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Medico-Legal Study of Non-Fatal Road Traffic Injuries

Nagi A Abdulla *PhD*

Forensic Medicine Unite- Para-Clinic Department, Faculty of Medicine and Health Sciences
Aden University - Yemen.

Abstract

Background Road traffic accidents are global problems, which represent one of the major causes of disability and death worldwide leading to unpleasant results on individuals, their families and their society.

Objective To study the incidence of road traffic accidents in relation to socio-demographic factors, and to find out the patterns and distribution of the resulting injuries.

Method This study included (375) victims of road traffic accidents whom were brought to the casualty room in AL-Gamhoria Teaching Hospital in Aden-Yemen for medical and legal evaluation during the period from 1st January up to 31 December 2010. Information collected consisted of personal identification data, and accident characteristics that were obtained from patients, close relatives, and other available persons who were present at the time of incidence.

Results Only 140 (37.4%) of victims were hospitalized. 32% of road traffic accidents (RTAs) was observed among those aged 21-30 years with predominance of male (82.9%). The illiterates were the victims in 38.7%, students (48%), and single (60%). Most of cases from middle and lower socio-economic classes (53.3% and 40%, respectively). Pedestrians (38.5%) and passengers (35.7%) were the victims in most of cases. Light motor vehicle was involved in 61.5%. Sideway and hit and run were the most common types of collisions seen in (33.3% and 30.2%, of all cases respectively). Most of the accidents occurred between 12.01pm to 06.00pm. Most of the accidents occurred during summer season, mainly in the weekend. Multiple superficial injuries like abrasions, contusions, and lacerations wee the commonest pattern of injuries. Limb injuries were the most (46.5%) followed by the head (26.4%).

Conclusion The middle aged group males were more common involved in road accidents. The pedestrians were mostly affected. The Injuries were mostly caused by light motor vehicles than other vehicles. Accidents were more common in the summer season and during weekend, in afternoon hours. Multiple superficial injuries were the commonest injury, and the head and limbs were the most common site of injuries among victims of non-fatal road traffic accidents.

Key words Non-fatal, road traffic accidents, injury patterns and distribution.

Introduction

Road traffic accidents (RTAs) are major but neglected global health problems. The death and injuries due to RTAs constitute a serious social problem worldwide [(1)].

Accident is an event, occurring suddenly, unexpectedly and inadvertently under unforeseen circumstances [(2)]. An accident has been defined as "an unexpected unplanned occurrence which may involve injury". A WHO advisory group in 1956 defined accident as "an unpremeditated event resulting in recognizable damage". According to another definition, an accident is that "occurrence in sequence of events which usually produces unintended injury, death or property damage [(3)].

The RTAs is defined as any vehicles accident occurring on a public road or highway and includes vehicle accidents where the place of occurrence is unspecified [(4)].

Worldwide the number of people killed in road traffic accidents each year is estimated at about

1.2 million, whereas those injured as high as 50 million [5]. During 1990 RTAs ranked ninth among the leading cause of death in world. It is projected to become second leading cause of death by the year 2020 next to Ischemic heart disease [3]. In 2009 the rate of road traffic death is 13 persons / hrs, according to National Crime Record Bureau (NCRB). Maximum cases reported between 15.00-18.00 hours in Asian countries and 60-80% RTAs occur in urban and semi urban regions [6]. All these figures are due to one, or more than one of the following factors, human, vehicles, road, and environment factors [2].

RTAs are no longer considered accidental but are part of the price we pay for the technological progress. The resulting injuries of which may involve head, neck, chest, abdomen, and extremities resulting death and deformity. Characterization of the commonly encountered injuries due to accidents, and establishment of corresponding precautions might reduce traffic accident related morbidity and mortality. Following the establishment of laws for use of seat belts and helmets worldwide, the frequency and severity of injuries particularly head traumas have decreased. Technological improvements in vehicles and inclusion of airbags are also regarded as protective factors. Also intense information campaigns through radio, television, and new papers have also been reported to reduce alcoholic driving profoundly [7].

The pattern of injury, fatal and otherwise, varies considerably depending upon whether the victim is a vehicle occupant, a motorcyclist – a pedal cyclist or a pedestrian [2]. The incidence of death in pedestrians is significantly higher than in car occupants or motorcyclists in road traffic accident, which are further increasing at an alarming rate [8].

The intention of our study is to search for the incidence of road traffic accidents in relation to socio-demographic factors, and to identify the patterns and distribution of injuries in case of road traffic accidents.

Method

This descriptive study was conducted at the casualty room in AL-Gamhoria Teaching Hospital in Aden-Yemen for evaluation of medical and legal aspects, comprised of 375 victims of road traffic accidents during the period from 1st January up to 31 December 2010.

Information collected were personal identification data, first including the socio-demographic factors as (sex, age, education status, occupation, marital state, socioeconomic status, and type of road user), next; accident characteristics as (type of vehicles, type of accident, cause of accident, time, day, and month of accidents, patterns of injuries and its distribution on the body parts and nature of treatment). Finally, the history of road traffic injuries was obtained from patient, close relatives and other available person who were present at the time of incidence. The data were manually analyzed.

Results

The distribution of study cases according to demographic profile is depicted in table 1. The sex distribution of the victims clearly showed a male predominance which constituted 311 (82.9%) of the total victims compared to only 64 (17.1%) females. Males outnumbered females in the ratio of 5:1. Age wise, the highest incidence of victims was seen in those belong to the age group (21-30 years) comprising 120 (32%) followed by age group 31-40 years having 103 (27.5%) and the lowest incidence was seen in extreme age groups, i.e. below 10 years and above 50 years, which represent 20 (5.3%) and 25 (6.7%) respectively.

About the education status, high numbers of the victims in the present study were Illiterate (38.7%) followed by those who were educated up to primary, secondary school level and university graduate. The occupation of the victims was highest among the students (48%). About 225 (60%) of victims were single. The people from middle and lower socio-economic class (53.3% and 40%) affected more than other class. Overall, the road user victims was divided

in to 3 categories, the pedestrians themselves constituted the largest group 144 (50.9 %) among all vulnerable RTAs. victims, followed by passengers 134 (35.7%) from them only 7% of drivers involved in RTAs. are learners while 93% were licensed.

Table 1. Demographic profile of victims in road traffic accidents

Demographic profile of victims			Number	Percentage
Sex	Males		311	82.9
	Female		64	17.1
Age (Years)	< 10		20	5.3
	11-20		48	12.8
	21-30		120	32
	31-40		103	27.5
	41-50		59	15.7
	> 50		25	6.7
Education status	Illiterate		145	38.7
	Primary school level		105	28
	Secondary school level		80	21.3
	Graduated level		45	12
Occupation	Unemployed		75	20
	Student		180	48
	Worker		105	28
	Housewife		15	4
Marital state	Single		225	60
	Married		105	28
	Divorced		15	4
	Widow		30	8
Socioeconomic status	Lower class		150	40
	Middle class		200	53.3
	Upper class		25	6.7
Type of road user	Pedestrian		144	38.5
	Vehicle occupants (N = 184)	Passenger	134	35.7
		Drivers	50	13.3
	Cyclist (N = 47)	Motor cycle	29	7.7
		Pedal cycle	18	4.8

In table 2 showing the distribution of study sample according to accident characteristics, It was observed that the most common offender vehicles being involved in the RTAs are the light motor vehicles (LMV) of all makes and models as (taxi, car, and minibus) represent 142 (61.5%) which is very high in comparison to accidents by others vehicles. Side way collision with hit and run was the most common type of accident seen in 125 (33.3%) and 113 (30.2%) cases respectively. It was seen that the high speed 98 (26%), congested road 79 (21.1%), and negligent road crossing 59 (15.7%) was the main causes in more than half of road traffic accident cases. According to the time of occurrence, the road traffic accidents were divided in to four slots; (12.01 am to 06.00 am), (06.01 am to 12.00 noon), (12.01 pm to 06.00 pm), and (06.01 pm to 12.00 midnight). It was seen that the highest percentage of RTAs reported in afternoon between 12.01 pm to 06.00 pm (40.8%) and the least percentage (13.3%) reported in morning between (12.01 am to 06.00 am).

Table 2. Distribution of study sample according to accident characteristics

Characteristic		Number	Percentage
Type of vehicles involved (N = 231)	Light motor vehicles	142	61.5
	Heavy motor vehicles	27	11.7
	Bicycles	44	19.0
	Others	18	7.8
Type of accident (collision) (N = 375)	Hit and run	113	30.2
	Run over	30	8.0
	Head on	20	5.3
	Side way	125	33.3
	Fall from bus	59	15.7
	Others	28	7.5
Cause of accident (event) (N = 375)	Negligent road crossing	59	15.7
	Negligent cycling	15	4.0
	Negligent driving	25	6.7
	Mechanical fault of vehicles	25	6.7
	Playing on road	38	10.1
	Congested road	79	21.1
	High speed	98	26.0
	Poor vision fingers	15	4.0
	Standing on doors (scoters)	21	5.6
Time of accident (N = 375)	12.01 am - 06.00 am	50	13.3
	06.01 am - 12.00 noon	90	24.0
	12.01 pm - 06.00 pm	153	40.8
	06.01 pm - 12.00 midnight	82	21.9

The highest percentage of road traffic accident occurred in summer season as June 50 (13.3%), July 49 (13.1%), and August 47 (12.5 %), while the lowers percentage occurred in winter season as January 12 (3.2%) and February 16 (4.2 %) respectively. There was a greater incidence of traffic injury during the weekend compared to mid-week-days as seen in fig. 1 and 2.

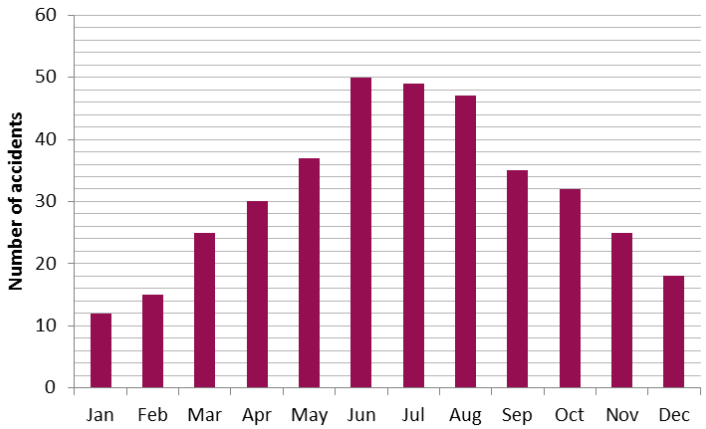

Fig. 1. Distribution of RTAs victims according to the months of the study

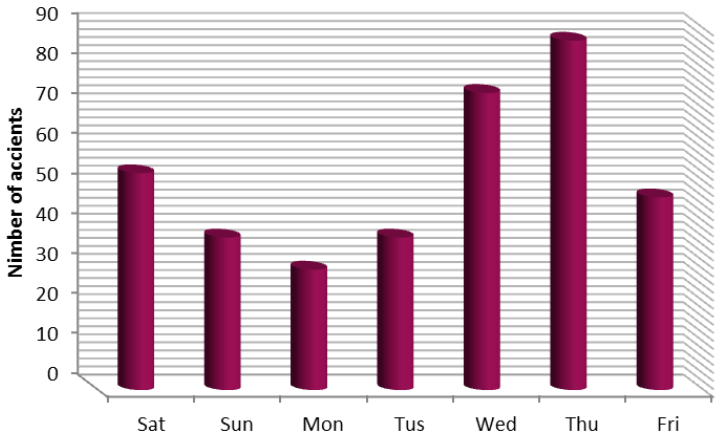

Fig. 2. Distribution of RTAs Victims according to the days of the week

Total number of all injuries seen in 375 RTA victims was 568, all type of injuries except incised wound were common. Multiple superficial injuries like abrasion 261 (46%), contusion 112 (19.7%) and laceration 100 (17.6%) were the common injury affected to the RTA victims followed by fracture of the bone 87(15.3%). The site of the body mostly affected by the road traffic injury included the head and face 150 (26.4%), lower and upper limb 135 (23.8%) 129 (22.7%) respectively, while the neck and spine injuries were much less common among the traffic victims as illustrated in table 3.

Table 3. Distribution of pattern of injuries on body site of RTAs victims

Site of injuries	Patterns of Injuries					Total
	Abrasion	Contusion	Incised	Laceration	Fracture	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Head and face	55 (9.7)	35 (6.2)	5 (0.9)	40 (7.0)	15 (2.6)	150 (26.4)
Neck and spine	2 (0.4)	2 (0.4)	0 (0.0)	3 (0.5)	2 (0.4)	9 (1.6)
Thorax	48 (8.5)	13 (2.3)	1 (0.2)	6 (1.1)	10 (1.8)	78 (13.7)
Abdomen	27 (4.8)	16 (2.8)	0 (0.0)	9 (1.6)	0 (0.0)	52 (9.2)
Upper limb	68 (12.0)	24 (4.2)	2 (0.4)	10 (1.8)	25 (4.4)	129 (22.7)
Lower limb	57 (10.0)	19 (3.3)	0 (0.0)	30 (5.3)	29 (5.1)	135 (23.8)
Pelvis	4 (0.7)	3 (0.5)	0 (0.0)	2 (0.4)	6 (1.1)	15 (2.6)
Total	261 (46.0)	112 (19.7)	8 (1.4)	100 (17.6)	87 (15.3)	568 (100)

All victims of road accidents suffered of same type of injuries to one or more of their body parts, the most frequent injured body parts are the limbs 130 (22.9%) and head 65 (11.4%) which are the most common areas affected among the pedestrian, while the drivers represent the second most common affected road user victim. The back seat occupants were much less commonly affected victims. Overall, the abrasion constituted the highest number injuries among all road user victims followed by laceration and fractures of bone 100 (17.6%) and 87 (15.3%) respectively, as shown in tables 4 and 5.

A Total of 235 (62.6%) road traffic victims were treated as out-patients clinic either conservative (no treatment) or by First Aid, while 140 (37.4%) road traffic victims needed admission for general or specific management. Regarding the type of treatment provided to the 140 admitted victims of road traffic accident, 100 victims (26.7%) received general management including First-Aid

and only 40 (10.7%) victims could receive specific management including major operation. It was observed from the study that 140 victims had sustained injuries, which required in-patient management; there were 40 (28.6) victims refer to privet hospital while the other admitted in different bed words within the same hospital as shown in tables 6 and 7.

Table 4. Anatomical distribution of injuries according to road user victims

Site of injuries	Type of road user victims					Total
	Pedestrian N = 144	Cyclist N = 47	Drivers N = 50	Front seat occupants N = 29	Back seat occupants N = 105	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Head and face	65 (11.4)	20 (3.5)	41 (7.2)	14 (2.5)	10 (1.8)	150 (26.4)
Neck and spine	2 (0.4)	1 (0.2)	3 (0.5)	1 (0.2)	2 (0.4)	9 (1.6)
Thorax	28 (4.9)	8 (1.4)	30 (5.3)	7 (1.2)	5 (0.9)	78 (13.7)
Abdomen	11 (1.9)	10 (1.8)	14 (2.5)	9 (1.6)	8 (1.4)	52 (9.2)
Upper limb	60 (10.6)	20 (3.5)	39 (6.9)	6 (1.1)	4 (0.7)	129 (22.7)
Lower limb	70 (12.3)	17 (3.0)	25 (4.4)	15 (2.6)	8 (1.4)	135 (23.8)
Pelvis	5 (0.9)	3 (0.5)	6 (1.1)	1 (0.2)	0 (0.0)	15 (2.6)
Total	241(42.4)	79(13.9)	158(27.8)	53 (9.3)	37 (6.5)	568 (100)

Table 5. Distribution of Injury patterns according to road user victims

Type of road user victims	Injury patterns					Total
	Abrasion	Contusion	Incised	Laceration	Fracture	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Pedestrian (N = 144)	150 (26.4)	52 (9.2)	0 (0.0)	55 (9.7)	41 (7.2)	298 (52.5)
Cyclist (N = 47)	38 (6.7)	8 (1.4)	2 (0.4)	12 (2.1)	12 (2.1)	72 (12.7)
Drivers (N = 50)	38 (6.7)	19 (3.3)	3 (0.5)	18 (3.2)	19 (3.3)	97 (17.1)
Front seat occupants (N=29)	20 (3.5)	16 (2.8)	2 (0.4)	9 (1.6)	10 (1.8)	57 (10.0)
Back seat occupants (N=105)	15 (2.6)	17 (3.0)	1 (0.2)	6 (1.1)	5 (0.9)	44 (7.7)
Total (N = 375)	261(46.0)	112(19.7)	8 (1.4)	100 (17.6)	87(15.3)	568 (100)

Table 6. The nature of treatment received among the victims

Treatment Receive		Number	Percentage
No treatment		184	49.0
Treated in casualty (First-Aid)		51	13.6
Treated in hospital (N = 140)	**General management**	100	26.7
	Specific management (major operation)	40	10.7
Total		375	100

Table 7. Distribution of victims according to the words of admission

Admitted in hospital ward	Number	Percentage
Emergency room	26	18.6
Intensive care unite	7	4.9
Orthopedic word	35	25
General surgery word	27	19.3
Pediatric word	5	3.6
Refer to other privet clinic	40	28.6
Total	140	100

Discussion

Road traffic accidents are global problem, which affects mainly young people [9]. They constitute the most common cause of traumas [10,11]. Human factors remains the leading cause of road traffic accident, such as over speeding, carelessness, not obeying traffic laws, under age driving, use of mobile, and fatigue [12].

Throughout the world as well as in Yemen, roads are bustling with cars, buses, trucks, and other types of vehicles. By making the transportation of good and people faster and more efficient, these vehicles support economic and social development in many countries. However, while motorized travel provides many benefits, it can also do serious harm unless safety is made a priority.

An accident usually takes place due to the interaction of a number of causes: bad driving is frequently a major reason but other factors may contribute to a variable extent; these include environmental conditions such as street lighting; the layout of crossroads, vehicle defects, alcoholic intoxication and natural disease of the driver [13].

In the current study, the male victims' outnumbered female victims, with male to female ratio as 5:1. This result comes in agreement with studies in the rest of the world [6,12,14-17]. It can be suggested that in our society males being the earning members of family are subjected to work related stress, and more exposed to outside environment as compared to female, in addition to cultural background.

Considering the age group analysis of the victims, it was also clear from the above study that the majority of RTAs victims were in the age group (21-30) years which represented (32%) of total number of victims, our observation closely match those of other researchers [6,14-16,18]. This age group represents the most active phase of life, physically and socially and the most productive age group of society suggesting huge economic loss to the country. This age group mainly consists of workers and students who usually travel by own vehicles or other. This situation can be improved by public education through the mass media and initiating road safety training campaign in school. Our observation closely matches those of other researchers [20]. The age group of 10 year and above the age group of 50 years, the proportion of victims was low, this finding were similar to the study reported by *Jha et al* (2003) [19] but other study found that age group between 45-64 is the highest age group [17].

Also, regarding the education status of victims, it was observe that the victims were either illiterate or had education only up to primary school level, and also are more affected in this study which gives the indication that lack of road traffic senses resulting either from illiteracy or poor literacy. Our observation closely matches those of other researchers [20].

About the occupation status of the victims in the present study the highest number of the victims were student, the reason for this may be attributed to the fact that those classes of persons are most often required to move out on the roads in the process of their studies and work. Our observation closely matches those of other researchers [20].

Regarding the type of road user victims status, it was found that more than one-third of victims were pedestrians (38.4%) followed by vehicle passengers, vehicle drivers, and cyclist respectively, this finding has been reported and conducted by various researchers [2,14], but other studies found that the vehicle passengers mainly drivers were more involved than pedestrians [6,21,22]. This difference is due to that the pedestrian in our country are the frequent road users and footpaths meant for their use are occupied by hawkers to such an extent that pedestrian are forced to walk onto the roads and ignoring traffic rules such as zebra crossing and waiting for green lights.

Considering the types of vehicle involved in road traffic accidents, our study showed that the LMV (61.5%) were more common offending vehicle involved in RTA than others, this finding coincides with the results of different studies [23], and contradicts with other which the HMV are common vehicles involved in their studies [16,24]. This could be attributed to the fact that the present study is carried out in an urban area where these types of vehicles are most common.

Analyzing the time at which RTA was sustained, it is found that, incidents were highest in afternoon hours between 12.01 pm to 06.00 pm (40.8%). Similar observation were made in other studies [6,12,17,21,25,26], but contradicts with other which the higher incidence occur in morning hours between 06.01 am -12.00 noon [2,16,17]. One of the reasons for the high rate during this time period could be the rush home for the main meal of the day when work finishes and schools close also due to heavy traffic during peak hours.

Regarding monthly distribution of accident victims, the present study revealed high incidence occurred in summer month (June, July, and August), similar finding were observed in other studies[18,26-28] while this finding contradicts with other which the higher incidence in rainy season (January to march) [14], also some studies showed the majority of accident occurred during winter season [25,29,30]. This may explain that the hot weather is on its peak in these months, in addition that the traffic is highly crowded making the traffic movement worse, and the holiday season in our country.

In our study, we found that most of vehicle accidents occur at the weekend (Thursday and Wednesday) 21.3% and 20% respectively. This finding differs from other studies found in Nepal where the highest numbers were in Sunday and the lowest on Monday [26], also in Iraq the highest numbers were in Saturday and the lowest on Tuesday [17], while in India which the highest numbers of accidents on Saturday, however, in a national injury mortality surveillance system in 2004 reported on Saturday and Sunday 20.8% and 17.1% respectively [25].

This study clearly revealed that head was injured in most of the cases followed by lower limbs and upper limbs (26.4%, 23.8%, and 22.7%) respectively, these results correlate with the works of others literature [14,17,31,32]. The most common pattern of injuries on the body of road user were multiple superficial injuries as (abrasion, contusion and laceration) than fractures on different body parts. This finding differs to those obtained by other studies which found the predominant pattern of injury were fractures [23,31,32].

As reported in our study, 49% of injured victims did not need medical treatment while the remaining victims 51% had taken medical treatment, from this 37.4% of victims admitted in hospital words mainly in orthopedic and general surgical words, these results correlate with the work of another study done in Nairobi [33].

Reference

1. Fujita Y, Shibata A. Relationship between traffic fatalities and drunk driving in Japan. Traffic Inj Prevent. 2006; 7: 325-27.
2. Singh YN, Bairagi KK, Das KC. An epidemiological study of road traffic accident victims in medico-legal autopsies. J Indian Acad Forensic Med. 2005; 27(3): 166-9.
3. Park Textbook of social and preventive medicine. 15th ed. Jabalpur: Banarsi Das Bhanot; 1997. p. 298-501.
4. Kaul A, Sinha US, Kapoor AK, et al. An epidemiological study of fatal road traffic accidents in Allahabad

region. Indian Internet J Forensic Med Toxicol. 2005; 3(1): 4-11.
5. Dhillon S, Sekhon HS. Pattern and distribution of injuries in fatal road traffic accidents in Shimla (Himachal Pradesh). Medico-Legal Update. 2007; 7(4): 115-8.
6. Patel DJ, Agnihotram G. Study of road traffic accident deaths in and around Bastar Region of Chhattisgarh. J Indian Acad Forensic Med. 2010; 32(2): 110-2.
7. Yildirim A, Ulusoy H, Cetin I, et al. Fracture Frequency and Variation in Fatal Traffic Accidents. Turkish J Forensic Sci. 2009; 8(2): 23-27.
8. Singh H, Dhattarwal S, Mittal S, et al. A review of pedestrian traffic fatalities. J Indian Acad Forensic Med. 2007; 29(4): 55-8.
9. WHO. World Report on Road Traffic Injury Prevention. Geneva: WHO, 2004; p. 3-29.
10. Stended WL, Corbus F, Feger SK. Epidemiology and Prevention of Fatal Head Injuries in Germany-Trends and the Impact of the Reunification. Acta Neurochir. 2005; 147: 231-47.
11. Vaca PJ. Fatal national highway traffic safety administration (NHTSA) notes. Ann Emerge Med. 2006; 48: 739-48.
12. Khan ZU, Al-Asiri KM, Iqbal J. Injury patterns from road traffic accidents. Pakistan J Med Sci. 2010; 26(2): 394-7.
13. Alissa A. Road Traffic Injuries: A descriptive analysis of cases received at the Emergency Department / King Hussein Medical Center. J Res Med Sci. 2006; 13(1): 35-8.
14. Shalaby SA, Akeed YA, Fawzi MM, et al. Prospective study of some medico-legal aspects of road traffic accidents in great Cairo 2007. Inter J Acad Res. 2010; 2(2): 127-37.
15. Rao D, Mukerjee S. A study of pattern of injuries in road traffic collisions. J Punjab Acad Forensic Med Toxicol. 2010; 10: 14-6.
16. Putul M. Study of abdomino-pelvic injuries in victim of road traffic accident. Inter J Med Toxicol Legal Med. 2010; 12(3): 25-9.
17. Al-Qazzaz MA. Medico-legal study of fatal road traffic injuries in Baghdad governorate. Board thesis, Iraq Council for Medical Specialization, 2002; p. 27.
18. Swarnkar M, Singh PK, Dwivedi S. Pattern of trauma in central India: an epidemiological study with special reference to mode of injury. Internet J Epidemiol. 2010; 9(1): 35-41.
19. Jha N, Srinivasa DK, Roy G, et al. Injury pattern among road traffic accident cases. A Study from South India. Indian J Commun Med. 2003; 23: 85-90.
20. Verma PK, Kov T. Epidemiology of RTAs in Delhi, result of survey. Regional Health Forum WHO. South East Asia Region. 2004; 8(1).
21. Patil SS, Kakade RV, Durgawale PM, et al. Pattern of road traffic injuries: A Study from Western Maharashtra. Indian J Commu Med. 2008; 33(1): 56-7.
22. http://www.4ishgd.valencia.upv.es/index_archivos/62.pdf. 4th international symposium on highway design. Analysis of accident patterns in Lebanon.
23. Ganveer GB, Tiwari RR. Injury Pattern among Non-Fatal Road Traffic Accident Cases: A Cross-Sectional Study in Central India. Indian J Med Sci. 2005; 59(1): 9-12.
24. Kual A, Sinha US, Pathak YK, et al. Fatal road traffic accidents, study of distribution, nature and type of injury. J Indian Acad Forensic Med. 2005; 27(2): 71-6.
25. Kumar A, Lalwani S, Agrawal D, et al. Fatal road traffic accidents and their relationship with head injuries: an epidemiological survey of five years. Indian J Neurotrauma. 2008; 5(2): 63-7.
26. Mishra B, Sinha ND, Sukhla SK, et al. Epidemiological study of road traffic accident cases from western nepal. Indian J Commu Med. 2010; 35(1): 115-21.
27. Stomp W, Fidler V, Duis HJ, et al. Relation of the weather and the lunar cycle with the incidence of trauma in the Groningen region over a 36- year period. J Trauma. 2009; 67(5): 1103-8.
28. Fried KA, Roesler JS, Azam A, et al. Predicting trauma admission: the effect of weather, weekday, and other variables. Minnesota Med. 2009; 92(11): 47-49.
29. Lahiri SK, Mandal P, Mandi P, et al. A study on cases contracting road traffic accidents in rural area and attending the Tarakeswar Rural Hospital, West Bengal. Indian J Prevent Soc Med. 2005; 36(3,4): 94-101.
30. Singh H, Aggarwal AD. Fatal road traffic accidents among young children. J Indian Acad Forensic Med. 2010; 32(4): 286-8.
31. Aggarwal KK, Oberoi SS, Kumar R, et al. Pattern and distribution of injuries in fatal road traffic accidental cases. J Punjab Acad Forensic Med Toxicol. 2010; 9(2): 71-5.
32. Oberoi SS, Aggarwal KK, Bhullar DS, et al. Pattern and distribution of injuries in fatal two wheeler accidental cases. J Punjab Acad Forensic Med Toxicol. 2011; 11(1): 31-3.
33. Gichuhi K. Injury pattern among non-fatal road traffic crash victims. East Afr Ortho J. 2007; 1: 23-5.

Correspondence to Dr. Nagi A Abdulla
E-mail: nagiali1966@hotmail.com
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