



Original Article

Accidents involving motorcyclists and cyclists in the municipality of São Paulo: characterization and trends^{☆,☆☆}



Cintia Leci Rodrigues, Jane de Eston Armond, Carlos Gorios^{*},
Patricia Colombo Souza

University of Santo Amaro, São Paulo, SP, Brazil

ARTICLE INFO

Article history:

Received 18 October 2013

Accepted 9 January 2014

Available online 8 November 2014

Keywords:

Traffic accidents

Epidemiology

Accident prevention

ABSTRACT

Objective: To describe the characteristics of motorcycle and bicycle accident victims, according to notifications of suspected and confirmed accidents that have occurred in the municipality of São Paulo.

Method: This was a descriptive epidemiological study. It covered all accidents (12,924) that occurred involving motorcycles (11,366) and bicycles (1558) between January 2011 and October 2013. Data in the Health Department's information system for surveillance of violence and accidents (SIVVA) was surveyed.

Results: Motorcycle accidents accounted for 52.1% of the cases notified and bicycles, 7.1%. Males predominated in both types of accidents: 81.6% and 80.6%, respectively. In the motorcycle accidents, the predominant age group among the victims was from 20 to 24 years. Both types of accidents occurred during the daytime (7:00–18:00 h): 37.4% and 27.0% respectively. Among the motorcycle accidents, the driver had been using alcohol in 3% and it was not possible to identify whether this had occurred in 67%.

Conclusions: Public policies prioritizing financial and human resources applied toward reducing these types of accidents need to be brought in.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved.

Acidentes que envolvem motociclistas e ciclistas no município de São Paulo: caracterização e tendências

RESUMO

Objetivo: Descrever as características de vítimas de acidentes de motocicleta e bicicleta, segundo notificações de acidentes, suspeitos e confirmados, ocorridos no município de São Paulo.

Palavras-chave:

Acidentes de trânsito

Epidemiologia

Prevenção de acidentes

[☆] Please cite this article as: Rodrigues CL, de Eston Armond J, Gorios C, Souza PC. Acidentes que envolvem motociclistas e ciclistas no município de São Paulo: caracterização e tendências. Rev Bras Ortop. 2014;49:602-606.

^{☆☆} Work developed at the University of Santo Amaro, São Paulo, SP, Brazil.

^{*} Corresponding author.

E-mail: gorios@terra.com.br (C. Gorios).

<http://dx.doi.org/10.1016/j.rboe.2014.11.002>

2255-4971/© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved.

Método: Estudo epidemiológico transversal, descritivo. Abrangeu todos os acidentes (12.924) ocorridos com motocicleta (11.366) e bicicleta (1.558) de janeiro de 2011 a outubro de 2013. Fez-se um levantamento dos dados do Sistema de Informação de Vigilância e Violência e Acidentes (SIVVA) da Secretaria de Saúde.

Resultados: Os acidentes de motocicleta corresponderam a 52,1% dos casos notificados; os de bicicleta, a 7,1%. O sexo masculino foi predominante em ambos: 81,6% e 80,6%, respectivamente. Nos acidentes de motocicleta, a faixa predominante das vítimas foi entre 20 e 24 anos. Ambos os acidentes ocorreram durante o dia (7 às 18 horas): 37,4% e 27,0% respectivamente. Entre os acidentes de motocicleta, em 3% os pilotos fizeram uso de álcool e em 67% não foi possível identificar se isso ocorrera.

Conclusões: Faz-se necessária a adoção de políticas públicas que priorizem a aplicação de recursos financeiros e humanos na redução desses tipos de acidente.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Publicado por Elsevier Editora Ltda. Todos os direitos reservados.

Introduction

Terrestrial transport accidents, also known as traffic accidents, are an important public health problem because of their high impact relating to morbidity and mortality.^{1,2}

According to Melione and Mello-Jorge,³ falls and transport accidents have been reported to be respectively the first and second reasons for hospitalizations due to external causes. Increased rates of accident and violence (external causes) have had a repercussion on the organization of the health-care system, which because of its responsibility for attending to trauma cases has been faced with higher expenditure on medical care. External causes account for higher mean expenditure and cost per day of hospitalization than those of cases with natural causes.

Among traffic accidents, increasing numbers of motorcycle accidents have been observed over recent years. These vehicles are becoming ever more accepted and approved among the population because they are agile, economical and inexpensive to buy.⁴

In the same way, bicycles are an efficient and popular means of transport among many populations around the world. Because of their low purchase and maintenance costs, they can be considered to be the cheapest form of urban transport, accessible to practically all social layers. They do not pollute the environment, they preserve public spaces and they do not cause the disturbance that characterizes motor vehicles in urban areas.⁵

For characterizing the epidemiological profile of accidents, hospital morbidity and mortality data present limitations.^{6,7}

In 2008, in the municipality of São Paulo, Brazil, an information system for monitoring accidents and violence (SIVVA) was implemented within the municipal healthcare system. This has enabled production of information for diagnosing, planning, monitoring and evaluating the actions undertaken toward coping with accidents and violence.⁷

Through recognizing accidents as a matter for surveillance and, at the same time, comprehending the complexity of the phenomenon by means of an interdisciplinary and intersectoral approach, the system has made it possible to formulate integrated public policies aimed at prevention.⁷

In the municipality of São Paulo, in 2013, 5624 transport accidents were notified, among which 51.7% involved motorcycles and 8.8%, bicycles.⁸

In view of the importance of motorcycle and bicycle accidents within the situation of morbidity and mortality, this study describes the characteristics of the victims, according to the notifications of suspected and confirmed accidents that occurred in the municipality of São Paulo.

Method

A descriptive cross-sectional epidemiological survey was developed with a view to finding out about and characterizing accidents involving motorcycles and bicycles and outlining the profile of the victims.

This study covered all of the accidents (12,924) that involved motorcycles (11,366) and bicycles (1558) in the municipality of São Paulo between January 2011 and October 2013.

The data were gathered from SIVVA during September and October 2013. This is a public-domain system that can be accessed through the portal of the municipal authority of the city of São Paulo, via its health department.

SIVVA is an instrument for all outpatient services (both primary care and specialized care), hospitals and emergency services, both within the National Health System (SUS) and within private hospitals in the city of São Paulo. The notification form for suspected or confirmed cases is filled out by all healthcare professionals when the patient attended presents signs or symptoms or reports situations of violence and/or accidents. Some fields on the form are for physicians to fill out, such as the diagnosis and characterization of the injury.

SIVVA makes it possible to gather data on the location where the violence or accident occurred and any association with use of alcohol or drugs. It reveals the groups that are more vulnerable and the consequences that follow from these events, so that intervention criteria that take into account this diversity can be established. The system also makes it possible to construct information on the nature and types of violence and enables characterization of accidents.

The variables used were the type of vehicle, pedestrian/rider, age (in years), sex (male or female), evolution of the case, diagnosis of the injury, whether the riders involved in the accidents had any type of deficiency (physical, visual, auditory or mental) and any suspicion of alcohol or illicit drug use by the victims (riders or pedestrians).

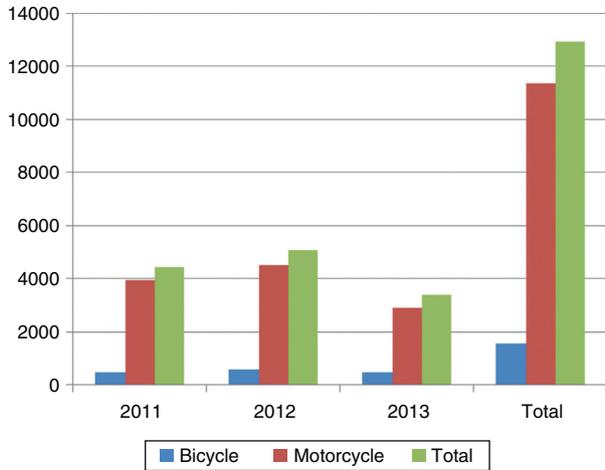


Fig. 1 – Notifications per year of attendance, according to the type of vehicle.

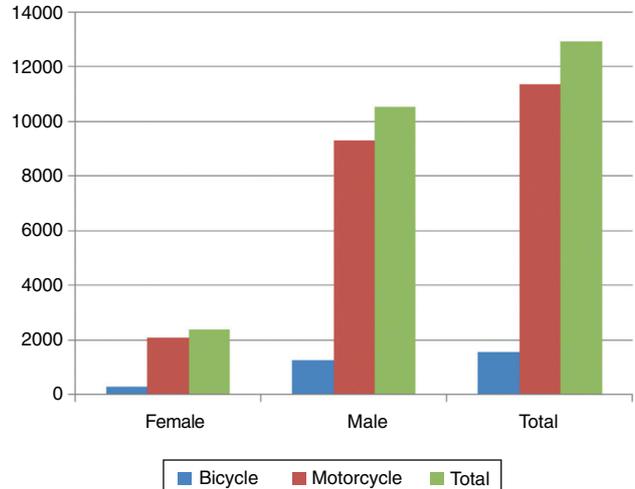


Fig. 2 – Notifications according to the sex of the victim and the type of vehicle.

After the data gathering, data processing and tabulation were performed and the absolute and relative frequencies were calculated.

Approval by the university's research ethics committee was dispensed with for this project, since it involved use of secondary data from a public-domain database, as declared in Resolution 196/96 from the National Health Council (CNS).⁹

Results

Over the period studied (2011–2013), 21,795 transport accidents were notified in the municipality of São Paulo. Those involving motorcycles accounted for 52.1% and those involving bicycles, 7.1% (Fig. 1).

There were 1558 notified bicycle accidents: in 21.4% the victims were pedestrians, and in 76.8%, the riders themselves.

There were 11,366 notified motorcycle accidents: in 16.2% the victims were pedestrians, and in 79.1%, the riders themselves.

Male sex predominated in the motorcycle or bicycle accidents: 81.6% and 80.6%, respectively (Fig. 2).

Among the motorcycle accidents, the dominant age group of the victims was between 20 and 29 years (46.2%). Among the bicycle accidents, it was between 10 and 19 years (39.3%) (Fig. 3).

Both of these types of accidents occurred during the day, between 07:00 and 18:00 h: 37.4% and 27%, respectively.

Among the cyclists who suffered accidents and had some type of deficiency (five cases notified), 20% had physical deficiency, 40% had auditory deficiency and 40% had unspecified deficiency. Among the motorcyclists (eight cases), 62.5% had physical deficiency, 12.5% had auditory deficiency and 25% had unspecified deficiency.

Among the motorcyclists, 3% had made use of alcohol and in 67% of the cases, it was not possible to identify whether this had occurred. Over the period evaluated, 63 cases of use of illicit drugs by motorcyclists involved in accidents were notified.

Among the cyclists, five cases of use of illicit drugs and 2.4% with use of alcoholic drinks were notified.

According to the instructions from the Ministry of Health in 2006, the notification should be filled out when there is a suspicion or evidence that the patient had made use of alcohol or illicit drugs before the accident that gave rise to the injury. This should be done by the professional who attends to the patient, at any healthcare establishment.

The main diagnosis for the injuries, according to the International Classification of Diseases, 10th edition (ICD-10), was trauma to the knee in motorcycle accidents and to the leg, in bicycle accidents.

In relation to the evolution of cases, 14% of the bicycle accident cases were transferred to specialized services and 72.5% were discharged from hospital immediately. Among the motorcycle cases, 3.7% were kept in hospital at the service where they were attended, 1% were dead on arrival, 6.9% were transferred to specialized services and the others were released from hospital immediately (Fig. 4).

The bicycle accidents occurred mainly in the southern zone of the city (15.2%) and the eastern zone (6.1%). The motorcycle accidents occurred in the same zones: 11.2% and 3.5%, respectively.

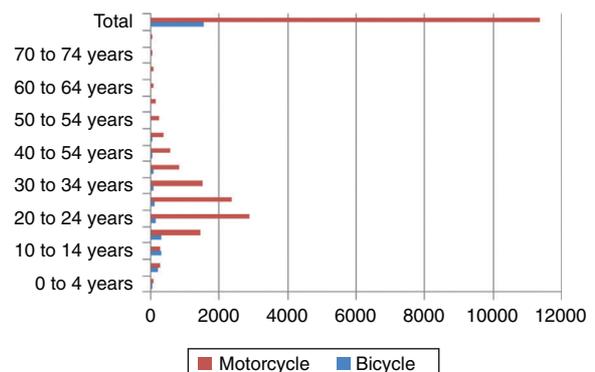


Fig. 3 – Notifications according to the type of vehicle and the age group of the victim.

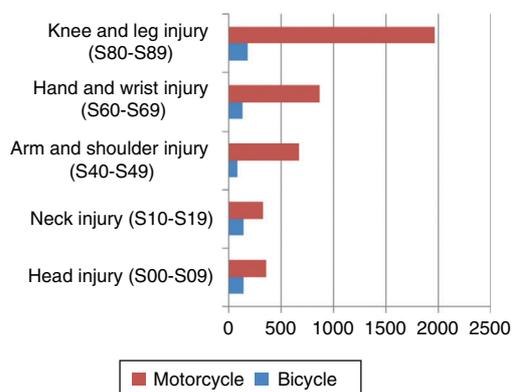


Fig. 4 – Notifications according to the diagnosis of the injury and the type of vehicle.

Discussion

Prevention of accidents and violence is the most important means for avoiding morbidity and mortality due to external causes.¹⁰

The victims of motorcycle and bicycle accidents observed here were mostly young males, as has already been indicated in very many studies conducted in other Brazilian cities.¹¹

In the present study, the bicycle accidents occurred predominantly during adolescence (10–19 years) and among males. The great participation of bicycles in accidents is due to a variety of factors, such as their relatively low cost and their use among children and adolescents as recreational equipment (Figs. 2 and 3).¹²

Today, bicycles are considered in many countries to be a viable solution for traffic problems, because of the high numbers of automotive vehicles in large and medium-sized cities. Health benefits for users and non-degradation of the environment are some of the advantages of this vehicle.¹³ However, in this study, it was not possible to assess whether those involved in accidents were using bicycles for recreation or as a means of transport. It was also not possible to ascertain whether they had been using helmets, knee pads and elbow pads.

According to Malta et al.,¹⁴ the importance of events within traffic that involve motorcyclists also has to be highlighted. Motorcycle riders and pillion passengers are now in first place among traffic accident victims. This trend has now been registered for some years in the mortality information system and the hospitalization information system. The present study has demonstrated, through data from SIVVA, that the number of accidents caused by motorcycles is greater than the numbers caused by other means of transport and that the victims of these accidents are young males.

In the present study, the majority of the accidents occurred during the daytime; some authors have suggested that the greater traffic flows during the day and the excessively long working days of up to 15 h without breaks among professional motorcyclists may be factors associated with greater occurrence of accidents during this period.¹⁵

Although in the present study no relationship was shown between the presence of deficiencies and the accidents that occurred, social inclusion practices are now under discussion

at national level, starting from the principle that for all individuals to be integrated into society, it needs to be capable of meeting the demands of all its members.

In several countries, studies have indicated that consumption of alcoholic drinks and illicit drugs is one of the main factors responsible for the high incidence of accidents with victims. In Brazil, this consumption has also been pointed out as one of the main causal factors of accidents. In comparing the relevance of the impact of alcohol on traffic accidents, there is significant underestimation and undernotification of alcohol consumption and illicit drug abuse in relation to traffic accidents in Brazil.^{16,17}

Transport accidents have been described in the literature as the second biggest cause of hospitalization. Lignani and Vilella¹⁸ observed that in Brazil, hospitalizations due to injuries resulting from transport accidents increased by 8.7% between 2000 and 2010, while the risk of hospitalization due to motorcycle accidents tripled. In the present study, it was seen that most of the cases of bicycle and motorcycle accidents were released from hospital immediately. However, this could be a limitation of the present study, given that we were unable to affirm whether the notification form was filled out at the time of release or whether the cases really evolved to hospital discharge.

As shown in Fig. 4, it was seen that the main injury diagnoses, according to the ICD-10, were knee and leg trauma and hand and wrist trauma. For motorcyclists and cyclists, the limbs are precisely the regions that are most unprotected, given that the safety equipment used provides protection only for the head. According to Oliveira and Sousa,⁴ authors in Japan concluded from a study conducted on the necropsy records of motorcyclists that effective use of a helmet significantly reduced the severity of their head and neck injuries but did not have any effect on the overall severity of injuries in other parts of the body.^{4,19}

The effectiveness of using helmets to reduce head injuries is incontestable. Most authors not only suggest that they should be used but also affirm the importance of multiple, synergic and contextualized strategies for injury prevention. Such strategies involve: use of bicycle lights; regulation and legislation for the transit of vehicles and bicycles; educational programs; and support and modifications of the environment in order to make practices safer, which includes cycle paths and exclusive lanes for motorcyclists and cyclists.^{9,20}

One important point that is worth taking into consideration is the difficulty and limitations of working with secondary data, because of deficiencies in filling out the notification forms and delays in data entry into the databases and in updating the information system.

The alarming growth in the number of motorcycles and bicycles, in relation to automobiles, because these are cheaper and more agile means of transport and, moreover, less polluting, constitutes a new public health problem because of the accidents that occur.

Conclusion

Actions toward minimizing traffic accidents should prioritize drivers' and riders' hours of work activity. It is necessary to

adopt public policies that give priority to application of financial resources to strategies for reducing these accidents.

Traffic education is essential for accident prevention, for all types of transport vehicles used by the population.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Marín-León L, Belon AP, Barros MB, Almeida SD, Restitutti MC. Tendência dos acidentes de trânsito em Campinas, São Paulo Brasil: importância crescente dos motociclistas. *Cad Saúde Pública*. 2012;28(1):39-51.
2. Rocha GS, Schor N. Acidentes de motocicleta no município de Rio Branco: caracterização e tendências. *Ciênc Saúde Coletiva*. 2013;18(3):721-31.
3. Melione LPR, Mello-Jorge MHP. Gastos do Sistema Único de Saúde com internações por causas externas em São José dos Campos, São Paulo. *Brasil Cad Saúde Pública*. 2008;24(8):1814-24.
4. Oliveira NLB, Sousa RMC. Diagnóstico de lesões e qualidade de vida de motociclistas, vítimas de acidentes de trânsito. *Rev Latino-Am Enfermagem*. 2003;11(6):749-56.
5. Bacchieri G, Gigante DP, Assunção MC. Determinantes e padrões de utilização da bicicleta e acidentes de trânsito sofridos por ciclistas trabalhadores da cidade de Pelotas, Rio Grande do Sul. *Brasil Cad Saúde Pública*. 2005;21(5):1499-508.
6. Brasil. Ministério da Saúde. Viva: Vigilância de Violências e Acidentes, 2006 e 2007. Brasília; 2009. Available at: <http://tabnet.datasus.gov.br/cgi/viva/vivadescr.htm>
7. Prefeitura da Cidade de São Paulo. Secretaria Municipal da Saúde. Sistema de Informação para a Vigilância de Violência e Acidentes: manual de preenchimento da ficha de notificação de casos suspeitos ou confirmados; 2007. Available at: http://www.prefeitura.sp.gov.br/cidade/secretarias/upload/08.09.10_manual_sivva_1254424639.pdf
8. Sistema de Vigilância de Violência e Acidentes: Acidentes de Transporte; 2013. Available at: <http://www.prefeitura.sp.gov.br> (accessed on 01.10.13).
9. Caiffa WT, Friche AAL. Urbanização, globalização e segurança viária: um diálogo possível em busca da equidade? *Ciênc Saúde Coletiva*. 2012;17(9):2238-41.
10. Santos AM, Moura ME, Nunes BM, Leal CF, Teles JB. Perfil das vítimas de trauma por acidente de moto atendidas em um serviço público de emergência. *Cad Saúde Pública*. 2008;24(8):1927-38.
11. Legay LF, Santos AS, Lovisi GM, Aguiar JS, Borges JC, Mesquita RM, et al. Acidentes de transporte envolvendo motocicletas: perfil epidemiológico das vítimas de três capitais de estados brasileiros, 2007. *Epidemiol Serv Saúde*. 2012;21(2):283-92.
12. Feitas JPP, Ribeiro LA, Jorge MT. Vítimas de acidentes de trânsito nas faixas etárias pediátricas atendidas em um hospital universitário: aspectos epidemiológicos e clínicos. *Cad Saúde Pública*. 2007;23(12):3055-60.
13. Bacchieri G, Barros AJ, Santos JV, Gonçalves H, Gigante DP. Intervenção comunitária para prevenção de acidentes de trânsito entre trabalhadores ciclistas. *Rev Saúde Pública*. 2010;44(5):867-75.
14. Malta DC, Mascarenhas MD, Bernal RT, Silva MM, Pereira CA, Minayo MC, et al. Análise das ocorrências das lesões no trânsito e fatores relacionados segundo resultados da Pesquisa Nacional por Amostra de Domicílios (Pnad) Brasil, 2008. *Ciênc Saúde Coletiva*. 2011;16(9):3679-87.
15. Montenegro MM, Duarte EC, Prado RR, Nascimento AF. Mortalidade de motociclistas em acidentes de transporte no Distrito Federal, 1996 a 2007. *Rev Saúde Pública*. 2011;45(3):529-38.
16. Abreu AMM, Lima JMB, Matos LN, Pillon SC. Uso de álcool em vítimas de acidentes de trânsito: estudo do nível de alcoolemia. *Rev Latino-Am Enfermagem*. 2010;18(spe):513-20.
17. Pechansky F, Duarte PC, De Boni R, Leukefeld CG, von Diemen L, Bumaguin DB, et al. Predictors of positive alcohol concentration (BAC) in a sample of Brazilian drivers. *Rev Bras Psiquiatr*. 2012;34(3):277-85.
18. Lignani LO, Vilella LCM. Estudo descritivo sobre a morbidade hospitalar por causas externas em Belo Horizonte, estado de Minas Gerais, Brasil, 2008-2010. *Epidemiol Serv Saúde*. 2013;22(2):225-34.
19. Gawryszewski VP, Rodrigues EMS. The burden of injury in Brazil, 2003. *São Paulo Med J*. 2006;124(4):208-13.
20. Carvalho ML, Freitas CM. Pedalando em busca de alternativas saudáveis e sustentáveis. *Ciênc Saúde Coletiva*. 2012;17(6):1617-28.