

UDC 616-001:614.8:656.1:616.8-009.831:615.38

<https://doi.org/10.26641/2307-0404.2018.2.133954>

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**INJURIES TYPE AND ITS RELATION
WITH GLASGOW COMA SCALE,
INJURY SEVERITY SCORE
AND BLOOD TRANSFUSION
IN ROAD TRAFFIC ACCIDENT VICTIMS**

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Key words: *injuries type, Glasgow Coma Scale, injury severity score, blood transfusion, road traffic accident*
Ключові слова: *тип травми, шкала коми Глазго, оцінка тяжкості травми, переливання крові, ДТП*

Abstract. Injuries type and its relation with Glasgow Coma Scale, injury severity score and blood transfusion in road traffic accident Victims. Abdulaziz Abdullah Alqarni, Radhi Ghanem Alanazi, Anthony Morgan, Ahmed Saud Alharbi, Faisal Fahad Aljuaid, Abdulrahman Mohammed Aldawsari, Faisal Khaled Almugrin, Abdulaziz Nasser Alaskar, Yazeed Mohammed Aldhfyhan, Abdullah Abdulrahman Alqeari. Motor Vehicular Accidents claim about 1.2 million lives and injure more than 10 million people annually worldwide. The injuries caused by MVAs can be analyzed based on the type of injury, injury severity score, Glasgow Coma Scale and required blood transfusion. Methodology: A total number of 190 patients were included in this retrospective study from January 01, 2010 to December 31, 2015. The study aimed to determine the correlation between the type of injuries and GCS, ISS, and blood transfusions in the patients suffering from Motor Vehicle Accidents, who were presented to the Emergency Department at the King Khalid Hospital. All the data of the patients fulfilling the inclusion criteria were collected from the database at medical records department of the hospital. Results: Majority of the patients were adults Saudi male. 68.9% of the patients did not sustain shock, and 75.8% of patients did not require a blood transfusion. Patients with head, neck, chest, abdominal, internal organ, pelvic or spinal injuries conferred a statistically significant higher mean ISS. Patients with abdominal or internal organ injuries had a statistically significant higher mean units of blood transfused. GCS was seen to be lower in the head, neck, chest, abdominal, internal organ, spinal and other injuries. Conclusions: The study documents a significant correlation between the type of injury and GCS, ISS, and blood transfusion in victims of road traffic accident. Emergency physician and the caregivers should be more careful about the injuries associated with lower GCS. Patients sustaining injuries of certain parts related to high ISS (i.e., head, chest, abdominal, internal organ, pelvic) should be addressed on priority basis.

Реферат. Тип травми та його взаємозв'язок зі шкалою коми Глазго, шкалою тяжкості травми та переливанням крові при ДТП. Абдулазиз Абдулла Алькарні, Раді Ганем Аланазі, Ентоні Морган, Ахмед Сауд Альхарбі, Фейсал Фахад Аллюїд, Абдулрахман Мохаммед Алдасарі, Фейсал Халед Алмугрін, Абдулазиз Насер Аляскар, Язід Мохаммед Альдхфян, Абдулла Абдулрахман Алькеїр. Дорожньо-транспортні пригоди (ДТП) забирають приблизно 1,2 мільйона життів та понад 10 мільйонів людей одержують травми щороку в усьому світі. Пошкодження, спричинені ДТП, можуть бути проаналізовані залежно від типу травми, шкали тяжкості травми (ШТТ), шкали коми Глазго (ШКГ) та необхідності в переливанні крові. Методологія: у це ретроспективне дослідження було включено 190 пацієнтів, які отримали травму з 01 січня 2010 року по 31 грудня 2015 року. Метою дослідження було встановити співвідношення між типом травм та ШКГ, ШТТ та переливанням крові в пацієнтів, які постраждали в ДТП і які були доставлені

у відділення невідкладної допомоги Лікарні Короля Халіда. Всі дані пацієнтів, які відповідають критеріям включення, були зібрані з бази даних архіва медичної документації лікарні. Результати: переважно пацієнти були дорослими саудівськими чоловіками. 68,9% хворих не мали шоку, а 75,8% пацієнтів не потребували переливання крові. Пацієнти з травмами голови, шиї, грудної клітки, черевної порожнини, внутрішніх органів, таза або хребта мали статистично значущо вищі середні показники ШТТ. Пацієнти з абдомінальними або ураженнями внутрішніх органів мали статистично значущо вищі середні показники одиниць переливання крові. Як видно, показники ШКГ були нижчими при травмах голови, шиї, грудної клітки, черевної порожнини, внутрішніх органів, хребта та інших. Висновки. Дослідження доводить є суттєву кореляцію між видом травми та ШКГ, ШТТ та переливанням крові жертв ДТП. Лікар невідкладної допомоги та медичний персонал повинні бути більш обережними щодо травм, пов'язаних з нижчим рівнем показників ШКГ. Пацієнти, які отримали травми певних частин тіла, з високими показниками ШТТ (голова, грудна клітка, черевна порожнина, внутрішні органи, таз), повинні отримувати допомогу в пріоритетному порядку.

Motor Vehicular Accidents (MVAs) claim about 1.2 million lives and injure more than 10 million people annually worldwide [1]. Global Status Report on Road Safety has reported that MVAs were the ninth leading cause of mortality in 2004, and are expected to be the fifth leading by 2030, superseding Diabetes Mellitus (DM) and Human Immunodeficiency virus (HIV) infection [2]. MVAs are a significant cause of grief, disability and mortality, with a significantly higher prevalence in developing countries compared to developed ones [3, 4]. Despite being a developed country, the KSA is ranked as the second highest MVA country in the Gulf region, after Iran. Similarly, KSA encounters worse MVA and MVA-related mortality rates compared to other developed countries such as Europe and North America [5, 6]. It is estimated that approximately 4.7% of the mortality in KSA is directly attributed to MVAs [7]. Furthermore, mortalities arising from MVAs in KSA have increased from 17.4 to 24 per 100,000 in the last decade alone [5]. Taking reference from the morbidity and mortality records from the KSA Ministry of Health, one fifth of all hospital beds are occupied by MVA victims, and 81% of deaths occur due to injuries sustained from MVAs [8]. In the last 20 years, KSA has documented 86,000 deaths and 611,000 injuries, of which 7% of them resulted in permanent disabilities [9]. A review of MVAs in KSA performed in 2016 showed that injury is the chief cause of disability-adjusted life years (DALY) lost in KSA [10]. The human cost aside, MVAs in KSA also result in a staggeringly high annual cost of 6 billion US dollars [11]. [The impetus to prevent MVAs and to put in place effective interventions to mitigate the deleterious consequences of MVAs is clear from the aforementioned statistics. These interventions should be specifically targeted at the 5 pillars of road safety identified by the World Health Organization (WHO)—road safety management, road infrastructure, safe vehicles, safe behaviour and post-MVA care [12]. Law has mandated the wearing of seatbelts with fully operational speed cameras

installed in populous cities, with police supervision. Record keeping system for MVAs has also been endorsed by law [13]. However, more efforts are needed to be undertaken to document and audit MVA data, as evidenced by the gross discrepancies between police-reported information and health system information [13].

In KSA, human factors are found to be implicated in about 80% of MVAs – 76% of MVAs in 2010 were attributed to human factors [14, 15]. These human factors may include the skillset and driving style of the driver [16]. A study conducted in 2015 showed that speeding, non-compliance with traffic regulations, exhaustion and carelessness, were the leading causes of MVAs in the Asir region [17]. Although KSA is a developed country, it is plagued by a high prevalence of MVAs that could be explained by behavioural aspects. KSA is uniquely positioned because it is the only nation worldwide that legally precludes women from driving. All drivers, therefore, are male, and it has been shown that young males exhibit risk-taking behaviour and aggression, particularly when in proximity with fellow males [18]. Another review conducted by Mansuri et al. in 2015, showed that most MVAs in KSA involve teenagers having “high speed” as a top risk factor.

The injuries caused by MVAs can be analyzed based on the type of injury, injury severity score (ISS), Glasgow Coma Scale (GCS) and required blood transfusion. Described by Baker et al. [19], ISS uses the numerical grade scoring system, validated for the recording of the severity of trauma injury. Although ISS has a mathematical, administrative and clinical limitation; however, it is most often used as a “Gold Standard” to measure the severity of trauma [20]. Several studies have used ISS to grade trauma severity as major or severe. GCS has been a reliable and straightforward assessment and monitoring Scale for change in conscious level, especially after head injuries. It is the most common assessment Scale, widely used for the unconscious patients. However, GCS incorporates

certain limitations such as inter-observer reliability; time passed the injury occurred and confounding factors [21]. Blood transfusions are required when hemorrhagic shock occurs in the patients with MVAs or those bleed profusely. In this regard, trauma injuries causing continuous massive blood loss should be dealt at priority basis with the arrangement of blood transfusion.

Certain type of injuries may sustain high ISS and others may develop low ISS. Similarly, it is considered that there is a significant correlation between the type of injuries and ISS or GCS or blood transfusion. For instance, head, neck, chest, abdominal, internal organ, pelvic or spinal injuries conferred a statistically significant higher mean ISS. Hemorrhagic shock may range from first degree to 4th-degree shock. Additionally, certain types of injuries may have low GCS, revealing that the patient needs careful monitoring.

Patterns of injury seen in MVAs are influenced by the mechanisms of injury culminating in the MVA. Many case series reports have attempted to elucidate the myriad factors (epidemiology, profile of injury, risk factors, etc.) contributing to the type of patterns of injury seen [22, 23]. The severity of injuries is dependent on specific mechanisms and kinematics arising from the initial impact of a MVA upon an unprotected pedestrian [23, 24]. Several studies have aimed to characterise the significant patterns of injury seen in MVAs, from which lower extremity musculoskeletal injuries could be assessed as being the most common pattern seen [25, 26]. Other studies analyzed the patterns of injury seen in MVAs and have found that lower limb fractures are the most frequent injury seen [2, 27-29]. The highest number of victims are typically seen in the 20-30-year-old age group. Even the timing of the day influences the MVA rate – as evidenced by a study conducted in Riyadh by Al-Shammari et al. in 2009, which showed that 67% of all MVAs in Riyadh occurred between midnight and noon [30]. This study aims at determining a correlation between the type of injury and ISS or GCS, and the need for blood transfusion. It will be a unique study as data is lacking about the topic of our interest in this study.

MATERIALS AND METHODS

We conducted this cross-sectional retrospective study in order to determine the type of injury and its correlation with Glasgow Coma Scale (GCS), Injury Severity Score (ISS) and blood transfusions in the victims of motor vehicle accidents (MVA) in central rural region of Kingdom of Saudi Arabia (KSA) during the period from January 01, 2010 to December 31, 2015. The study was conducted at King Khalid Hospital and Prince Sultan Center for Health

Services (KKH & PSCHS) after having a written permission from the ethical committee and research department of the hospital. King Khalid Hospital and Prince Sultan Center for Health Services is a major hospital in Al-Kharj Governorate, affiliated with the Prince Sattam Bin Abdulaziz University. KKH & PSCHS utilizes the national delivery system to provide preventive, curative, and rehabilitative healthcare services to Saudi people. It caters healthcare needs of Al-Kharj Industrial City and its neighboring communities. Hence, a large number of patients are referred from the peripheries to KKH & PSCHS for consultations and better management.

The study aimed to determine the correlation between the type of injuries and GCS, ISS, and blood transfusions in the patients suffering from Motor Vehicle Accidents (MVA), who were presented to the Emergency Department at the King Khalid Hospital. Inclusion criteria of the study included all the patients with road traffic accident (RTA) mechanism of injury who stayed at the hospital for more than 24 hours during the given period of the study. Exclusion criteria of the study included all those who were not with the RTA mechanism of injury and those whose hospital stay was less than 24 hours. All the data of the patients fulfilling the inclusion criteria were collected from the database at medical records department of the hospital. The files of the patients collected were admitted in the given period in order to study patients' characteristics. The demographic data including patient's name, age, gender and severity of the injury were recorded on the pre-designed proforma.

The patients with trauma were categorized according to the nature of the accident and its severity in accordance with Injury Severity Score (ISS) classification. All the cases were subdivided into the groups according to the injured body area: upper and lower limbs, head and neck, chest, abdominal, pelvic, spine and multiple injuries. The data were analyzed for statistical significance using 20th versions of the Statistical Package for the Social Sciences (SPSS). The results were tabulated as given below. The quantitative variables like age and its categories were presented by calculating mean and standard deviation. The qualitative variables like gender, nationality, and type of injury were presented by calculating frequency and percentages. Correlation between the severity of injury and multiple parameters were studied. Mann-Whitney U test was applied to assess the correlation between the type of injury and GCS or ISS or blood transfusions. Effect modifiers like age, gender, and

the severity of the accident were controlled through stratification.

A total of 190 patients were recruited for this study. This study is aimed to determine the correlation between the type of injuries and GCS, ISS and blood transfusions in the patients suffering from Motor Vehicle Accidents (MVA). A majority of the patients considered for this study were adults (74.7%), of which young adults prevailed (61.5%). Majority of the patients considered for the study were Saudis (63.1%), and most of them were male

(n=177). 68.9% of the patient did not sustain shock, whereas 21.1% experienced 1st-degree shock, 8.4% passed through 2nd-degree shock, 1.1% went through 3rd-degree shock and 0.5%, 4th-degree shock respectively. 75.8 of patients did not require a blood transfusion, whereas 8.4% of patients required 1 unit of blood transfusion, and 15.8% of patients required 2 or more units of blood transfusion. A detailed breakdown of demographics, Shock Degree, and Blood Transfusion can be referred to in Table 1.

Table 1

Distribution of Age Category , Nationality, Gender, Shock Degree , and Blood Transfusion

		Frequency	Percent
Age Category	0-10	11	5.8%
	11-20	37	19.5%
	21-30	70	36.8%
	31-40	47	24.7%
	41-50	8	4.2%
	51-60	13	6.8%
	ABOVE 60	4	2.1%
Nationality	Saudi	120	63.1%
	Non-Saudi	70	36.8%
Gender	FEMALE	13	6.8%
	MALE	177	93.2%
Shock Degree	1ST DEGREE	40	21.1%
	2ND DEGREE	16	8.4%
	3RD DEGREE	2	1.1%
	4TH DEGREE	1	0.5%
	NO SHOCK	131	68.9%
Blood Transfusion	1 UNIT	16	8.4%
	2 UNITS	15	7.9%
	3 UNITS	5	2.6%
	4 UNITS	6	3.2%
	5 UNITS	2	1.1%
	More Than 5	2	1.1%
	No Blood Transfusion	144	75.7%

RESULTS AND DISCUSSION

Analysis of the patterns of injury seen amongst the 190 patients recruited for this study was performed. Taking reference from Figure 1, head injuries and lower limb injuries ranked chiefly amongst all injuries documented at 50.5% and 36.6% respectively. This is in line with results from other studies and will be accounted for in the discussion. After head injuries and lower limb injuries, scalp injuries and chest injuries are seen to be the next highest in prevalence at 34.2% and 32.6% respectively. Of note,

22.1% of the patients had documented brain damage, which implies that almost half (44.2%) of the patients with head injuries sustained brain damage from presumably severe head injuries. Taking reference from Figure 2, the same proportion (44.2%) of head injury patients sustained skull fractures. This is expected, as severe head injuries caused by force strong enough to cause skull fractures, typically lead to underlying traumatic brain injury.

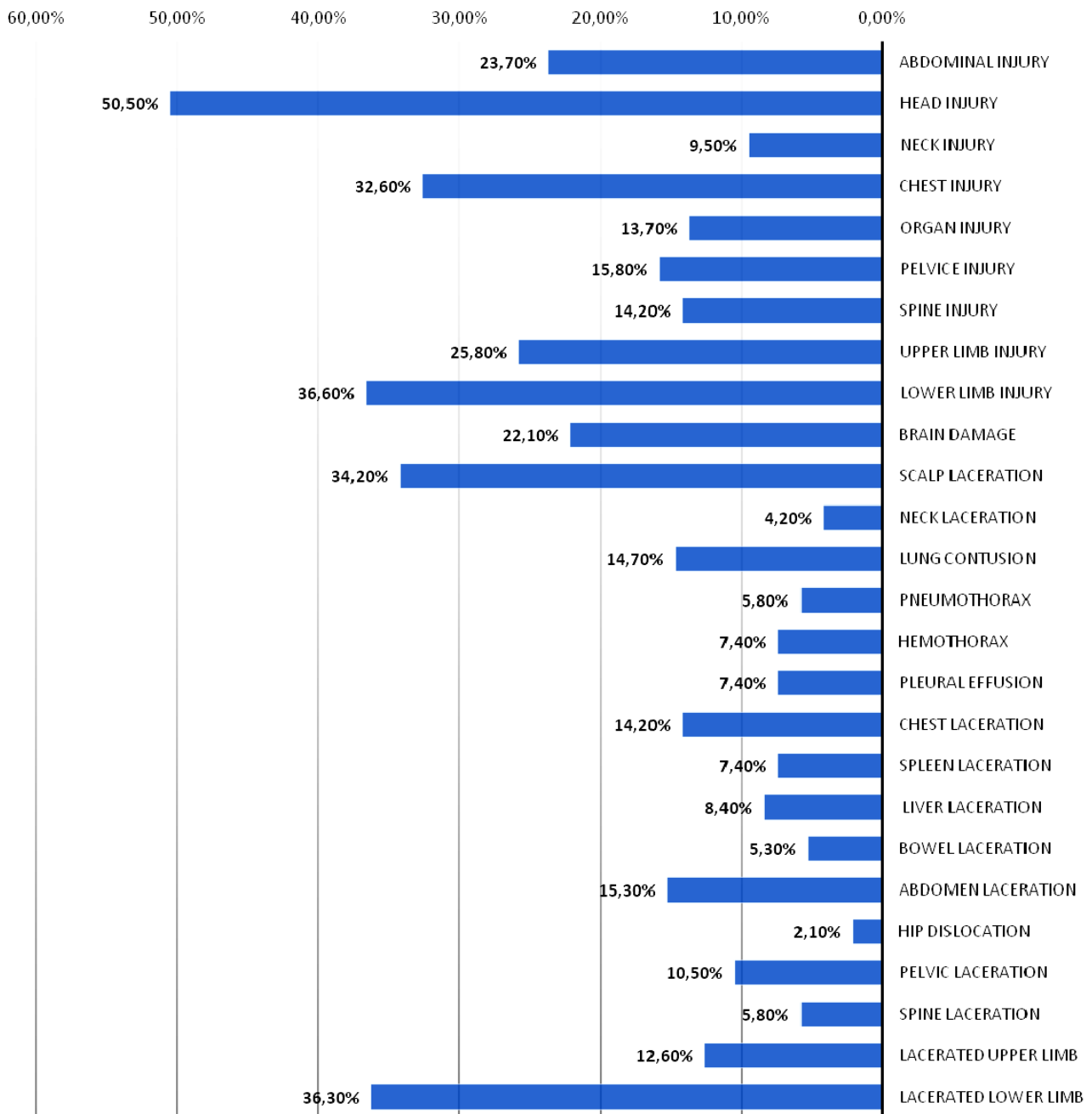


Fig. 1. Patterns of Injury

23.7% of all patients sustained abdominal injuries. Of this population (n=45), 57.8% of patients (n=26) sustained abdominal organ injuries, which include spleen and liver lacerations, as well as bowel lacerations. It can be inferred that 57.8% of abdominal injuries seen in this study were severe due to the blunt trauma force required to cause internal organ damage.

Taking reference from Figure 2, skull and rib fractures account for most of the fractures seen in this cohort, at 22.1% and 21.1% respectively. Lower limb fractures such as tibial and fibular fractures are perceived to be highly prevalent at 10% and 8.4% respectively.

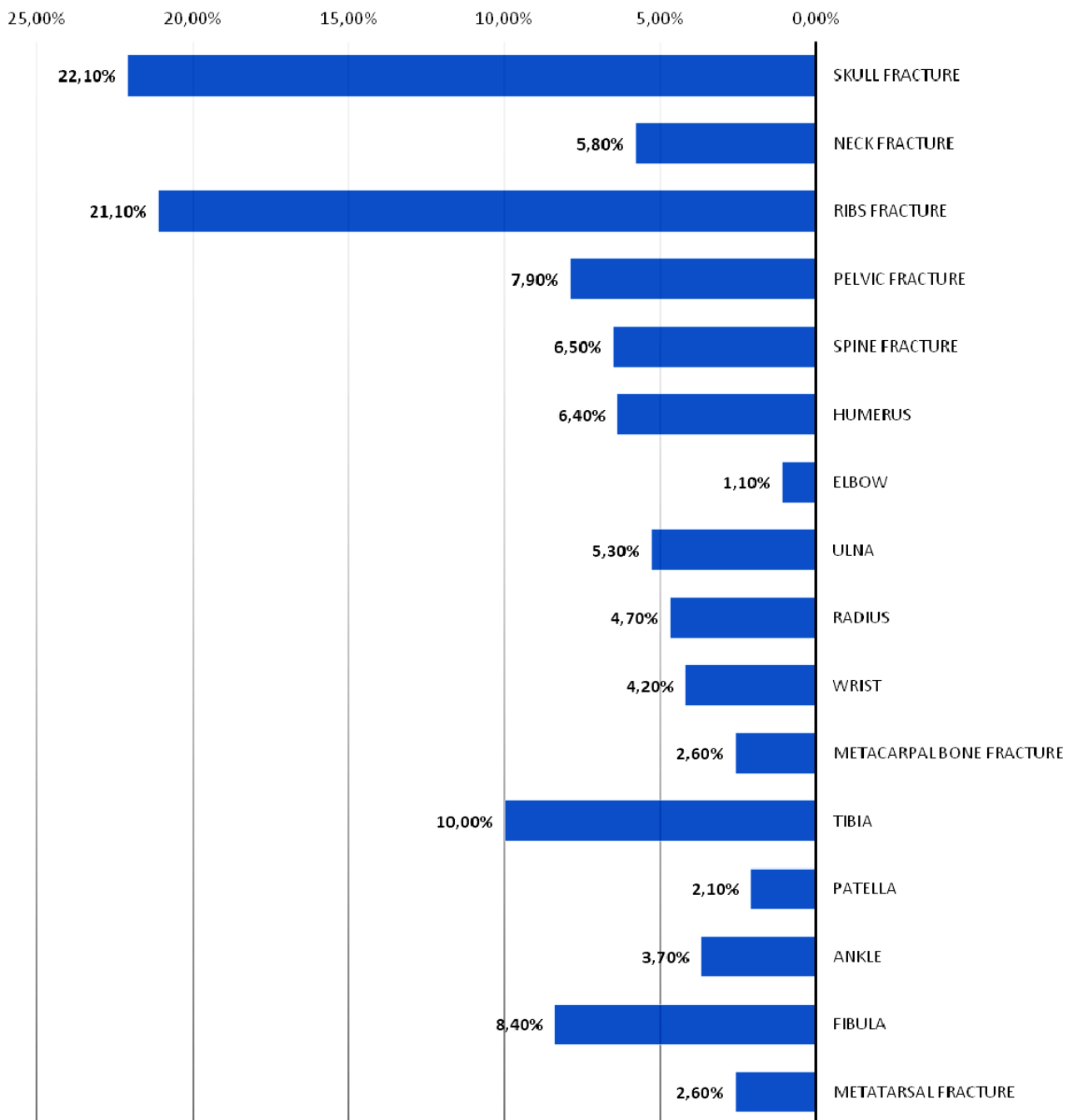


Fig. 2. Patterns of Fractures

The mean Injury Severity Score (ISS) was seen to be higher in the presence of certain patterns of

injury, than without. This was so for all patterns of injury, except for upper and lower limb injuries.

The Mann-Whitney U test showed that having head, neck, chest, abdominal, internal organ, pelvic or spinal injuries conferred a statistically

significant higher mean ISS. A detailed breakdown of result can be referred to in Table 2.

Table 2

Mean (SD) of ISS by injuries

Injury Type		Frequency	Mean	Std. Deviation
Head Injury	No	94	14.46	1.163
	Yes	96	13.05	2.822
p value	0.000*			
Neck Injury	No	172	13.98	2.152
	Yes	18	12.50	3.204
p value	0.019*			
Chest Injury	No	128	14.13	1.867
	Yes	62	13.23	2.933
p value	0.013*			
Abdominal Injury	No	145	13.99	2.162
	Yes	45	13.33	2.671
p value	0.028*			
Organ Injury	No	146	13.19	2.241
	Yes	26	13.35	2.652
p value	0.029*			
Pelvis Injury	No	160	13.79	2.326
	Yes	30	14.07	1.196
p value	0.324			
Spine Injury	No	163	14.01	2.014
	Yes	27	12.81	3.465
p value	0.196			
Upper Limb Injury	No	141	13.70	2.324
	Yes	49	14.24	2.213
p value	0.009*			
Lower Limb Injury	No	121	13.64	2.519
	Yes	69	14.17	1.831
p value	0.098			
Other Injury	No	181	13.89	2.178
	Yes	9	12.78	4.147
p value	0.858			

Note. Mean (SD) ISS was higher in all the injuries except upper and lower limb injuries. Moreover, Mann-Whitney U test showed a statistically significant higher mean ISS in all injuries except upper and lower limb; and other injuries.

The mean Glasgow Coma Scale (GCS) was seen to be lower in head, neck, chest, abdominal, internal organ, spinal and other injuries. The Mann-Whitney U test showed that having head, neck, chest, ab-

dominal, internal organ or pelvic injuries conferred a statistically significant lower mean GCS. A detailed breakdown of result can be seen in Table 3.

Table 3

Mean (SD) of GCS by injuries

Injury Type		Frequency	Mean	Std.Deviation
Head Injury	No	94	17.87	10.861
	Yes	96	21.40	11.982
p value	0.039*			
Neck Injury	No	172	18.81	11.138
	Yes	18	27.72	12.578
p value	0.002*			
Chest Injury	No	128	16.99	9.898
	Yes	62	25.15	12.792
p value	0.000*			
Abdominal Injury	No	145	16.43	8.404
	Yes	45	30.04	14.029
p value	0.000*			
Organ Injury	No	146	17.05	9.042
	Yes	26	36.08	12.241
p value	0.000*			
Pelvis Injury	No	160	19.00	11.526
	Yes	30	23.13	11.209
p value	0.024*			
Spine Injury	No	163	18.39	10.764
	Yes	27	27.30	13.286
p value	0.000*			
Upper Limb Injury	No	141	20.65	12.156
	Yes	49	16.80	9.097
p value	p=0.075			
Lower Limb Injury	No	121	19.90	12.076
	Yes	69	19.22	10.644
p value	0.959			
Other Injury	No	181	19.59	11.380
	Yes	9	21.00	15.289
p value	0.965			

Note. Mean (SD) GCS was higher in pelvis, upper, and lower limb injuries. However, Mann-Whitney U test showed statistical significance only in upper limb injury. On the other hand, mean (SD) GCS was lower in all the other injuries. Moreover, Mann-Whitney U test statistically significance in all injuries except spine and other injuries.

The Mann-Whitney U test also showed that patients with abdominal or internal organ injuries had a statistically significant higher mean units of blood transfused. A detailed breakdown of result can be seen in Table 4.

Two-way cross-tabulation showed that patients with chest, abdominal and internal organ injuries were more likely to sustain a 1st-degree shock, while those with pelvic injuries were most likely to sustain a 2nd-degree shock, and those with upper or lower limb injuries were unlikely to have any degree of shock.

Kingdom of Saudi Arabia (KSA) records a significant number of motor vehicular accidents (MVA) annually, affecting the quality of life. The present study included 190 patients, having the majority of Saudi Arabians, male and young adults. The most common injuries were head injuries and lower limb injuries, followed by scalp and chest injuries. Head injuries resulted in brain damage or skull fractures in a significant number of patients. In descending order, skull, ribs, tibial and fibular fractures were the most common fractures in the study. Regarding fractures, skull and rib fractures ranked above all. The present study reported a significant correlation between the type of injuries and Glasgow Coma Scale (GCS) or Injury Severity Score (ISS) or degree of shock or blood transfusion.

Studies have reported that young and economically active people are more prone to road traffic accidents (RTAs), mainly males aged 45 years or younger "31". It shows that the previous studies support the results of the recent study in terms of RTAs among the young adults. In the present study, males were more involved in MVAs as only males are allowed to drive in KSA at the time the study was conducted. So, males experience most of the road traffic injuries (RTIs) "32". Additionally, more than 50% of deaths caused by RTIs occur among young adults"33". In young people, high speed is the most common cause of RTAs. Al-Naami et al. reviewed trauma care system in KSA and reported high speed, over-confidence, thrill-seeking, violation of the traffic laws, aggressive personality traits, poor education, stress and lack of good attitude as reasons of MVAs among young adults"34". All these shortcomings found in young adults result in increased trauma and mortality among them.

The present study revealed head injuries and lower limb injuries as most common injuries among Saudi drivers. Brimmah et al. surveyed the epidemiology of RTIs in Qassim Region of KSA including 835 participants with RTIs"32". They reported head/neck (63.19%) and lower limb injuries (27.87%) as most common RTIs. It shows a high

prevalence of head injuries and low prevalence of lower limb injuries as compared to the results of the present study. However, it may depend on the type of motor vehicle and severity of accidents. Similarly, Mansuri et al. also reported the head and limb injuries as most common road traffic injuries in KSA. Batouk et al. reviewed the data of 303 RTA victims seen dead in an emergency room of Assir Central Hospital Saudi Arabia. On the contrast to the present study, they reported limb injuries as the most common type of injuries followed by head and neck injuries"35".

In Hapur, India, Singh et al. conducted a retrospective record-based study on the pattern and severity of RTIs among 347 patients"36". They reported extremities as the most common injured regions (53.54%) of the body followed by maxillofacial trauma (MFT). They reported head and neck injuries in 18.78% patients. It indicates that Singh et al. reported less head and neck injuries as compared to the present study. This variation may be attributed to the violation of certain traffic rules such as not using seat belts. On the contrast, Farooqui et al. conducted a prospective study on the socio-demographic profile and pattern of injuries in victims of RTA in the district of Maharashtra state, India "37". They included 98 victims of RTA and reported most common injuries (32.44%) in head and neck regions. It shows that the pattern of injuries varies with the locations even within the same country. Shanks et al. conducted an audit of 361 RTA victims presenting in the emergency room of King Khalid National Guard Hospital (KKNHG), Jeddah, and reported that none of them was wearing a seatbelt "38". Hence in KSA, not wearing seatbelts may be the cause of increased head and neck injuries. However, in the recent years, traffic rules and regulations are being improved in KSA to prevent the high rate of MVAs.

In the present study, 22.1% of the patients suffered from brain damage, accounting for almost half (44.2%) of the patients with head injuries sustained brain damage from presumably severe head injuries. Motor vehicle accidents account for 50% traumatic brain injuries (TBIs) with high mortality rate "39". TBIs usually involve young adults and significantly affect the quality of life. Majdan et al. studied 683 individuals with RTA in five European countries and reported TBIs in 44% patients "40". Therefore, a significant association between TBIs and MVAs, especially in KSA, warrants for the development of sound preventive measures and trauma care.

The present study reported a vital association between type of injury and ISS. Head, neck, chest, abdominal, internal organ, pelvic or spinal injuries conferred a statistically significant higher mean ISS.

Previous studies support this outcome in terms of the type of injury and ISS. For instance, Koo et al. conducted a questionnaire-based survey to determine the correlation between ISS and long-term quality of life in trauma patients. They reported that severity of the injury is associated with a long-term disability

“41”. However, data on the relationship between the type of injury and ISS is lacking. Hence, the present study is a valuable addition to the literature in terms of the type of injury and ISS. It invites further studies to determine which type of injury sustains higher ISS and to validate the results of the present study.

Table 4

Mean (SD) of blood transfusion by injuries

Injury Type		Frequency	Mean	Std.Deviation
Head Injury	No	94	0.87	2.347
	Yes	96	0.44	1.014
	p value	0.159		
Neck Injury	No	172	0.64	1.854
	Yes	18	0.78	1.353
	p value	0.328		
Chest Injury	No	128	0.61	2.036
	Yes	62	0.74	1.227
	p value	0.019		
Abdominal Injury	No	145	0.23	0.677
	Yes	45	2.00	3.184
	p value	0.000*		
Organ Injury	No	146	0.37	1.515
	Yes	26	2.46	2.420
	p value	0.000*		
Pelvis Injury	No	160	0.51	1.355
	Yes	30	1.40	3.255
	p value	0.052		
Spine Injury	No	163	0.60	1.669
	Yes	27	0.96	2.519
	p value	0.990		
Upper Limb Injury	No	141	0.67	1.520
	Yes	49	0.61	2.482
	p value	p=0.232		
Lower Limb Injury	No	121	0.53	1.141
	Yes	69	0.87	2.595
	p value	0.668		
Other Injury	No	181	0.62	1.802
	Yes	9	1.22	1.986
	p value	0.965		

Note. Mann-Whitney U test showed a statistically significant difference in the mean blood transfusion unit in abdominal and organ injuries only.

In the present study, 21.1% experienced 1st-degree shock, 8.4%, 2nd-degree shock, 1.1%, 3rd-degree shock and 0.5%, 4th-degree shock respectively. Considering the shock, 8.4% of patients required 01 unit of blood transfusion, and 15.8% of patients required 2 or more units of blood transfusion. Chest, abdominal and internal organ injuries were more likely to sustain a 1st-degree shock, those with pelvic injuries were most likely to sustain a 2nd-degree shock, and those with upper or lower limb injuries were unlikely to have any degree of shock. Abdominal or internal organ injuries had a statistically significant higher mean units of blood transfused. The present study is unique to document the degree of shock and number of units of blood required in the patients with MVA. The present study reveals that head, neck, chest, abdominal, internal organ or pelvic injuries conferred a statistically significant lower mean GCS. Usually, low GCS is associated with traumatic brain injury and depends upon its severity. However, literature is lacking in terms of the type of injury and GCS. Hence, large-scale studies are required to address these entities in KSA. Similarly, more studies are required to be performed worldwide in terms of patterns of injury and GCS or degree of shock.

CONCLUSION

In conclusion the present study is a unique study, which documents the significant relationship between the type of injury and GCS, ISS, and blood transfusion in victims of road traffic accident. It indicates that the emergency physician or the caregivers should be more careful about the injuries associated with lower GCS, e.g., head, neck, chest, abdominal, internal organ or pelvic injuries. Such injuries should be admitted in high dependency unit (HDU), and intensive care should be provided. Endotracheal tube insertion or tracheostomy should be considered if the airway is not secured. Similarly, the patients having injuries of certain parts with high ISS (i.e., head, neck, chest, abdominal, internal organ, pelvic or spinal injuries) should be addressed on priority basis. Additionally, drivers of motor vehicles should strictly follow the traffic rules and regulations, especially wearing of seat belts to avoid severe injuries. However, literature is lacking on this topic of discussion. Therefore, more studies at a large scale are required to validate the results of the present study.

Acknowledgement. We would like to express our sincere appreciation to the administration and medical staff of King Khalid Hospital & Prince Sultan Center for Health Services.

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The article has been received
2018.06.01