

Motorcycle Injuries: Socio-demographic, Temporal and Injury Patterns at a Regional Hospital in Jamaica

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ABSTRACT

Objective

To describe the demographic profile, temporal and injury patterns of persons treated at the St. Ann's Bay Regional Hospital, Jamaica for injuries sustained following a motorcycle crash.

Methods

A cross-sectional study was conducted over 28 months. Patients involved in motorcycle crashes who were managed in the emergency room, admitted directly to the surgical ward, or referred to the Orthopaedic Clinic, were included in the study. Patients were interviewed within 24 hours of presenting to the Orthopaedic service. Socio-demographic and injury-related data were collected.

Results

Of the 155 patients, 98.7% were males. Ages ranged from 14 to 64 years (median 28 years, IQR = 16.5); 47.1% were 20-29 years old and 20.3% were between 30-39 years old. Higher injury rates were observed for 'holidays' and 'weekend days' compared to 'weekdays': 53.8, 24.5, and 14.2 per 100-day type respectively. The most popularly reported contributory mechanism for injury were collision (47.4%, n=101), loss of control (38.0%, n= 81) and errant overtaking (14.6%, n=31). The commonest injured areas were the leg (18%), ankle (12%), forearm (12%) and thigh (11%).

Conclusion

Males less than 40 years accounted for most motorcycle injuries in the study. Motorcycle crashes occur substantially more during holidays and weekends, and affect mainly the legs. Mechanisms of injury suggest critical roles for preventative strategies in efforts to reduce morbidity and health system burdens from motorcycle crashes.

Keywords: Motorcycle, Injury, St. Ann, Jamaica

INTRODUCTION

Injuries have become a major global issue in recent years and account for 9% of global deaths annually. These injuries are responsible for approximately 6% of all years lived with disability¹. Deaths from road traffic crashes have been increasing, with projections for further increase by the year 2030. Non-fatal injuries related to road traffic crashes add to the burden on the health systems, through hospitalizations, visits to emergency department and treatment received from medical practitioners.¹

The contribution of motorcycle crashes to overall road traffic crashes in Jamaica has steadily been increasing over the years. Data published in 2010 demonstrates that motorcycle crashes accounted for 8% of all road traffic crashes², however by 2014, the absolute number of motorcycle crashes had increased, and they then accounted for 15% of all road traffic crashes.³ Current data continue to highlight the problem of motorcycle injuries and fatalities locally. In the first six months of 2021, 35% of all road fatalities was motorcycle related.⁴ Motorcycle-related fatalities were reportedly at a three year high with speeding, overtaking and failure to comply with traffic signals reported as contributory factors.⁵ Despite an overall reduction in road deaths in the initial six months of 2021, motorcyclists are of major concern.^{6,7}

Injuries associated with these crashes particularly affect young people, cause substantial economic burden and result in loss of productivity.^{8,9} Motorcyclists are of particular concern as their injury risk in a crash is three times greater and their mortality risk 17 fold higher, than their motorcar counterparts.⁹ Trends, patterns and factors relating to motorcycle crashes have been reported in various studies. Motorcycle crash rates vary by day type (weekday versus weekend), with rate of crashes higher on weekends compared to weekdays.^{10,11} Crash rates may also vary by engine capacity or cubic centimetres rating (cc rating).^{12,13} Motorcycle crashes affect various body parts disproportionately.^{3,14} Mechanism of injury also vary and include collision and loss of control.¹⁵ While the causes of motorcycle crashes are multi-factorial, the aforementioned variables have not been extensively studied in Jamaica and the wider Caribbean. This paper focuses on the demographic profile of persons treated at the St. Ann's Bay Regional Hospital, Jamaica. The paper also describes the distribution of injuries sustained

following a motorcycle crash and associated factors, temporal patterns, motorcycle engine capacity and mechanisms of injuries.

METHODS

A cross-sectional study was conducted between March 2016 and June 2018 at the St. Ann's Bay Regional Hospital in Jamaica. This hospital serves as the major trauma referral centre for the North East Region of the island. This region includes the parishes of St. Ann, St. Mary and Portland. Subjects were patients who were treated at the St. Ann's Bay Regional Hospital for injuries which occurred following a motorcycle crash. A census was done for the entire period. Patients were either admitted directly to the surgical ward once seen in the Emergency Room, or referred to the Orthopaedic Outpatient Department. The patients were interviewed by trained Orthopaedic staff with the aid of a pre-tested questionnaire. Interviews were conducted within 24 hours of the patient presenting to the Orthopaedic service, except when this was neurologically or clinically contraindicated. In such cases, interviews were conducted at a later time as appropriate. The questionnaire consisted of mainly closed-ended questions and elicited data on socio-demographic characteristics, crash circumstance, motorcycle specifications and physical injuries sustained. Data were analysed using SPSS version 20 and descriptive summaries generated. Informed consent was obtained from all participants in the study.

RESULTS

There was a total of 155 participants in the study; the majority (98.7%) being male. The ages of participants ranged from 14 to 64 years with a median age of 28 years (IQR = 16.5 years). As seen in Table 1, the plurality of participants was in the age category 20-29 years, and an equal proportion of persons were in the age categories 40-49 years and 50 years and older. Most (63%) participants resided in St. Ann, followed by 18.2% from St. Mary. Almost 12% of persons were unemployed. At the time of the crash, 91% were riders and only 9% were passengers.

Among the study participants, 51% (n=77) reported being a current smoker. Among smokers, marijuana was the most popularly reported main substance used (93.3%, n=70). The remaining portion smoked mainly

cigarettes. Approximately 41% (n=62) self-identified as alcohol users.

month period of the study. Higher rates were noted for the holidays (53.8) and weekends (24.2), compared with weekdays (14.2).

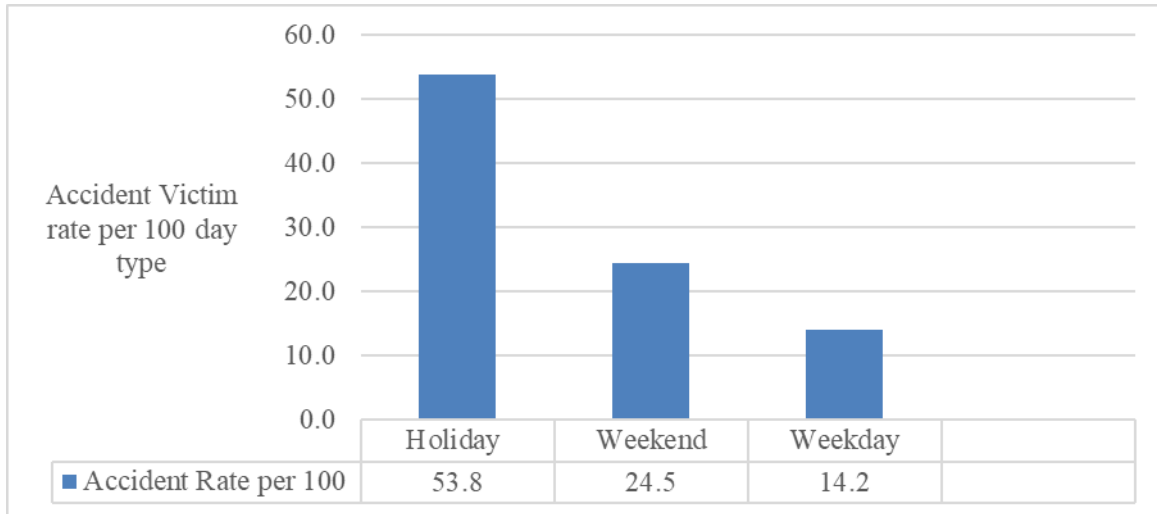
Temporal Patterns of Motorcycle Accidents

Figure 1 shows the variation in the mean number of motorcycle crash victims per 100 'day type' during the 28-

Table 1: Socio-demographic characteristics of participants

Variables	% (n)
Gender	
Male	98.7
Female	(153)
Total	1.3 (2)
	100.0 (155)
Age Category	
Under 20	7.8 (12)
20-29	47.1 (72)
30-39	20.3 (31)
40-49	12.4 (19)
50 and Older	12.4 (19)
Total	100.0 (153)
Parish of Residence	
St. Ann	63.0 (97)
Trelawny	5.2 (8)
St. Mary	18.2 (28)
Portland	7.1 (11)
Clarendon	4.5 (7)
Other	1.9 (3)
Total	100.0 (154)
Employed	
Yes	87.7 (135)
No	12.3 (19)
Total	100.0 (154)
Position on Motorcycle	
Rider	91.0 (141)
Pillion Rider	9.0 (14)

Figure 1: Motorcycle Accident Victim Rate by Day Type

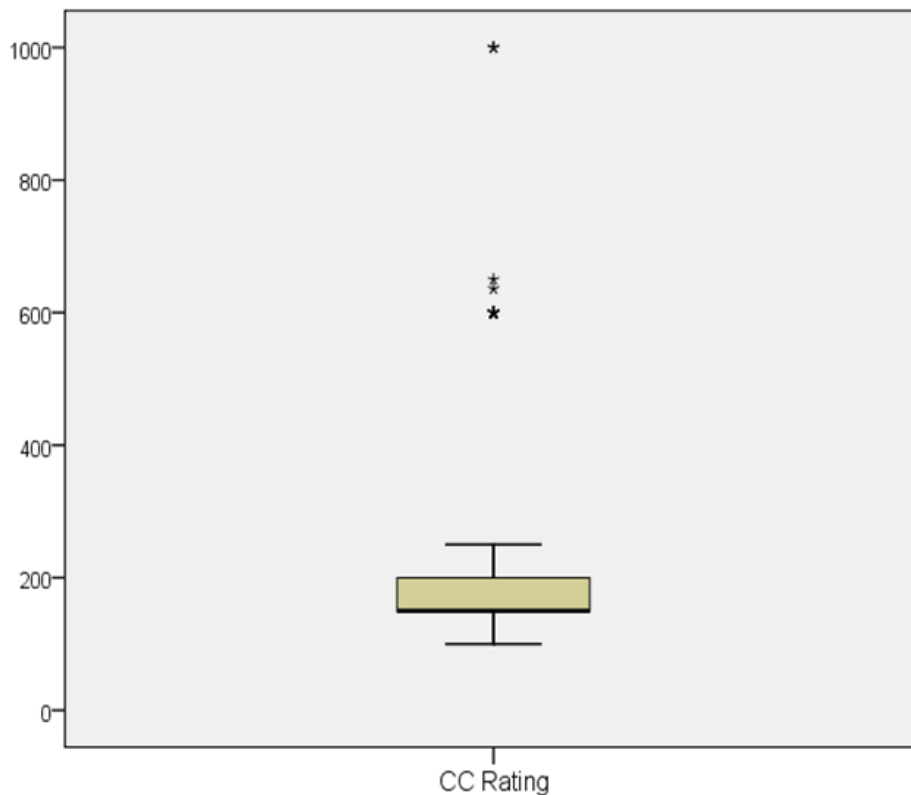


CC Rating and Mechanism of Injury

Motorcycles varied in CC rating (a proxy indicator of the engine power of the bike), ranging from 100cc to 1000cc

with a median CC rating of 150 (IQR = 50). Twenty five percent of motorcycles had a CC rating in excess of 200. The distribution of CC rating is shown in Figure 2.

Figure 2: Distribution of Motorbike CC Rating



Two hundred and thirteen responses regarding contributory mechanisms of injury were obtained. The most popularly reported contributory mechanisms of injury were: collision (47.4%, n=101), loss of control (38.0%, n= 81) and errant overtaking (14.6%, n=31). More than one of these contributory mechanisms were reported by some riders. Among 148 riders, 68.2% indicated collision as a mechanism of injury, while the corresponding figures were 54.7% and 20.9% for loss of control and overtaking respectively. There was a statistically significant correlation between the CC rating and the number of mechanisms of injury involved. As the CC rating increased, the number of mechanisms decreased (Spearman’s rho = -0.198, p=0.018).

A statistically significant difference existed in mean CC rating by rider status [t (129) = 4.5, p<0.001]. Where a pillion was involved, the mean CC rating was 153, compared to rider only, when the mean CC rating was 226.

Body Areas Involved

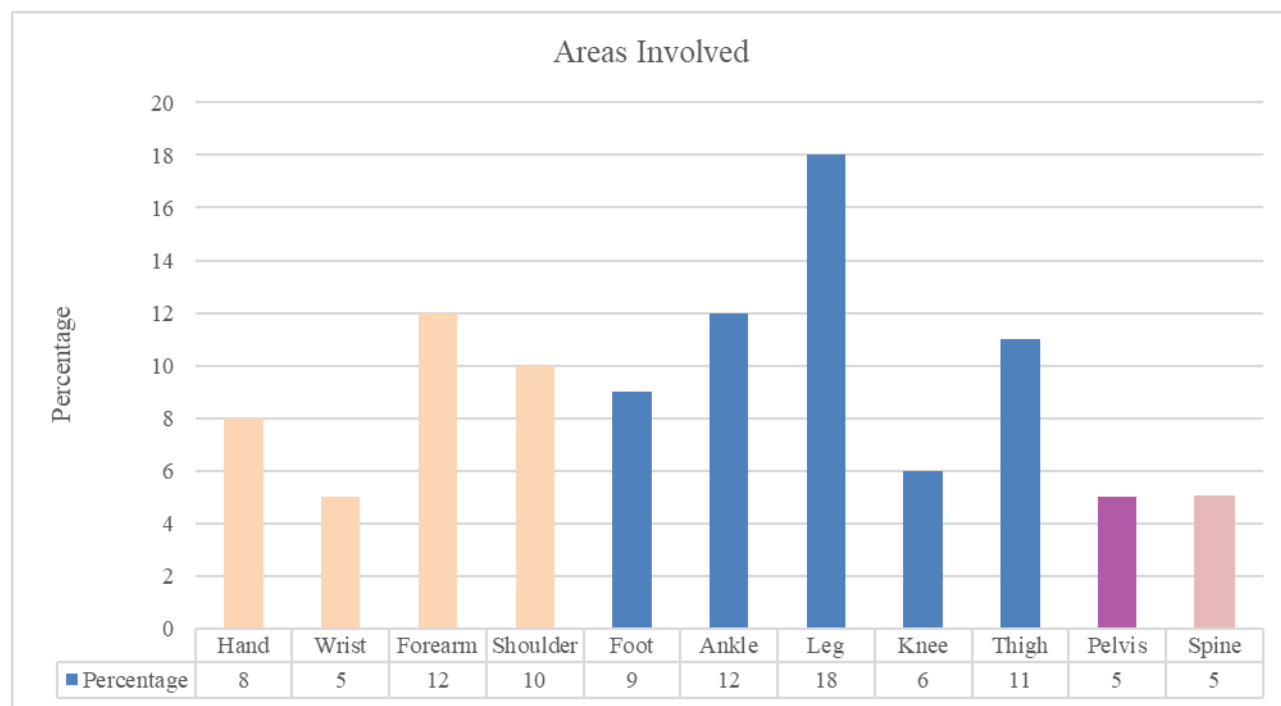
There was a total of 153 of 155 persons (98.7%) for which area(s) of injury were specified. Among all injuries, the frequencies by body area were: leg (18%), ankle (12%), forearm (12%) thigh (11%) and shoulder (10%) (Figure 3).

Twenty-nine patients (18.7%) had open fractures. Two of those patients each had two open fractures. One patient had bilateral open radial fractures and the other patient had ipsilateral femoral and patellar open fractures. Of the open fractures, tibia (41.9%, n=13), ankle (13.8%, n=4), foot (10.3%, n=3), patella (6.9%, n=2), femur (6.9%, n=2), forearm (17.2%, n=5), and hand (6.9%, n=2).

Three patients each had degloving injuries, two involving the foot and one involving the forearm. One patient had a traumatic amputation of a toe. There were seven dislocated joints (shoulders n=2, fingers n=2, elbow n=1, hip n=1 and pelvis n=1). There were two tendon ruptures (one rotator cuff and one patellar tendon injury) and two patients with neurological injuries (one involving the cervical spine and one brachial plexus injury).

Most (72.1%, n=111) riders had only one of the aforementioned areas involved. Approximately one fifth (20.1%) had two areas involved. Almost 6% had three areas involved and less than 2% had four or more areas involved. No statistically significant correlation was found between CC rating and the number of areas involved. There was a statistically significant difference in the mean number of areas involved by rider status; rider – 1.4, pillion rider – 1.1 [t (25.2) =2.29, p = 0.031].

Figure 3: Relative Frequency of Body Areas Involved



In 63% (n=97) of cases, only orthopaedic injuries were observed. Among the remaining patients (n=57), 84.2% (n=48) had both head and orthopaedic injuries, while 15.8% (n=9) had other non-specific injuries. Approximately 75% of patients required hospitalization and of these, nearly half (49.6%) were admitted for less than one week. Almost one in three were admitted for 1-2 weeks, and a fifth of admissions stayed longer than two weeks.

DISCUSSION

In this study, 98.7% of patients were male. This is in contrast with other studies in Thailand¹⁶ and the USA¹⁷, where the corresponding percentages were 58% and 83% respectively, but is similar to that reported from Nigeria, where 99% was male.¹⁸ The variation and differences observed may reflect cultural and societal norms and expectations. In Jamaica, females do not customarily ride motorcycles.

Most patients were under 40 years old and corroborates observations that injured motorcycle riders tend to be relatively young and in their productive years.^{17,19} Chichom-Mefire et al found that the greatest incidence of motorcycle injuries was in 20 to 40 year old males, but surprisingly the second peak age range was found to be 41 to 60 years.¹⁹ Kumar et al found that most of the crash victims were in their 20's followed by the patients in their 30's, as was the case in our study.²⁰ Hassan et al found a higher rate of teenagers crashing (20%), but a similar rate for patients in their thirties (21.1%) compared to our study.²¹

The motorcycle accidents per 100 days was 3.8 times higher during holidays compared with weekdays. Multiple festive gatherings predominantly occur around weekends and holidays and these are often accompanied by increased alcohol consumption, which we purport, plays a role in motorcycle crashes. Similar sentiments have been expressed in another Caribbean study.¹¹ This may partially explain variations by day type.

The median CC rating was 150 signifying that the typical motorcycles in the study were of small CC rating. There is literature to suggest that larger engine size positively correlates with the risk of injuries because they are harder to control, but in our study where most

motorcycles were of small CC rating, we found no such association.²² Langley et al have similarly reported no correlation between engine size and risk of injury.¹² The difference in CC rating where a pillion rider was involved, we posit, may reflect increased likelihood of persons to ride pillion-style based on their perception of the smaller bike being 'less fast' with 'less accident risk'.

Ogunlusi and Nathaniel found that the commonest injuries were overwhelmingly soft tissue injuries (95.6%) followed by fractures (33.8%), however most had a combination of injuries.¹¹ Some authors have found that head and extremity trauma accounts for the majority of the motorcycle injuries.^{19,23} Abdul-Sahib, et al noted that the commonest injured area was the leg followed by the ankle, which mirrors our study findings.²⁴ With regard to upper limb injuries, our findings are consistent with those from a major registry where forearm fractures were the commonest upper limb injury resulting from motorcycle crashes.²⁵

Loss of control, errant overtaking and collision with another vehicle were identified as major mechanisms of injury. These mechanisms suggest that the motorcycle injuries may be largely preventable. With further exploration and increased understanding of factors associated with motorcycle crashes and injuries, prevention and intervention strategies may be developed.

In the literature, marijuana and alcohol use have been suggested as contributory factors (direct and indirect) to crashes and injuries.²⁶⁻²⁸ A limitation of our study is its inability to incontrovertibly identify the role and association, if any, of marijuana and alcohol in the occurrence of crashes, as blood and other relevant investigations to establish level of these chemicals at/ around the time of the crashes were not done.

This study is the first of its kind in Jamaica with an emphasis on motorcycle injuries. Data was prospectively obtained over an extended period. Most of the patients were interviewed for this study within 24 hours of referral to the service which minimised errors pertaining to recall. There were small numbers of pillion riders and females in the study, which limited the ability to analyse or make generalisations about these groups.

CONCLUSION

Motorcycle injuries are seen predominantly in males less than forty, occur substantially more during holidays and weekends, and affect mainly the leg, ankle and forearm. The majority of crashes involved motorcycles of lower CC rating. Mechanisms of injury suggest critical roles for preventative strategies in efforts to reduce morbidity and health system burdens from motorcycle crashes. Our study is an essential step towards elucidation of factors related to motorcycle crashes and injuries as we seek to further understand these issues to support policy development and implementation.

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Author Contributions: C. Fletcher conceptualized the study, participated in study design and data collection, performed statistical analyses, and contributed to manuscript writing. C. Thompson performed statistical analyses and contributed to manuscript writing and revision. K. James performed statistical analyses and contributed to manuscript writing. K. Lambert Fletcher participated in study design, contributed to manuscript writing and revision.

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