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Influence of type of helmet on facial trauma in motorcycle accidents

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Abstract

The mandatory use of helmets by motorcyclists has lowered the incidence of facial trauma, but we know little about the effects of different models of helmet on such injuries. We aimed to find out how different types of helmet affect facial injuries. We collected retrospective data from the medical records of 157 patients treated in a trauma centre in metropolitan São Paulo between January and December 2011. Patients wearing open-face helmets were twice as likely to require an operation as those wearing full-face helmets. The type of helmet is strongly associated with the treatment required.
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Keywords: Motorcycle; facial trauma; traffic accidents; head protection devices

Introduction

In Brazil, accidents are responsible for about 16 000 deaths each day, and thousands of other injuries result in disabling or permanent sequelae.[1] In 2007, nearly 30% of all deaths from external causes were traffic-related, and the proportion of motorcyclists killed out of the total killed in traffic-related accidents rose from 4% in 1996 to 28% in 2007. The large increase in the number of motorcycles sold in recent years has been an important contributing factor.[2]

Facial injuries, including fractures, have serious implications for the management of patients with multiple injuries.[3] The implementation of laws that require seat belts to be worn in cars and helmets to be worn by motorcyclists is likely to have an impact on the incidence of facial trauma,[4] and in developed countries this has been the case.[5]

Facial injuries can have emotional and functional consequences, and can result in permanent deformity.[6] In 2010, the Brazilian Federal Government spent about R$ 44,303,497,000 on health, of which 52% was invested in outpatient and inpatient hospital care. Spending was US$ 771.56 per capita, and R$ 3,198,391,200 was spent on admissions for operations.[7]

Facial trauma accounts for 7.4% - 8.7% of admissions to accident and emergency (A&E) departments.[8,9] The vulnerability of the face and the lack of protection provided by

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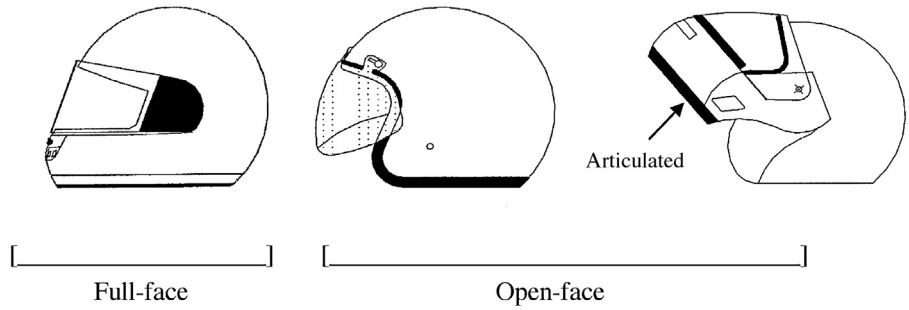

Fig. 1. Types of helmet approved by Brazilian law.

open-face helmets may explain the high incidence of injury including severe injury in this area. Head injuries, which may account for half of all trauma-related deaths,[10] often require treatment by a multidisciplinary team including specialists from ophthalmology, general surgery, plastic, oral and maxillofacial surgery, and neurosurgery.[11]

In Brazil, the number of motorcyclists injured in traffic accidents is gradually overtaking that of other road users. Motorcycles are increasingly being used to transport passengers ("mototaxis") and for commercial purposes ("motoboys"),[12] and riders are more vulnerable to injury than occupants of other motor vehicles.[13,14] Resolution 203 of the Brazilian Traffic Code (September 2006) made the wearing of helmets by motorcyclists mandatory on public roads. The regulations state that helmets must display a safety stamp from the National Institute of Metrology, Quality and Technology (INMETRO) which is responsible for verifying minimum safety levels, and 3 types of helmet are acceptable: fixed full-face, articulated full-face, and open-face (Fig. 1).[15]

Studies on the wearing of helmets by motorcyclists in urban areas have highlighted 2 main points: the effectiveness of laws aimed at increasing their use, and the protection provided against brain injuries and death.[16–18] Even with the increased use of helmets, little is known about how effectively they protect the face. Therefore, we aimed to evaluate the association between the type of helmet and type of facial injury.

Methods

This was a case-control study of 157 patients treated at Santo André Municipal Hospital Centre (CHMSA), Sao Paulo, Brazil, between January and December 2011. Only patients injured in the face in a motorcycle accident were included. Those with injuries to any other part of the body or whose injuries resulted in death were excluded.

Variables included were age, sex, area of facial trauma, treatment, and type of helmet approved by Brazilian law. The types of helmet were grouped into 2 categories according to the extent of facial protection: full-face (fixed full-face), and open-face (open-face or articulated full-face) helmets (Fig. 1).

Continuous variables were described using measures of central tendency and dispersion, and categorical variables using absolute and relative frequency. The association between the type of helmet and area of facial trauma was done using Pearson's chi square or Fisher's exact test, as appropriate. Logistic regression models were used to evaluate the odds of surgical treatment according to the type of helmet worn.

The Ethics Committee of the ABC School of Medicine approved the study.

Results

A total of 1628 patients presented with facial injuries at CHMSA in 2011. Of these, 157 had been involved in motorcycle accidents (10%) (mean age 26 years, range 14 – 61) and 143 (91%) of them were male.

A total of 75 patients (48%) had worn fixed full-face helmets, 34 (22%) open-face or articulated full-face helmets, and 48 (31%) had worn no helmet. To analyse the impact of the type of helmet, those who had not been wearing one were excluded. The remaining sample was stratified into 2 groups: those wearing full-face (n = 75) and those wearing open-face (n = 34) helmets.

Table 1 shows that the type of helmet was not associated with the area of face injured. The prevalence of operation in patients who had worn an open-face helmet was twice that of those wearing a full-face model (p = 0.013) (Table 2). Table 3

Table 1
Number (%) of injuries by type of helmet worn.

Type of injury	Group				p value
	Open-face helmet (n = 34)		Full-face helmet (n = 75)		
	No.	(%)	No.	(%)	
Facial contusion	13	(38)	42	(56)	0.09
Zygomatic fracture	9	(27)	12	(16)	0.20
Nasal fracture	5	(15)	12	(16)	0.86
Mandibular fracture	8	(24)	8	(11)	0.09
Orbital fracture	5	(15)	9	(12)	0.76
Dentoalveolar fracture	3	(9)	3	(4)	0.37
Jaw fracture	2	(6)	2	(3)	0.59

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