ORIGINAL ARTICLE

ScienZTech

INTERNATIONAL JOURNAL OF NOVEL TRENDS IN PHARMACEUTICAL SCIENCES

Published by ScienzTech Publication Journal Home Page: www.scienztech.org/ijntps

A study on Private Car Accidents

Abdulmajeed Alamri*[1], Tarek M. Esmael[1], Sami Fawzy[1], Hany Hosny[1], Saleh Attawi[1], Ahmed Asiri[1], Arulanantham Zechariah Jebakumar[2]

[1]EMS department, Prince Sultan Military College of Health Sciences, PO Box:33048, Dammam-31448, Kingdom of Saudi Arabia
[2]Vice Deanship of Postgraduate Studies & Research, Prince Sultan Military College of Health Sciences, PO Box: 33048, Dammam - 31448, Kingdom of Saudi Arabia.

Article History:

Received on: 07 Feb 2021
Revised on: 10 Mar 2021
Accepted on: 16 Mar 2021
Published on: 27 Mar 2021

Keywords:

Road traffic accidents (RTA),
Trauma,
Orivate car,
Saudi Arabia

ABSTRACT

In this study, road traffic injury (RTI) was defined as any injury resulting from a road traffic accident irrespective of severity and outcome. Road traffic accident (RTA) was defined as any crash on the road involving at least one moving vehicle, irrespective of it resulting in an injury. This could include collision with a vehicle or any non'moving object while driving/riding a vehicle, collision with a moving vehicle while walking/running/standing/ sitting on the road, or fall from a moving vehicle. The burden of road traffic accidents (RTA) is a leading cause of all trauma admissions in hospitals worldwide. Road traffic injuries cause considerable economic losses to victims, their families, and to nations as a whole. These losses arise from the cost of treatment (including rehabilitation and incident investigation) as well as reduced/lost productivity (e.g. in wages) for those killed or disabled by their injuries and for family members who need to take time off work (or school) to care for the injured. Road traffic fatality in the Kingdom of Saudi Arabia (KSA) is the highest, accounts for 4.7% of all mortalities. Road injuries also are reported to be the most serious in this country, with an accident to injury ratio of 8:6. In this study, we try to focus on some causes of the accidents in KSA, so we can implement the prevention plan.

*Corresponding Author

Name: Abdulmajeed Alamri
Phone:
Email: amalamri@psmchs.edu.sa

eISSN: 2277-2782

DOI: https://doi.org/10.26452/ijntps.v11i1.1409

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INTRODUCTION

Definition of road traffic injury

The burden of road traffic accidents (RTA) is a leading cause of all trauma admissions in hospitals worldwide. According to the World Health Report (WHR) in 2010, road traffic injuries (RTI) have been identified as the ninth most common cause of disability-adjusted life years (DALYs) lost for all age and gender categories. The World Health Organization (WHO) reported that 1.25 million people were killed every year on the road, and up to 50 million people were injured worldwide, and the number of road traffic deaths is expected to increase further by 2020. Nearly three-quarters of overall road deaths occur in developing countries, although road deaths are common in developed countries. Road traffic fatality in the Kingdom of Saudi Arabia (KSA) accounts for 4.7% of all mortalities, while road traffic fatalities do not exceed 1.7% in Australia, the United Kingdom (UK), or the United States of America (USA).

Similarly, road fatalities in KSA have increased over the last decade from 17.4 - 24 per 100,000 popu-

lation compared with 10 in the USA and 5 in the UK, where road safety has been taken seriously, and all primary and secondary preventive measures are implemented appropriately. Saudi Arabia was found to have a higher number of deaths from RTAs among high-income states (accident to death ratio is 32:1 versus 283:1 in the USA) and is considered to be the country's main cause of death for 16-30-year-old males. Road injuries are reported to be the most serious in this country, with an accident to injury ratio of 8:6, compared with the international ratio of 8:1. The rate of RTA caused by 4-wheeled vehicles is the highest of all worldwide accidents [1].

Traffic accidents cause a social and economic problem in many developed countries of the world as well as developing countries, both because of their social, economic and disastrous effects [2] . The World Health Organization statistics to an estimated 1.2 million deaths each year as a result of these incidents and that this number will rise by 65% during the next two decades and bringing the number of those who are exposed to infection in the world each year to 50 million and increases the number of deaths and injuries all traffic accidents in developing countries like in developed countries [3].

Studies carried out in the field of traffic accidents has been confirmed that such incidents cause humanitarian and economic losses and heavy drain a lot of money, especially in developing countries [4, 5]. Due to the significant rise in living standards in the last 50 years, Saudi Arabia has experienced dramatic changes to its road network and the number of cars. Asphalted road networks increased from 239 km in 1952 to 45 000 km, and the number of cars increased from 145000 in 1970 to 6.26 million cars currently. These changes, inevitably, resulted in a significant increase in the number of road traffic accidents (RTAs) and related deaths and injuries. Recent statistics show that more than 5000 people are being killed, and 34 000 are being injured annually as a result of the 290 000 RTAs . The use of seat belts (SBs) has been proved to be one of the most effective ways to reduce RTA fatalities and reduce the number of injuries or minimize the extent of these injuries [6].

Wearing Seat Belts for drivers and front-seat passengers (FSPs) was made compulsory in Saudi Arabia on 5 December 2000. Before that, the voluntary wearing rate for drivers was estimated to be 2.9% [7] there were indications that this rate in Saudi Arabia jumped to around 60% for drivers and 23% for FSPs immediately after enacting the law [8]. Between 1971 and 1997, 564,762 people were died or injured in Road Traffic Injuries (RTIs), a figure equivalent to 3.5% of the total population in the Kingdom of Saudi Arabia (KSA). During this period, 66,914 people have died on the roads in KSA due to RTIs amounting to one person Killed and four injured every Hour [9] . An audit of KTIs over a one-year period revealed that, out of 361 victims, 16% were less than 10 years and 47% between 11 and 30 years, indicating a high productivity loss [10] .

Knowing about the productive years of life lost due to premature death provides important information to the health sector and social security. It partially reflects the social impact of the problem, whose prevention and/or control were unquestionably beneficial [11] .

Saudi Arabia is a vast country of 2,149,690 km2 and is the largest Arab state in Western Asia. The Kingdom has been categorized as a high-income nation and is part of the "Group of Twenty" (G-20) of major economies. It has a total population of approximately 27 million, one-fourth of whom are expatriates, with the highest population density (per km2) of 101 in Jizan, and 38 in Makkah, and the lowest of 2.8 in Najran, and 3.6 in Al-Jawf [12] .

In KSA, motor vehicles are the main means of transportation within and in-between cities. According to a recent estimate, more than 6 million cars are found on the roads of KSA [13] . According to the morbidity and mortality records in the Ministry of Health (MOH) hospitals, 20% of beds are occupied by RTA victims, and 81% of deaths in the hospitals are due to RTIs [14] . Over the past 2 decades, KSA has recorded 86,000 deaths and 611,000 injuries in RTAs, with 7% resulting in permanent disabilities. The economic implications of RTAs estimated in terms of potential productive years life lost (PPYLL) were examined in a study that reported a 31.6% increase in deaths due to RTA among males in 1997-2002 compared with a 1.3% increase in deaths due to RTA among females .Rad traffic accidents are a major health hazard, with 19 killed daily and four injured every hour in KSA. The young and economically productive age groups are the most affected [15] the young and economically productive age groups are the most affected. In industrialized countries, the gross loss due to accidents is $1\pm2\%$ of the national income, while for KSA, this loss has been estimated to be between 2.2 and 9%. The accident or injury-reporting system in KSA has been much improved over the last couple of decades. Legislation on seat belt use has been put into practice, along with operational speed camera systems in large cities under the control of police departments and police department record-keeping of road mortalities and collisions [16].

Table 1: Questionaries

		Frequency	Percent
Participants in the study Nationality	Saudi	217	89.3
	Non Saudi	26	10.7
	Total	243	100.0
Age group	< 20 years	83	34.2
	20 - 30	99	40.7
	30 - 40	32	13.2
	> 40 years	29	11.9
	Total	243	100.0
Car safety	Seat belts	34	14.0
	Air bags	17	7.0
	Seat belts and Air bags	2	.8
	Total	53	21.8
	System	190	78.2
	Total	243	100.0
Seat-belt use	All the time	47	19.3
	Frequently	86	35.4
	Less frequent	68	28.0
	None	42	17.3
	Total	243	100.0
Car maintenance every:	6 months	56	23.0
	1 year	95	39.1
	3 years	37	15.2
	None	55	22.6
	Total	243	100.0
Car maintenance in	Agency	98	40.3
	Non- agency	145	59.7
	Total	243	100.0
Driving speed according to the road speed limits	Normal	95	39.1
	Low	24	9.9
	High	94	38.7
	Not sure	30	12.3
	Total	243	100.0
Follow traffic regulations	All time	65	26.7
	Most time	132	54.3
	Less time	29	11.9
	None	17	7.0
	Total	243	100.0
Mode of transport to the work/school	Private car	221	90.9
	Company/school bus	22	9.1
	Total	243	100.0
Distance to the work/school	< 20 km	160	65.8
	20 – 50 km	56	23.0
	>50 – 100 km	20	8.2
	>100 km	7	2.9
	Total	243	100.0
Daily driving hours	<1	35	14.4
	1 - 2	55	22.6
	3 - 4	115	47.3
	≥ 5	38	15.6

Continued on next page

Table 1 continued

		Frequency	Percent
	Total	243	100.0
Long distance travel monthly	< 1	103	42.4
	1 - 2	63	25.9
	3 - 4	42	17.3
	≥ 5	35	14.4
	Total	243	100.0
Do you use the mobile or electronic device during driving?	All time	45	18.5
	Frequently	86	35.4
	Less time	80	32.9
	No	32	13.2
	Total	243	100.0
Do you have car insurance	Yes	177	72.8
	No	66	27.2
	Total	243	100.0
Did you have an accident before?	Yes	138	56.8
	No	103	42.4
	Total	241	99.2
	System	2	.8
	Total	243	100.0
How many accidents did you have?	1	45	18.5
	2	50	20.6
	3	21	8.6
	4	14	5.8
	5	6	2.5
	> 5	2	.8
	Total	138	56.8
	System	105	43.2
	Total	243	100.0
If yes, the car safety measure used:	Seat belts	34	14.0
	Air bags	17	7.0
	Seat belts and Air bags	2	.8
	Total	53	21.8
	System	190	78.2
	Total	243	100.0
If yes, the air-bag worked:	Yes	71	29.2
	No	67	27.6
	Total	138	56.8
	System	105	43.2
	Total	243	100.0
If yes mechanism of accident:	Roll over	26	10.7
	Collision with bike	5	2.1
	Collision with another car	96	39.5
	Collision with motor bike	3	1.2
	Collision with pedestrian	8	3.3
	Total	138	56.8
	System	105	43.2

Continued on next page

Table 1 continued

		Frequency	Percent
	Total	243	100.0
If yes, mode of transport to the hospital:	Car	43	17.7
	Ambulance	74	30.5
	Total	117	48.1
	System	126	51.9
	Total	243	100.0
Area/s of injuries:		116	47.7
	Head	8	3.3
	Head and Face	2	.8
	Head, Face and Neck	6	2.5
	Head, Face and Chest	4	1.6
	Head, Face and Upper limbs	3	1.2
	Head, Neck and Chest	5	2.1
	Head, Neck, Upper limbs and Lower limbs	6	2.5
	Head, Chest	6	2.5
	Head, Upper limbs	3	1.2
	Head and Lower limbs	4	1.6
	Lower limbs	26	10.7
	Face	9	3.7
	Face and Neck	3	1.2
	Face, Chest and Abdomen	3	1.2
	Neck	6	2.5
	Neck and Chest	3	1.2
	Neck and Upper limbs	4	1.6
	Chest	8	3.3
	Pelvis	8	3.3
	Upper limbs	8	3.3
	Back	2	.8
	Total	243	100.0
Fade from the hospital:	Discharge	44	18.1
	ICU	18	7.4
	Ward	30	12.3
	Transfer	7	2.9
	Operation	4	1.6
	Didn't go to hospital	27	11.1
	ICU and Ward	3	1.2
	Total	133	54.7
	System	110	45.3
	Total	243	100.0

Table 2: Questionaries

		Frequency	Percent
Do you have car insurance	Yes	177	72.8
	No	66	27.2
	Total	243	100.0
Did you have an accident before?	Yes	138	56.8
	No	103	42.4
	Total	241	99.2
	System	2	.8
	Total	243	100.0
How many accidents did you have?	1	45	18.5
	2	50	20.6
	3	21	8.6
	4	14	5.8
	5	6	2.5
	> 5	2	.8
	Total	138	56.8
	System	105	43.2
	Total	243	100.0
If yes, the car safety measure used:	Seat belts	34	14.0
	Air bags	17	7.0
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If yes, mechanism of an accident:	Roll over	26	10.7
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	System	126	51.9
	Total	243	100.0
Area/s of injuries:		116	47.7
	Head	8	3.3
	Head and Face	2	.8
	Head, Face and Neck	6	2.5

Continued on next page

Table 2 continued

		Frequency	Percent
	Head, Face and Chest	4	1.6
	Head, Face and Upper limbs	3	1.2
	Head, Neck and Chest	5	2.1
	Head, Neck, Upper limbs and Lower limbs	6	2.5
	Head, Chest	6	2.5
	Head, Upper limbs	3	1.2
	Head and Lower limbs	4	1.6
	Lower limbs	26	10.7
	Face	9	3.7
	Face and Neck	3	1.2
	Face, Chest and Abdomen	3	1.2
	Neck	6	2.5
	Neck and Chest	3	1.2
	Neck and Upper limbs	4	1.6
	Chest	8	3.3
	Pelvis	8	3.3
	Upper limbs	8	3.3
	Back	2	.8
	Total	243	100.0
Fade from the hospital:	Discharge	44	18.1
	ICU	18	7.4
	Ward	30	12.3
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	Operation	4	1.6
	Didn't go to a hospital	27	11.1
	ICU and Ward	3	1.2
	Total	133	54.7
	System	110	45.3
	Total	243	100.0

The aim of the study

The main aim of the study presented in this paper is to provide a first step in a survey over university students' and their families and private drivers. The aim is to highlight the important points about private car accidents; causes for better prevention planning. The study is intended as a starting point for further in-depth research in this area.

In this presentation, we focus attention on:

- the common age group of accidents
- the response of the people in case of an accident
- driving years and the correlation to the accidents and number of accidents
- safety measures in the cars and their use and correlation to the accidents
- car maintenance and its effect on the accidents
- drivers follow the speed roads limits and follow traffic regulations and the correlation to the accidents
- mode of transport and the distance to the work/school and the correlation to the accidents
- daily driving hours and long-distance monthly travel, correlation to the accidents
- use of electronics like mobile during driving and the correlation to the accidents
- car insurance and the relation to the accidents
- drivers who had accidents before, mechanism of injury, number of accidents, injured areas, mode of transport to the hospitals, the fade from the hospital

Method

The 243 subjects (all are males as females are not allowed to drive a car in the KSA) participating in the study were recruited from the PSMCHS' students and the students' families and drivers. In Table 1 below, the samples and some characteristics are presented.

Participants in the study

The participants were asked to complete a questionnaire consisting of questions about their nationality, age, driving years, what will do if they see an accident?, car safety, seat – belt use, car maintenance, driving speed according to the road speed limits, if they follow traffic regulations, the mode of transport to the work/school, distance to the work/school, daily driving hours, long-distance (long-distance here not less than 450 km) travel monthly, if they use the mobile or electronic device during driving, do they have car insurance?, did they have an accident before? If yes, how many accidents did they have? The safety measure used, the air-bag worked or not, mechanism of an accident, mode of transport to the hospital, injuries and the fade from the hospital.

The questionnaire was distributed to the students during ordinary day time at the PSMCHS, Dhahran. The student's respondents completed it immediately and anonymously and took the other papers to their families and drivers. It took about 10 - 15 minutes to complete. The data was analyzed by quantitative methods (Tables 2 and 3).

The result of the data analysis

Figure 1 shows, Chi-square = 1.34; P-value = 0.72; 9.9% of our participants had driving experience 1-2 years, while the majority has more driving experience. 56.8% had accidents before. The number of accidents increases with the driving year's experience (high with more than 10 years experience) may be due to over confidence.

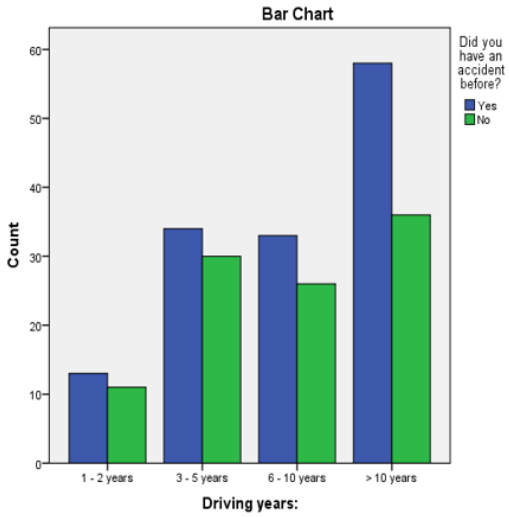

Figure 1: Did you have an accident before?

Figure 2 depicts, Chi-square = 17.89; P-value = 0.27. 17 cases are the highest one accident in the drivers who have 3-5 years driving experience, 2, 3, 4 & 5 accidents are higher in drivers who have more than 10 years driving experience. This gives the clue that the more driving experience the more accidents (it needs more research about the causes)

Figure 3 shows, Chi-square = 8.91; P-value = 0.03*

18 participants whom had accidents they used seat belts (13% of accident cases), 22 of the cases the air bags alone were working (15.9% of accident

Table 3: Drivingyears: Did you have an accident before?Crosstab

			Did you have an accident before?	Total
		Yes	No	
Driving years:	1 - 2 years	13	11	24
		54.2%	45.8%	100.0%
	3 - 5 years	34	30	64
		53.1%	46.9%	100.0%
	6 - 10 years	33	26	59
		55.9%	44.1%	100.0%
	> 10 years	58	36	94
		61.7%	38.3%	100.0%
Total		138	103	241
		57.3%	42.7%	100.0%

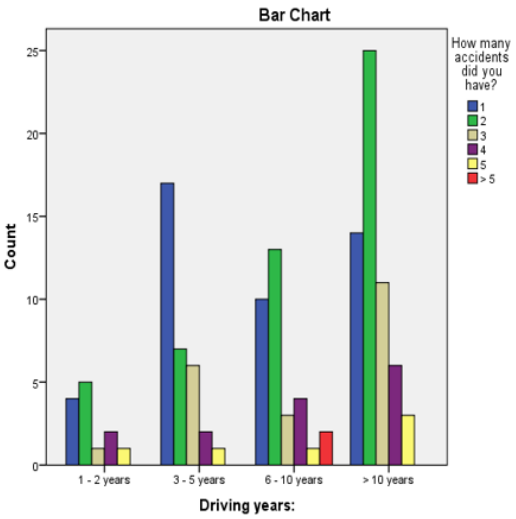

Figure 2: How many accidents did you have?

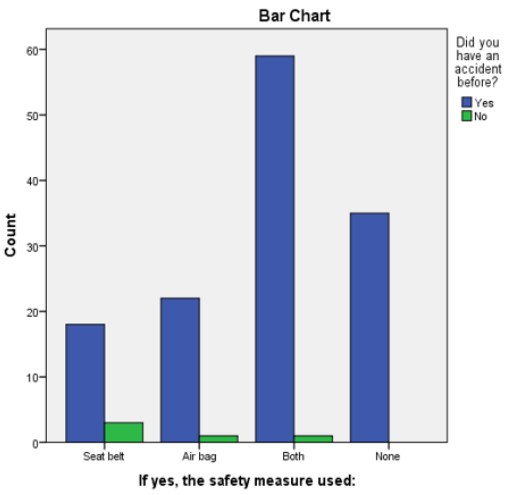

Figure 3: Did you have an accident before?

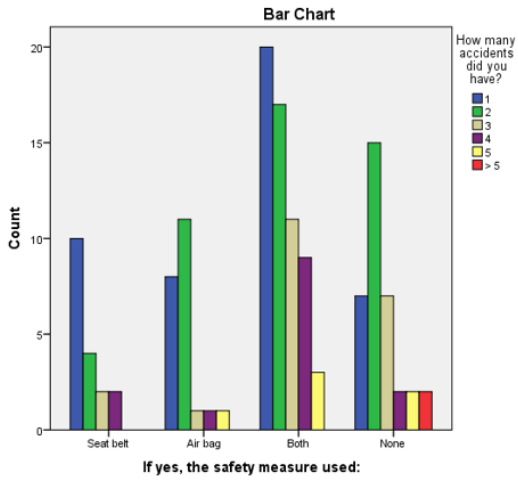

Figure 4: How many accidents did you have?

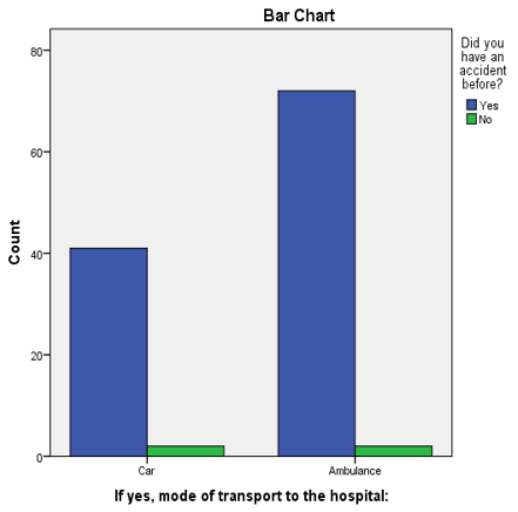

Figure 5: Did you have an accident before?

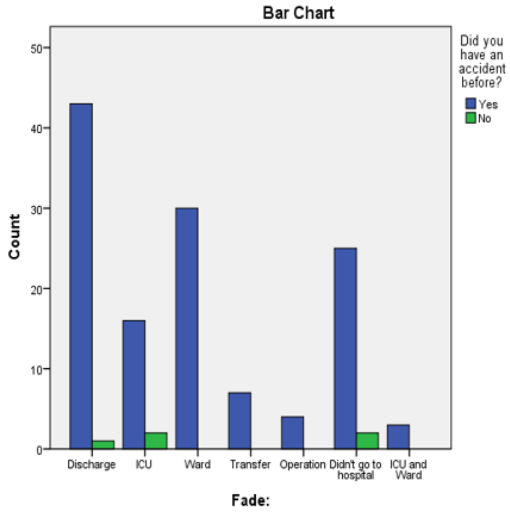

Figure 6: Did you have an accident before?

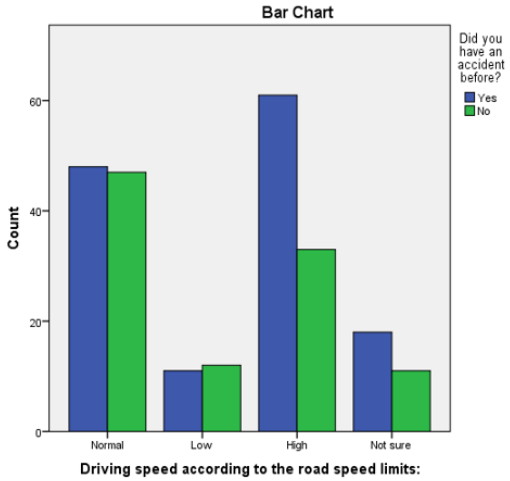

Figure 9: Did you have an accident before?

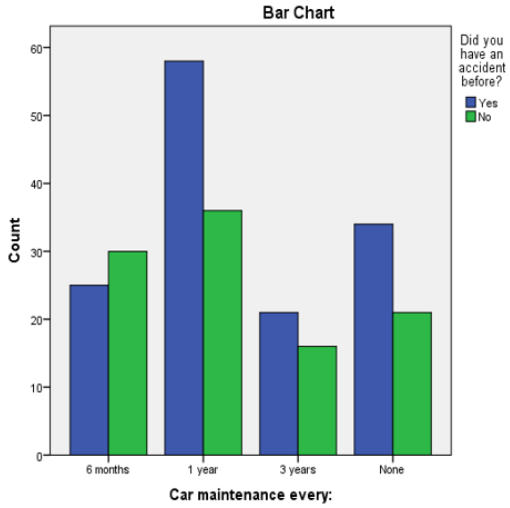

Figure 7: Did you have an accident before?

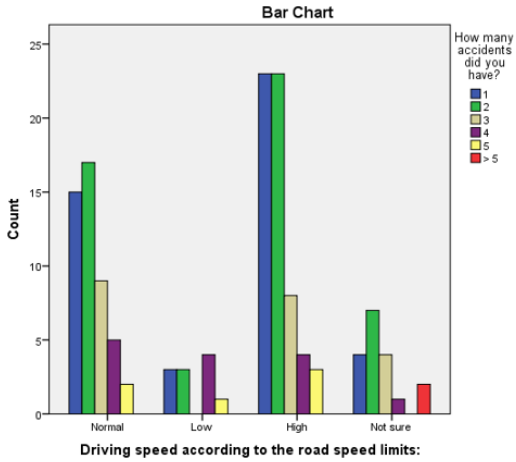

Figure 10: How many accidents did you have ?

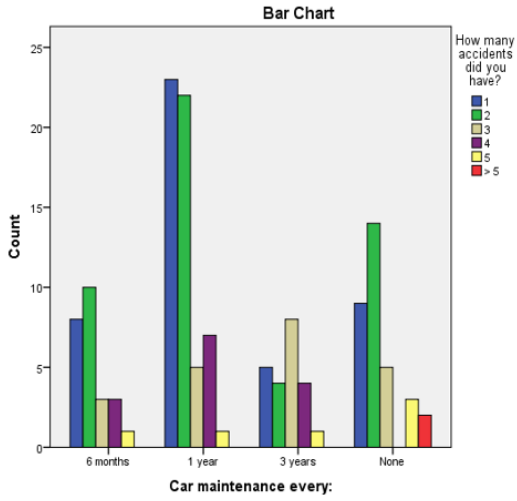

Figure 8: How many accidents did you have?

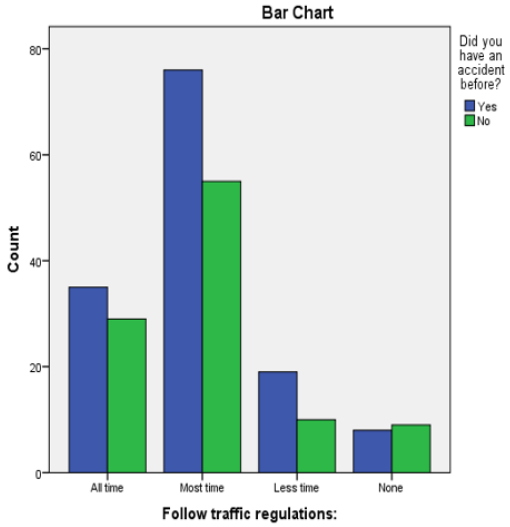

Figure 11: Did you have an accident before?

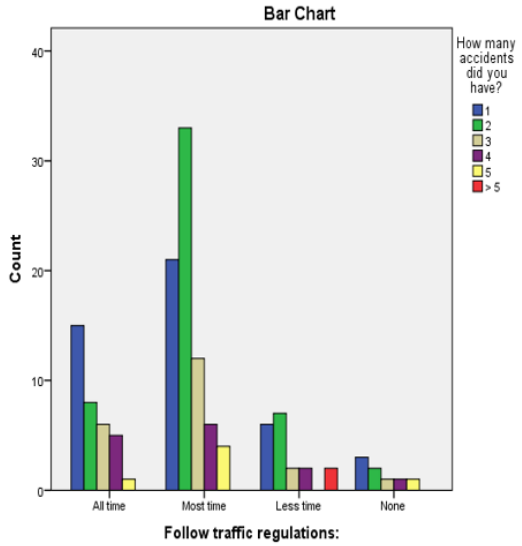

Figure 12: How many accidents did you have ?

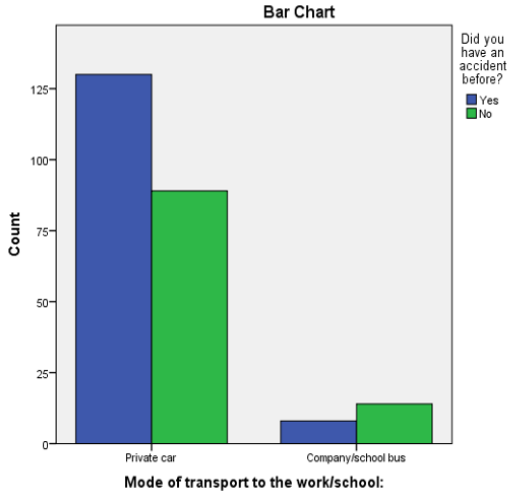

Figure 13: Did you have an accident before?

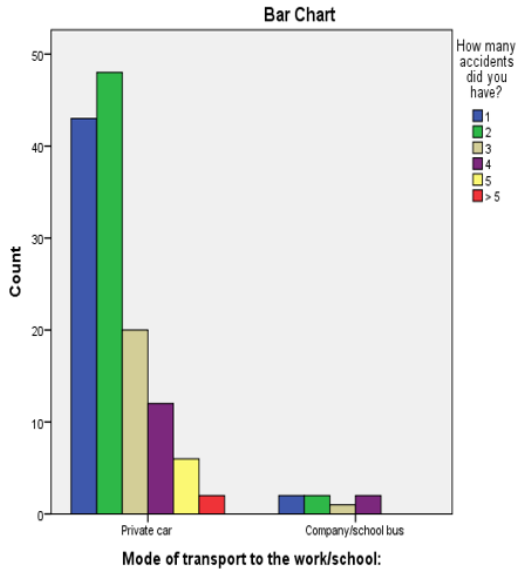

Figure 14: How many accidents did you have?

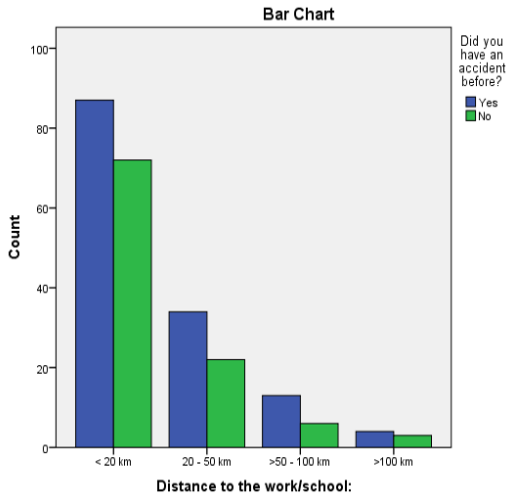

Figure 15: Did you have an accident before?

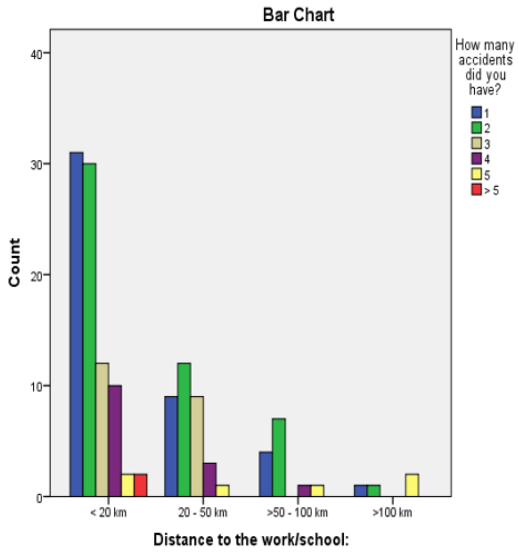

Figure 16: How many accidents did you have?

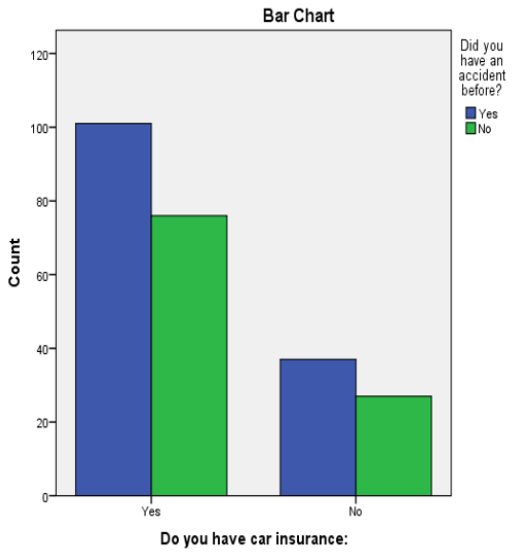

Figure 17: Did you have an accident befor?

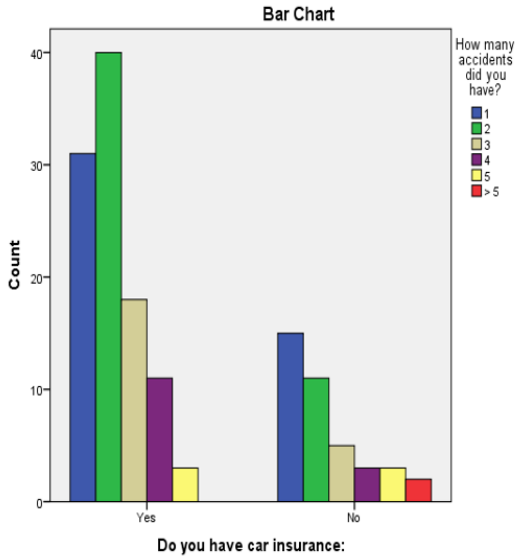

Figure 18: How many accidents did you have?

cases), and 59 of accident cases, the seat belt and the airbags were used (42.8% of accident cases).

The P-value is positive = 0.03

Figure 4 depicts, Chi square = 20.32; P-value = 0.16

Both the seat belt use and the air bags worked in 20 participants whom had one accident, 17 participants whom had two accidents, 11 participants whom had three accidents, 9 participants whom had four accidents and 3 participants whom had five accidents,

Figure 5 shows, Chi square = 0.31; P-value = 0.58

41 of the accident cases were transported to the hospital by private cars.

Figure 6 shows, Chi-square = 5.67; P-value = 0.46

43 of the accident cases (31.9%) had minor injuries and were discharged from the emergency room.

Figure 7 shows, Chi square = 4.36; P-value = 0.23

The accidents were more with annual car maintenance, followed by no maintenance then every 3 years maintenance (maybe the cases with every 3 years maintenance had new cars).

Figure 8 shows, Chi square = 26.64; P-value = 0.03*

The majority of accident cases were in those who were doing maintenance every year.

The P-value is positive = 0.03

Figure 9 shows, Chi square = 5.11; P-value = 0.16

The accident cases were higher in the high-speed group (64.9% of the high-speed group had accidents).

Figure 10 shows, Chi square = 27.69; P-value = 0.02*

Still, the number of accidents increased with high-speed driving.

The P-value is positive = 0.02

Figure 11 shows, Chi square = 1.73; P-value = 0.63

The accident cases were higher in people follow the traffic regulations most of the time 76 cases (50.1% of all accidents) and followed by drivers follow the regulations all the time? (It needs more research).

Figure 12 shows, Chi square = 21.20; P-value = 0.13

The cases that had 1 or more accidents are higher in the drivers who follow traffic regulations most of the times.

Figure 13 shows, Chi square = 4.32; P-value = 0.04*

Most of the accidents cases went to their work or school by their own cars 94.2%.

P-value is positive = 0.04

Figure 14 shows, Chi square = 3.06; P-value = 0.69

The accidents increased more in private car drivers (131 cases). 7 cases only had accidents where the company/school buses were used.

Figure 15 shows, Chi square = 1.66; P-value = 0.65

The accidents increased in driving distances less than 20 km (63% of accident cases). This is maybe due to more intersections inside the cities)

Figure 16 shows, Chi square = 29.96; P-value = 0.01*

The number of accidents is high in driving distances less than 20 km, followed by distances 20-50 km.

The P-value is positive = 0.01

Figure 17 shows, Chi square = 0.11; P-value = 0.92

The accidents increased in the cases with car insurance (73.2% of all accident cases).

Figure 18 shows, Chi square = 8.95; P-value = 0.11

Also, the number of accidents increased in the drivers who had car insurance.

P-value is positive if < 0.05. Road traffic fatality in the Kingdom of Saudi Arabia (KSA) is the highest, accounts for 4.7% of all mortalities. Road injuries also are reported to be the most serious in this country, with an accident to injury ratio of 8:6. 45.3% of the participants do not use or less frequently use seat belts. Needs more media awareness about the importance of its use as law alone is not enough (the drivers put on the seat belts in front of the police men then remove after leaving the area). 22.6% of the participants do not go for car maintenance and 59.7% of the maintenance done outside the cars agencies (maybe due to high fees in the agencies and mostly replace parts not fixing the problems). The

car agency has to increase the period of checks and decrease the fees of maintenance.

50% of the accidents in high speed driving above the roads limits, 18.9% were due to not following traffic regulations or follow them less frequently. Needs more media awareness about the importance follow traffic regulations. 90.9% of the participants are going to their work/ school by their private cars; 11% of them drives > 50 km, and 15.6% drives ≥ 5 hours daily. 17.3% of the participants drive long distances 3-4 times monthly. There is a need to know the importance of using the public/ school or work transportations. 53.9% of the participants use electronic devices while driving always or frequently. Public education about the danger of that behaviour must be of the top priority. 56.8% of the participants had accidents before; 36.2% had 2 accidents, and 31.2% had ≥ 3 accidents. 14% of the accident cases used the seat belt. Media and public education about the importance of the car safety measures are needed [15] .

69.6% of the accidents were due to collisions, followed by 18.8% rollover. 31.2% of the accident cases were transported to hospitals by private cars. Media awareness and public educations are needed to know that secondary injuries can occur if an injured is moved by non-medical people. 37.7% of the accident cases were multiple, 18.8% lower limbs injuries, 31.9% were minor injuries and 19.6% of the accident cases did not go to the hospitals. The more driving years' experience had more accidents and more number of accidents!? May be due to over confidence. 13% of the accident cases used seat belts alone, 15.9% the air bag deployed, and 42.8% the seat belts used and the air bags deployed. Accidents were higher in one-year car maintenance, followed by no maintenance!? P-value is positive. The cause may be the cases of no maintenance had new cars.

The high-speed group had more accidents, 64.9%, and number of accidents also high, 50.1%. P-value is positive. Saher is not enough to control speed, so public educations through the media and schools are mandatory. 94.2% of the accident cases used private cars to go to their work/ school. P-value is positive. Media awareness of the importance to use public and work transportations is needed.

Accidents cases were 63% in driving distances less than 20 km. (maybe due to intersections inside the city). P-value is positive. The intersections inside the city have to be decreased and will control. 73.2% of the accident cases had car insurance. There must be penalties to the drivers who were responsible about the accidents [16] .

Various methodological problems that have been discussed elsewhere are not all mentioned here since they do not seem to affect the reliability and validity of the results discussed. The people all over the word face the road traffic accidents problems, but we here in KSA, although the high quality of the roads and the infra structures, the mortality and morbidity are higher than in other countries. There are 21% of the participants will stop and help the accident cases and transport them by their own private cars. (There is a need for public & media awareness about the secondary injuries due to improper moving of the injured patients). This is an important role of the college & EMTs to educate and train the 1^{st} responders. There is a need for more researches in each topic, which are conducted in that research for more in-depth details.

CONCLUSIONS

Road traffic accidents can be prevented. Governments need to take action to address road safety in a holistic manner that requires involvement from multiple sectors (transport, police, health, education) and that addresses the safety of roads, vehicles, and road users themselves. Effective interventions include designing safer infrastructure and incorporating road safety features into land-use and transport planning, improving the safety features of vehicles, and improving post-crash care for victims of road crashes. Interventions that target road user behaviour are equally important, such as setting and enforcing laws relating to key risk factors and raising public awareness. We conclude from the above that the problem of traffic accidents in the Saudi Arabia serious need to pause so as to curb the escalation and that the road to improve traffic safety level requires the development of a national strategy with specific targets to be implemented according to plan Specific time to address the phenomenon of traffic accidents. The activation of intelligent transport systems in major cities are needed to raise the efficiency of the roads and reduce traffic accidents by raising the level of safety and the application of traffic regulations.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

ACKNOWLEDGEMENT

The authors are thankful to everyone who supported this work.

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ABOUT AUTHORS

Abdulmajeed Alamri

Lecturer, EMS department, Prince Sultan Military College of Health Sciences, PO Box 33048, Dammam - 31448
Kingdom of Saudi Arabia.

Cite this article: Abdulmajeed Alamri, Tarek M. Esmael, Sami Fawzy, Hany Hosny, Saleh Attawi, Ahmed Asiri, Arulanantham Zechariah Jebakumar. **A study on Private Car Accidents** . Int. J Nov. Tren. Pharm. Sci. 2021; 11(1): 10-24.