it was evidenced that the main cause of trauma in this body parts was motorcycle accidents, with 11 (55%) cases, and the injuries required surgical repair.[9,22]

Lesions resulting from traumatic brain injury represented seven (10.9%) of the total. Thus, it can be argued that this low index demonstrates the effectiveness of protection offered by the use of helmets against neurological harm. Motorcyclists presented a high frequency of injuries in the extremities, and the sequelae from these injuries generate personal, economic and social consequences.[20]

Regarding the days when the accidents occurred, the data found in this study are in agreement with the findings of the researched literature, in which the majority happened on weekends. This fact is due to the large number of festive events on those days, with a consequent higher frequency of alcoholic drinking, overtaking in the speed limit, risky maneuvers and reduced inspection on these days.[9,13]

As for the most frequent occurrence of accidents, higher frequency occurred in the night shift, between 18:31h to 06:29h. These hour limits were used because they correspond to the work shift of the nursing team. In other studies, frequency was highest in the morning and afternoon, at the most usual time of trips to work and return to home. However, a higher frequency of deaths at night was also reported.[19,23]

In this study, with respect to the period in which accidents occurred the most, we found the months of March and July to present the same number of accidents, i.e. nine (14.1%) accidents. The month of July coincides with the usual month of vacations. A study conducted with the objective of analyzing the trend of land transport accidents with motorcyclists in Belo Horizonte foun May as the months with more occurrences, 1,281 (9.7%).[23]

In this study, only three (4.7%) patients developed surgical site infection (SSI), and no other complication was detected. However, the length of stay of these patients was long, alternating between 19 and 95 days. A study on factors associated with the length of hospital stay of injured motorcyclists found that the permanence of the patients with SSI was also long. Complications acquired by patients such as SSI, pressure ulcer, urinary tract infection and bronchopneumonia, lead to longer hospitalization. Infection of the lesion of the patient is related to the number of surgical interventions and the use of drugs, mainly antibiotics, which increase hospitalization time. In the case of survivors of motorcycle accidents, injuries can cause temporary or permanent physical disability, directly affecting their quality of life.[24]

The condition of the patient at hospital discharge was analyzed based on the medical reports and information given by the nursing team, from stratification into degrees of functional disability, according to the Rankin classification (modified). This analysis demonstrated the patient's ability to perform activities of daily life and their dependence to carry out tasks. In this study, motorcycle accident victims were moderately disabled in most cases, 35.9%, had symptoms that significantly restricted their lifestyle and/or impeded complete independence in activities

of daily living and unaided walking. Then, slight disability, with 31.3%, in which the patient is unable to perform some tasks that he used to perform before the accident, but he is independent in the activities of daily living. It can be seen that the motorcycle accidents affect not only the local economic activity, but also the quality of life of the victims and of their relatives.[25]

## CONCLUSION

Motorcycle accidents are frequent in our country, characterizing a growing public health problem, with risk of death or disabling sequelae. The general profile of victims of motorcycle accidents was a young adult males who suffered a most frequently injuries in the lower limbs. These eventualities interfere in the quality of life and economy of the country, since this is an economically active population and generates expenses to the Unified Health System.

Some limitations were found during the research due to the use of secondary data retrieved from the AER records, which led to problems related to insufficient or illegible filling with possible omissions. The main data not found in the medical records were the level of education, presence or absence of helmet at the moment of the accident and if there was evidence of use of psychoactive substances. In this way, there is a clear need for more accurate data to make it possible to understand the clinical evaluation of the victim.

Nursing acts directly to assist these victims. Information such as frequency of events and which are the more frequent injuries make it possible to organize the emergency service and, thus, direct assistance based on prioritization of care and the development of protocols.

Therefore, it is expected that this study may provide subsidies for the creation of public policy actions, since based on the profile of the victims and the events, it is possible to implement preventive measures and health promotion to influence in the aspects related to the drivers, and through the reduction of the number of accident rates ensure the reduction of expenses in the public sector.

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