

## Head Injuries due to Motorcycle Accidents in Karbala-Iraq

### Prospective clinical Study

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#### Abstract

**Background:** Head injury is one of the most important causes of death in trauma, preventive measures are widespread but not applied in all countries, and motorcycle accidents account the major problem in Karbala for the last few years.

This study is aiming to compare the incidence, severity, outcome and other factors for each of motorcycle accidents from other causes of head injury in Karbala.

**Methods:** 240 patients sustained head injuries admitted to neurosurgical ward and intensive care unit, from 1st of January till the last of August 2008 in Al- Hussein Teaching Hospital, those patients had been divided into five groups according to the cause of head injury, the following parameters were analyzed, which are age, sex, severity of head injury, other systemic injury, type of treatment, and the outcome of each group.

**Results:** the study showed that patients with motorcycle accidents have the highest incidence (No. = 168, 70%), most of them were young, male, and carry the highest morbidity and mortality.

**Conclusion:** motorcycle accidents account for the highest incidence of head injury in Karbala in 2008 which carry high morbidity and mortality.

#### Recommendation:

1. Educate motorcyclist about the preventive measures which should be taken like helmet wearing, limitation of the speed of vehicles.
2. Strict traffic laws should be applied.

**Key Words:** head injury, motorcycle accidents, Karbala.

#### المخلص

**الخلفية:** اصابات الرأس أحد أهم أسباب الموت في مكان الصدمة، وعلى الرغم من وجود إجراءات وقائية واسعة الانتشار في العالم ولكن لا تطبق في اغلب الاحيان، وتعتبر حوادث الدراجات النارية المشكلة الرئيسية في كربلاء للسنوات القليلة الماضية.

**هدف الدراسة:** هذه الدراسة تُهدَفُ لمقارنة الشدة الخارجية على الراس من حيث النسبة المرضية و مقدار الشدة، ونتيجة الاصابة و عوامل أخرى لكل من حوادث الدراجات النارية بالمقارنة مع الأسباب الأخرى للشدة الخارجية على الراس في محافظة كربلاء المقدسة.

**الطرق:** 240 مريض اصابوا بجروح في الرأس ادخلوا إلى ردهة الجراحة العصبية ووحدة العناية المركزة، من الأول من يناير/كانون الثاني حتى الأخير من أغسطس/أب 2008 في مستشفى ال حسين التعليمي وتم توزيع المصابين الى مجاميع حسب نوع الاصابة (دراجات نارية , حوادث السيارات ..... الخ) واخذت معلومات تفصيلية عن العمر، والجنس، و شدة اصابة الرأس و هل هناك اصابات اخرى غير الراس و نوع المعالجة ، ونتيجة المعالجة لكل مجموعة.

**النتائج:** بينت الدراسة بأن المرضى بحوادث الدراجات النارية مثلوا النسبة الأعلى بين المصابين (= مصاب 168, 70%)، معظمهم كانوا باعمار الشباب , ذكور, تعرضوا لاثار شديدة و كانت نسبة الوفاة اكثر بينهم عند المقارنة بغيرهم من المجاميع.

**الخاتمة:** تُعتبر حوادث الدراجات النارية الحوادث الأعلى نسبة لاصابات الشدة الخارجية على الرأس في كربلاء لعام 2008 وادت الى اعلى نسب مرضية واكثر معدلات للوفاة.

**التوصية:**

1. تعلّم راکبی الدراجات النارية الإجراءات الوقائية التي يجب اتخاذها
2. يجب أن تُطبّق قوانين المرور الصارمة.
3. الإنتباه الخاص إلى أولئك الذين يتعرضون الى حوادث الدراجات النارية عند استقبالهم .
4. تطبيق إستراتيجيات الصدمة المتقدمة الإنعاشية ATLS

## Introduction

Traumatic injuries are a major public health problem imposing a greater burden on modern society than other diseases, but are the most preventable of major public health problems. In children and adults under age 45, injuries remain the leading cause of death, each year claiming more than 142000 American lives<sup>(1, 6)</sup> and causing more than 62 million Americans to seek medical attention<sup>(4,5)</sup> analysis of trauma literature has shown that 50% of all trauma deaths are secondary to traumatic brain injury<sup>(8, 36)</sup> prevention of injuries to the head appears to be the most effective means of improving survival rates , unlike many other major health problems , a variety of effective preventive measures are available , unfortunately they are not applied .<sup>(7, 35)</sup>

Head injuries can be classified according to many aspects (one of the important classification is according to conscious level of the injured patient using Glasgow coma scale GCS) into 3 types: mild head injury (GCS 14-15), moderate (GCS 9-13), and severe (GCS <8)<sup>(9, 34)</sup>.

Intensive management of traumatic brain injury (TBI) is directed toward prevention of further damage to an already compromised brain and maintenance of an optimum biological environment to promote neuronal recovery<sup>(10, 11, 33)</sup>.

The study of large population of TBI patients in the United States and United Kingdom has demonstrated that secondary injury in humans is responsible for increased morbidity and mortality<sup>(12, 13)</sup> .

Many factors play role in the outcome such as transport time to definitive neurosurgical care<sup>(14)</sup>, admission systemic oxygen value<sup>(15, 36)</sup>, admission systemic blood pressure<sup>(16)</sup>, timing of operative decompression of an intracranial

hematoma<sup>(17)</sup> length of time spent with an intra cranial pressure (ICP) greater than 20 mmHg<sup>(16, 32)</sup> the presence of traumatic arterial vasospasm<sup>(18, 30)</sup> and the episodes of jugular oxygen desaturation<sup>(19)</sup> level of cerebral perfusion pressure<sup>(23)</sup> .

Appropriate triage of head injured victims from the scene of an accident to medical center facilities is essential to begin proper aggressive management and to prevent secondary insults.<sup>(2,3, 22)</sup>

## Aim of the study

- 1- To show the incidence of head injuries by different mechanisms in Karbala - Iraq.
- 2- To compare between motorcycle accidents and other mechanisms of head injuries in terms of incidence, severity, morbidity, mortality and other variables

## Patients and Methods

This prospective clinical study was performed on 240 patients with head injuries who had been admitted to neurosurgical ward and intensive care unit in Al- Hussein Teaching Hospital, Karbala - Iraq, The study started on the 1<sup>st</sup> of January 2008 and completed on the last of August 2008.

The patients had been classified into five groups according to the mechanism of trauma, these include: motorcycle accidents (no= 168), car accidents (no=30), missiles injuries (no=3), fall from height (no=24) or others (no=15), for car and motorcycle accidents, both pedestrians and drivers or cyclists are included in this study.

Exclusive criteria include patients under alcohol or toxic drugs.

For each included patient, a detailed history was taken including name, age, sex, residence, detailed history about the

trauma, complete physical examination, using Glasgow Come score GCS to classify them into mild, moderate or severe, most of the patients were subjected to Brain CT scan according to the indications of Brain CT scan applied in head injured patients then they were treated accordingly (conservative or operative).

The fate of each patient was recognized to whether discharged well or with disability or died.

Statistical Methods: chi-square ( $\chi^2$ ) tests were used to assess whether the obtained differences could be accepted as insignificant (if  $p=0.05$ ), significant (if  $0.01 < p \leq 0.05$ ) or highly significant (if  $p \leq 0.01$ )<sup>(26)</sup>.

## Results

In the present study, 240 patients with head injuries admitted to Neurosurgical ward and Intensive care unit in Al-Hussein Teaching hospital, Karbala- Iraq.

**Distribution of patients according to the type of injuries:** Out of 240 patients, 168 patients (70%) were traumatized by motorcycles accidents (both the cyclists and the passengers), 30 patients (12.5%) with car accidents, 3 patients (1.25%) with missiles injuries, 24 patients (10%) with fall from height, and 15 patients (6.25%) with other types of injuries. In comparison among all types of head injuries, motorcycle accidents account the majority, the difference is highly significant ( $p < 0.01$ ) see table (1) and figure (1).

**The gender:** Most of the patients were male, total No. of male patients were 202 (84.2%) while female patients were 38 (15.8%). with a ration male: female (5.4: 1), the difference is highly significant ( $p < 0.01$ ), see table (2) and figure (2).

**The Age** Most of the patients are young below 20 yr. old age (no =151) (64.6%).

the difference is highly significant ( $p < 0.01$ ), fall from height affects the youngest age group; See table (3) and figure (3).

**Severity of head injuries** Most of the patients had mild head injuries (GCS 13-15) (no=130, 54.2%) while moderate head injuries (GCS 9-12) are 38 patients (15.8%), and those with severe head injuries (GCS $\leq$ 8) are 72 patients (30%) among those 66 patients got motorcycle accidents out of 168 (35.7%) and only 6 with car accidents out of 30 (20%) so that motorcycle accidents carry the highest risk, the difference is highly significant ( $p < 0.01$ ), see table (4) and figure (4 A,B).

**Other associated injuries:** Most of the patients have other systemic injuries (no=148, 61.25%) while only 92 patients (37.75%) showed no other injuries among those with other injuries, 108 patients (64.3%) out of 168 patients with motorcycle accidents got other systemic injuries which show the highest incidence in comparison to others, the difference is highly significant ( $p < 0.01$ ), See table (5) figure (5).

**Type of treatment:** Either conservative or surgical, out of 240 patients, 180 patients were treated conservatively (75%), while only 60 patients (25%) were treated surgically, motorcycle accidents account the majority of surgical demand, 52 patients out of 168 (44.8%), the difference is highly significant ( $p < 0.01$ ), see table (6) and figure (6).

**Fate of Patients:** (discharged well or with disability or died) most of the patients were discharged well (no=131, 62.9%), While only 43 patients (17.9%) died out of 240 patients, motorcycle accidents show the highest mortality rate 42 patients out of 168 (25%), the difference is highly significant ( $p < 0.01$ ), See table (7) and figure (7A,B).

Table (1) Distribution of patients according to the type of injuries

Type of Head Injuries	Patients Numbers	Percentage of total
Motorcycles accidents	168	70
Car accidents	30	12.5
Missiles injuries	3	1.25
Fall from height	24	10
Others	15	6.25
Total	240	100

Table (2) Distribution of patients according to the gender

Type of Head Injuries	Male Patients	Female Patients
Motorcycles accidents	150	18
Car accidents	25	5
Missiles injuries	3	0
Fall from height	15	9
Others	9	6
Total	202	38

Table (3) distribution of the age of patients in relation to type of injury

Type of Head Injuries	Patients Age			
	≤ 20 years	21 - 40 years	41 - 60 years	> 60 years
Motorcycles accidents	100	57	5	6
Car accidents	18	12	0	0
Missiles injuries	1	2	0	0
Fall from height	20	0	4	0
Others	12	1	2	0
Total	121	72	11	6

Table (4) distribution of severity of head injury according to the type of injury

Type of Head Injuries	Severity of Head Injuries		
	Mild Head Injury GCS (13 - 15)	Moderate Head Injury GCS (9-12)	Severe Head Injury GCS (≤ 8)
Motorcycles accidents	90	12	66
Car accidents	18	6	6
Missiles injuries	2	1	0
Fall from height	12	12	0
Others	8	7	0
Total	130	38	72

Table (5) distribution of other associated injuries in relation to type of injury

Type of Head Injuries	Associated Injuries				
	Spine	Musculoskeletal system	chest	Abdomen	None
Motorcycles accidents	8	78	18	4	60
Car accidents	6	0	0	0	18
Missiles injuries	0	0	0	0	1
Fall from height	2	12	1	1	8
Others	0	6	3	0	6
Total	16	104	22	5	93

Table (6) distribution of type of injuries in relation to type of treatment

Type of Head Injury	Mode of Treatment	
	Conservative	Operative
Motorcycles accidents	116	52
Car accidents	28	2
Missiles injuries	3	0
Fall from height	24	0
Others	12	3
Total	180	60

Table (7) distribution of type of injuries in relation to the fate of the patients

Type of Head Injury	Patients Fate		
	Discharged well	Discharged with Disability	Died
Motorcycles accidents	96	30	42
Car accidents	23	6	1
Missiles injuries	2	1	0
Fall from height	18	6	0
Others	12	3	0
Total	151	46	43

## Discussion

Motorcycle accidents are underreported from developing countries, Solagberu in his study showed that motorcycle accidents account 22.8% in China, 27% in Nigeria, 62% in Vietnam.<sup>(29)</sup>

In our study motorcycle accidents account the major cause of head injuries in Karbala in year 2008 70% (since first of January to the last of August) and this might be explained that there are many motorcycle vehicles in the markets which are cheap, with no proper traffic laws, besides no proper protective activities taken by motorcyclist.<sup>(27, 33)</sup>

Most of the injured patients were male (male: female 5.3:1) this is shown by other references<sup>(2, 1, 32, 34)</sup> possibly because men are more concerned with motorcycles and daily activities than women.

Most of the patients were young even below 20 yr. old shown by other references<sup>(2, 25, 28)</sup> (No. =151, 64.6%), most of the patients with motor bicycle accidents were young <20 yr (no=100 out of 168, 59.5%) possibly because no age limit to motorcyclists.

Most of the patients were classified as mild head injury GCS (13-15) (No.= 130, 54.2%) while it is 80% in other studies<sup>(2, 36)</sup> and this might be due to great number

of motorcycle accidents, while those with sever head injuries (GCS  $\leq$  8) accounts 30% (No.= 72) but motor bicycle accidents accounts the majority of those with sever head injuries (no=60 out of 168, 35.7%) and this is again might be due to no proper protective measures taken by the motorcyclist like wearing helmet, knee caps.. etc. , besides no limitation of the speed of motorcycle vehicles with no age limit<sup>(27, 29, 31)</sup>.

Most of the patients had got other associated systemic injuries<sup>(2, 20, 31)</sup> but motorcycle accidents showed the highest incidence (108 out of 168, 64.3%) possibly because no protective measures.<sup>(21, 32)</sup>

Conservative treatment was the most appropriate way of treatment to the majority of the patients<sup>(2)</sup> (No. = 180, 75%) because most of the patients got mild head injuries while only 60 patients (25%) were subjected to surgery, but from those who were subjected to surgery, 52 patients out of 168 (44.8%) were due to motorcycle accidents because they represent the most dangerous type than others<sup>(27)</sup> [noting that missiles injuries in this study were only 3 patients (1, 25%)]. Most of the patients were discharged well 62.9% (No. = 151) while those who died (No. = 43, 17.9%) were mostly due to motor bicycle accidents (No. = 42 out of 168, 25%)

which indicate the severity of this type of injury <sup>(24,27,34)</sup> Stella showed that large proportion of head injury related motorcycle crash deaths are related to the unsafe behavior of motorcyclists <sup>(28, 34)</sup> also Solagbera showed that motorcycle accident is 20 times higher risk of death than motor vehicle crash even in developed countries <sup>(29, 31)</sup>.

**Conclusion**

- 1- The type of trauma is different from one society to another according to many factors like geographical construction, religious and cultural background or other factors but the principles of management are the same; however preventive measures might be different.
- 2- Motorcycle accidents accounts the major type of trauma in Karbala during 2008 (January- last of August) associated with high morbidity & mortality which necessitate further burden on medical services and more cost on the Government.

**Recommendation**

- 1- Educate people regarding preventive measures to all motorcyclists like wearing helmet, knee caps...etc to decrease the incidence of trauma and to decrease budget used for this purpose.
- 2- Strict traffic laws should be applied regarding motor cyclist like
  - \* Limitation of age and avoid more than one person who rides the motor vehicle.
  - \* Use of preventive measures.
  - \* Limitation of speed of motor bicycle vehicles.
- 3- Pay special attention to those who sustain motorcycle accidents because they carry high morbidity & mortality
- 4- Apply Advanced Trauma Life Support strategies in our hospitals and improve the capacity of the emergency department in Karbala.

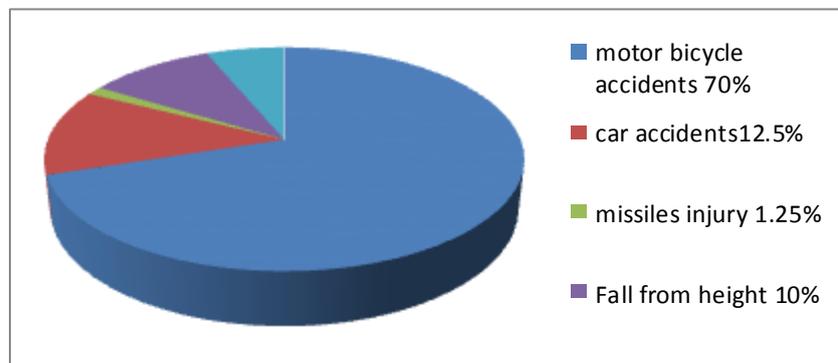


Figure (1) Distribution of patients according to the type of injuries

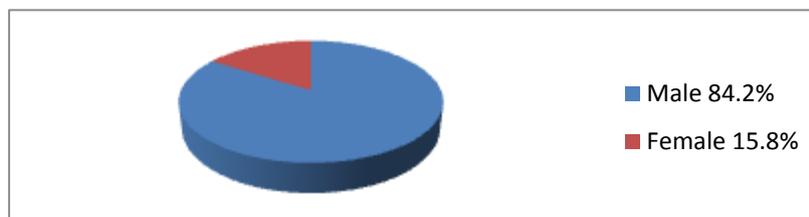


Figure (2) Distribution of patients according to the gender

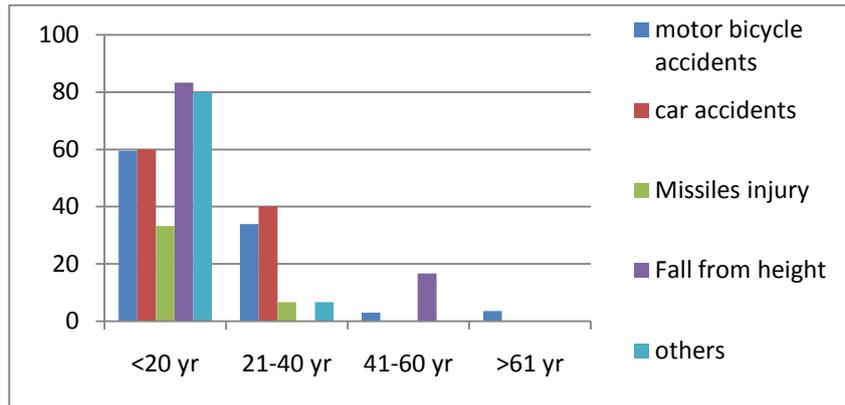


Figure (3) distribution of patients according to the age

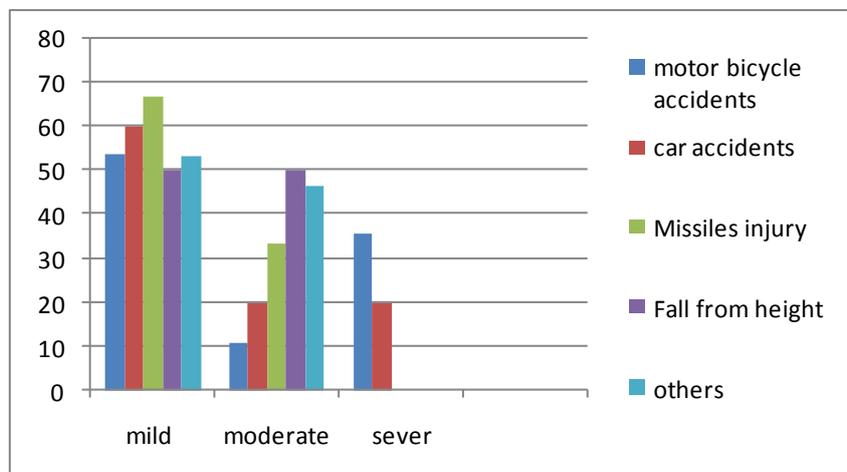


Figure (4 A) distribution of patients according to severity of head injury in different types of trauma

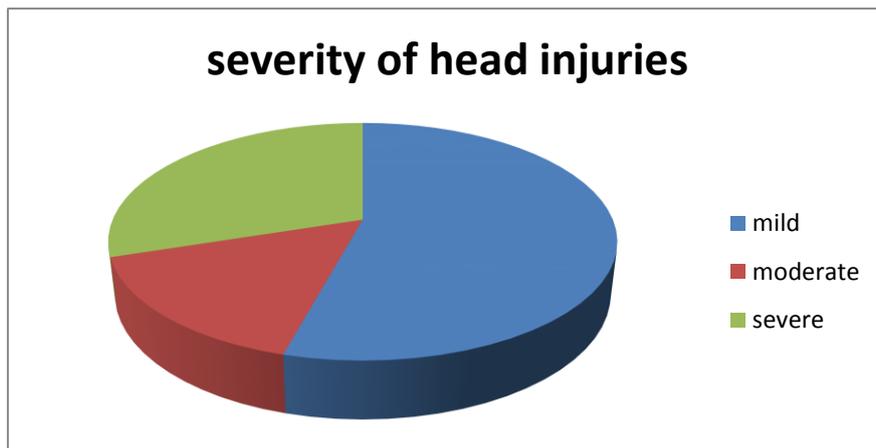


Figure (4 B) distribution of patients according to severity of head injury

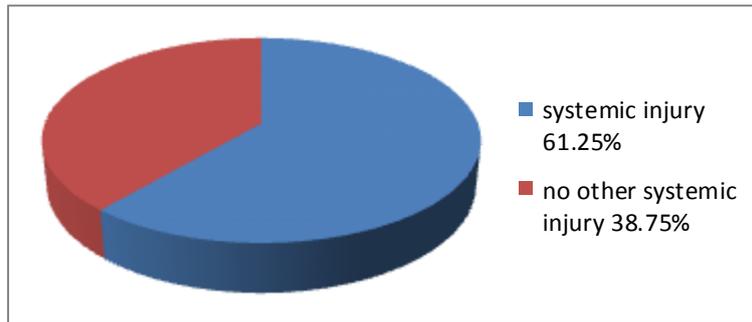


Figure (5) distribution of other systemic injuries

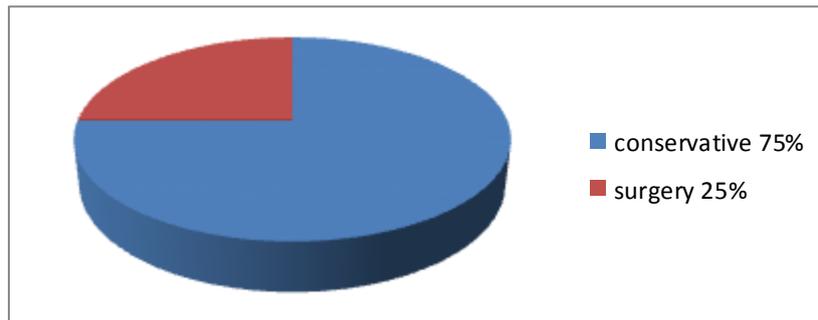


Figure (6 A) distribution of type of treatment

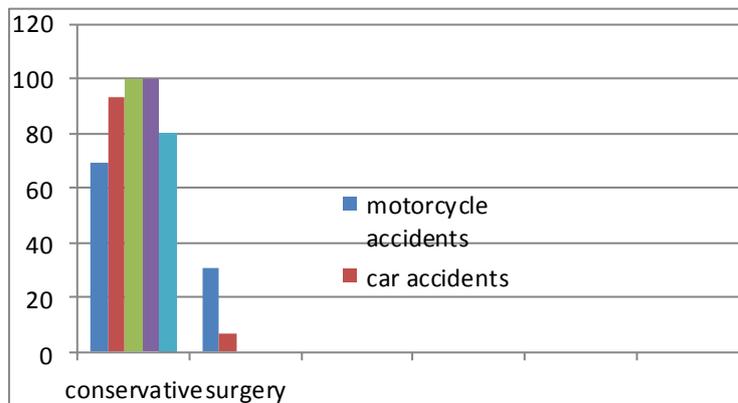


Figure (6 B) distribution of type of treatment in relation to type of injury

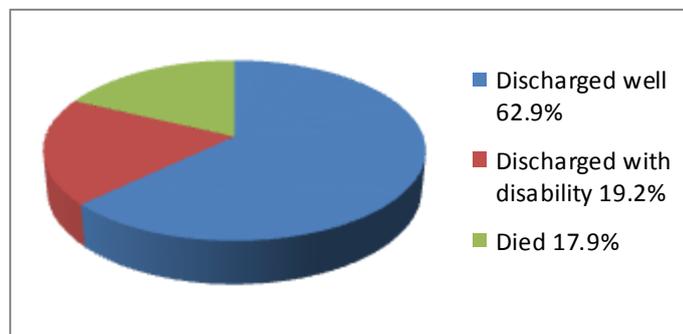


Figure (7 A) distribution of patients according to the fate

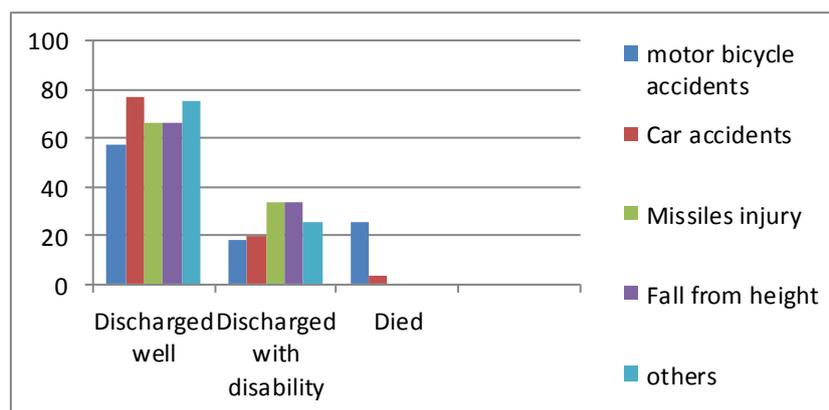


Figure (7 B) distribution of patients according to the fate in different types of trauma

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