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Pattern of Fatal Injuries due to Road Traffic Accidents in Khartoum, Sudan: A Retrospective Study



نمط الإصابات القاتلة الناجمة عن حوادث المرور في الخرطوم، السودان: دراسة بأثر رجعي.

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Abstract

This retrospective study was carried out to find out the pattern of fatal injuries due to RTAs as well as the socio-demographic profile of the victims. This helps in reconstruction of RTAs and suggestion of steps for prevention.

All the victims of road traffic accidents subjected to medico-legal autopsy at the mortuary of Bashayir teaching hospital in Khartoum, Sudan during the three month period from 1st January 2017 to the 31st of March 2017 were included in the study.

Out of 256 autopsies conducted during the study period, deaths due to RTA were 109 (42.6%). Males died due to RTA more than females with a ratio of 2:1. The highest number of deaths was 36 (33%), recorded in the age group 20-29 years, and the lowest number was 6 (5.5%) in the age group 60 years and above. From the majority of RTA victims, 50 (45.9%) died due to head injury followed by 29 who died from multiple injuries/fractures 29 (26.6%). Hemorrhagic shock was the cause of death in 22 (20.2%) cases. Septicemia and complications were the cause in 5 (4.6%) and 2 (1.8%) cases, respectively. Spinal injuries took the life of one victim (0.9%).

This study shows that there was a high percentage of RTA deaths among males of a young age. Abrasions were the most common type of external injuries. The skull was the most common bone to be fractured in the accidents. And head injury was the most common cause of death.

المستخلص

تُعرّف حادثة المرور على الطرق بأنها أي حادث سيارة يحدث على الطريق، أي ينشأ أو ينتهي أو يشتمل على مركبة جزئياً على الطريق. ولا يزال العدد الإجمالي للوفيات الناجمة عن حوادث المرور في جميع أنحاء العالم مرتفعاً بشكل غير مقبول؛ مع ما يقدر بنحو ١,٢٥ مليون شخص يموتون كل عام وما بين ٢٠ إلى ٥٠ مليون شخص يعانون من إصابات غير مميتة. تم إجراء هذه الدراسة لمعرفة نمط الإصابات القاتلة الناجمة عن حوادث المرور وكذلك التعريف الاجتماعي والديموغرافي للضحايا، ما يساعد في إعادة بناء تصور لحوادث المرور واقتراح خطوات للوقاية منها.

أجريت هذه الدراسة بأثر رجعي، حيث تم تضمين جميع ضحايا حوادث الطرق الذين تعرضوا للتشريح الطبي الشرعي في مشرحة مستشفى بشاير التعليمي في الخرطوم، في السودان خلال فترة الثلاثة أشهر الممتدة من ١ يناير ٢٠١٧ إلى ٣١ مارس ٢٠١٧.

من أصل ٢٥٦ عملية تشريح أجريت خلال فترة الدراسة، كانت الوفيات الناجمة عن حوادث الطرق ١٠٩ حالة وفاة (٤٢,٦٪). توفي الذكور بسبب حوادث الطرق والمواصلات أكثر من الإناث بنسبة ٢:١. وتم تسجيل أكبر عدد من الوفيات ٣٦ (٣٣٪) في الفئة العمرية ٢٠-٢٩ سنة وأدنى عدد ٦ (٥,٥٪) في الفئة العمرية ٦٠ سنة وما فوق. توفي غالبية ضحايا حوادث الطرق ٥٠ (٤٥,٩٪) بسبب إصابة في الرأس. تليها إصابات متعددة / كسور ٢٩ (٢٦,٦٪). وكانت الصدمة النزفية السبب في ٢٢ (٢٠,٢٪). وتسمم الدم والمضاعفات كانت السبب في ٥ (٤,٦٪) و ٢ (١,٨٪) على التوالي. وتوفي نتيجة إصابات العمود الفقري ضحية واحدة (٠,٩٪).

توضح هذه الدراسة أن هناك نسبة عالية من وفيات حوادث الطرق بين الذكور في سن مبكرة. وكانت السحجات أكثر أنواع الإصابات الخارجية شيوعاً. وكانت الجمجمة هي العظم الأكثر شيوعاً الذي يمكن كسره في الحوادث. وكانت إصابة الرأس هي السبب الأكثر شيوعاً للوفاة.

الكلمات المفتاحية: علوم الأدلة الجنائية، الطب الشرعي. حوادث المرور على الطرق، النمط الديموغرافي الاجتماعي، نمط الإصابات المميتة، تشريح الجثة

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1. Introduction

A road traffic accident (RTA) is defined as any vehicular accident occurring on the roadway, i.e. originating on, terminating on, or involving a vehicle partially on the roadway [1]. It occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris or other stationary obstruction [2]. It is one of the most preventable causes of deaths and disabilities worldwide. RTAs are due to speeding, driving under the influence of drugs or alcohol, driving without sufficient experience or proper driving licenses, carelessness and ignorance of traffic rules including red light jumping, avoiding safety precautions like seat belts and helmets, being distracted whilst driving and using mobile phones and chatting. They can also be caused by natural diseases such as poor sight or hearing, hypoglycemia, epileptic attack and psychological problems that lead to suicide. The types of vehicles usually available on the roads are cycles, motorized two wheelers, three wheelers, light motor vehicles, heavy motor-vehicles, and tractors. Motorized two wheelers are the vehicles most involved in accidents. Road traffic accidents result in unintended injury, death or permanent disability [3].

RTAs become a major medico-legal problem, placing an extra burden on resources. The total number of deaths due to RTAs worldwide remains unacceptably high, with an estimated 1.35 million people dying each year and between 20 to 50 million suffering non-fatal injuries [4,5]. Road traffic accidents continue to increase at an alarming rate throughout the world, and this indicates that the progress to realize Sustainable Development Goals (SDGs) target 3.6, which calls for a 50% reduction of the number of RTA deaths by the year 2020, remains far from sufficient [4]. It has been estimated, unless immediate action is taken, that RTA deaths will result in an estimated 2.4 million fatalities per year [6,7].

Approximately 70% of all RTA fatalities occur in developing countries, although they own less than 15% of vehicles worldwide [8]. According to recent WHO data published in 2017, RTA deaths in Sudan reached 9,882 or 3.69% of total deaths. The age adjusted death rate is 35.23 per 100,000 of the population, which ranks Sudan 27th in

the world [9]. Since there are a low number of studies in this field, this study was done to find out the pattern of fatal injuries due to RTAs as well as the socio-demographic profile of the victims, as this will help in reconstruction of RTAs and suggestion of steps of prevention.

2. Materials and Methods

This is a retrospective study. All the victims of road traffic accidents subjected to medico-legal autopsy at the mortuary of Bashayir Teaching Hospital in Kartoum, Sudan, during the three month period from 1st January 2017 to 31st March 2017 were included in the study.

The information about the victims included age, gender, day of accident, external injuries, fractures, and pattern of fatal injuries. This information was taken from the post-mortem records, and the findings were entered in a separate case sheet designed for this study. Data analysis was done by statistical package for social science SPSS version 22.

This study was approved by the Institutional Ethics Committee. Ethical approval was also taken from the Department of Forensic Medicine and Toxicology in Alneelain University and from Bashayir Teaching Hospital. No names were included in the study so privacy and confidentiality of the victims was secured.

3. Results

Out of 256 autopsies conducted during the study period, deaths due to RTAs were 109 victims (42.6%).

Males died due to RTA more than females with a ratio of 2.03:1. All victims were aged between 1 and 85 years. The highest number of deaths was 36 (33%), recorded in the age group 20-29, and the lowest number was 6 (5.5%), recorded in the age group 60 and above, followed by the age group 10-19 with 8 victims (7.3%) (Table-1).

Most of the accidents occurred on Fridays (18.3) and the lowest numbers of accidents were reported on Saturdays (8.3) (Table-2).

Most of the external injuries were found in the head, neck and face (41.3%), followed by upper and lower extremities with a percentage of 21.8% and 16.4%, respectively. Among the types of external injuries, abrasions were



found to be the most common (40.4%), followed by contusions in 22.7%, then lacerations seen in 28.6% of cases (Table-3).

The skull was found to be the most common bone to be fractured in an RTA (27.8%), followed by the thorax in 20.1% of cases. The spine and pelvis were the least affected bones (Table-4).

The main aim of our study is to ascertain the exact causes of death. The majority of RTA victims, who numbered 50 (45.9%), died due to head injury. This was followed by multiple injuries/fractures in 29 (26.6%) victims. Hemorrhagic shock was the cause of death in 22 (20.2%) victims. Septicemia and complications were the cause of death in 5 (4.6%) and 2 (1.8%) victims, respectively. Spinal injuries took the life of 1 (0.8%) victim (Table-5).

4. Discussion

During the period of study, 256 autopsies were carried out in Bashayir teaching hospital in the Department of Forensic Toxicology, of which 109 died due to RTAs. This shows that RTA deaths represented 42.6% of the total autopsies conducted during the study period, which is a high percentage. In a research done in Orissa, RTA deaths represented only 21.67% of the total PM examinations conducted during the study period [10].

The male predominance in this study fits well with the reporting of many studies of a similar nature [10-14]. The gender bias could be due to the fact that more males work outdoors and are therefore more exposed to RTAs than females. Many of the deceased male victims were likely to

Table 1- Socio-demographic characteristics of victims.

Age (years)	Male no. (%)	Female no. (%)	Total no. (%)
1-9	7(9.6)	6(16.7)	13(11.9)
10-19	7(9.6)	1(2.8)	8(7.3)
20-29	26(35.6)	10(27.8)	36(33.0)
30-39	10(13.7)	5(13.9)	15(13.8)
40-49	12(16.4)	4(11.1)	16(14.7)
50-59	8(10.9)	7(19.4)	15(13.8)
60 and above	3(4.1)	3(8.3)	6(5.5)
Total	73(100)	36(100)	109(100)

Table 2- Day of accident.

Day of accident	no.	%
Saturday	9	8.3
Sunday	11	10.1
Monday	19	17.4
Tuesday	16	14.7
Wednesday	19	17.4
Thursday	15	13.8
Friday	20	18.3
Total	109	100



Table 3- Distribution of RTA victims according to the type and site of external injuries .

Part of the body	Abrasion	Contusion	laceration	Incised wound	no. (%)
Head, Neck And Face	52(28.1)	49(47.1)	44(50.6)	44(53.7)	189(41.3)
Upper extremities	55(29.7)	15(14.4)	13(14.9)	17(20.7)	100(21.8)
Thorax	40(21.6)	13(12.5)	5(5.7)	4(4.9)	62(11.3)
Abdomen and Pelvis	15(8.1)	8(7.8)	7(8.0)	2(2.4)	32(7)
Lower extremities	23(12.4)	19(18.3)	18(20.7)	15(18.3)	75(16.4)
Total	185 (40.4)	104 (22.7)	87 (18.9)	82 (17.9)	458 (100)

have been the sole bread winner of their families, and this causes an adverse economic impact on the family [11,15]. However, the difference in proportions of males and females is not that much in developed countries.

The highest numbers of RTA deaths were recorded in the age group 20-29. According to the WHO global status

Table 4- Distribution of RTA victims according to the site of fractures .

Part of the body	no. (%)
Skull	78 (40.2)
Upper extremities	31(15.5)
Spine	7 (3.6)
Thorax	39 (20.1)
Pelvis	4 (2.0)
Lower extremities	32 (15.9)
Total	194 (100)

Table 5- Distribution of victims according to the pattern of fatal injury.

Pattern of Fatal Injuries	no.	%
Head injury	50	45.9
Multiple injuries/fractures	29	26.6
Hemorrhagic Shock	22	20.2
Septicemia	5	4.6
Complications	2	1.8
Spinal Injuries	1	0.9
Total	109	100%

report on road safety, RTAs are now the leading cause of death among children and young adults aged 5-29 [4]. This shows that the most active and productive age group are involved in RTAs, and this has adverse outcomes economically and socially. The study also shows that there are less accidents reported in the age group 60 and above due to reduced mobility and less use of vehicles by people in that age group [16].

This study shows that most of the accidents occurred on Fridays (18.3%) because it is a public holiday in Sudan and more people come out to buy things or to visit relatives or to travel within or outside Khartoum to enjoy the weekend. The second important reason is that on Fridays people deviate from their week-time driving patterns, and this results in more accidents. The lowest numbers of accidents were reported on Saturdays (8.3%), which is different from other studies because of the difference in weekends among countries [17-19].



Most of the external injuries were found on the head, neck and face followed by upper and lower extremities, which is in accordance with a research conducted at the post-mortem centre of Rural Medical College, Loni [11]. A study done by Verma PK found that limbs followed by head were commonly affected by RTAs [12]. Abrasions were the most common type of external injuries and this has also been documented by other researchers [11,12]. The total number of external injuries (458) exceeded the total number of victims (109), which indicates multiplicity of injury among the victims [11].

Head injury was the most common pattern of fatal injuries, which has also been reported in many researches of a similar nature [12-14,20-23].

5. Limitation of the study

This study was conducted to find the pattern of fatal injuries due to RTAs. It will help policy makers in laying down road safety measures. However, this study was conducted in a single mortuary for only a 3 month period and with a small sample size. Another limitation of the study is that the risk factors for RTA like alcohol drinking, the intoxicating influence of drugs, and the seat position of the victim could not be ascertained. Therefore, further studies in this field have to be conducted.

6. Conclusion

This study shows that there is a high percentage of RTA deaths among males of a young age. Abrasions were the most common type of external injuries. The skull was the most common bone to be fractured in the accidents, and head injury was the most common cause of death.

Recommendations

The author recommends several measures to reduce the incidence of road traffic accidents:

1. Road safety education should be introduced in primary school curriculums.
2. Highlight the importance of helmets when riding two-wheelers, as head injury was found to be the

most common cause of death.

3. Roads and junctions should be wide and well-lit so that visibility is good. There must be proper foot-paths for pedestrians.
4. Well-maintained vehicles with good brakes, lights and seatbelts.
5. Raise awareness among citizens and enforce laws that govern speed limits.
6. Provision of well-equipped ambulances and trained health personnel in transporting RTA victims to hospitals and highlighting the importance of golden hours in saving lives of victims.

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Conflict of interest

None declared.

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