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ORIGINAL ARTICLE
ORTHOPEDICS AND TRAUMATOLOGY

THE IMPACT OF COVID-19 ON THE PROFILE OF MOTORCYCLE ACCIDENTS ATTENDED AT A TERTIARY HOSPITAL IN CAMPINAS

IMPACTO DA COVID-19 NO PERFIL DE ACIDENTADOS DE MOTO ATENDIDOS EM UM HOSPITAL TERCIÁRIO EM CAMPINAS

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ABSTRACT

Traffic-accidents are a public health problem with repercussions on population morbimortality. Objective: To analyze the impact of the pandemic on the profile of motorcycle accidents assisted at the Tertiary Hospital in 2020. Methods: Cross-sectional, descriptive retrospective study in 2017 and 2020 of 260 medical records of care for motorcycle accidents in the emergency room of the Tertiary Hospital. Statistical analysis of data and their correlations using the chi-square test ($p < 0.05$). Results: Of the 105 medical records in 2017, 83% are men, mean age 29.8 years, and death rate of 3.90%. Fractures in 98.10%, 64.10% exposed and predominantly the tibia (61.90%). Of the 155 medical records in 2020, 91.61% are men, mean age 31.21 years, and no deaths. Fractures in 94.84%, 37.42% exposed and predominantly the tibia (28.57%). Between 2017 and 2020, Infosiga-SP showed a relevant reduction ($p < 0.001$) of deaths in the hospital environment (52.46% to 31.91%). Conclusion: The incidence of motorcycle accidents increased, in-hospital deaths dropped, but the epidemiological profile of accidents at the Hospital remained unchanged. ***Level of Evidence III, Comparative Retrospective Study.***

Keywords: Traffic Accidents. Motorcycles. COVID-19.

RESUMO

Acidentes motociclísticos configuram um problema de saúde pública com repercussões na morbimortalidade populacional. Objetivo: Analisar o impacto da pandemia por COVID-19 no perfil de acidentes motociclísticos atendidos em um hospital terciário em 2020. Métodos: Estudo transversal, descritivo e retrospectivo que analisou 260 prontuários de acidentados de moto atendidos na Urgência e Emergência do Hospital Universitário Terciário em 2017 e 2020. Realizou-se uma análise estatística dos dados e suas correlações pelo teste qui-quadrado ($p < 0,05$). Resultados: Dos 105 prontuários de 2017, 83% são de homens ($p < 0,001$), com média de 29,8 anos, e índice de óbito de 3,90%. Houve fraturas em 98,10% dos casos, sendo 58,10% expostas e predominantemente da tíbia (61,90%). Dos 155 prontuários de 2020, 91,61% são homens ($p < 0,001$), com média de 31,21 anos e sem casos de óbito. Houve fraturas em 94,84%, sendo 37,42% expostas e predominantemente da tíbia (28,57%). Entre 2017 e 2020, o Infosiga-SP mostrou redução significativa ($p < 0,001$) de mortes em ambiente hospitalar (de 52,46% para 31,91%). Conclusão: Houve aumento na incidência dos acidentes motociclísticos e queda nos óbitos intra-hospitalares, mas o perfil epidemiológico dos acidentados no hospital permaneceu inalterado. ***Nível de Evidência III, Estudo Comparativo Retrospectivo.***

Descritores: *Acidentes de Trânsito. Motocicletas. COVID-19.*

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INTRODUCTION

Traffic accidents are part of the set of external causes of morbidity and mortality and are one of the most important problems of public health worldwide.[1] In 2009, a survey on traffic accidents worldwide conducted by the World Health Organization (WHO) revealed that they are responsible for about 1.24 million deaths per year, and 20 to 50 million people survived with sequelae. The study estimated that 90% of all deaths occurred in middle and low income countries, which held only 48% of the world's fleet of vehicles. Moreover, the WHO predicted that would reach around 1.9 million in 2020 deaths if no intervention was performed.[2]

Between 2007 and 2018, the National Traffic Department (Denatran) recorded 395,998 deaths from land traffic accidents in Brazil, which 30% involved motorcycles. The study shows that this percentage relates to the increase in the fleet of motorcycles in this period, which increased from 11 million to 26.7 million.[3]

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The study was conducted at PUC-Campinas Hospital.
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The Life in Traffic Project Report (*Projeto Vida no Trânsito* - PVT), prepared by the Department of Health Surveillance (DEVISA) in 2017, points to the predominance of deaths resulting from motorcycle accidents in males between 18 and 34 years. Therefore, it showed that the risk factors for accidents are: alcohol intake, speed, lack of qualification, disrespect for traffic signs and conditions related to the vehicle. This report also related the absence of helmet use with increased severity of trauma, raising the probability of death of an individual who suffered an accident.[4] According to the WHO, the use of this safety equipment reduces 70% in the chances of TBI and up to 40% in the chances of death.[5]

Motorcycles are a mean of transport and a working equipment for delivery, transportation and other services.[3] In the context of the SARS-Cov-2 pandemic, several state decrees limited or prohibited face-to-face service in bars, cafeterias and restaurants. As a result, these establishments increased their performance in delivery apps that use motorcycle couriers to deliver food, beverages and products.[6] Between the 1st and 2nd semester of 2020, the Inter-Union Department of Statistics and Socioeconomic Studies (Dieese) observed an increase in 12.2% of unemployed individuals, using the study "Profile of motorcycle couriers and delivery men." However, the transport sector showed an increase of 529,000, suggesting that the unemployed resorted to the delivery service as an alternative income.[7]

Thus, this study aimed to compare the data of the victims assisted in the Emergency Department of a Tertiary Hospital of Campinas due to motorcycle accident in 2017 and in 2020. Moreover, it seeks to evaluate the impact of the pandemic context caused by COVID-19 and the measures taken, such as the implementation or intensification of delivery services through digital platforms, because the possibility of making essential purchases without leaving home became imperative for the entire population.[6]

METHODS

This is a retrospective observational study, conducted at the PUC-Campinas Hospital, founded in 1978, located in the Northwest region of the city of Campinas.

Victims of motorcycle accidents in Campinas (SP) from January to December, 105 in 2017 and 155 in 2020, formed the sample of 260 patients. We analyzed data from medical records listed in the Orthopedics and Traumatology service of the PUC-Campinas Hospital. Individuals that suffered motorcycle accidents with orthopedic surgical management in 2017 and 2020 and were treated in the Emergency Department of the PUC-Campinas Hospital who accepted participate in the study and provided written consent were included in the study. Those injured patients who did not undergo orthopedic surgeries, were not in the driver or rump category and who suffered bicycle accidents were excluded.

The screening of patients who meet the inclusion criteria took place in two stages: via the preparation of a report with all patients hospitalized for surgical procedures in the Orthopedics and Traumatology sector of the Hospital in the "MV System 2000i Hospital Management," and by selecting the medical records of individuals who suffered motorcycle accidents from the list generated by the program. Then, the following information were obtained from medical records of the study population: gender, age, presence of fracture, polytrauma caused by traffic accidents, exposed fracture, affected limb and bone, deaths, trimester, profession, speed of accident and use of helmet (yes, no or incorrect use).

Additionally, the Database called "Traffic Accident Information System of the State of São Paulo" (Infosiga-SP) was used to survey the total quantity and place of death (accident site, hospital or others) in 2017 and 2020, resulting from motorcycle accidents in Campinas. Infosiga-SP's information system gathers information about traffic accidents that occurred in the state of São Paulo notified by the Civil Police, Military Police and Federal Highway Police. The Infosiga-SP was chosen at the expense of the Traffic Accident Occurrence Book of the Municipal Development Company of Campinas (EMDEC), because accidents that occur on highways are not included in their analyses.[8]

From September to December 2020, the data were collected from records by medical professionals and students using a previously prepared form. For data processing and graphing, the Excel program version 16.44 (Build 20121301), which has a tool called pivot table to gather the results and facilitate statistical analysis, was used. The statistical analysis was performed with the assistance of the chi-square test, used to estimate the probability (p-value) of the data to comply with the pattern related to some hypothesis contrary to what we wanted to demonstrate. Thus, we considered our observations statistically significant when the p-value was low ($p < 0.05$).

This study is part of the research project called "Epidemiological Profile and socioeconomic impact of victims of motorcycle accidents in the emergency of a Tertiary Hospital", approved by the Research Ethics Committee of PUC-Campinas according to CAE 88812818.3.0000.5481 and opinion number 2,722,693/2018. The regulatory standards expressed in Resolution No. 196/1996 of the National Health Council were respected.

RESULTS

In the two years, the analysis of medical records at the PUC-Campinas Hospital showed significant bias ($p < 0.001$) for males, from 87 (82.86%) in 2017 to 142 (91.61%) in 2020 (Table 1). The age group from 18 to 29 years old presented higher incidence, with 45.71% and 53.55% for 2017 and 2020, respectively. The mean age was 29.8 in 2017 and 31.2 in 2020 (Table 1).

Moreover, the data showed a high incidence of fracture and poly trauma among victims of motorcycle accidents, with 103 (98.10%)

Table 1. Characteristics of the victims of motorcycle accidents treated at the PUC-Campinas Hospital in 2017 and 2020.

Characteristics of victims	2017			2020			[b]p-value
	n	%	[a]p-value	n	%	[a]p-value	
Gender			p < 0.001			p < 0.001	p > 0.05
Male	87	82.86		142	91.61		
Female	18	17.14		13	8.39		
Age							p < 0.01
0-17 years old	13	12.38		3	1.94		p < 0.001
18-29 years old	48	45.71		83	53.55		
30-39 years old	22	20.95		33	21.29		
40-49 years old	13	12.38		20	12.90		
50-59 years old	5	4.76		13	8.39		
60-69 years old	4	3.81		3	1.94		
Mean age	29-8 years old			31-21 years old			
Most prevalent age group	18-29 years old			18-29 years old			
Age range	6-69 years old			16-67 years old			
Fracture	103	98.10		144	94.84		p > 0.05
Polytrauma	61	58.10		80	51.61		
Open fracture	67	63.81		58	37.42		p < 0.001
Lower limb	94	89.52		117	75.48		p = 0.05
Tibia	65	61.90		44	28.57		p < 0.001
Deaths	4	3.90		0	0.00		p < 0.05

[a]p-value: by chi-square test using the homogeneity of the distributions each year as null hypothesis;
[b]p-value: by chi-square test using the homogeneity of the distributions each year as null hypothesis.

fractures, 61 (58.10%) of poly traumatic fractures, and 67 (63.81%) of open fractures in 2017 compared to 144 (94.84%) of fractures, 80 (51.61%) of poly traumatic fractures and 58 (37.42%) of open fractures in 2020. In both periods, the most affected bone was the tibia, present in 65 (61.90%) cases in 2017 and 44 (28.57%) cases in 2020. We observed a statistically significant reduction ($p < 0.005$) in deaths between years, from 4 (3.90%) to 0 deaths.

The distribution of motorcycle accidents during the 2017 quarters occurred homogeneously ($p > 0.05$), and it was impossible to affirm a higher concentration in a specific quarter. In 2020, in turn, the data are dispersed heterogeneously ($p < 0.001$), and the second and third quarters concentrated most accidents, with 62 (40.00%) and 57 (36.77%) cases, respectively (Table 2).

The profession of the injured was suppressed in 76 (49%) medical records, but the most prevalent occupations were motorcyclists, with 19 (12%) cases, and self-employed, with five (3%) patients.

Only in 2020, data about the period of the accident, speed and helmet use at the time of impact were collected. The statistical difference ($p < 0.001$) regarding the use of helmets was 11 (7.1%) did not use it, 136 (87.74%) used it and eight (5.16%) used it incorrectly (Table 3). Since $p > 0.05$, the hypothesis that the velocities occurred homogeneously cannot be excluded, therefore, we cannot affirm that some speed range was prevalence (high, moderate and low).

According to Infosiga-SP, the number of deaths between 2017 and 2020 reduced from 61 to 48 fatal victims. Besides, the number of deaths in the hospital environment decreased from 32 (52.46%) to 15 (31.91%), showing statistical relevance ($p < 0.001$) (Table 4).

DISCUSSION

According to the National Survey on Accidents and Violence (VIVA Project), conducted in Brazil in 2017, most victims of motorcycle accidents were young adults, aged 18 to 29 years, and male, as already pointed out by numerous studies conducted in different Brazilian cities.[9-13]

In 2017 and 2020, this study observed the same age and gender profile found in the literature (Table 1). Moreover, it also showed a significant reduction in accidents in the age range 0-17 years old. This fact may be related to the suspension of classes in public and private schools during most of 2020, between March and October, which decreased the circulation of minors and, consequently, their involvement in motorcycle accidents.[14]

The National Household Sample Survey Data (PNAD) in 2008 indicates that males are twice as likely to be involved in motorcycle accidents as females. In 2019, the Brazilian Association of Manufacturers of Motorcycles, Mopeds, Scooters, Bicycles and Similar (Abraciclo) reported that 77.3% motorcycle driver licenses belong to men.[15] Therefore, the greatest involvement of the male population in motorcycle accidents is due to their greater exposure in traffic.

From 2017 to 2020, the number of trauma patients due to motorcycle accidents treated by the PUC-Campinas Hospital increased 62%, from 104 to 155 cases (Table 1). The first main cause of this increase is that the Sectoral Coordination of Access Regulation of the Department of Audit and Regulation of the SUS made the PUC-Campinas Hospital a reference for the care of the flow of traumas and "non-covid" pathologies in the city, aimed to adapt the city's hospitals to the demand caused by the pandemic.[16]

The second main cause is the significant increase in the number of deliveries to households due to the restriction of circulation imposed in March 2020 in the city of Campinas.[17] RankMyApp's research showed that the use of delivery apps increased 30% between February and March 2020.[18] Moreover, one delivery app declared 100,000 new restaurant registrations during the pandemic, as well as a 60% increase in orders between 2019 and 2020.[19] According to the Association of Motorcycle Couriers of Applications of Campinas, the number of motorcycle and bicycle delivery men in this period increased 32%, from 5,000 to 6,600.[20] However, the need for greater rigor in filling out the profession in the patient's form is emphasized, since this information was not present in 76 (49%) medical records, so in this research it is impossible to confirm the correlation between the growth of motorcycle accidents and increase of motorcycle boys.

According to Debieux et al.,[21] lower limb injuries represent 53.9% of injuries resulting from motorcycle accidents, and the femur is the most prevalent bone.[22] Lower limbs have a greater susceptibility to affection because they are the most unprotected areas, since usually the safety equipment used provides protection only to the head region.[23] In our sample, although the tibia was the most affected bone (Table 1), there was agreement in both years regarding the predominance of lower limb injury, 89.5% (2017) and 75.48% (2020).

In cases of fatal victims, the most observed injuries are on the head, abdomen, lower limbs and pelvis, as Koizumi[24] points out. This study presents limitation regarding information on deaths,

Table 2. Characteristics of the victims of motorcycle accidents treated at the PUC-Campinas Hospital in 2017 and 2020.

Characteristics of the accident	2017			2020		
	N	%	[a]p-value	n	%	[a]p-value
Quarter			p > 0.05			p < 0.001
First quarter	22	20.95		13	8.39	
Second quarter	27	25.71		62	40.00	
Third quarter	21	20.00		57	36.77	
Fourth quarter	35	33.33		23	14.84	

[a]p-value: by chi-square test using the homogeneity of the distributions each year as null hypothesis;

Table 3. Characteristics of the victims of motorcycle accidents treated at the PUC-Campinas Hospital in 2020 and 2020.

Characteristics of the accident	2020		
	N	%	[a]p-value
Speed			
[b]High	37	23.87%	
[c]Moderate	28	18.06%	p > 0.05
[d]Low	29	18.71%	
Not informed	61	39.35%	
Helmet use			p < 0.001
Yes	136	87.74%	
No	11	7.10%	
Incorrect use	8	5.16%	

[a]p-value: by chi-square test using the homogeneity of the distributions each year as null hypothesis; [b]High 30 km/h; [c]Moderate: between 30 and 60 km/h; [d]Low: 60 km/h.

Table 4. Number and place of deaths resulting from motorcycle accidents in the city of Campinas in 2017 and 2020.

Deaths in the city of Campinas	2017		2020		[a]p-value
	N	%	N	%	
Total	61		48		
Place of death					
Place of accident	28	45.90%	31	63.83%	
Hospital	32	52.46%	15	31.91%	p < 0.001
Others	1	1.64%	2	4.26%	

[a]p-value: by chi-square test using the homogeneity of the distributions each year as null hypothesis. Source: Traffic Accident Information System of the State of São Paulo (Infosiga-SP).

since in 2017 it is known only that they were caused by TCE and polytrauma, while in 2020 it had no data to be collected.[22]
Between 2017 and 2020, despite the increase in the total number of motorcycle accidents seen at the PUC-Campinas Hospital, the number of fatal victims decreased significantly, from 4 (3.9%) to no cases (Table 1). The fact that the Hospital did not have any death may be related to the high rate of correct use of helmet 136 (87.74%) among the injured (Table 3). This decrease associates to the increase in deaths at the accident site and, consequently, a decrease in the hospital environment, with 32 (52.46%) in 2017 and 15 (31.91%) in 2020 (Table 4). However, sample size is an important limiting factor, since we collected epidemiological data already available.
Thus, the main victims were individuals between 18-29 years of age, with most infections in the lower limbs, and predominance of the tibia. Despite the increase in the number of motorcycle accidents between 2017 and 2020, the deaths reduced in Campinas, which may be related to the decrease in the number of deaths in hospitals in general.

CONCLUSION

The analysis between 2017 and pandemic period of 2020 showed an increase in the incidence of motorcycle accidents, but the epidemiological profile of motorcycle victims treated at the PUC-Campinas Hospital was constant: young people between 18-29 years old from the male sex. Despite the decrease in deaths during this period, both in the Hospital and in the city of Campinas, further investigating and evaluate the epidemiological profile of the victims is essential, as well as their injuries, in order to provide adequate basis for the implementation of awareness and prevention measures targeting the most affected groups.

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