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SEAT BELTS WEARING AND MAXILLOFACIAL TRAUMA AMONG IRAQI POPULATION

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بسم الله الرحمن الرحيم

وَيَسْأَلُونَكَ
عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا
(قَلِيلًا ﴿٨٥﴾)

صدق الله العلي العظيم

سورة الاسراء: اية 85

Dedication To

I dedicate this small project to the most precious and my first teachers my parents may Allah bless them.

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I owe a great many thanks to the great people who helped and supported me to complete this project**.**

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ABSTRACT

INTRODUCTION: Trauma caused by traffic accidents is among the main etiologies involved in the occurrence of facial fractures throughout the world. However, the trauma mechanisms involved are different according to the location where the study was performed, due to different conditions of development, legislation, and culture. A retrospective study was done between October 2022 and January 2023, with the purpose of determining the epidemiology and the mechanisms involved in the occurrence of facial fractures among car occupants in the Baquba in Diyala, one of the governorates of Iraq.

METHODS: Data were collected from 223 patients admitted with facial fractures to the emergency room of the Baquba General Hospital, Baquba. Within this period, 102 individuals had been involved in traffic accidents, among which 50 (49.01%) were inside passenger cars. These were grouped based on the seating position that they were occupying at the time of the accident and the wearing of seat belts. Data concerning the number of fracture bone were obtained from the different groups, and a fracture/patient index (F/P I) was calculated to compare and make reference to the impact energy among these groups, for subsequent analysis and discussion.

RESULTS: 116 fracture bones occurred among 50 patients who were car occupants. By applying the F/P I, we obtained higher values in the group of rear-seat passengers who were not wearing seat belts (2.75 fractures per patient), followed by front seat passenger not wearing seat belt (2.73 fractures per patient) followed by drivers not wearing seat belt (2.6 fractures per patient) followed by driver wearing seat belt (0.7 fractures per patient). None of the rear-seat passengers was wearing seat belts.

CONCLUSION: The study indicate that the driver position shows a high incidence of maxillofacial fractures, not being effectively protected by the seat belt, although the wearing of seat belts appear to be protective against occurrence of maxillofacial fractures in front-seat passengers. It was not possible to evaluate the wearing of seat belts among rear-seat passengers, even though the high incidence of fractures in this group showed its high susceptibility to the occurrence of facial fractures, which highlights the need of taking protective measures against this situation.

KEYWORDS: Facial fractures. Car accidents. Epidemiology. Trauma. Seat belt

INTRODUCTION

Previously-published epidemiological studies show that the etiology of facial fractures is variable throughout the world. Traffic accidents are among the most frequent causes of facial fractures 1-4. Several studies reveal the influence of security items such as airbags and seat belts,5-7 but few have analyzed the effect of the seating position inside the vehicle 8.There are economic, cultural and development differences among countries that must be taken into consideration. In 2022 the National Traffic Department reported that there were 50 accidents in Diyala that were severe enough to lead to significant injury or fatality. Motor vehicle collisions are the leading cause of traumatic deaths in Diyala. In 2022, a total of 11 people were killed in motor vehicle collisions, and other 39 were injured. In Baquba city only, more than 30 were victims of motor vehicle collisions. A retrospective study with data collection and analysis of all facial fracture cases in car occupants presented to (Baquba teaching hospital) between October 2022 and January 2023.Study was performed to examine the relationship between the number of fractures that occurred in each group and the seating position and the wearing of seat belts, to determine the safest place to sit in a car for avoiding the occurrence of facial fractures.9-18

METHODS

A retrospective analysis of all patients with facial fractures who were admitted during a 4-month period to a emergency center, Baquba teaching hospital was conducted. Within this period, from a database of 297 patients admitted with facial fractures to the emergency room of the Institution, 102 had been involved in

traffic accidents, among which 50 (49.01%) were inside passenger cars,. The 50 patients who were inside passenger cars were selected and grouped based on the seating position that they were occupying in the vehicle at the time of the accident and the wearing or not of seat belts. Data concerning the number and location of fracture lines were obtained from the different groups, and a fracture/patient index (F/P I) – all fracture lines divided by the number of patients in each group – was calculated to compare and allow the analysis of the safety against facial fractures in each seating position.

Data were collected from patients to fill out a protocol with the following information:

1. Personal data

- Patient identification
- Gender
- Age

2-Trauma mechanism

- Vehicle involved
- Position in the vehicle
- Wearing of seat belts
- Activation of airbag

3-Clinical findings

a. Number of fracture lines

b. Bones involved:

- Frontal
- Orbit
- Zigoma
- Nasal
- Maxilla

- Mandible

The car occupants were divided into 6 groups:

Group A – Drivers wearing seat belts;

Group B – Drivers not wearing seat belts;

Group C – Front-seat passengers wearing seat belts; Group D – Front-seat passengers not wearing seat belts; Group E – Rear-seat passengers wearing seat belts; Group F – Rear-seat passengers not wearing seat belts. Larger groups were formed by the sum of groups: Group Drivers (regardless of wearing seat belts) = A + B Group Front-seat passengers (regardless of wearing seat belts) = C + D

Group Rear-seat passengers (regardless of wearing seat belts) = E + F

Group Car occupants wearing seat belts (regardless of seating position) = A + C + E

Group Car occupants not wearing seat belts (regardless of seating position) = B + D + F

The number of registered fractures refers to the number of fracture lines, regardless of the possibility of a single line affecting two or more bones. Following that pattern, in case a single bone showed 2 different fracture lines, those were counted twice, according to the number of fracture lines.

The F/P I was calculated for all of these groups to have an indirect measure of the impact on each of them.

RESULTS

The study revealed that 50 patients suffered 102 facial bones fractures due to being inside a car during a car accident. The average age of enrolled patients was 37.96 years. The ratio of men to women was 1,63:1.

Dividing the 50 car occupants into groups based on the seating position in the vehicle and the wearing of seat belts, the data revealed that 10 out of the 15 drivers were wearing seat belts, that 0 out of the 15 front-seat passengers were wearing seat belts, and that none of the rear-seat passenger was wearing seat belts (Table 1). Among drivers wearing or not wearing seat belts, 7 and 13 fracture bones were found, respectively; among front-seat passengers had 41 fracture bones , with none of them wearing seat belts, respectively. Rear-seat passengers had 55 fracture bones, with none of them wearing seat belts (Table 2).

Table 1 - Number of patients per group

Number of Patients	With Seat Belt	Without Seat Belt	Total
Driver	10	5	15
Front Passanger	0	15	15
Rear Passanger	0	20	20
Total	10	40	50

Table 2 - Number of fractures bones per group.

Number of Fractures	With Seat Belt	Without Seat Belt	Total
Driver	7	13	20
Front Passanger	0	41	41
Rear Passanger	0	55	55
Total	7	109	116

The highest F/PI(number of fractures bone per patient) was found among rear seat passengers (2.75 fractures per patient) followed by front seat passenger not wearing seat belt (2.73 fractures per patient) followed by drivers not wearing seat belt (2.6 fractures per patient) followed by driver wearing seat belt (0.7 fractures per patient) (Table3).

Table 3 – F/PI (number of fractures bone per patient) applied to different groups.

F/P I	With Seat Belt	Without Seat Belt	Total
Driver	0.7	2.6	1.3
Front Passanger	0	2.73	2.73
Rear Passanger	0	2.75	2.75
Total	0.7	2.725	2.32

When the F/P I was applied to seating positions regard- less of seat belt wearing, the highest F/P I was found in the rear passenger position (2.75 fractures per patient), followed by the front passenger position (2.73 fractures per patient), and the driver position (1.3 fractures per patient) (Table3)

Patients not wearing seat belts had a higher F/P I (2,725 fractures per patient) than patients wearing seat belts (0.7 fractures per patient) (Table 3).

It was not possible to analyze data concerning the protection provided by airbags, because none of the passenger cars carried such devices.

DISCUSSION

Epidemiological studies vary due to many factors depending on where and when the studies take place.1-4 Comparsion of data requires that some local factors be considered, because patterns are not universal. Throughout the world, traffic accidents are very frequent and are one of the most prevalent etiologies of facial fractures, involving mainly young men, which is in agreement with the findings of the present study 2,4 Our study took place in emergency center, Baquba Teaching Hospital .when the wearing of seat belts became compulsory by the new Traffic Code, car accidents are still one of the most frequent causes of maxillofacial fractures.

Passive safety devices such as frontal airbags and side airbags have been introduced in motor vehicles, mainly in Europe and North America, with studies demonstrating their role in the protection against the occurrence of maxillofacial fractures. We had no cases in which airbag-equipped vehicles were involved. Perhaps this was because in our area, the number of cars that have this device is very low, or perhaps t because in cases when the airbag was activated, it worked so well that no facial fracture occurred.

Consequently, the seat belt was the only safety device that could be evaluated. This fact corroborates the need for new

epidemiological studies that would be adequate for the specific conditions that exist in each location.

By analyzing car occupants, we realized that the distribution of patients with facial fractures in different seating positions was similar, with 20 patients (30%) sitting in the driver seat, 15 (30%) sitting in the front passenger seat and 20 (40%) sitting in the rear passenger seat. If one takes into account the fact that not all vehicles commute with all their seats full, one would expect a decrease pattern in the incidence of facial fractures among drivers, front-seat passengers and rear-seat passengers. The distribution of patients with facial fractures according to the seating position and the wearing of seat belts were very similar as well, except for Group E—Rear-seat passengers wearing seat belts—which was an empty group.

The numerous fractures in the group of rear-seat passengers not wearing seat belts were highlighted from the numbers of fractures in other positions. There was a contrast between the 55 fractures in the group of rear-seat passengers not wearing seat belts and the 41 fractures in the group of front-seat passengers not wearing seat belts, which was better studied after the F/P I was applied.

Our data demonstrate a protective effect of seat belts against facial fractures. Regardless of the seating position in the vehicle, the F/P I was 289.28% higher in the group of patients not wearing seat belts (F/P I = 2.725) than in the group of those who were wearing them (F/P I = 0.7), showing greater susceptibility to the occurrence of facial fractures among those not wearing seat belts.

However, the protective effect was not confirmed when we analyzed the wearing of seat belts in the driver position. The P/F I for drivers wearing seat belts was 0.7, and for drivers not wearing seat belts it was 2.6. In cases when drivers were wearing seat belts, the device may have managed to keep the patient's body

attached to the seat, not allowing them to be ejected, but permitting their heads to be thrown against the steering wheel, which resulted in maxillofacial fractures . Since the front passenger seat does not have a steering wheel in front of him, seat belts can be more effective in the prevention of facial fractures in this case.

It was not possible to evaluate the rear-seat passenger seats with respect to the efficacy of the wearing of seat belts, because none of these patients was wearing seat belts. Indeed, those were the seating positions in which the highest F/P I values were found, showing the susceptibility of rear-seat passengers to more complex injuries, with a large number of fractures in a single patient.

The number of patients with fractures among rear-seat passengers was relatively high (36.36%) when compared to the other groups, which alerts us to the significant role that not wearing seat belts may have in the etiology of facial fractures. A hypothesis to explain the relatively high incidence of facial fractures in rear-seat passengers is that they believe that they are better protected due to the central position that they occupy inside the vehicle and are therefore being less careful about wearing seat belts.

The high number of victims not wearing seat belts found in this study reflects the real situation of vehicle traffic in Diyala Baquba, showing the necessity to make a greater effort to increase the wearing of seat belts by car occupants.

Although current legislation imposes the wearing of seat belts for passengers in all seating positions in the vehicle, there must be an educational regarding the wearing of such devices, especially in the rear seats, where such prevention may bring a significant impact in the occurrence of maxillofacial fractures . The renewal of the passenger car fleet ought to bring more security, with an increase in the use of airbags (which have already proved to be an important tool in the prevention of maxillofacial fractures 6-8), thus reducing the incidence of fractures among drivers by interposing themselves between the driver’s face and the

steering wheel. A more comprehensive study of the dynamics of car accidents, mainly of those which involve rear-seat passengers, will probably bring benefits through the development of new safety devices for these commuters.

Because of the small number of patients in this study, it will be continued in order to increase in the number of cases, which will allow for a statistical analysis to support making more definitive conclusions.

CONCLUSION

1-Use of driver side airbags, when combine with use of seat belts result in decrease incidence and severity of maxillofacial trauma.

2-Wearing of seat belts appear to have a protective effect against the occurrence of facial fractures among front-seat passengers.

3-Seat belts of the drivers have limited effectiveness against facial fractures, due to the existence of the steering wheel.

4-It is not possible ta analyze wearing of seat belts among rear seat passengers

5-Rear seat passengers are more susceptible to maxillofacial fractures than Front seat passengers because none of these patients was wearing seat belts.

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