https://doi.org/10.15218/zjms.2023.034

Characteristics and outcome of road traffic accidents in Erbil: A prospective hospital-based study

Received: 06/07/2022 Accepted: 15/09/2022

Hayman Mohammed Saeed Rashid [1]* Kameran Hassan Ismail [2]

Abstract

Background and objective: Internationally, the eighth leading cause of death among young males is attributed to road accidents, as yearly a million and three-quarters of people die which became a series public of health concerns in developing countries. This study aimed at determining the pattern and outcomes of hospitalized road traffic accidents in Erbil city.

Methods: This prospective hospital-based study was conducted from March 2020 to February 2021, at RozhHalat and RozhAwa Emergency governmental hospitals in Erbil, Iraq. Data was collected for one complete year and the admitted cases in the year had been included. Which was composed of 2225 road traffic accident victims. A specially designed questionnaire was used to collect the data using direct face-to-face interviews.

Results: 2225 victims were obtained in both Emergency hospitals 1835 (82.5%) of them were males, 390 (17.5%) were females, and the mean age±SD was (24.7±15.1) years old. The death rate from road traffic accidents was 250 (18%). Nearly one-third of 689 (31%) of victims were at aged (20-29), the highest pattern rate of 1221 (54.9%) was among drivers, and on motorcycles 883 (39.7%) had the highest reported victims rate, occurred at rush hours (5-7 pm). During Summer season 681 (30.6%), at daylights 1608 (72.3%). With *P* <0.001, a significant association was reported between back injuries, speeding, pedestrians, alcoholics, seatbelts/helmets, rapidity, and night shift of street accidents and the outcomes.

Conclusion: Human behavior is significantly related to the high incidence of road injuries and deaths. Road accidents have resulted in a major public health problem. A new strategy to reduce the incidence of this problem is essential.

Keywords: Road; Accidents; Study; Victims; Traffic; Iraq.

Introduction

Worldwide road traffic accidents (RTAs) are responsible for the deaths of approximately 1.35 million people, [1,2] and the risk factor for deaths is higher among young people, particularly those aged 15-29 years. It was estimated that road injuries are currently the 8th leading cause of mortality among all age groups internationally, and are expected by 2030 to become the seventh leading cause of death.[1,3] They are a complex phenomenon the reasons are due to a multitude of aspects, including road users' behavior, highway, and its environment, vehicle aspects, besides age, being young male, speeding, having drugs, alcohol consumption, traveling in darkness, fatigue, novel driving in the same car, a vulnerable street user in the city and inhabited areas, vehicle factors, such vehicle problems, defects in road design, that can similarly with a problem to unsafe behavior by road users, inadequate visibility because of environmental factors and poor eyesight of road users.[1,3]

[1] Department of Anesthesia Techniques, College Alqalam University Kirkuk, Iraq.
[2] Department of Community Medicine, College of Medicine, Hawler Medical University, Erbil, Iraq.
Correspondence: hemenjaff@ymail.com

https://doi.org/10.15218/zjms.2023.034

The risk of road traffic death is considered to be higher in low-income nations (incidence proportion of 27.5 fatalities per 100,000 people) three times than in high-income nations' incidence proportion of 8.3 deaths per 100,000 people.[4]

An estimation by the World Health Organization (WHO) the traffic mortality proportion in the Eastern Mediterranean Region (EMR) is the second-highest rate globally after the African Region and increasing in several of the countries in the region. Iraq as one of these countries has the highest road mortality,[5] that suffering from this subject, due to that deferent researcher analyzed and explained subjects of the road in Iraq and Kurdistan Region.[5-9.]

An increase in the number amount of traffic accidents was one of the thoughtful challenges that local authorities confronted. Besides, several factors like failure to wear seat belts, rapidity, and aggressive road behavior are among the principal reasons for the crash. There are a few published data considerations of RTAs in Erbil.

Therefore, this study was going to highlight various aspects including pattern features, risk factors, and outcomes of road traffic accidents in Erbil, which will be baseline data to make a strategic plan for RTA prevention in Erbil.

Methods

Design and setting: The current prospective hospital-based study was used to calculate the road user features of injuries and outcomes for all victims of road traffic accidents (injuries/deaths) of all ages who attended the Emergency hospital (Trauma Department) of RozhHalat, and the RozhAwa Emergency governmental hospitals in Erbil, the capital of the Kurdistan Region Government (KRG) of Iraq. The study was carried out from March 1st, 2020 to February 28th, 2021. The reported victims who followed up to the end medical stage either lived with/without disabilities or died.

Data collection: Data collection was conducted from direct interviews with the victims using a specialized designed questionnaire prepared by the researcher for the study to relevant subjects to include all the possible variables that address the study's objective for the research subject. Designing the questionnaire after presented to a group of experts in the fields and changes are done accordingly was to attain data on variables comprised related to the research such as socio-demographic profile (age, sex, marital status, education, and occupation), bad part injury, type of road users (drivers, passengers, pedestrians) and at which daytime period the RTAs happened. Moreover, victims' medical records were reviewed to attain data about injury types, body injured site, and the victims' outcome (disability, dyeing, and staying length in both hospitals). A pilot study was done and the final draft of the questionnaire was prepared.

The income had been selected accordingly by European Asylum Support Office (EASO, 2020).[10] As followings:

The poverty proportion in the Erbil governorate Affording to the 2015 World Bank calculation, was 4.1%.[10] 2018 information from the International Organization of Migration (IOM) presented that 29 % of families in Erbil governorate are alive on a once-a-month salary (income) between Iraqi Dinar (IQD) 500 000-750 000. While 25.9 % received 250 000-500 000 IQD, 21.1 % had a once-a-month salary located 750,000-1,000,000 IQD, and 8.2 % of the Erbil governorate families graphed lived on a once-a-month salary lesser than 250,000 IQD. After being associated with other KRG advanced salary families were additionally predominant in Erbil (16 %).

Data analysis: For data entry and analysis SPSS version 24 was used. Cross-tabulations, frequency distributions, and Chi-Square (X^2) analysis were performed, and statistically, the association was significant at $P \leq 0.05$.

https://doi.org/10.15218/zjms.2023.034

Results

In one year a total of 2225 casualties of RTAs arrived at emergency governmental hospitals in Erbil city from 118 different areas. They attended the two study hospitals (Rozh-Halat and Rozh-Awa). 689 (31%) of victims aged (20-29) years, less than one-fourth of 535 (24%) of them were in the age group of 10-19 years, the majority 1835 (82.5%) were males and 390 (17.5%) were females. The mean age ± SD of them was 24.7±15.1 years, most of the victims were Muslims 2176(97.8%), 1795(80.7%) were Kurdish, almost more than half 11157 (52%) of them were living in a rural area (Table 1.)

Table 1 Distribution of study sample (N=2225) by their sociodemographic characteristics.

Variables	Features	No.	(%)
Age (years)	< 10	348	(15.6)
	10-19	535	(24.0)
	20-29	689	(31.0)
	30-39	329	(14.8)
	40-49	144	(6.5)
	50-59	98	(4.4)
	≥ 60	82	(3.7)
Gender	Male	1835	(82.5)
	Female	390	(17.5)
Religion	Muslim	2176	(97.8)
	Christian	36	(1.6)
	Others (Yazidi, Hindus)	13	(0.6)
Marital Status	Single	1014	(45.2)
	Married	751	(33.7)
	Divorced	15	(0.7)
	Widow	26	(1.2)
	Child	427	(19.2)
Nationality	Kurdish	1795	(80.7)
	Arabic	286	(12.9)
	Turkmen	18	(0.8)
	Christian	21	(0.9)
	Foreign	105	(4.7)
Residence	Inside	1068	(48)
	Outside	1157	(52)

https://doi.org/10.15218/zjms.2023.034

In the present hospital study (Table 2.), more than half of the victims were either illiterate 642 (28.9%) or graduated from primary school 550 (24.7%), and more than fifty percent of the victims' jobs were even Unskilled Manual 702 (31.6%) and Semi-skilled manual 485 (21.8%), about 1325 (59.6%) and 1354 (60.9%) owned their home and automobile respectively, lived in poor condition nearly recorded to half 1018 (45.8%) (Table 2.).

Table 2 Distribution of study sample (N=2225) by some lifestyle characteristics.

Variables	Features	No.	(%)
Educational Level	Illiterate	642	(28.9)
	Read and write	188	(8.4)
	≤ Preschool	237	(10.7)
	Primary	550	(24.7)
	Intermediate School	299	(13.4)
	High School	139	(6.2)
	Diploma (2 years)	88	(4.0)
	Bachelor	82	(3.7)
Occupation	Unemployed/ housewife	221	(9.9)
	Unskilled Manual	702	(31.6)
	Semi-skilled manual	485	(21.8)
	Skilled manual and non-manual	220	(9.9)
	Associate Professional	30	(1.3)
	Skilled professional or senior managerial	5	(0.2)
	Child	235	(10.6)
	Student	327	(14.7)
Homeownership	Owned	1325	(59.6)
	Rented	735	(33)
	Partial Owned	21	(0.9)
	Others	144	(6.5)
Car Ownership	Yes	1354	(60.9)
	No	762	(34.2)
	NA	109	(4.9)
Family Income	Not Enough	1018	(45.8)
	Enough	1125	(50.5)
	Exceed Need	82	(3.7)

https://doi.org/10.15218/zjms.2023.034

Risk health behavior and victims type

The most involved victims of RTAs rate were 1221 (54.9%), nonsmokers by 869 (39.1%), without having alcohol 1622 (72.9%), and absence of driving license 934 (42%), Alcohol consumption during the street accidents period at the lowest rate was 183 (8.2%). The highest proportion 934 (42.1%) of victims witnessed RTAs with absence driving license, nearly two-thirds 1443 (64.9%) of them denied wearing safety measures during crashes. Only 309 (13.9%) had been using this measurement, where more than one-fourth 560 (25.2%) of the victims were in maximum rapidity. More than fifty percent of them occurred outside the city by 1243 (55.9%) and the lowest of this proportion was reported in Erbil 982 (44.1%) (Table 3).

Table 3 Characteristics of risk behavior of study sample (N=2225).

Variables		No.	(%)
Road user type	Driver	1221	(54.9)
	Passenger	501	(22.5)
	Pedestrian	503	(22.6)
Smoking	Non-Smoker	869	(39.1)
	Ex-Smoker	112	(5.0)
	Current Smoker	831	(37.3)
	NA	413	(18.6)
Alcohol Drinking	Yes	183	(8.2)
	No	1622	(72.9)
	NA	420	(18.9)
Driving License owning	Yes	623	(28)
	No	934	(42)
	NA	668	(30)
Seatbelt/helmet wear	Yes	309	(13.9)
	No	1443	(64.9)
	NA	473	(21.3)
Exceeds Speed Limits	Yes	560	(25.2)
	No	1226	(55.1)
	NA	439	(19.7)
Place of RTA	Inside City	982	(44.1)
	Outside City	1243	(55.9)

https://doi.org/10.15218/zjms.2023.034

The highest rate of vehicles involved in RTAs were motors 883 (39.7%), and private vehicles 840 (37.8%) while the lowest than this rate reported 40 (1.8%) among Buses/Vans (Figure 1).

Pattern of RTAs

As shown in Figure 2, the pick time trends of RTAs were during 5-6 pm (rush hour), the Summer season as the highest proportion 681 (30.6%) (Figure 3), in October 265 (11.9%) (Figure 4), in Friday 364 (16.4) (Figure 5), at daylight 1608 (72.3) (Figure 6), while the least pattern number shown during 3 am, on April 12 (0.5%), at Spring 293 (13.2%), in the Tuesdays 264 (11.9%), at the night shifts 617 (27.7%).

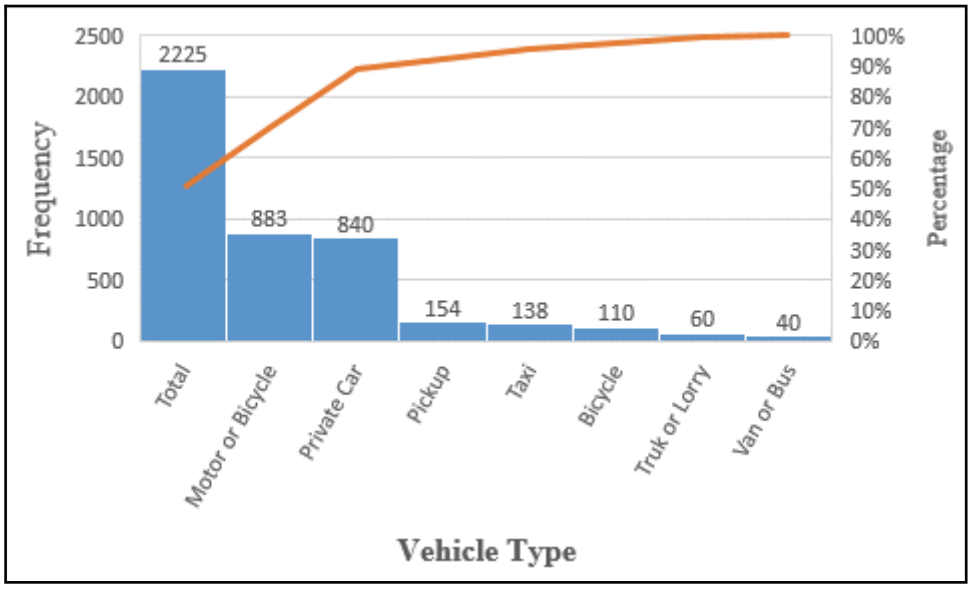

Figure 1 Distribution of vehicles involved in the highway accidents.

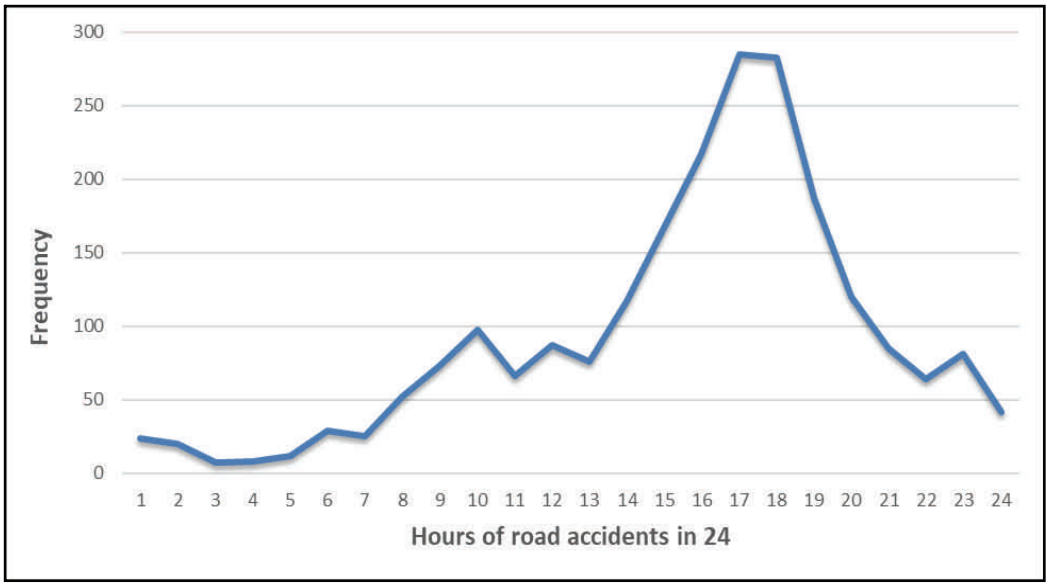

Figure 2 Trend of hour time of RTA occurrence.

https://doi.org/10.15218/zjms.2023.034

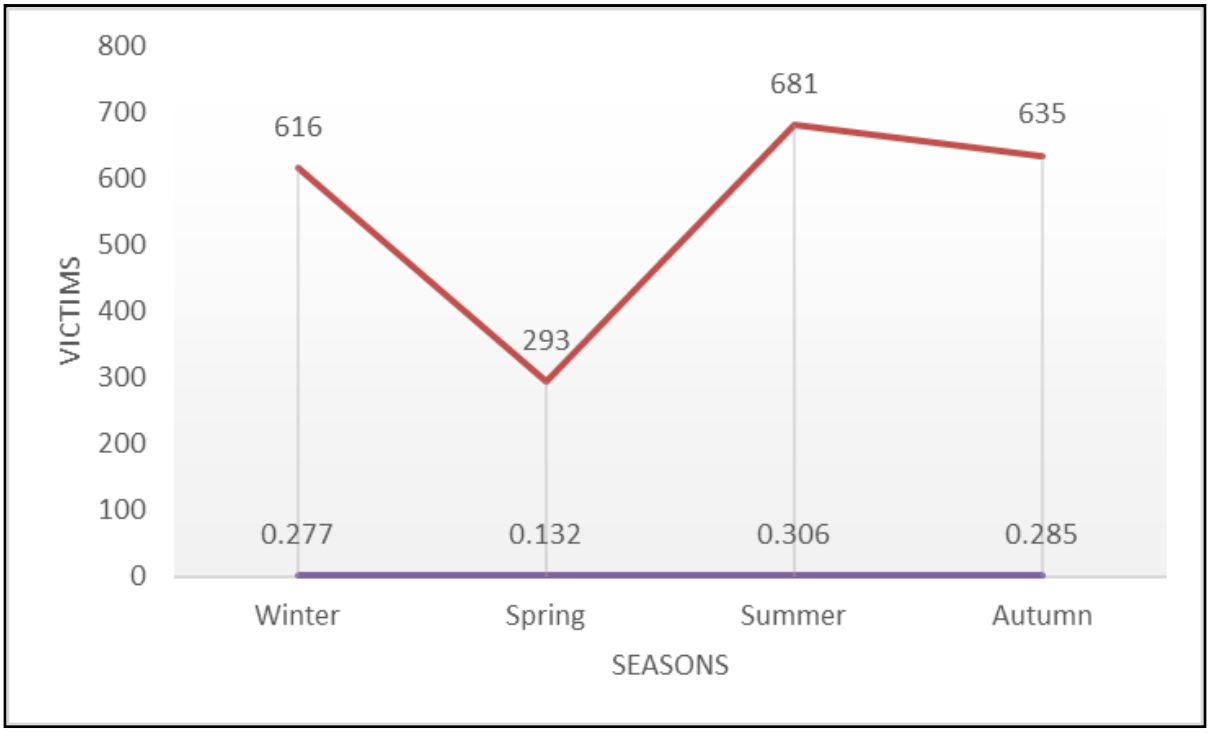

Figure 3 Pattern of seasons period of RTA occurrence.

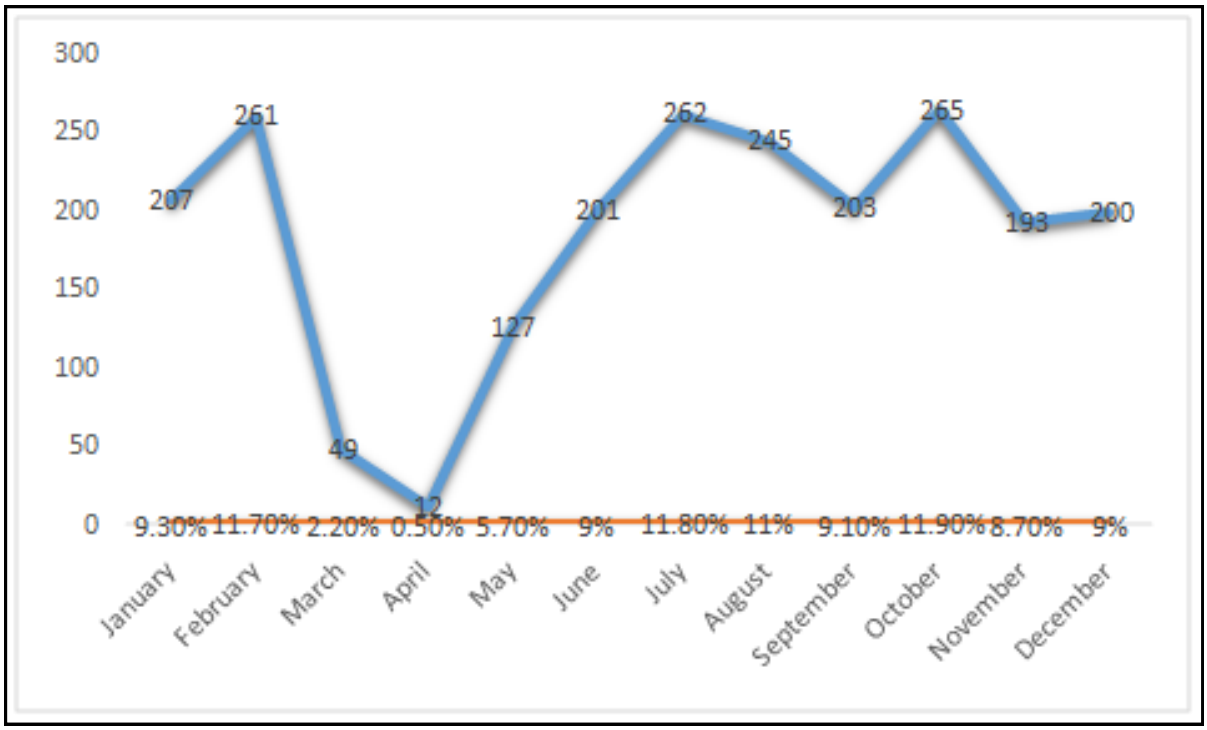

Figure 4 Pattern of months' RTA period occurrence.

https://doi.org/10.15218/zjms.2023.034

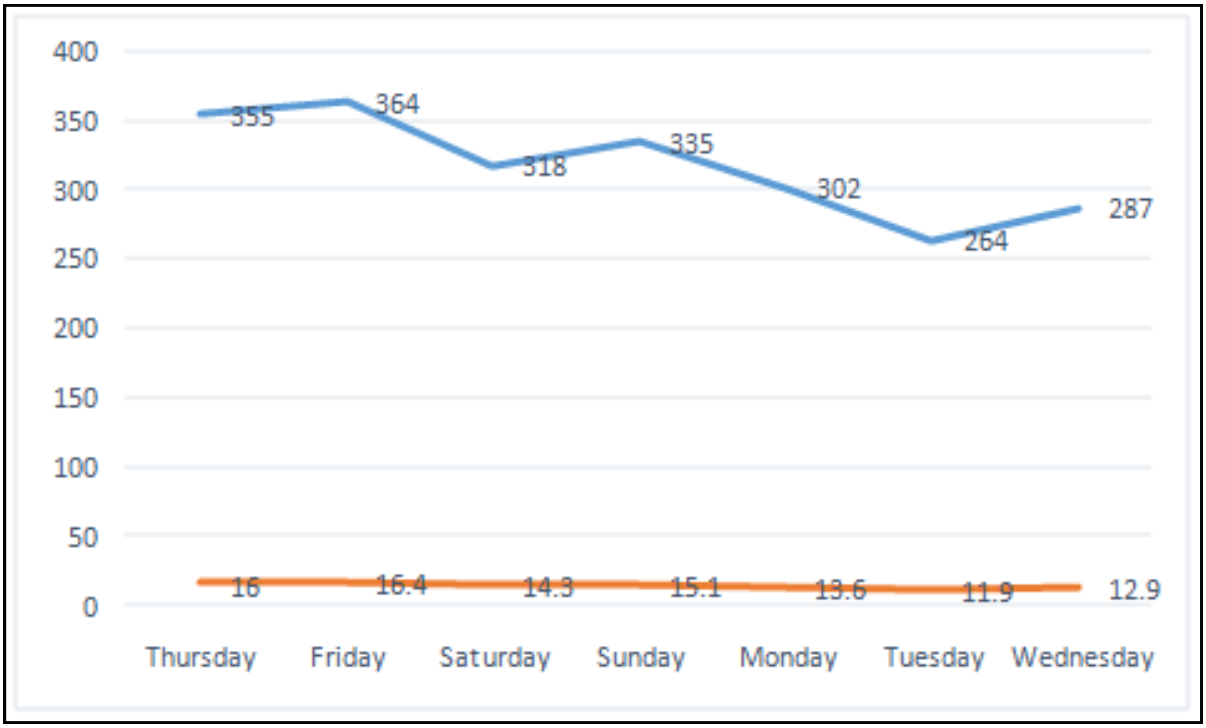

Figure 5 Pattern of days period of RTAs occurrence.

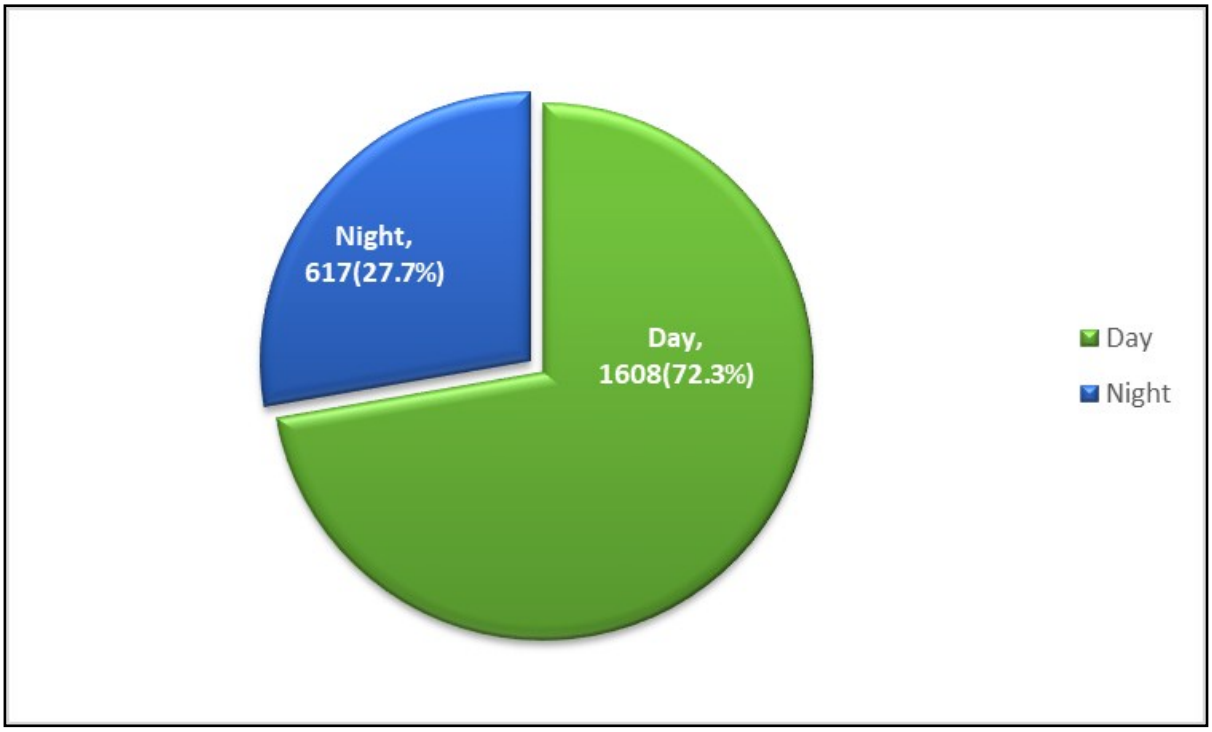

Figure 6 Pattern of RTAs time occurrence.

https://doi.org/10.15218/zjms.2023.034

Clinical causalities characteristics of RTAs

The highest proportion pattern due to death was in the back part of the victims, 58 (25.2%), while the lower extremities showed the lowest proportion recorded. For all but the lower extremities, a statistically significant association was found between the injury site and the deadly outcomes of RTA victims. The highest etiology due to death from RTAs was a sudden show by 24 (22.6%), and the lowest was recorded in distractions by 12 (4.6%).

There was a statistically significant relationship between speeding (*P* value <0.001), sudden stop (*P* value <0.001), distraction (*P* value <0.001), fatigue (*P* value = 0.013), close following (*P* value = 0.012), while no significant relationship was reported among careless (*P* value = 0.151), unsafe vehicle (*P* value = 0.187), unsafe road infrastructure (*P* value = 0.0476), beaten by others (*P* value = 0.84), and other circumstances (*P* value = 0.64) (Table 4.)

Table 4 The injury body part and the etiology of RTAs association outcomes for the study sample (N=2225).

Variables	Outcome	Dead	Alive	Total	*P* value
	N= 2225	Features	No. (%)	No. (%)	
Injury site*	Head	229 (16.1)	1195 (83.9)	1,424 (100)	<0.001
	Chest/abdomen	129 (22.7)	440 (77.3)	569 (100)	<0.001
	Upper Limbs	153 (13.7)	965 (86.3)	1,118 (100)	<0.001
	Lower Limbs	140 (12.2)	1007 (87.8)	1,147 (100)	0.14
	General pain	58 (20.4)	226 (79.6)	284 (100)	<0.001
	Back	58 (25.2)	172 (74.8)	230 (100)	<0.001
Etiology*	Speeding	94 (15.7)	505 (84.3)	599 (100)	<0.001
	Careless	57 (12.7)	391 (87.3)	448 (100)	0.151
	Reverse direction	31 (11.1)	248 (88.9)	279 (100)	1.00
	Sudden show	24 (22.6)	82 (77.4)	106 (100)	<0.001
	Unsafe Vehicle	19 (9.1)	189 (90.9)	208 (100)	0.187
	Unsafe roads infrastructure	15 (10.6)	126 (89.4)	141 (100)	0.476
	Distracted Driver	12 (4.6)	247 (95.4)	259 (100)	<0.001
	Hit by car	12 (7.6)	145 (92.4)	157 (100)	0.84
	Fatigue	3 (3.7)	79 (96.3)	82 (100)	0.013
	Close following	2 (2.9)	67 (97.1)	69 (100)	0.012
	Others	4 (8.3)	44 (91.7)	48 (100)	0.649

*More than one affected cause could be included.

https://doi.org/10.15218/zjms.2023.034

According to Table 5, a significant association was reported between the mortality rate of pedestrians 102 (20.3%) (*P* ≤0.001) victims, alcoholic victims 43 (23.5%) (*P* ≤0.001), absence of using safety measures by more than one-tenth 148 (10.3%) with *P* ≤0.001, excessive speed (*P* ≤0.001), in night shift 102 (16.5%) <0.001 and the outcome of the study sample. However, statistically non-significant association was recorded between the proportion prevalence mortality among ex-smokers 17 (15.3%) with *P* = 0.569, absence of driving license (P = 0.131), with new involved vehicles 192 (12%), *P* = 0.169 and the results of road accidents, these information present in details in Table 5.

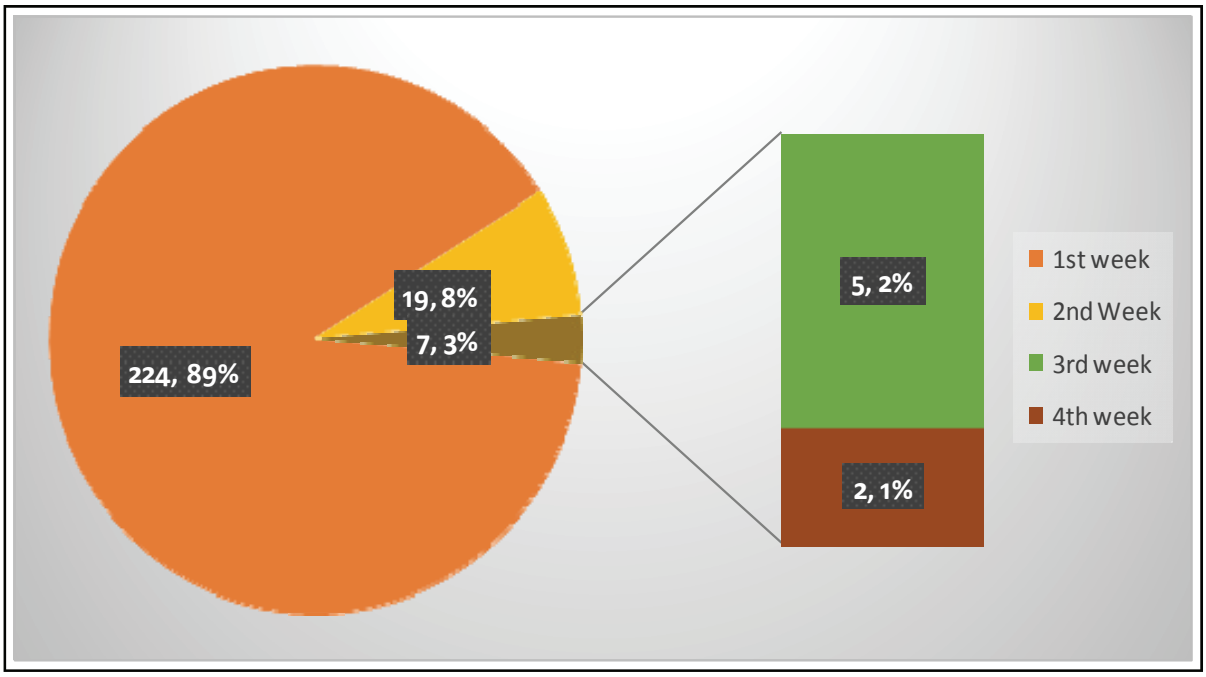

Figure 7 Week-to-week mortality distribution in the study sample.

https://doi.org/10.15218/zjms.2023.034

Table 5 Rate of death by the studied factors of the study sample (N=2225).

Variables	N=2225	Outcomes features		*P value*
		Dead (250) No. (%)	Alive (1975) No. (%)	
Age (years)				
≤9	348	40 (11.5)	308 (88.5)	
10-19	535	44 (8.2)	491 (91.8)	
20-29	689	64 (9.3)	625 (90.7)	<0.001
30-39	329	39 (11.9)	290 (88.1)	
40-49	144	18 (12.5)	126 (87.5)	
50-59	98	12 (12.2)	86 (87.8)	
≥60	82	33 (40.2)	49 (59.8)	
Gender				
Male	1835	200 (10.9)	1635 (89.1)	0.158
Female	390	50 (12.8)	340 (87.2)	
Victim type				
Driver	1221	106 (8.7)	1115 (91.3)	
Passenger	501	42 (8.4)	459 (91.6)	<0.001
Pedestrian	503	102 (20.3)	401 (79.7)	
Smoking				
Non-Smoker	869	97 (11.2)	772 (88.8)	
Ex-Smoker	111	17 (15.3)	94 (84.7)	
Current Smoker	831	92 (11.1)	739 (88.9)	0.569
NA	414	44 (10.6)	370 (89.4)	
Alcohol drink				
Yes	183	43 (23.5)	140 (76.5)	
No	1622	163 (10)	1459 (90)	<0.001
NA	420	44 (10.5)	376 (89.5)	
Driving license				
Yes	623	67 (10.8)	556 (89.2)	
No	934	119 (12.7)	815 (87.3)	0.131
NA	668	64 (9.6)	604 (90.4)	
Safety measures				
Yes	309	12 (3.9)	297 (96.1)	
No	1443	148 (10.3)	1295 (89.7)	<0.001
NA	473	90 (19)	383 (81)	
Excessive speed				
Yes	560	122 (21.8)	438 (78.2)	
No	1226	43 (3.5)	1183 (96.5)	<0.001
NA	439	83 (19.4)	354 (80.6)	
Time of RTAs				
Day	1608	148 (9.2)	1460 (90.8)	<0.001
Night	617	102 (16.5)	515 (83.5)	

*Multi-response factors of RTAs victims

https://doi.org/10.15218/zjms.2023.034

Discussion

This study detected the proportion incidence of death among victims of RTAs by 11.24%, whereas, a study [11] in Iraq by the Central statistical organization (CSO) in 2019 revealed 11.7% somehow consistent with our study, in contrast to our research a report in the USA revealed the death rate of 18% in 2021 by Shepardson.[12]

This may be the differentiation in the lifestyle, besides the USA considered one the essential developed countries. This result was higher than what had been founded in a study by (Leidman et al., 2016).[5] A total of 7,976 road traffic fatalities were documented between January 2010 and December 2013 in the eight Iraqi governorates under surveillance, 9.9 per 100,000 populations per year, due to the stability of Erbil, more Providing job opportunities, and the capital of the Kurdistan Region of Iraq (KRI).

The majority of the participants in this research showed in road traffic accidents were of the male gender, the young category. Because males like to engage in riskier problems such as driving without driving licenses, not taking safety measures (seatbelts/helmet), smoking, and alcohol ingestion. This research coincided with another study that indicated the heavy burden of accidents on young motorcyclists aged 16-30 years.[13,14] On this basis, a vital statistical relationship was found between age and the outcomes of RTAs.

The absence of seatbelts/helmets revealed nearly two-thirds of the current findings which belong to misconduct behavior by adolescents and young age, or even illiterate individuals this study was in contrast with another study in Thailand showed that about two-thirds of automobile users commonly wear safety belts.[15]

The study revealed that the occurrence of road accidents raised between 5:00 pm to 6:00 pm (25.6%). This may be due to heavy traffic during these hours and because a majority of shopping and daily essential lifestyle was improved on this occasion, besides the spread of Coronavirus and lockdown of the road at the beginning of Spring to the middle of summer in Iraq generally and KRG particularly[16,17] and what was founded in the current study for the months of March-June of 2020. In March and April usually, most of the people who reside in Erbil have spring trips to nature, so, the possibility of RTA s may be more, except in 2020, less person mobility because of lockdown so that were fewer RTAs.

Inconstancy, another study in Karachi, presented the peak period for coincidence was between 4:00-and 5:00 pm.[14] Office workers and students usually commute during this time. However, this study contrary to another study witnessed that the incidence of RTAs enlarged between 6:00 am-12:00 pm (44.2%) in Karachi.[13] Motorcycle (two-wheeler-three-wheelers) showed the highest proportional incidence (39.7%), which is why we found youngster's majority source of RTAs in Erbil. This result was related to another study in Karachi [13] that revealed (46.1%) of motorcycle accidents. This study revealed that most part effect during RTAs was head/neck/face, although this part among 1424 victims caused a death rate (16.1%), and the highest death rate reported among 230 back injuries were (25.7%), in another study showed the most affected part in fatal condition was head 45 (76.3%). These results were indifferent results to our result 1424 (64%). These varying results are nothing but the impact of the period in which Covid-19 appeared, where fear, dispersal, anxiety, and speed of infection have on society, whose effects were demonstrated in our research.

For these consequences there was a significant relationship between the body injured and the outcomes of road accidents. In the recent study, humans (speeding, carelessness, close following, distraction, beating, sudden show, fatigue) behavior represented the highest proportion incidence that affected significantly victims and the outcomes of RTAs. This study related significantly with

https://doi.org/10.15218/zjms.2023.034

the previous reports,[3,7,13] among 106 victims of RTAs had diagnosed from sudden show conditions the rate of victims died on the roads were (22.6%) highest reported separately. Finally, a significant association was founded between the road users, alcohol drinking, seatbelts and helmet wearing, rapidity, night shift occurrence, and mortality proportion among the resulting victims that consider risk factors contributed to injuries or maybe death which is called human behavior. These factors presented obviously by WHO,[3] the finding of the current study was in relation with another one in a retrospective study for international travelers in Thailand reported risk factors, such as motorbike use, alcohol/drug use, night-period driving, and less use of seatbelt/helmet. This study was supported by another one in a multinomial logistic regression analysis, alcohol drinking [adjusted odds ratio (AOR) 2.53, 95% confidence interval (CI=1.41-4.55) and driving at night-time (AOR 2.54, 95% CI 1.36-4.75) were hospitalization related,[19] and a systematic review believed that human factors were the utmost significant risk factor for RTDs such as age, male gender, education level, alcohol consumption, obesity, not using helmets by motorcyclists, driving without a driver's license, and high-speed driving.[20] Some differences appeared in the risk factors of traffic accidents due to the demographic difference, time, and lifestyle, and this naturally occurs due to the different societies in the world.

Limitation: a limitation found during the study improvement, was that Covide-19 spread and treated the patients in Rozhawa hospital which did not receive any trauma cases, instead the other cases were taken from the Emergency hospital in the required period.

Ethical considerations:

The approval from the ethical committee from the college of medicine at Hawler Medical University was obtained to do this study. The official permission from the directorate of health and directorates of both emergency hospitals was taken. Verbally informed consent from all participants was taken.

Conclusion

The study concludes that young males are more disposed to highway accidents with lower limbs being more affected. Safety precautions like wearing seatbelts provide more protection against RTAs. Based on the results, these precautions must be exercised, and awareness regarding the subject, because of speeding, negligence, distraction, hitting, and sudden appearance showed human behavior as a vital relationship to road injuries, speed, and negligence came in the first degree as the causes of road accidents. Besides the drivers, the young age group was the most vulnerable to these accidents, so realistic measures must be taken to reduce the percentage of injuries and deaths, and the state can assemble a specialized team for this issue.

Funding

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. CDC. Road Traffic Injuries and Deaths-A Global Problem. 2020. [Cited 2022 March 14] https://www.cdc.gov/injury/features/global-road-safety/index.html
2. WHO. SDG Target 3.6 halves the number of global deaths and injuries from road traffic accidents. 2020. [Cited 2022 March 19] https://www.who.int/data/gho/data/themes/world-health-statistics
3. WHO. Road traffic injuries: Key facts. 2021. [Cited 2022 April 17] https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries
4. WHO. Global status report on road safety 2018: summary. Geneva: World Health Organization; 2018 [WHO/NMH/NVI/18.20). License: CC BY-NC-SA 3.0 IGO).
5. Leidman E, Maliniak M, Sultan SS, Hassan A, Hussain SJ, Bilukha OO. Road traffic fatalities in selected governorates of Iraq from 2010 to 2013: prospective surveillance. Confl

Health 2016; 10(2):1–10. [Cited 2022 April 7] DOI: 10.1186/s13031-016-0070-0
6. Mahmood SO, Sallam SA, Wahda IH, Hama Ghareeb KA, Hasan YA, Gubari MIM, et al. Survey on the Causes of Road Traffic Accidents in Sulaymaniyah, Kurdistan Region, Iraq. Int Electron J Med 2020; 9(1):31–7. [Cited 2022 April 17] https://ddj.hums.ac.ir/citation_report/A-10-172-1/crossref
7. Aldoski ZNS, Mohammed DA, AL-Jameel HA. Investigating The Causes of Traffic Accidents for Duhok-Zakho International Road. Journal of Duhok University 2018; 21(2):130–9. [Cited 2022 April 7] https://journal.uod.ac/index.php/uodjournal/article/view/283/191
8. Mohammed H, Jaff D, Schrock S. The challenges impeding traffic safety improvements in the Kurdistan Region of Iraq. Transportation Research Interdisciplinary Perspectives 2019; 2(0):100029. [Cited 2022 April 7] https://doi.org/10.1016/j.trip.2019.100029
9. Jaff D. A public health initiative to address road traffic accidents in the Kurdistan Region of Iraq. Middle East Journal of Family Medicine 2018; 16(2): 280–4. [Cited 2022 March 13] http://www.mejfm.com/February%202018/RTA%20Kurdistan.pdf
10. EASO. Iraq: Key socio-economic indicators for Baghdad, Basra, and Erbil. Country of Origin Information Report. European Asylum Support Office. Page 46.2020.
11. Central statistical organization Iraq (CSO) Traffic Accidents Statistics for 2018, Iraq. Paper Report1-25. 2019.
12. Shepardson DUS. Traffic deaths soar 18% in 2021 to the highest first-half since 2006. Reuters 2021. [Cited 2022 March 26] https://www.reuters.com
13. Ahmer Z, Siddiqui A. Most Frequently Affected Body parts in Road Traffic Accidents Reporting to the Accident and Emergency Department of Karachi's Largest Tertiary Care hospital in 2019. J Community Health Research 2021; 10(3):235–42. [Cited 2022 March 17] https://jhr.ssu.ac.ir/article-1-669-en.pdf
14. Jooma R, Shaikh MA. Epidemiology of Karachi Road traffic crash mortality in 2013. Journal of Pakistan Medical Association 2015; 65(5):548–51. [Cited 2022 April 8] https://pubmed.ncbi.nlm.nih.gov/29885181/
15. Vallibhakara SA, Plitponkarnpim A, Suriyawongpaisal P, Thakkinstian A. The Nationwide Surveillance of Seat Belt Usage and Encouraging Factors of Increasing the Seat Belt Rate in Thailand: A Road Safety Survey. J Med Assoc Thail 2018; 101:809–19. [Cited 2022 April 14] http://www.jmatonline.com/index.php/jmat/article/view/9058
16. IOM. IOM Iraq. Iraq Mobility Restrictions Due to COVID-19 28 July-10 August. 2020. [Cited 2022 March 28] https://reliefweb.int/report/iraq/iraq-mobility-restrictions-due-covid-19-28-july-10-august-2020
17. Crisis. Iraq: Lockdown extended in Kurdistan Region March 18 /update 14. KRG extends lockdown amid COVID-19 spread on March 18; follow authority directives 2020. [Cited 2022 March 5] https://crisis24.garda.com/alerts/2020/03/iraq-lockdown-extended-in-kurdistan-region-march-18-update-14
18. Febres JD, García-Herrero S, Herrera S, Gutiérrez JM, Gutiérrez JM, Mariscal MA. Influence of seat-belt use on the severity of injury in traffic accidents. Eur Transp Res Rev 2012; 12(9):1–12. [Cited 2022 March 14] https://etrr.springeropen.com/articles/10.1186/s12544-020-0401-5
19. Sapsirisavat V, Mahikul W. Drinking and Night-Time Driving May Increase the Risk of Severe Health Outcomes: A 5-Year Retrospective Study of Traffic Injuries among International Travelers at a University Hospital Emergency Center in Thailand. Int J Environ Res Public Health 2021; 18(18):9823. [Cited 2022 April 11] https://www.mdpi.com/1660-4601/18/18/9823
20. Liu G, Chen S, Zeng Z, Cui H, Fang Y, Gu D, et al. Risk factors for extremely serious road accidents: Results from national Road Accident Statistical Annual Report of China. PLoS ONE 2018; 13(8):e0201587. [Cited 2022 March 14] https://pubmed.ncbi.nlm.nih.gov/30067799/