


## Most Frequently Affected Body parts in Road Traffic Accidents Reporting to the Accident and Emergency Department of the Largest Tertiary Care hospital of Karachi in 2019

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### ABSTRACT

**Introduction** Injuries sustained during Road Traffic Accidents (RTAs) amounts to a serious public health crisis. The aim of the study was to determine the body parts most likely affected in an RTA in patients brought to Accident and Emergency (A&E) department of Jinnah Postgraduate Medical Centre (JPMC), the largest tertiary care hospital of Karachi.

**Method** A descriptive cross-sectional study was done in January-March 2019 among 371 respondents aged 15-65 years. Study participants were recruited through non-probability convenience sampling. A structured questionnaire was used to collect data on sociodemographic variables and type, severity and nature of injury. Chi Square test was used to determine the significant difference between using safety precautions with body parts affected. All analysis was performed on SPSS version 20.

**Results** Out of 371 study participants, 64.4% (n=239) were between 15-35 years with 91.9% (n=338) males. In 77.1% (n=286) cases, emergency medical services responded in less than one hour and first aid was provided by doctor to 95.7% (n=355) at hospital. In 82.5% (n=306) cases, private vehicles were involved, with 46.1% (n=171) motorcycles. In 79.8% (n=296) cases, bone injury was prevalent, with 57.1% (n=212) leg injuries, which was the most frequently affected body part. Majority, 56.2% of the study participants who did not wear seat belts had chest area affected (p=0.006).

**Conclusion** It is concluded that males of 15-35 years who were motorcyclists were more prone to RTAs with lower limbs more frequently being affected. Safety precautions like wearing seatbelts provide protection against RTAs.

**Keyword:** Road Traffic Accident (RTA), frequently affected body parts, A&E department, Karachi

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## Introduction

The world is realizing that RTA is a serious public health problem (1). Road accident is the eighth major cause of fatalities worldwide (2). Injuries sustained during road accidents is considered as a major cause of public health crisis (3). Current patterns of increasing population, industrialization and migration towards urban areas are bringing a huge burden on transportation infrastructure posing great dangers like road traffic mishaps (4).

Automobile accident is one of the major reasons for casualties in minors around the world and nearly 75% of road casualties occur in developing countries and males are mostly affected constituting a total of 80% of these casualties (5). WHO statistics of 1995 states, nearly 10 million road accidents occur each year claiming 885000 lives worldwide and in Karachi, according to the 2013 records, the most affected age group by road crash mortality are twenties and thirties, constituting 27.2% of all casualties while as far as concerning the type of vehicle involved in road mishaps, about 51.1% of them are due to motor cycles whereas the second common type of vehicles involved, are buses and coasters contributing to 9.6% of fatalities (2). In Karachi, according to 2008 records, about 616 deaths were reported by the police department and about 1092 deaths were reported by the hospitals, that occurred as a result of road accidents (6).

In Karachi, traffic congestion is expanding up to its outskirts especially during peak hours (7). Added to this, the uncontrolled growth in urbanization and motorization contributes to a transportation system that is socially, economically, and environmentally unsustainable (8). Factors like quick mechanization and urbanization, increasing population, increasing requirement for better transport infrastructure, unavailability of safe conveyance, reckless driving under the influence of alcohol, medicine and substances like cocaine and heroin, under-aged drivers, over-speeding, driving under stress, talking and messaging via mobile phones during driving

and impaired visual clarity during driving etc. are increasing the probability of road mishaps (3).

In Pakistan, worth mentioning reason of automobile crashes is the poor enforcement of traffic rules about safety belts and helmets (9). Negligent driving and over speeding also leads to road mishaps (5). Precautions like utilization of pedestrian bridges, speed breakers, walkways, zebra crossings, following instructions of city wardens and awareness about traffic signs, and traffic rules play important role in avoiding road accidents (1).

The parts of the body injured and the severity of injury relates with the front symmetry of vehicle like head is more prone to injury in mini-van accidents and after striking against windshields whereas for bonnet type vehicles, legs are more prone to get injured (10). According to findings from a surveillance study conducted recently, it was observed that 60.3% injuries were of external body resulting due to clothing related bike wounds and entrapment of loose dresses in motorbikes in Karachi (11). Tibia because of its exposed position, is the most vulnerable bone of lower limb to get injured in motor bike accidents (12). Damages to head and neck are the most accountable causes of mortality and impairment among victims of accidents involving motorbikes (13). Road mishaps are also one of important causes of the fracture of cheek bone (zygomatic bone) (14).

Road mishaps are an imperative yet avoidable cause of casualties, ailment and disability in a developing country like Pakistan and they can be avoided if preventive measures are taken properly (15). Since limited work has been done, to assess the most affected body parts in a road accident in Karachi, our research may give a certain picture of what areas of the body are most often affected and severity of injuries sustained during RTAs. The results of the research will be beneficial in creating awareness regarding road ethics and the importance of preventive measures so that any sort of negligence should never get precedence over human life. The objective of the study was

therefore to determine the body parts that are most likely to be injured in RTAs in patients brought to A&E department of the largest tertiary care hospital of Karachi, Pakistan.

### Methodology

This descriptive cross sectional study was conducted in the A &E department of Jinnah Postgraduate Medical Centre (JPMC), which is the largest and one of the most accessed tertiary care hospital in the populous city of Karachi, Pakistan from January to March 2019. It was a snapshot study of the road traffic accidents and areas of the body affected in injuries sustained during these accidents in patients brought to Accident and Emergency Department of JPMC.

Sample size was estimated using the software "Sample Size Determination in Health Studies" of World Health Organization. With an anticipated population proportion of 59.4%, confidence level of 95% and bound on error of 5%, a sample size of 371 was calculated (4). Non probability convenience sampling was used for the selection of the victims of RTAs.

Male and female victims of road traffic accident between 15 to 65 years of age, relatives of the above mentioned victims in case of unconscious patients or those who were having any severity of injury except minor cuts, bruises, simple abrasions and scratches were included in the study. Those who were unwilling to participate and did not give consent or assent (in case of minors), who were suffering from memory loss as a consequence of RTA, pregnant women and those with any mental disorders were excluded from the study.

The study participants were interviewed through a questionnaire consisting of close and open ended questions. The structured questions were composed in English and translated in local languages. Face validity was obtained after getting it reviewed from subject experts. The questionnaire contained questions pertaining to the socio-demographic details of the participants and the type, nature and severity of injury sustained during RTA. Responses were in the form of yes/no, whereas choices were given for variables pertaining to time

and severity of injury, vehicle involved in the accidents, traffic congestion at the time of the incident etc.

After pre-testing on 10% of similar sample, data was collected, cleaned for missing variables and cross-validated by random checking. Our study tool had reasonably good internal consistency with study population as well with Cronbach's alpha of 0.625.

The ethical considerations of this study included getting ethical approval from Institutional Review Board of Jinnah Sindh Medical University and JPMC along with informed consent or assent (in case of minors). The participants were assured that their responses would be kept confidential and their identities would not be revealed in the research. The participants had the right to withdraw their participation any time during the research. The study conformed to the Helsinki Declaration and the code of ethics.

The data was analysed and subjected to statistical inference by Statistical Package for the Social Sciences (SPSS), version 20. Continuous variables were summarized by reporting mean and standard deviation and categorical variables by frequencies and percentages. Chi Square test was used to find the significant difference between using safety precautions with area of body affected. A p-value of  $\leq 0.05$  indicated statistical significance.

### Results

Out of a total of 371 study participants, 64.4% (n=239) belonged to the age group of 15-35 years with 91.1% (n=338) males. Out of the cases sampled, 37.7% (n=140) were reported from South district of Karachi, and majority of the incidences i.e.; 44.2% (n=164) occurred between 6:00 am-12:00 noon. It was further observed that 79.8% (n=296) of injuries involved bones, with 57.1% (n=212) being leg injuries and thus the most frequently affected body part. In 77.1% (n=286) of the cases the emergency medical services responded in less than 1 hour and first aid was provided by doctors at hospitals in 95.7% (n=355) of cases. In 82.5% (n=306) of the cases, private

vehicles were involved in the accident out of which 46.1% (n=171) were motorcycles. (Table 1)

When association of using safety precautions with body parts affected was analysed, it was shown that 56.2% of study participants who did not wear seat belt had chest area affected in RTA (p= 0.006). Rest of the body parts affected had no association with safety precautions like wearing seatbelts. (Table 2)

When relevant factors regarding RTA were analysed, it was found that 26.4% (n=98) had an

accident due to their own negligence. Majority, 83.6% (n=310) and 84.1% (n=312) responded that there was no traffic police and ambulance at the site of accident respectively. In 59.6% (n=221) of the cases, the respondents suffered from severe injury. Furthermore, 75.5 % (n=280) of the respondents claimed that they were not brought to the hospital by the person responsible for RTA. Lastly, in 48.2% (n=179) of the cases, the accident occurred during heavy traffic hours. (Table 3)

**Table 1.** Sociodemographic characteristics and body parts affected in RTA of the study participants (n=371)

		n	(%)			n	(%)
Age	15-35	239	64.4	*Area of Body Affected	Head area	Yes	76 20.5
	36-65	132	35.6		Head area	No	295 79.5
Gender	Male	338	91.1		Neck area	Yes	36 9.7
	Female	33	8.9		Neck area	No	335 90.3
Number of family members	1 to 6 Members	214	57.7		Chest area	Yes	16 4.3
	7 or More Members	157	42.3		Chest area	No	355 95.7
Monthly income	Below 10000	49	13.2		Back area	Yes	14 3.8
	10000-20000	49	13.2		Back area	No	357 96.2
	21000-30000	85	22.9		Arm area	Yes	99 26.7
	31000-40000	76	20.5		Arm area	No	272 73.3
	41000-50000	57	15.4		Leg area	Yes	212 57.1
	Above 50000	55	14.8		Leg area	No	159 42.9
	Central District Karachi	59	15.9	Time for medical emergency services to respond	Less than 1 hour	286	77.1
	East District Karachi	60	16.2		1-2 hours	57	15.4
Site of incidence	South District Karachi	140	37.7		More than 2 hours	28	7.5
	West District Karachi	10	2.7	Provision of first aid	By doctor at hospital	355	95.7
	Malir District Karachi	33	8.9		By themselves at home	11	3
	Korangi District Karachi	66	17.8		No provision of first aid due to immediate death	5	1.3
	Interior Sindh	3	0.8	Vehicle/s involved in accidents	Private Vehicle	306	82.5
Time of incidence	06:01am-12:00pm	164	44.2		A) Motor cycle	171	46.1
	12:01pm-04:00pm	30	8.1		B) Car	135	36.4
	04:01pm-10:00pm	65	17.5		Commercial vehicle	65	17.5
	10:01pm-06:00am	112	30.2		A) Van	13	3.5
Type of injury	Soft Tissue Injury	58	15.6		B) Bus	12	3.2
	Bone Injury	296	79.8		C) Rickshaw	17	4.6
	Haemorrhage	5	1.3		D) Truck	23	6.2
	Amputation	12	3.2				

\* Multiple responses apply

\*Chi Square as a test of significance, p<0.05

**Table 2.** Relationship of adopting safety precautions like the use of seat belt with body part affected during RTA

Area of Body Affected	Use Of seat belt		p-value*
	Yes	No	
Head Area	13.20%	86.80%	0.213
Neck Area	22.20%	77.80%	0.494
Chest Area	43.80%	56.20%	0.006
Back Area	14.30%	85.70%	0.708
Arm Area	20.20%	79.80%	0.517
Leg Area	16.00%	84.00%	0.242

**Table 3.** Factors related to RTA as reported by respondents (n=371)

		n	%
Errors responsible for RTA	Human error		
	Negligence of respondent	98	26.4
	Negligence of person whose vehicle hit the respondent	95	25.6
	Reckless driving	87	23.5
	No utilization of safety precautions	11	3
	Usage of mobile phone on road	24	6.5
	Systematic errors		
	Fault in vehicle	13	3.5
	Inappropriate condition of road	34	9.2
	Absence of zebra crossing, pedestrian bridge, walk-way	14	3.8
	Inappropriate condition of weather	7	1.9
Traffic police at the site of accident	Yes	61	16.4
	No	310	83.6
Ambulance station at the site of accident	Yes	61	16.4
	No	312	84.1
Severity of injury	Fatal		
	Yes	17	4.6
	No	354	95.4
	Very Severe		
	Amputation	8	2.2
	Bone crushed	80	21.6
	Multiple fractures	1	0.3
	Severe		
Was the participant brought by the person responsible for RTA	Fracture	221	59.6
	Muscular injury	44	11.9
	Yes	42	11.3
Condition of traffic at the time of accident	No	280	75.5
	Hit and run	49	13.2
	Traffic jam	11	3
	Heavy traffic	179	48.2
	Low traffic	131	35.3
	Open road	50	13.5

## Discussion

RTA is one of the major reasons for casualties in developing countries in the younger age group especially among motorcyclists and pedestrians accounting for 1.2 million deaths yearly worldwide (3). Our study also showed that the

majority of participants involved in RTAs were from the younger age groups. Our finding coincided with another study which stated the heavy burden of accidents involving young motorcycle riders of age group 16-30 years (12). This could be due to reckless driving on part of



the younger population which gives them a sense of freedom and is considered more desirable among this age group (16).

The younger age group being affected is also a cause for concern as they are most active and productive age group, which poses a very serious economic loss to the community. As per literature, this could affect their quality of life and could lead to psychological distress (17-19). To reduce prevalence among this age group, minors should not be allowed to drive until they are licensed and rest of the population should be bound to obey traffic rules and not to drive recklessly.

Our study found that the more commonly affected participants were males (91.1%). This finding was also similar to another study which revealed that the accident rate was 4.9 times higher in males than in females (2). This may be due to the higher population of male drivers and passengers on roads and higher risk taking behavior among males.

The study observed that the frequency of RTAs increased between 6:00am to 12:00 pm (44.2%). This may be due to heavy traffic during these hours and because majority of office workers and students usually commute during this time. However, we found this contrary to another study in Karachi, which showed that the peak time for accident was between 4:00-5:00 p.m. (2). According to the study, motorcycles were more commonly involved in RTAs than any other vehicle (46.1%). The possible reason could be that since motorcycles are two wheeled vehicles, there is higher possibility for motorcycles to get dis-balanced. Moreover, since motorcycles are more economical than any other transport therefore motorcycles are the most preferred mode of transport in developing countries. This finding was contrary to another study, which concluded that cars were more commonly involved in RTA (4). This may be due to the fact that since inflation rates are increasing therefore, people prefer to use cheaper modes to transportation.

We also found that the body part which was most commonly affected, was lower extremity (57.1%) followed by upper extremity (26.7%).

This was contrary to findings of earlier study conducted in Karachi, Pakistan during year 2010-2011, in which head and face area were found to be more affected (4). According to our study findings, most of affected participants were motorcyclists, therefore leg injuries are more frequently reported in our study. This has also been reported in literature (20-22). Injuries that occurred due to collision or collapse of vehicles usually hit extremities first before striking head, so it can also account for leg injury being more than head injury. In majority of the cases, bone fractures were reported followed by injuries causing crushing of bones. This is similar to an autopsy study done in India previously, which also found bone fractures as a common occurring injury in RTAs (23). This could be due to a large number of motorcyclists in our study, whereby long bones fracture was observed being the exposed body part.

In 84.1% cases, ambulance was not available at the time of incident. This indicates that there is lack of availability of ambulance to cater the increasing population rise in Karachi. In our neighboring country, there is a scarcity of ambulance service at times of RTAs (24). Furthermore, general awareness should be created among masses to allow passage to ambulance so that medical treatment could be provided at the right time. According to our study, one third of the study participants did not take safety precautions like wearing of seatbelt and had injury as a result to the chest area. It has been shown in previous studies that wearing seatbelts reduces mortality and the risk of injury (25-28). This clearly indicates that creating realization of use of safety precautions among masses is essential to reduce the worst outcomes of RTA.

Majority of the participants were not brought by the person responsible for RTA. There are many evidences of 'hit-and-run' instances in Asian countries reported in literature (29-31). This is a cause of concern and should be corrected by spreading awareness regarding social responsibility among public, through campaigns especially by the use of social media.

There were some limitations to our study. Firstly since we collected data from a convenience sample, our results cannot be generalized. Additionally even though the human behavioral factors in RTAs have been reported and they might be shared with other populations. However, caution should be taken in generalizing the findings of the study in other parts of the world where road infrastructure and regulations might differ.

### Conclusion

The study concludes that males of 15-35 years are more prone to RTAs with lower limbs being more affected. Safety precautions like wearing seatbelts provide more protection against RTAs. Based on the results, it is imperative that safety precautions are exercised, awareness regarding

hazards of RTAs should be given to general public, provision of quick emergency services should be made and implementation of traffic laws should be mandatory.

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### Conflict of interest

Authors declare no conflict of interests.

### Statement of authors' contribution

ZA conceived and designed the study. AS collected the data, performed the analysis, wrote the first draft. Both authors approved the final manuscript.

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