Motorcyclist accidents: An ecological study of fatal victims

Acidentes com motociclistas: Um estudo ecológico de vítimas fatais

Accidentes de motocicleta: Un estudio ecológico de víctimas mortales

RESUMO

OBJETIVO: Analisar os acidentes de trânsito com desfechos fatais envolvendo motociclistas. MÉTODOS: Estudo descritivo, ecológico de vítimas fatais de acidentes de trânsito com motociclistas na cidade de Maringá/PR, no período de 01 de janeiro de 2015 a 31 de agosto de 2020. Como banco de dados, foram utilizadas informações presentes nos boletins de ocorrência da Polícia Militar. A análise dos dados foi por estatística descritiva e calculadas as frequências das variáveis por meio do software R 3.2.3. RESULTADOS: Foram vítimas de acidentes de trânsito 231 pessoas, sendo 57,57% motociclistas. Das vítimas fatais decorrentes do evento com motocicleta, predominaram: sexo masculino (87,22%), faixa etária entre 19 a 39 anos (70,67%), com eventos que ocorreram de segunda a sexta-feira (62,41%). CONCLUSÃO: É imprescindível reforçar a educação do trânsito e ajustar as políticas públicas de trânsito para a categoria com maiores vítimas, como os motociclistas.

DESCRITORES: Acidentes de Trânsito; Mortalidade; Motocicletas.

ABSTRACT

OBJECTIVE: To analyze traffic accidents with fatal outcomes involving motorcyclists. METHODS: Descriptive, ecological study of fatal victims of traffic accidents with motorcyclists in the city of Maringá/PR, from January 1, 2015 to August 31, 2020. As a database, information from the police reports was used of the Military Police. Data analysis was performed using descriptive statistics and variable frequencies were calculated using the R 3.2.3 software. RESULTS: 231 people were victims of traffic accidents, 57.57% of which were motorcyclists. Of the fatal victims resulting from the motorcycle event, the following predominated: males (87.22%), aged between 19 and 39 years (70.67%), with events that occurred from Monday to Friday (62.41%). CONCLUSION: It is essential to reinforce traffic education and adjust public traffic policies for the category with the greatest victims, such as motorcyclists.

DESCRIPTORS: Traffic Accidents; Mortality; Motorcycles.

RESUMEN

OBJETIVO: Analizar accidentes de tráfico con desenlace fatal que involucran a motociclistas. MÉTODOS: Estudio descriptivo, ecológico de víctimas fatales de accidentes de tránsito con motociclistas en la ciudad de Maringá / PR, del 1 de enero de 2015 al 31 de agosto de 2020. Como base de datos, se utilizó información de los informes policiales de la Policía Militar. El análisis de los datos se realizó mediante estadística descriptiva y las frecuencias de las variables se calcularon mediante el software R 3.2.3. RESULTADOS: 231 personas fueron víctimas de accidentes de tráfico 57.57% de las cuales fueron motociclistas. De las víctimas fatales derivadas del suceso de motocicleta, predominaron: hombres (87,22%), con edades entre 19 y 39 años (70,67%), con hechos ocurridos de lunes a viernes (62,41%). CONCLUSIÓN: Es fundamental reforzar la educación vial y adecuar las políticas públicas de tránsito para una categoría con mayores víctimas, como es el motociclista.

DESCRIPTORES: Accidentes de Tránsito; Mortalidad; Motocicletas.

Débora Regina de Oliveira Moura
PhD in Nursing. Professor at the Nursing Department at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-6415-3394

Sarah Sigora da Silva
Graduated in Nursing from the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-8131- 6431

Eniuce Menezes de Souza
Post-Doctorate in Applied Computing. Professor at the Department of Statistics and at the Postgraduate Program in Biostatistics at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0003-0265-7586

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Moura, D. R. O., Silva, S. S., Souza, E. M., Leme, M. H. C., Marques, F. R. D. M., Salci, M. A., Marques, P. G., Carreira, L.
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Matheus Henrique Cecilio Leme
Master's student in Biostatistics by the Postgraduate Program in Biostatistics at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-0874-8780

Francielle Renata Danielli Martins Marques
Doctoral student in Nursing at the Postgraduate Program in Nursing at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-8578-9615

Maria Aparecida Salci
Doctor in Nursing. Professor of the Graduate Program in Nursing at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-6386-1962

Priscila Garcia Marques
PhD in Physical Education. Professor of the Graduate Program in Nursing at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0002-0582-1671

Lígia Carreira
Post-Doctorate in Nursing. Professor of the Graduate Program in Nursing at the State University of Maringá. Maringá, PR, Brazil.
ORCID: 0000-0003-3891-4222

INTRODUCTION

Annually, almost 1.3 million people die as a result of traffic accidents in the world, which represents one death every 24 seconds. [1] Land transport accidents (LTA) are the eighth leading cause of death in all age groups, the main one being among individuals aged between five and 29 years. [1]

Low- and middle-income countries account for approximately 93% of road traffic deaths worldwide, with a predominance of males and young adults. [2] In Brazil, in 2017 alone, traffic accidents represented the second cause of death from external causes with 35,400 victims, being more frequent in males (82.0%) and in people between 20 and 39 years old (42.9%). [3]

These events represent a great economic burden to the Unified Health System (SUS) culminating in a serious public health problem, since they cause premature deaths, sequels or even temporary damages to the people involved, whether motorcyclists, pedestrians or car drivers [4,5], mainly in the adult and economically active age group. [5]

Considering only external causes, LTA accounts for the second highest rate of DALY (disability-adjusted life years), an indicator used in the study of disease burden, behind only homicides and violence [6], with alcohol use being pointed out as an important risk factor associated with deaths and disabilities from this cause, especially in the male population. [7]

In Paraná, 1,605 people lost their lives in LTA in 2019, the highest rate in the last three years. [8] In the city of Maringá, located in the Northwest of the State of Paraná, statistics corroborate national data 3 whose deaths affect the younger population, of working age, male and motorcyclists. [5,6]

Motorcycles are increasingly being used as an important means of work, due to their low acquisition and maintenance cost. [9] Mototaxis and delivery services represented new job opportunities with demands that demand agility in services and with remuneration that are often linked to the motorcyclist's productivity. It is understood that, in most cases, risky behavior is not a personal choice, but imposed by the profession. [10]

DMV statistics [8] records that in the city,

the motorcycle fleet in 2018 corresponded to 42,497 units and points to a progressive increase in motorcycle deaths of 8.2% per year. [11] These numbers reflect the impact of the motorcycle collision. The entire impact is absorbed by the driver and the energy transferred to his body is greater when compared to a car accident, in addition to the probability of the occupant ejecting, causing major damage as a consequence. [12]

Considering the high rates of traffic accidents involving motorcyclists and the significant number of deaths that occurred as a result, this study aimed to analyze traffic accidents with fatal outcomes involving motorcyclists.

METHOD

This is a descriptive and ecological study of fatal victims of traffic accidents, according to the motorcyclist category, which occurred in the city of Maringá/PR, from January 1st, 2015 to August 31st, 2020. The choice of this period is justified by the availability of consistent data to support the analysis of the study. A fatal victim of a traffic accident is considered to be a per-

son who suffers a traffic accident and dies within 30 days of the accident, due to some type of complication related to the event. [13]

Data collection took place from September to November 2020, from the Traffic Accident Occurrence Bulletins (TAOR) of the Military Police (MP). The TAOR contains detailed information on the circumstances of the accidents, the characteristics related to the accident, identification and category of the victim. Inclusion criteria were the TAOR registered in the city of Maringá/PR with fatal victims, and data containing incomplete information were excluded.

For data collection, an instrument was created with the help of Microsoft Excel 2013 software to tabulate the following independent variables: gender (male and female), age group (0 to 60 years or older); category of the victim at the time of the accident, according to ICD-10 [14]: (V 29.9); day of the week of the occurrence (Monday to Friday or Saturday and Sunday); and, the weather at the time of the event (good, rain or cloudy). Each victim was identified with an ordinal number, linked to the record found with the TAOR of the Military Police. For data analysis, descriptive statistics were used and the frequencies of the variables were distributed with the aid of the R 3.2.3 software.

All ethical precepts of Resolutions 466/2012 and 510/2016 of the National Health Council were respected, with approval by the Permanent Committee on Ethics in Research Involving Human Beings (COPEP - Comitê Permanente de Ética em Pesquisa) of the State University of Maringá, opinion No. 1,329,069/08. The waiver of the Informed Consent Term (ICF) was requested and authorized, since the research was carried out without the identification of the victims being revealed.

RESULTS

TAOR of 231 victims were analyzed, grouped according to sex, age group, victim category, day of the week and the weather at the time of the event (Table 1).

The male sex predominated among the

Variables	Death on the spot		Later death		Total	
	n	%	n	%	n	%
Sex						
Female	13	13,8	28	20,4	41	17,8
Male	81	86,2	109	79,6	190	82,3
Age group (years)						
0-17	4	4,26	7	5,11	11	4,76
18-29	33	35,1	43	31,4	76	32,9
30-39	26	27,7	18	13,1	44	19,1
40-49	10	10,6	14	10,2	24	10,4
50-59	9	9,57	20	14,6	29	12,6
60 and more	11	11,7	35	25,5	46	19,9
Not informed	1	1,06	0	0	1	0,43
Traffic accident category						
Car	10	10,6	13	9,49	23	9,96
Motorcyclist	61	64,9	72	52,6	133	57,6
Pedestrian	15	16	36	26,3	51	22,1
Others	8	8,51	16	11,7	24	10,4
Day of the week						
Monday to Friday	61	64,9	87	63,5	148	64,1
Saturday to Sunday	33	35,1	50	36,5	83	35,9
Weather						
Stable	84	89,4	111	81	195	84,4
Rainy	6	6,38	9	6,57	15	6,49
Cloudy	2	2,13	8	5,84	10	4,33
Not informed	2	2,13	9	6,57	11	4,76

FONTE:

victims, representing 82.25% of the events. Regarding the age group, people aged between 18 and 29 years were the main victims (32.9%-76), followed by the elderly population (19.91%-46).

The category of traffic accidents described the means of locomotion used by the victim at the time of the accident, being described the automobiles, motorcyclists, pedestrians and the other means were grouped, given their low representativeness. More than half of the accidents involved motorcyclists (57.57%-133), followed by pedestrians (22.08%-51). Regarding the

days of the events, the highest occurrence of accidents with deaths was between Monday and Friday (64.07%-148). In addition, the weather at the time of the accident was characterized, which could vary from good, rainy or cloudy. The data revealed that the vast majority of accidents with fatal outcomes occurred in good weather (84.42%-195).

Considering the representativeness of fatal accidents involving motorcyclists, these required an analysis isolated from the other categories. In the period from 2015 to 2020, there were 133 fatal accidents in-

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volving motorcyclists, of which 61 people died on the spot (45.86%) and 72 died after the accident (54.13%). Males comprised 87.22% (116 people) of deaths (Table 2).

The age group from 18 to 29 years old had the highest number of fatal traffic accidents involving motorcyclists, accounting for more than twice as many deaths when compared to the other age groups.

Regarding the days in which the most deaths occurred, they predominated between Monday and Friday, with a total of 83 victims (62.41%), 39 of which were on the spot and 44 died after the accident. On weekends, although the data revealed a lower number of deaths, 50 people (37.59%) lost their lives as victims of motorcycle accidents, maintaining the superiority of deaths after the accident to those that occurred at the time of the event, representing 38.89% and 36.07%, respectively.

DISCUSSION

Among LTA victims, males obtained significant representation compared to females. Men mostly show aggressive behavior in traffic, overestimate their ability and confidence, exceed speed, do not wear helmets or seat belts and show a lack of care and attention, such as sociocultural standards imposed on sex. [12]

The data revealed that most victims who died in traffic accidents were aged between 18 and 39 years. The younger population is exposed to numerous risk factors such as drug abuse, speeding and disobeying traffic laws. [12] In addition, young people have gained popularity in providing services with motorcycles and concentrated in the informal market, which may suggest an increase in the number of accidents, as they are paid for production. [10]

The elderly also represented a considerable statistic in traffic accidents. The age group of 60 years was in second place in the ranking of general deaths. It is believed that this age group is involved in traffic accidents due to several factors, including the aging process itself, in which the person presents anatomical changes that can reduce their mobility, mental capacity, as well as decre-

Table 2 - Motorcyclist deaths, by sex, age group, day of the week. Maringá, PR, Brazil, 2021						
Variables	**Death on the spot**		**Later death**		**Total**	
	n	%	n	%	n	%
Sex						
Female	8	13,11	9	12,5	17	12,78
Male	53	86,89	63	87,5	116	87,22
Age Group (years)						
0-17	2	3,28	0	0	2	1,5
18-29	30	49,18	36	50	66	49,62
30-39	18	29,5	10	13,89	28	21,05
40-49	6	9,84	9	12,5	15	11,28
50-59	3	4,92	11	15,28	14	10,53
60 and more	2	3,28	6	8,33	8	6,01
Day of the week						
Monday to Friday	39	63,93	44	61,11	83	62,41
Saturday to Sunday	22	36,07	28	38,89	50	37,59
FONTE:						

ase the ability to react quickly. This covers both seniors, pedestrians or drivers. [15]

The general analysis of mortality revealed that the number of deaths among motorcyclists represented more than half of all deaths from traffic accidents. This is due to the victim's great exposure on the motorcycle, increasing the chances of suffering major serious injuries in a collision or fall, because the death rate in motorcyclists is thirty times higher compared to other cars, as well as other studies have already been directed to this result. [5,16] In a collision with motorcyclists, the greater shock is absorbed by the rider who takes the wheel of the motorcycle, where the impact of the collision is uneven compared to a collision with a car. [12]

In the study, it was found that the second highest number of deaths occurred among pedestrians. These have the highest number of deaths compared to other means of transport, representing 79.65% of the total with 184 victims out of 231 analyzed. Related to pedestrians, and because they represent an important part of traffic violence, factors such as unmarked lanes, unmarked roads, poor street lighting, two-

-way roads, areas under construction on the roadbed, location of half-block lanes and even the summer period factor contribute to the increase in accidents and deaths. [17]

The fact that the study reveals that most motorcycle accidents occurred during the week may indicate the motorcyclist as a profession. The working conditions of these individuals can contribute to the occurrence of accidents, such as long working hours, fatigue, lack of safety equipment or misuse. [11,18]

Traffic accidents that occur during the week account for most of the data. The average between the two tables is 63.24% of deaths from Monday to Friday. In the period understood as days of the week is when people go out to work, increasing the volume of motorcycles in traffic, accidents and deaths resulting from them, as corroborated by another study. [18]

The highest number of deaths occurred in good weather conditions. In sunny weather, drivers can be overconfident, being less careful when driving, performing maneuvers that can be dangerous. [19] This is valid for any mode of transport, especially for motorcyclists. These, on rainy days, end up

leaving the motorcycle at home and opting for another means of transport, such as a car or public transport.

With high mortality rates, it is necessary to introduce stricter legislation and more drastic punishments in order to reduce this statistic. It should also be taken into account that pedestrians account for an important number of traffic deaths, requiring safety measures to protect them. [17]

To deal with traffic mortality, the Brazilian Traffic Code (CTB - Código de Trânsito Brasileiro), implemented in 1998, was one of the most important measures adopted, with stipulations of conduct, infractions and penalties for drivers. In 2008, the dry law was implemented, known for designating zero alcohol driving with penalties of arrest, fine, suspension of the license or seizure of the vehicle for those who violate it. Even so, the numbers of deaths in traffic are still high. [4]

Given this scenario, it is believed that the best way to prevent traffic accidents is education. Learning is more successful when taught in childhood, so that the child can build values and form an idea about the subject, making it possible to disseminate this content, learning and teaching correctly. [15]

CONCLUSION

The research achieved the main objective of analyzing the fatal victims of motorcycle accidents in the city of Maringá/PR between the years 2015 to 2020. It is conclusive that the most vulnerable were motorcyclists, male, aged between 18 and 39 years who were involved in accidents followed by death, revealing that the motorcycle does not offer protection for the rider besides the helmet, leaving him more unprotected and unfavorable in relation to other vehicles.

Given this situation, it is essential to reinforce traffic education, especially among young people, with special attention to males. In addition, it is considered to analyze and strengthen public transit policies to minimize the suffering and disabilities of victims, with a consequent reduction of economic and emotional impacts.

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