

# Prevalence and severity of non-traumatic acute kidney injury in multiple trauma patients attending emergency department

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## Abstract

**Aim:** Early prediction of acute kidney injury in multiple trauma patients to decrease its sequel and begin early treatment to improve outcome. Acute kidney injury (AKI) is an uncommon but serious complication after trauma. In large trauma victims, the incidence of post-traumatic AKI varies from 0.098 to 8.4% in published series with mortality ranging from 7 to 83%.

Patients who develop AKI have a high mortality rate, especially when requiring dialysis with rates ranging from 37% to 88%. There has been progressive technical and scientific development in patient care towards AKI prevention.

**Material and Methods:** This study is prospective study conducted in emergency department (ED) and randomly selected 270 multiple trauma patients at Suez Canal university hospital from them 21 patients developed acute kidney injury. And select according the Inclusion criteria and exclusion criteria.

**Results:** All included 270 patients with multiple trauma 21 (7.7%) developed AKI and 3 (1.1%) of them required dialysis with mortality rate of (38%). 88.50% of multiple trauma patients were suffering from head trauma and (50.30%) were having abdominal injury while 36.80% were suffering from orthopedic trauma. And patients were developed AKI divided into 3 stages; stage one (5.20%), stage two (1.50%), and stage three (1.10%).

**Conclusion:** Majority of studied patients were have normal creatinine level at time of arrival, after 24hrs some patients developed acute kidney injury and the most common cause was hypovolemic shock while the most common cause of mortality in acute kidney injury was septic shock.

**Keywords:** Acute kidney injuries; polytrauma, outcome

## INTRODUCTION

Trauma is defined as an injury to human organs and anybody structures that result from transfer of energy from environment. Injuries are caused by variant forms of energy that human body could not be tolerated and beyond body's resilience. Trauma is the most dangerous and serious global health problem, estimated as one in 10 deaths worldwide (1).

Trauma is responsible about approximately for 5 million deaths annually, of which one million are in Europe. Almost half of injury-related mortality is in young people between the ages of 15 and 44 years. Hence, the burden to society

due to loss of productivity is enormous; costing about a total of 182 million disability adjusted life years loses per year (2).

Trauma is ranked to be the third leading cause of death in all age group in the developed world and the highest cause of death in those persons between 1-44 years old. According to the World Health Organization (WHO), by the year 2020, trauma will be the leading cause of years of life lost in both developed and developing countries equally (3).

Trauma has different mechanisms which divided into traumatic brain injury, chest trauma, abdominal trauma

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and musculoskeletal trauma. When a person experiences more than one simultaneous injury, we called multiple trauma patients. Acute kidney injury (AKI) is an uncommon but serious complication after trauma (4).

Acute kidney injury (AKI) can be defined as the sudden loss of kidney function which is potentially reversible regardless of etiology or mechanisms. Recent criteria for acute kidney injury (AKI) classification, such as AKIN is currently considered as a reference standard for the evaluation of hospitalized patients (5).

The AKIN classification/staging system of acute kidney injury: (6).

Stage	Serum creatinine	Urine out put
One	↑ SCr ( $\geq 0.3$ mg/dL) or ↑ SCr $\geq 150 - 200\%$ ( $1.5 - 2\times$ )	<0.5 mL/kg/h (>6 h)
Two	↑ SCr >200 - 300% (>2 - 3 $\times$ )	<0.5 mL/kg/h (>12 h)
Three	↑ SCr >300% (>3 $\times$ ) or if baseline SCr $\geq 353.6$ $\mu\text{mol/L}$ ( $\geq 4$ mg/dL) or ↑ SCr $\geq 44.2$ $\mu\text{mol/L}$ ( $\geq 0.5$ mg/dL)	<0.3 mL/kg/h (24 h) or anuria (12 h)

During the Second World War, there were many studies reporting an association between AKI and acute trauma and were published their results. Since then there has been progressive technical support and scientific attention to patient care towards AKI prevention (7).

While the early literature suggested that AKI was secondary to crush injuries and rhabdomyolysis. Renal impairment in those patients was recorded due to death or damage of tubular cells because of the imbalance between oxygen supply and demand of energy secondary to hypoperfusion (8). Our study aimed to detect acute kidney injury in multiple trauma patients to decrease its sequale and improve outcome.

## MATERIAL and METHODS

### Research design

This study was a prospective study and carried out in Emergency Medicine Department at Suez Canal University Hospitals.

### Study population

All multiple trauma patients attending to the Emergency Department (ED) of the Suez Canal university Hospital and fulfilling our inclusion criteria were included as follow.

### Inclusion criteria

- 1-Adult patients (more than 18 years old) even normal or with comorbid conditions as DM or HTN.
- 2-Both sexes.

### Exclusion criteria

- 1-Patients transferred from other hospitals for other consultation
- 2-patients under 18 years old
- 3-patients on drugs affecting on kidney (aminoglycosides-digitalis)
- 4-patients with history of CKD

## STUDY OBJECTIVES

### Aim of Work

This study aimed to early prediction of acute kidney injury in multiple trauma patients to decrease its sequel and begin early treatment to improve outcome.

### Study Questions

- Is Acute kidney injury is common in multiple trauma patients?
- What is the prevalence of AKI and risk factors?

### Primary objective

- To asses Prevalence, severity and outcome of acute kidney injury in multiple trauma patients in ER department in Suez Canal University hospitals.

### Secondary objective

- To find out the risk factors for multiple trauma patient with non-traumatic kidney injury at Emergency Room.

### Sample size

All multiple trauma patients who came emergency department in Suez Canal University during 6 months starting from the beginning of April 2016 to the end of September 2016 .

### Methods

Data was recorded in pre-organized data sheet by the researcher from patients fulfilling inclusion and exclusion criteria. Patients were clinically assessed and managed by the ABCDE protocol. After stabilizing the patient, the following was studied:

### Study plan

*All multiple trauma patients in Emergency room were subjected to*

#### 1- Full history (from patient or relative) including

- 1-patient's file number.
- 2-Patient personal data: Age, Sex, Occupation and residence.
- 3- Date of admission and date of discharge to calculate the patient's Length of stay (LOS) in hospital
- 4- Timing of injury and timing of admission.
- 5-Mechanism and type of injury.
- 6- Associated co-morbidity e.g. common endocrinal, cardiovascular, Drug abuse or blood transfusion.

o **Clinical evaluation:** Clinical evaluation of the patients was carried out at the time of arrival to Emergency Medicine Department regarding: Initial assessment of ABCDE was done (airway and cervical spine control, breathing, circulation, dysfunction of the central nervous system and exposure). Careful assessment of the patient's condition either stable or unstable was settled and determines the further investigations and plane of management.

o **Risk factors:**

- Age
- time of transfer
- sex
- Drugs used
- comorbid condition including HTN, DM

**2- Clinical examination**

- Vital signs: pulse, blood pressure, respiratory rate.
- Initial assessment of ABCDE (airway and cervical spine control, breathing, circulation, dysfunction of central nervous system and exposure).
- Abdominal examination (for abdominal tenderness and/or rigidity).
- Urine output at time of arrival and during 48 hrs.

**3-Investigations include**

- Laboratory investigations, as complete blood count, blood typing and cross match and coagulation profile , CK & serum creatinine
- Serum creatinine was measured at time of arrival then after 24hrs then after 48 hrs.
- Radiographic investigations, as Plain chest x-ray, pelvic-abdominal ultrasound.

o **Treatment:** It was concern with patients having acute kidney failure according to AKIN criteria

o **Follow up for** risk factors that could cause acute kidney injury including taking of nephrotoxic drugs , hypotension ,sepsis , using of frusmaide and rhabdomyolysis

o **Fate (outcome);** acute kidney injury following polytrauma may resolved , required dialysis or could lead to death

**Data analysis & management**

Data collected throughout history, clinical examination and laboratory investigations were coded, entered and analyzed using Microsoft Excel software. Data was imported into SPSS (Statistical Package for Social Sciences) software program version 24.0 for analysis. According to the type of data, the following tests were used to test differences for significance: Chi square, t test. P value was set at <0.05 for significant results. Data was presented in the form of graphs, numeric presentations & tubular presentations.

**Ethical Considerations**

- 1) Approval of authority (local ethical committee of Faculty of Medicine, Suez Canal University) was taken.
- 2) Agreement of participant without obligation.
- 3) Confidentiality of data.
- 4) Explanation of our study to the participants.

An informed written consent was taken from each patient or from his relatives before taking any data or doing any intervention (appendix I).

The consent contained

1. All samples were used in research only.
2. Arabic title of the research.
3. Aim of the research and brief scientific background.
4. Explanation of the aim in a simple manner to be understood by the common people.
5. All direct and indirect benefits.
6. No harmful maneuvers were used.
7. Right of the patient to refuse involving in the research and he would have his usual treatment.
8. All data are confidential.
9. Right of the participant to withdraw from the study at any time without giving any reason.
10. All participants were announced by results of the study.
11. Right of patient to have a copy from the informed consent.
12. Signature or fingerprints of the patient or his relatives.

**BUDGET**

The Clinical work budget was covered as a part of the health service provided in the Emergency Department in Suez Canal University Hospital.

**RESULTS**

This study was prospective study and carried out in Emergency Medicine Department at Suez Canal University Hospitals to determine the Prevalence, severity and outcome of acute kidney injury in multiple trauma patients. This study included 270 multiple trauma patients presented in ER department at Suez Canal university hospitals.

Acute kidney injury national criteria (AKIN) was used to classify patients with acute kidney injury into 3 stages depending on serum creatinine and urine output. From 270 patients with multiple trauma, the prevalence of AKI was 21(7.7%) and divided into 3 stages ;stage one(5.20%),stage two( 1.50%) and stage three( 1.10%).

(1.1%) of them required renal replacement therapy with mortality rate of (38%).

The age in this studied patients ranged from 18-70years old with majority of them between 31-50 years (52.59%) while the minority (15.55%) was >50 years old and the mean age 37.2 + 13. This study showed that (62.80%) of the studied patients were males while (37.20%) of them were females, also road traffic accident considered to be the first cause of trauma in our patients in 66.50% of multiple trauma patients while 32.70% presented after falling from height and only 0.80% after assault.

Table (1) revealed that (65.9%) of multiple trauma patients were have pulse less than (100b.p.m) with (67.03%) of patients with blood pressure more than (100mmhg) and the mean BP was107.7 +20.7. It was found that majority of multiple trauma patients (74.81%) were have Glasgow coma scale ranging from13to 15 while only (6.6%) were have GCS ranging from 3 to 7.

Table 1. Vital signs & primary assessment			
		Number	Percent
Pulse	<100 b.p.m.	178	65.92%
	>100 b.p.m.	92	34.07%
	Mean + SD	96.3+ 20.7	
	Range	71(69-140)	
Systolic Blood pressure	>100 mmhg	181	67.03%
	<100 mmhg	89	32.96%
	Mean + SD	107.7 +20.7	
	Range	100(60-160)	
GCS	3-7	18	6.66%
	8-12	50	18.51%
	13-15	202	74.81%

Table (2) showed that half of studied patients (55.1%) has no chronic illness while (2.2%) were have hypertension and diabetes, 21.11 % had diabetes mellitus only and 21.48% of them are hypertensive only. The study revealed that 50.2% Of multiple trauma patients were have intra-peritoneal collection.

Table 2. Chronic illness		
	Number	Percent
No chronic illness	149	55.18%
DM only	57	21.11%
HTN only	58	21.48%
HTN & DM	6	2.22%

While describing the mechanism of trauma in our study patients, Figure 1 showed that(88.50%) of multiple trauma patients were suffering from head trauma and( 50.30%) had abdominal injury and ( 36.80% )were suffering from

orthopedic trauma. Also the study revealed that the majority of studied patients (92.5%) were having normal creatinine level at time of arrival and after 24hrs. (5.5%) of patients showed elevation in creatinine level  $\geq 150$  -200% of the base line at time of arrival .after 24hrs(1.1%) show elevation S.Cr>200 to 300% of the base line and (1.1%) elevation show S.Cr>300% of the baseline.

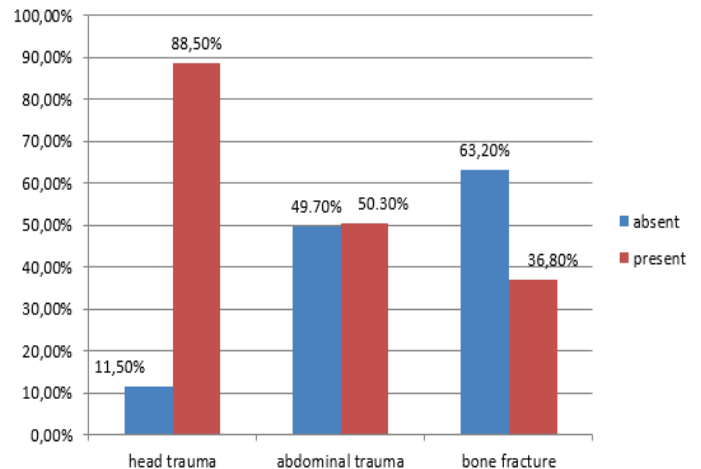


Figure 1. Organ injury

In studying the Relation between age and AKI in multiple trauma, we found that most of multiple trauma patient were between 31 to 50 years (52.8% of all population) and most of patients develop AKI were from same age group (52% of AKI patients). Patients developed stage 1 AKI were the most patients (14), 7 of the managing from 31 to 50 years.

This study revealed that most of patients who developed AKI were males (4.8% of all population) also Relation between sex and AKI in multiple trauma patients that Relation between Glasgow Coma Scale and AKI in multiple trauma patients that202/270 multiple trauma patient presented to ER with GCS between 15 to 12 and 7 of them developed stage I AKI, 50 multiple trauma patients presented with GCS between 11 to 8 and 7 of them develop stage I AKI while 1 developed stage II and 1 developed stage III, 13 patients presented with GCS between 7 to 3 and 3 of them developed stage 2 AKI and 2 patients developed stage 3.

The study revealed that (92.9%)of patients developed stage I of acute kidney injury,(75%)of patients developed stage II and (66.7%)of patients developed stage III were shocked with low blood pressure & high pulse, so most of acute kidney injury patients were had hypovolemic shocked. In Figure 2 show that the main cause of AKI of multiple trauma patients was hypovolemic shock (61.90%) followed by septic shock (28.60%) then rhabdomyolysis (9.50%). And the study revealed that final outcome of multiple trauma patients (85.18%) of multiple trauma patients were treated inpatient successfully while (11.11%) required ICU admission and (7.40%),(20 patients) were died from which 13 patients died in ICU and 7 shortly after arrival to ER. But Final outcome of the patients with

acute kidney injury (AKI) most of patients who developed AKI after multiple trauma need only observation and good fluid resuscitation (57.1%) while only 3 patient of 21 who developed AKI required dialysis and 8 patients who developed AKI died. And causes of Mortality of patients developed AKI that 8 patients developed AKI where died and most of them due to septic shock (62.50%) while only 1 AKI patient died by hypovolemia and 2 by rhabdomyolysis.

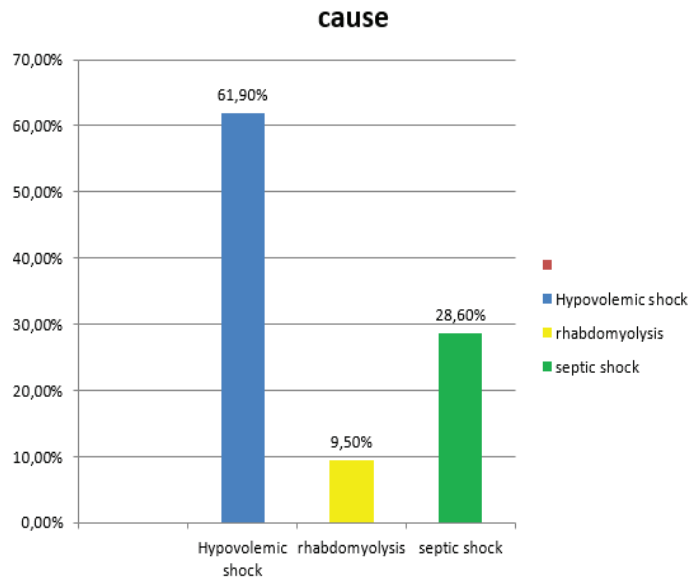


Figure 2. Causes of acute kidney injury

In the study (Figure 3): Relation between serum creatinine and mortality and (Figure 4): Relation between urine output and mortality but (Figure 5): Relation between cause of renal injury and mortality and also (Figure 6): Relation between stage of AKI and mortality.

ROC Curve

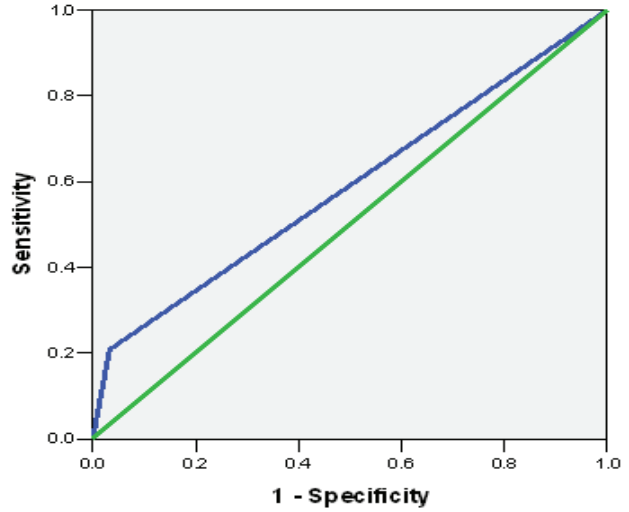


Figure 4 show the following  
 Area under the curve=0.5  
 Cut off point =1  
 Sensitivity =20.8%  
 Specificity=3%

Figure 4. Relation between urine output and mortality

ROC Curve

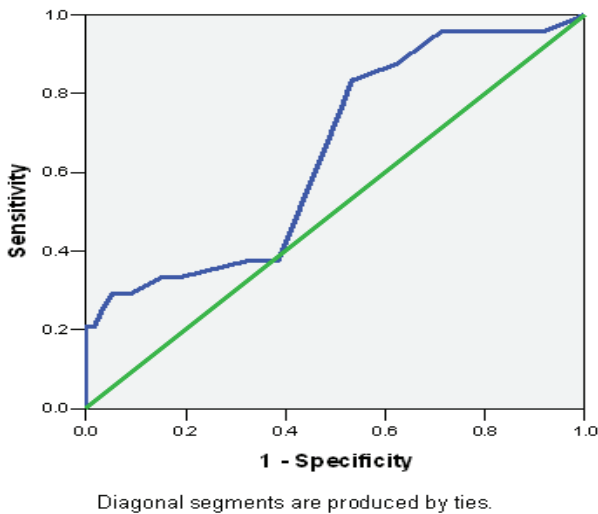


Figure 3 show the following  
 Area under the curve=0.6  
 Cut off point =0.5  
 Sensitivity =95.8%  
 Specificity=91.8%

Figure 3. Relation between serum creatinine and mortality

ROC Curve

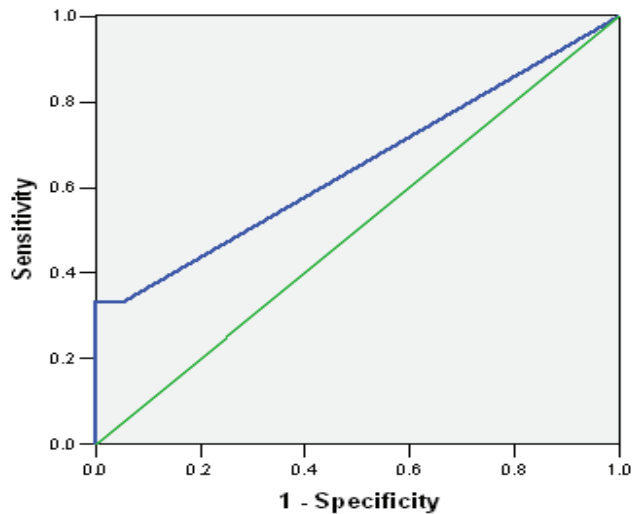
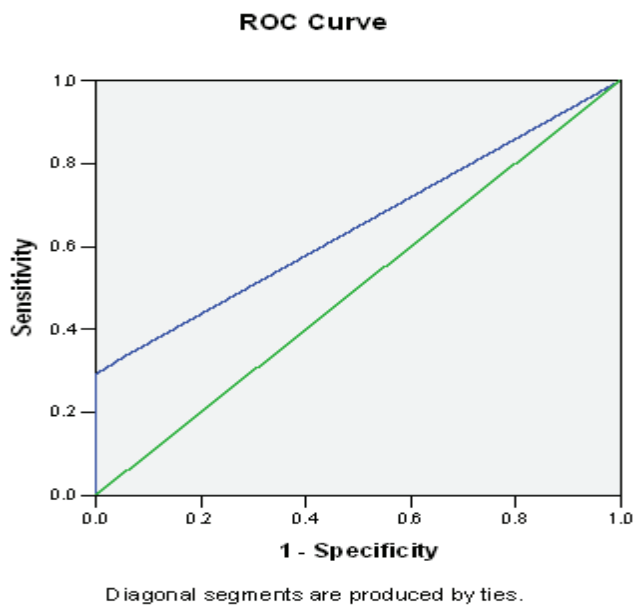


Figure 5 show the following  
 Area under the curve=0.6  
 Cut off point =hypovolemic shock  
 Sensitivity =33.5%  
 Specificity=5%

Figure 5. Relation between cause of renal injury and mortality



**Figure 6** the show the following

Area under the curve=0.6

Cut off point =stage 1

Sensitivity =33.4%

Specificity=5%

**Figure 6.** Relation between stage of AKI and mortality

## DISCUSSION

Trauma is an injury to human tissues and organs that result from transfer of energy from environment. Injuries are caused by some forms of energy that beyond body's resilience and tolerate. Trauma is a major health problem, accounting for approximately one in 10 deaths worldwide (1).

Acute kidney injury (AKI) is an uncommon sequale to trauma but it is fatal and most dangerous complication secondary to trauma (4).

Acute kidney injury (AKI) can be defined as the abrupt loss of kidney function, potentially reversible regardless of etiology or mechanisms. Recent criteria for acute kidney injury (AKI) classification, such as AKIN are currently considered as a reference standard for the evaluation of hospitalized patients (5).

So the aim of this study was to determine the prevalence, severity and outcome of acute kidney injury in multiple trauma patients in ER department in Suez Canal University.

This prospective study was carried out in Emergency Medicine Department at Suez Canal University Hospitals. This study was conducted on 270 multiple trauma patients presented in ER department at Suez Canal university hospital

This study showed that the age of the studied patients ranged from 18-70 years old with the majority of them were between 31-50 years (52.5%) and the mean age 37.2±13.

These results agree with the results of a study conducted by Eriksson M et al, in which the mean age of the studied patients was 40 years (9) and also agree with the results of another study by Gomes E et al, in which the median age of the trauma patients was 37 years. (10). This is because that the adult were prone to accidents and trauma than very old or very young population.

During studying the risk factors for trauma, this study showed that (62.80%) of multiple trauma patients were males while minority of them were females (37.20%).

These results match the results of a study conducted by Eriksson M et al, in which the majority of the studied patients were males (78%) while the minorities were females (22%) (9). This is probably due to that males are prone to trauma & accidents in their work. Also most of the drivers are males

This study showed that 66.50% of multiple trauma patients presented after road traffic accident while 32.70% presented after falling from height and only 0.80% after assault.

These results agree with the results of a study done by Antunes R et al, in which mechanism of trauma caused by road traffic accidents (67%). And another study by Eriksson M et al, in which road traffic accidents caused 44.1% of the trauma mechanism followed by falls from height 19% (9).

This study demonstrated that (65.9%) of the patients had pulse less than (100b.p.m), ( 67.03%) of them with blood pressure more than (100mmhg) and it was found that majority of trauma patients (74.81%) having Glasgow coma scale ranging from 13 to 15 while only (6.6%) were have GCS ranging from 3 to 7.

These results close to the results of a study done by Sean M. Bagshaw et al, in which the SBP was >100 mmHg in 83.3% of the patients(11) and match the results of another study conducted by Lai WH et al, in which 90% of the studied patients had SBP >100 mmHg (12).

Also these results close to the results of a study by Lai WH et al, in which the majority of the patients (91.1%) had GCS from 13 – 15 while (5%) of them had GCS of ≤8 (12).

This study showed that approximately half of the studied patients (55.1%) had no chronic illness while (21.11%) had Diabetes only and (21.48%) had HTN only.

On the other hand These results don't match the results of a study conducted by KrasnalhiaLivia S de Abreuet al, in which (5.4%) of the patients were Diabetic and (3.9%) were hypertensive this is most probably due to large population of this study and we have high prevalence of diabetes mellitus and hypertension in Egypt.

This study described the different organ injuries in multiple trauma patients. We found head trauma was the highest forms of trauma and occurred in (88.50%) of the studied population, followed by abdominal injury occurred in (50.30%) of patients while (36.80%) were suffering from orthopedic trauma.

These results are close to the results of a study done by Gomes E et al, in which 94% of the studied patients had head injuries (10).

However these results don't match the results of the study conducted by KrasnalhiaLívia S de Abreu et al, in which 21% of the patients had orthopedic injuries while 29% had abdominal injuries this is most probably due to large population of this study (12).

This study showed that majority of studied patients (92.5%) had normal creatinine level at time of arrival and after 24hrs and (7.7%) of patients showed elevation in creatinine level  $\geq 150 - 200\%$  of the base line at time of arrival. After 24hrs (1.1%) show elevation  $SCr > 200$  to  $300\%$  of the base line and (1.1%) elevation show  $SCr > 300\%$  ( $> 3\times$ ) of the baseline.

This study showed that (92.20%) of studied patients had no kidney injury and (7.8%) were developed AKI divided into 3 stages: stage one (5.20%), stage two (1.50%) and stage 3 (1.10%).

These results match the results of a study conducted by Podoll AS et al, in which 94% of the trauma patients had no kidney injuries while 5.1% developed stage one of AKI, (0.6%) of them developed stage 2 of AKI and (0.2%) of them developed stage three of AKI (13).

This study showed that most of multiple trauma patient were between 31 to 50 years (52.8% of all population) and most of patients developed AKI were from same age group (52% of AKI patients). Patients developed stage one AKI were the most common patients (14), 7 of them ranging from 31 to 50 years which is statistically significant regarding to age.

These results agree with the results of a study conducted by Podoll AS et al, in which patients with AKI were from 25-55 years, but they weren't statistically significant regarding to the age between the patient with or without AKI (12) and agree with the results of another study conducted by Gomes E et al, in which patients with AKI were from (24-55) but they weren't statistically significant regarding to the age between the patient with or without AKI (10).

This study showed that 61.9% of patients with AKI were males (4.8% of all population).

These results match the results of a study conducted by Bihorac A et al, in which 70% of the patients with AKI were males. (80) And match results of a study conducted by Sean M. Bagshaw et al, in which 61% patients with AKI were males (11).

This study showed that 202 out of 270 the trauma patient presented to ER with GCS between 12 to 15 and (2.6%) of them developed stage I AKI, 50 multiple trauma patients presented with GCS between 8 to 11 and (2.6%) of them developed stage I AKI while (0.4%) developed stage II and (0.4%) developed stage III with total of (3.4%), 13 patients presented with GCS between 3 to 7 and (1.1%) of them developed stage 2 AKI and (0.7%) patients developed stage 3 with total of (1.8%).

These results don't match with the results of a study done by Lai WH et al, in which (0.3%) of the patients with GCS 12 – 15 had AKI, (1.4%) of the patients with GCS 8 – 11 had AKI and (2.7%) of the patients with GCS 3 – 7 had AKI. (12)

This study showed that (92.9%) of patients developed stage I of acute kidney injury, (75%) of patients developed stage II and (66.7%) of patients developed stage III were shocked with low blood pressure & high pulse, so most of acute kidney injury patients were had hypovolemic shock which both of them were statistically significant related to the occurrence of AKI.

These results match with results of a study conducted by Lai WH et al, in which 35.9% of the patients with AKI had tachycardia (HR > 100) (11).

This study showed that the main cause of AKI in multiple trauma patients was hypovolemic shock (62%) followed by septic shock (28.5%) then rhabdomyolysis (9.5%).

Unlike the results of the study conducted by S. de Abreu KL et al, in which the causes of AKI were sepsis in (52%) of the studied patients, hypotension in (34%) of them, rhabdomyolysis was found in (11.5%) of patients with AKI (13).

This study showed that (85.18%) of multiple trauma patients were treated inpatient successfully while (11.11%) required ICU admission and mortality rate was (7.40%) from which (4.81% of all population) died in the ICU while (2.59%) of them died shortly after arrival to ER.

These results were close to the results of a study conducted by Bihorac A et al, in which 83.4% of the patients admitted to inpatient for management while 19.22% admitted to the ICU according to the results of the study by Lai WH et al (15).

Unlike the results of a study by S. de Abreu KL et al, in which the mortality rate was (95.3%) and such disagreement may be due to small sample size of their study (n=129) (79) and also disagree with the results of another study conducted by Baitello AL et al, in which mortality rate was (22.7%) and also disagreement may be due the selection of severe poly-trauma patients and small sample size (n=75) in comparison to our study in which sample size was 270 patients (16).

This study showed that most of patients who developed AKI after multiple trauma need only observation and good fluid resuscitation (57.1%) while (14.3%) who developed AKI required dialysis and (38%) who developed AKI died.

These results match the results of a study done by Bihorac A et al, in which 51% of the patients with AKI were treated by fluids and completely cured while 11% of them needed Dialysis, but 60% of the patients with AKI died and this may increase number of the patients with AKI in this study (n= 235) while the number of patients with AKI in our study (n = 21) (15).

This study showed that 8 patients developed AKI died and most of them due to septic shock (62.50%) and 2 by rhabdomyolysis.

These results close to the results of a study conducted by Eriksson M et al, 56.3% of the patients with AKI died from septic shock (9).

So from this study we found that acute kidney injury is uncommon but serious complication followed multiple trauma and the most common cause of acute kidney injury is hypovolemic shock so early and good resuscitation of multiple trauma patients can help in avoid acute kidney injury.

## LIMITATIONS

Our study have some important limitation, due to relatively small simple size, Although it is still larger in compared to Elbaih 2019.(17) About sepsis with renal failure in the same site of study, SCUH, further studies with greater number of patients would be helpful to provide more accurate results, which, can be generalized.

## RECOMMENDATIONS

Acute kidney injury following trauma remain a significant management challenge. A thoughtful approach to the management has the potential to optimize outcome for these conditions.

- We should inform the patients and their families that neither a conservative management nor dialysis will guarantee the best results and return of normal functions and physiology of the patients.
- Evidence based protocols for management of AKI should be developed for every aspect of care, from arrival to ER department to ICU management.
- Urologists and Emergency physicians should participate at all levels of resuscitation and management of AKI.
- Increase the awareness of hazards causing severe trauma as road traffic accidents, the period of transmission to hospital and pre hospital management of hypovolemic shocked patients after trauma.
- Researches about prevalence of road traffic accidents and AKI following multiple trauma in Egypt should be considered and increase to prevent this serious complication
- Emergency Medicine Service (EMS) providers should be trained and educated in the management of multiple trauma patients and how to deal in critical cases.
- The Ministry of health should increase the awareness of primary care hospitals about how to deal with multiple trauma patients and how to early resuscitate hypovolemia before transmission to tertiary care hospitals.

## CONCLUSION

- Most of multiple trauma patient presented in ER were in age between 31-50 years.
- Majority of multiple trauma patients were males.
- The most common mechanism of multiple trauma patients was road traffic accidents followed by falling

from hight and head trauma was the most common type of injury followed by abdominal trauma.

- The majority of multiple trauma patients were vitally stable with GCS ranging from 11/15 to 15/15.
- Most of multiple trauma patients were had normal urine output and normal serum creatine level at time of arrival to ER.
- There was no significance between presence of chronic illness and acute kidney injury occurred in multiple trauma patients
- Most common cause of acute kidney injury followed acute kidney injury was hypovolemic shock followed by septic shock.
- Majority of patients developed AKI after multiple traumas needed only observation with good fluid resuscitation and minority need dialysis.
- The most common cause of death in multiple trauma patients developed acute kidney injury was septic shock.
- At the end of this study, we found that majority of studied patients were have normal creatinine level at time of arrival , after 24hrs the minority of patients had acute kidney injury, and the majority of them were shocked having low blood pressure and high pulse and majority of AKI required only good fluid resuscitation.

*Competing interests: The authors declare that they have no competing interest.*

*Financial Disclosure: There are no financial supports.*

*Ethical approval: All the patients give consent to participate in the study without affecting their plan of management accordingly to Institutional approvals of the Research Ethics Committee of the Faculty of Medicine, Suez Canal University was taken. 1) Approval of Research ethics committee. 2) Administrative of SCUH was informed consent. 3) Confidentiality of data).*

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