AIM OF THE WORK

The aims of the present work were to:

1. Study the characteristics of elderly trauma patients admitted to the Emergency Department of Alexandria Main University Hospital during the period from first of July till the end of December 2013.
2. Study the incidence and pattern of injuries among those patients.
3. Evaluate the most frequent risk factors for the occurrence of these injuries.
4. Assess the severity, prognosis and outcome of these injuries using Trauma Score-Injury Severity Score (TRISS).

PATIENTS

This study was carried out on 104 elderly trauma patients 65 years old and more who were admitted to the Emergency Department of Alexandria Main University Hospital during the period from the first of July till the end of December 2013.

METHODS

1) Informed consent was taken from the patients or their relatives before clinical assessment.

2) Patients (or their relatives) were interviewed. Patients were clinically examined and data were collected in a specially designed sheet **(Appendix I)** which included the following:
   - Demographic Data: age, sex, marital status, residency, history of previous diseases and injuries…etc.
   - Data related to present injury: circumstances of injury, site and type of injuries.
   - Clinical examination: Glascow coma scale, vital signs, systematic review.
   - Investigations done: either laboratory (that were routinely applied to these patients including; complete blood count, arterial blood gases, renal function tests, liver function tests, random blood sugar) and radiological investigations (X-ray, CT, ultrasound, etc.) that were applied depending on the injured site.
   - Treatment received: either conservative or operative.
   - Outcome: whether improved, developed complications or died.

3) Clinical assessment of the patients to determine the severity of their injuries will be carried out using Trauma Score-Injury Severity Score **(TRISS) (Appendix II)**.

❖ Trauma Score - Injury Severity Score: TRISS

The TRISS method offers a standard approach for evaluating outcome of trauma care. Anatomic, physiologic, and age characteristics are used to quantify probability of survival as related to severity of injury. [121, 140]

TRISS determines the probability of survival (Ps) **o**f a patient from the given values of; Injury Severity Score (ISS), Revised Trauma Score (RTS), patient's age and, type of injury (blunt or penetrating) using the following formulae [137, 139]

$Ps = 1/ (1+e-b)$

$e = 2.718282$

Where 'b' was calculated from:

$b = b0 + b1 (RTS) + b2 (ISS) + b3 (age\ index)$

The coefficients b0-b3 were derived from multiple regression analysis of the Major Trauma Outcome Study (MTOS) database. Age Index was 0 if the patient was below 54 years of age or 1 if 55 years and over. They were different for blunt and penetrating trauma. If the patient was less than 15 years, the blunt coefficients were used regardless of mechanism whether blunt or penetrating.

Blunt injury: b0 = -1.2470, b1 = 0.9544, b2 = -0.0768, b3 = -1.9052

Penetrating injury: b0 = -0.6029, b1 = 1.1430, b2 = -0.1516, b3 = -2.6676

Now, there is available online calculation of TRISS.

➢ Revised Trauma Score

It is calculated from three clinical parameters which are; glascow coma scale, systolic blood pressure, respiratory rate

The formula for the weighted RTS is: $RTS_w = 0.7326$ (systolic blood pressure) + 0.2908 (respiratory rate) + 0.9368 (GCS). [135]

Table (1): Shows coded values of each parameter in RTS: [135]

Clinical parameter	Category	Score
Respiratory rate (breaths per minute)	> 29	4
	10-29	3
	6-9	2
	1-5	1
	0	0
Systolic blood pressure (mmHg)	89	4
	76-89	3
	50-75	2
	1-49	1
	0	0
Glasgow Coma Scale	13-15	4
	9-12	3
	6-8	2
	4-5	1
	3	0

• The Glasgow Coma Scale

It is scored between 3 and 15, 3 being the worst and 15 the best. A Coma Score of 13 or higher correlates with a mild brain injury; 9 to 12 is a moderate injury and 8 or less a severe brain injury. [128, 129]

Table (2): Shows the three parameters of the patient's best response to calculate the GCS: [131]

Domain	Level of response	Score
Eye opening	Spontaneous	4
	To verbal commands	3
	To pain	2
	None	1
Best verbal response	Oriented	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
Best motor response	Obeying commands	6
	Localizing to pain	5
	Withdrawal from pain (normal flexion)	4
	Abnormal flexion to pain (Decorticate)	3
	Extensor posturing (Decerbrate)	2
	None	1

Maximum total = 15 Minimum total = 3

➢ Injury Severity Score (ISS)

- ❑ It depends on anatomical distribution of injuries over six specified body regions.
- ❑ It is calculated by the sum of squares of 3 most severe (highest AIS scores) only.
- ❑ The Abbreviated Injury Scale 1985 (table 3) was used in the current study.

ISS BODY REGION	AIS SCORE	SQUARED
HEAD /NECK	.....	.....
FACE	.....	.....
THORAX	.....	.....
ABDOMINAL /PELVIC CONTENTS	.....	.....
EXTREMITIES /PELVIC GIRDLE	.....	.....
EXTERNAL	.....	.....

Table (3): The Abbreviated Injury Scale, 1985

	1	2	3	4	5
AIS SCORE	MINOR	MODERATE	SEVERE: NOT LIFE THREATENING	SEVER: LIFE THREATENING	CRITICAL SURVIVAL UNCERTAIN
HEAD/NECK	PI= PENETRATING INJURY	PI to neck with no organ involvement	Complex PI to neck with tissue loss/organ involvement Minor lac. Carotid/vertebral A; internal jugular V Transaction ± segmental loss jugular V Thyroid laceration superficial lac. Larynx/pharynx Cord contusion with transient neurological signs	Minor lac. Carotid/vertebral A with neurological deficit Transaction carotid/vertebral A; int. jugular V Segmental loss int. jugular vein Perforation larynx/pharynx Cord contusion with incomplete cord syndrome	PI with entrance and exit wounds PI of cerebrum/cerebellum seqmental loss carotid/vertebral A Complex laceration larynx pharynx Cord laceration Complete cord lesion
FACE	PI with no tissue loss	PI with superficial tissue loss Corneal/sclera lac.	PI with major tissue loss		
THORAX	PI with no violation of pleural cavity	Thoracic duct laceration Pleural laceration	Complex PI but no violation of the pleural cavity Sup. Lac. Innominate/pulmonary/subclavian and other named smaller veins Sup. Lac. Trachea/bronchus/esophagus. Lung laceration ≤1 lobe Unilateral h` or p`thorax Diaphragmatic laceration Cord contusion with transient neurological signs	Sup. Aortic laceration Major lac. Innominate/pulmonary/subclavian and other named snakker art; vena cava /brachiocephalic pulmonary/subclavian and other names smaller veins Transaction/tissue loss other named smaller veins Perforation trachea/bronchus esophagus Multilobar lung laceration H`p`mediastinum Bilateral h`p`thorax Tension p`thorax H`thorax >1000 cc Cardiac tamponade Cord contusion with In complete cord syndrome	Major aortic laceration Transaction/segmental loss vena cava/pulmonary/brachiocephalic V. & other named smaller arteries Lac. Trachea/bronchus/esophagus with tissue loss Multilobar lung lac. With tension p`thorax/>1000cc Myocardium/ valve laceration Cord laceration Complete cord lesion
ABDOMEN	PI with no peritoneal penetration	PI with superficial tissue loss but no peritoneal penetration Sup. Lac. Stomach/SB/ mesentery/bladder/ureter/kidney/liver/spleen/pancreas Laceration through peritoneum	PI with significant tissue loss but no peritoneal penetration Sup. Lac. Vena cava/iliac and other named smaller arteries and veins Sup. Lac. Duodenum/colon/rectum Full thickness laceration SB/ mesentery/bladder/ urterer Major lac. Or minor lac. With major vessel injury/>1000cc h`peritoneum; kidney/liver/spleen/pancreas Cord contusion with transient neurological signs	Minor aortic laceration Major lac. Vena cava/iliac A & V and other named smaller arteries and veins Transaction/segmental loss iliac and other named smaller veins Full thickness lac. Stomach/colon/duodenum/rectum Tissue loss/gross contamination stomach/SB/mesentery bladder/ureter Cord contusion with incomplete cord syndrome	Major aortic laceration Transaction/segmental loss vena cava/iliac and other named smaller arteries Tissue loss/gross contamination duodenum/colon/rectum Tissue loss kidney/liver spleen pancreas Cord laceration

EXTREMITIES	Sup. Lac. Brachial and other named veins	Simple PI with no internal structure involvement Sup. Lac. Axillary/brancial/popliteal A;axillary/femoral/popliteal V. Major lac. ± segmental loss brachial vein and other named smaller arteries and veins Lac. Median/radial/ulnar/femoral/tibial/peroneal N Major tendon/muscle lac.	Complex PI with internal structure involvement Sup. Laceration femoral A. Major lac. Axillary/popliteal A; axillary/femoral/popliteal V. Segmental loss axillary/femoral popliteal V. Sciatic nerve laceration >1 nerve lac. In same extremity Multiple tendon/muscle lacerations in same extremity	Major lac. Branchial/femoral artery Segmental loss branchial axillary/popliteal artery	Segmental loss femoral A
EXTERNAL	Superficial laceration ≤ 5 cm on face or hand ≤10 cm on body PI with no tissue loss	Laceration >5 cm on facehand or >10 cm on body PI with superficial tissue loss			
AIS = 6	MAXIMUM INJURY AUTOMATICALLY ASSIGNED ISS = 75		INJURY SEVERITY SCORE (I.S.S)		
HEAD/NECK	Brainstemlaceration		I.S.S BODY REGION	A.I.S SCORE	SQUARED
THORAX	Aortic transaction Segmental loss aorta/innominate pulmonary/subciavian arteries Complex myocardial laceration		HEAD/NECK FACE THORAX ABD/PELVIC CONTENTS EXTREMITIES/PELVIC GIROLE EXTERNAL I.S.S. (sum of squares of 3 most severe only)	_____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____ _____
ABDOMEN	Aortic transaction/segmental loss				

Table (3): The Abbreviated Injury Scale, 1985, Cont.

	1	2	3	4	5
AIS SCORE	MINOR	MODERATE	SEVERE: NOT LIFE THREATENING	SEVER: LIFE THREATENING	CRITICAL SURVIVAL UNCERTAIN
HEAD/NECK	Headache/dizziness 2o to head trauma Cervical spine strain with nofracture or dislocation	Amnesia from accident Letharqic/stuporous/ obtunded; can be roused by verbal stimuli Unconsciousness <1 hr Simple vault fracture Thyroid contusion Brachial plexus injury Dislocation or fracture spinous of C-spine Minor compression fracture (≤ 20%) C-spine.	Unconsciousness 1-6 hrs Unconsciousness <1 hr with neurological deficit Fracture base of skull Comminuted compound or depressed vault fracture Cerebral ontusion/subarachnoid hemorrhage Intimal tear/thrombosis carotid A. Contusion larynx, pharyns Cervical cord contusion Dislocation or fracture of lamina body, pedicle or facet of C-spine Compression fracture >1 vertebra or >20% anterior height	Unconsciousness 1-6 hrs with neuro deficit Unconsciouness 6-24 hrs Appropriate response only to painful stimuli Fractured skull with depression >2 cm, torn dura or tissue loss Intracranial hematoma ≤ 100 cc Incomplete cervical cord lesion Larynqeal crush Intimal tear/thrombosis carotid A with neuro deficit.	Unconsciousness with inappropriate movement unconscious >24 hrs Brain stem injury intracranial hematoma >100 cc Complete cervical cord lesion C4 or below
FACE	Corneal abrasion Sup. Tongue laceration Nasal or mandibular ramus * fracture Tooth fracture/avulsion or dislocation	Zygoma, orbit*, body* or subcondylar mandible* fracture Lefort I fracture Scleral/corneal laceration	Optic nerve laceration Lefort II fracture	Lefort III fracture	
THORAX	Rib fracture* Thoracic spine strain Rib cage contusion Sternal contusion *Add AIS 1 if associated with h`thorax p`thorax or h`p`mediastinum	2-3 rib fractures* Sternum fracture Dislocation or fracture spinous or transverse process T-spine Minor compression Fracture (≤ 20%) T-spine	Lung contusion/lac. ≤1 lobe Unilateral h` or p`thorax Diaphragm ruture ≥ 4 rib fractures* Intimal tear/minor lac/thrombosis subclavian or innominate A. Inhalatign burn, minor Dislocation or fracture of lamina body, pedicle or facet of t-spine Compression fracture >1 vertebra or more than 20 % height Cord contusion with transient neurological signs	Multilobar lung contusion or laceration H`p`mediastinum Bilat h`p` thorax Flail chest Myocardial contusion Tension p`thorax Hemothorax >1000 cc Tracheal fracture Intimal aprtic tear Major lac. Subclacian or innominate A. Incomplete cord syndrome	Major arotic laceration Cardiac laceration Ruptured bronchus/trachea Flail chest/inhal. Burn requiring mechanical support Laryngotracn separation Multilobar lung laceration with tension p`thorax h`p`mediastinum or >1000 cc hemothorax Cord laceration or complete cord lesion
ABDOMEN	Abrasion/contusion superficial lac. Scrotum,vagina, vuva, perineum Lumbar spine strain Hematuria	Contusion/sup. Laceration stomach, mesentery, SB bladder, ureter, urethra Minor contusion/lac. Kidney, liver, spleen pancreas Contusion duodenum/colon Dislocation or fracture spinous or transverse process L-spine Minor compression fracture (≤ 20) L-spine Nerve root injury	Sup. Lac. Duodenum/colon/rectum Perforation SB/mesentery/bladder ureter/urethra Major contusion/or minor lac. With major cessel invol., or h`perition >1000 CC of kidney/liver/spleen/panc Minor iliac A. or V. laceration Retroperitoneal hematoma Dislocation or fracture of lamina body, facet, or pedicle of L-spine Compression fracture >1 vertebra or >20 % anterior height Cord contus. With trans neuro signs	Perforation stomach duodenum/colon/rectum Perforation with tissue loss stomach/bladder SB/ ureter/urethra Major liver laceration Major iliac A. or V. lac. Incomplete cord syndrome Placental abruption	Major lac. With tissue loss or gross contamination of duodenum/ colon/ rectum Complex rupture liver spleen/ kidney/ pancreas Complete cord lesion

EXTREMITIES	Contusion elbow shoulder, wrist, ankle Fracture/dislocation finger, toe Sprain A-C joint, shoulder, elbow, finger, wrist, hip ankle. Toe.	Fracture humerus* radius* ulna*, fibula, tibia*, clavicle. Scapula, carpals metacarpals, calcaneus tarsals. Metatarsals, public rami or simple pelvic fracture Dislocation elbow, hand, shoulder, A-C joint Major muscle/tendon lac. Intimal tear?minor lac. Axillary, brachial, popliteal A;axillary femoral, popliteal V	Comminuted pelvic fracture Fractured femur Dislocation wrist/ ankle/knee /hip Below knee or upper extremity amputation Rupture knee ligaments Sciatic nerve laceration Intimal tear/minor lac. Femoral A. Major lac. ± thrombosis axillary or popliteal A; axillary, popliteal or femoral V.	Pelvic crush fracture Traumatic above knee amputation/crush injury Major laceration femoral or brachial artery	Open pelvic crush fracture *Add AIS I to these fracture if open, displaced or communated
EXTERNAL	Abrasions/contusions ≤ 25 cm on face/hand ≤ 50 cm on body. Superficial lacs. ≤ 5 cm on face/hand ≤ cm on body 1° burn up to 100 2° or 3° burn/deglov. Injury <10% tot. body.	Abrasions/contusions >25 cm on face or hand > 50cm on body Aceration >5 cm on face or hand 10 cm on body 2° or 3° burn or degloving injury 10-19% of total body	2° or 3° burn or degloving injury 20-29% of total body	2° or 3° burn or degloving injury 30-39% of total body	2° or 3° burn or degloving injury 40-89% of total body
AIS = 6	MAXIMUM INJURY AUTOMATICALLY ASSIGNED ISS = 75		INJURY SEVERITY SCORE (I.S.S)		
HEAD/NECK	Crush fracture, crush/laceration brain stem decapitation Cord crush/ laceration or total transaction with or without fracture C3 or above		I.S.S BODY REGION	A.I.S SCORE	SQUARED
THORAX	Total severance aorta Chest massively crushed		HEAD/NECK FACE THORAX ABD/PELVIC CONTENTS EXTREMITIES/PELVIC GIROLE EXTERNAL I.S.S. (sum of squares of 3 most severe only)	_____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____ _____
ABDOMEN	Torso transaction				
EXTERNAM	2° or 3° burn or deglovinginjury ≥90% T.B.S.				

Methods of Statistical Analysis:

Data were analyzed using SPSS-9 (Statistical Package for Social Sciences version 9). Statistics of the results were carried out according to the following formulae:

❑ **Arithmetic mean ($\bar{X}$):** was calculated as follows:

$$\bar{X} = \frac{\sum x}{n}$$

Where: Σx = Sum of observations. n = number of observations.

❑ **Standard deviation (SD):** was calculated as follows:

$$SD = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

Where: Σx^2 = sum of squared observations. n = number of observations.
$(\Sigma x)^2$ = square of the sum of observations.

❑ **Chi-square (X^2):**

For comparison between distributions of patients according to different items of study and use this formula for calculation:

$$X^2 = \Sigma \frac{(O - E)^2}{E}$$

O = Observed results
E = Expected results
$(O - E)^2$ = *difference* squared
Where $E = \frac{\text{Total row x total column}}{\text{Grand total}}$

Statistical was done at level of significance of $p \leq 0.05$

RESULTS

The present study entailed a total number of 104 elderly patients who were admitted to the Emergency Department of Alexandria Main University Hospital during the period from the first of July till the end of December 2013. This number represented 1.96% of the total admissions to the ED from all age groups.

Data were collected in a specially designed sheet (Appendix I) which included demographic data, data related to the injury, clinical examination on admission, assessment of the severity of injuries using Trauma Score Injury Severity Score (TRISS) (Appendix II), investigations, treatment and outcome.

I. Distribution of the studied patients according to demographic data:

Age:

Age of the studied patients ranged from 65 to 90 years old with a mean age of 72.15 ± 7.0 years. Table (4) and figure (1) show that the highest percentage of patients was in the age group 65-70 years (53.8%).

Sex:

Table (4) and figure (2) reveal that there was male predominance (53.8%) while females represented (46.2%) with a ratio 1.67:1.

Marital status:

Table (4) and figure (3) show that 56.7% of patients were married, while 40.4% of them were widows.

Smoking:

Table (4) and figure (4) show that the majority of patients (65.4%) were non-smokers and only 34.6% were smokers.

Residency:

Table (4) and figure (5) reveal that 58 patients (55.8%) were from urban residency, while 46 (44.2%) of them were from rural areas.

History of chronic illnesses:

Nearly one third of the patients (32.7%) have diabetes mellitus (DM). History of hypertension was given by another one third of patients (33.7%), 12.5% have cardiac disease, while nearly one third of patients (32.7%) had no history of chronic illness as shown in figure (6).

History of previous injuries:

Figure (7) demonstrates that the majority of patients (82.7%) had no previous injuries, 11 patients (10.6%) had previous accidents, six patients (5.8%) were previously assaulted, and only one patient (1%) attempted suicide.

Disability for daily activities:

Ninety one patients (87.5%) had no disability for daily activities while only 13 patients (12.5%) had some degree of disability before getting injured as shown in figure (8).

Table (4): Distribution of the studied patients (n = 104) according to demographic data.

	No.	%
Age (years)		
65 - 70	56	53.8
71 - 75	21	20.2
76 - 90	27	26.0
Min. – Max.	65.0 – 90.0	
Mean ± SD.	72.15 ± 7.0	
Median	70.0	
Sex		
Male	56	53. 8
Female	48	46. 2
Marital status		
Single	3	2.9
Married	59	56.7
Widow	42	40.4
Smoking		
Smoker	36	34.6
Non smoker	68	65.4
Residency		
Rural	46	44.2
Urban	58	55.8
Total	104	100.0

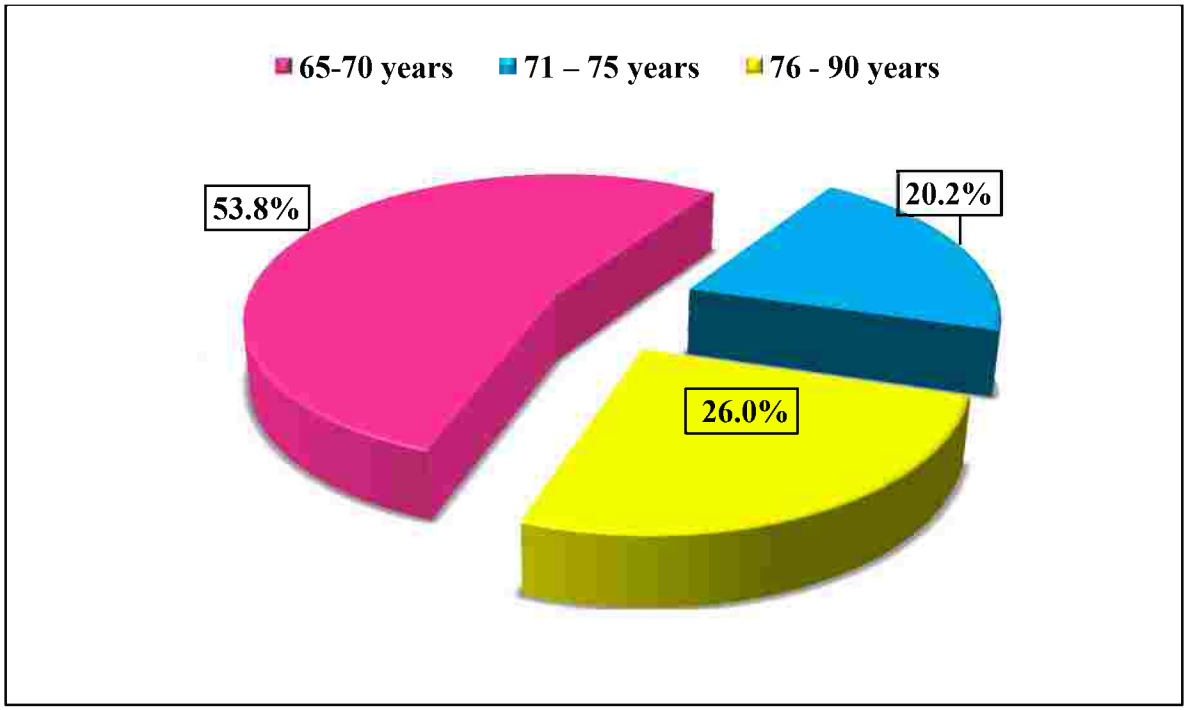

Figure (1): Distribution of the studied patients (n = 104) by age.

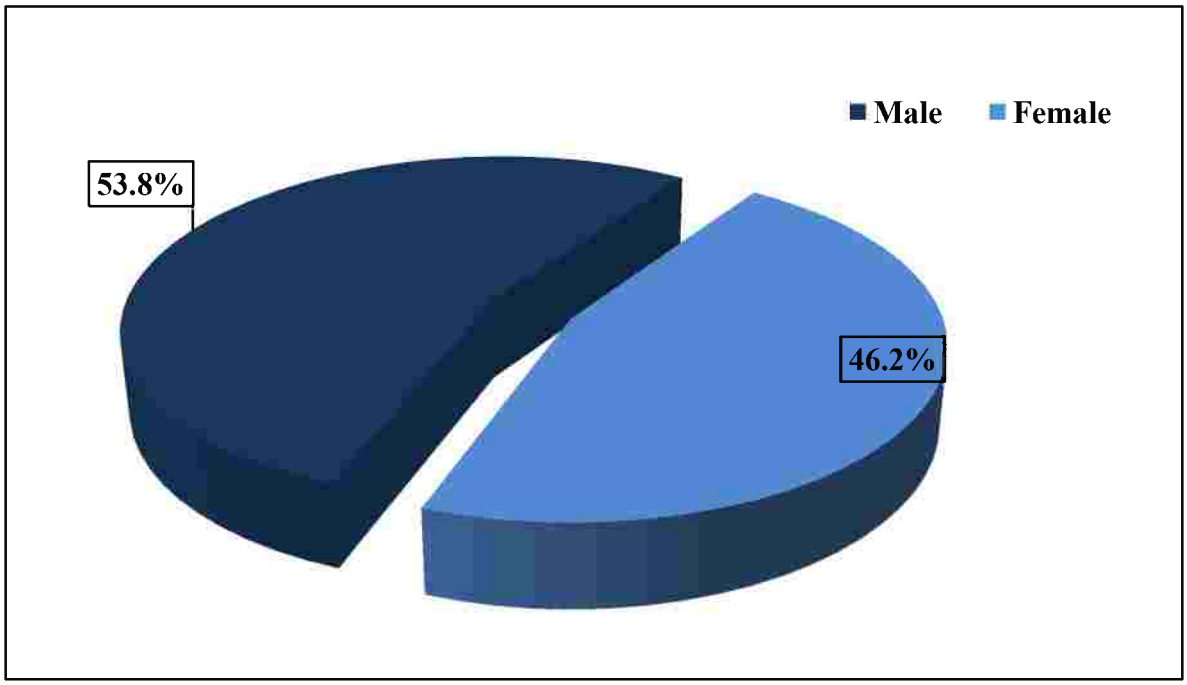

Figure (2): Distribution of the studied patients (n = 104) by sex.

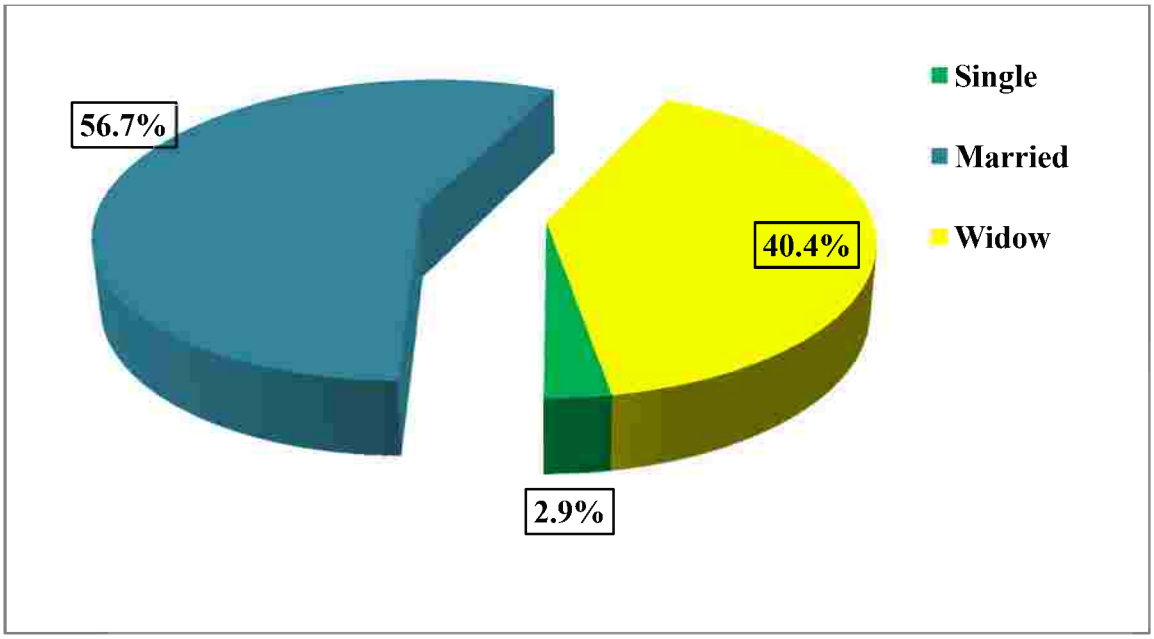

Figure (3): Distribution of the studied patients (n = 104) by marital status.

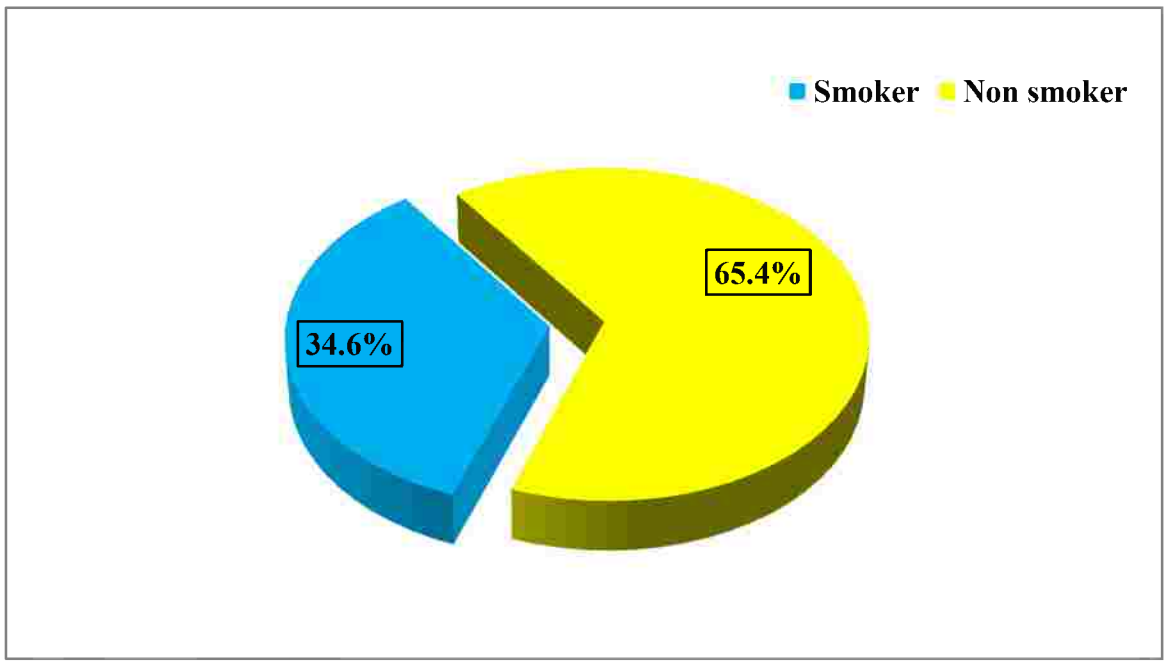

Figure (4): Distribution of the studied patients (n = 104) by smoking habits.

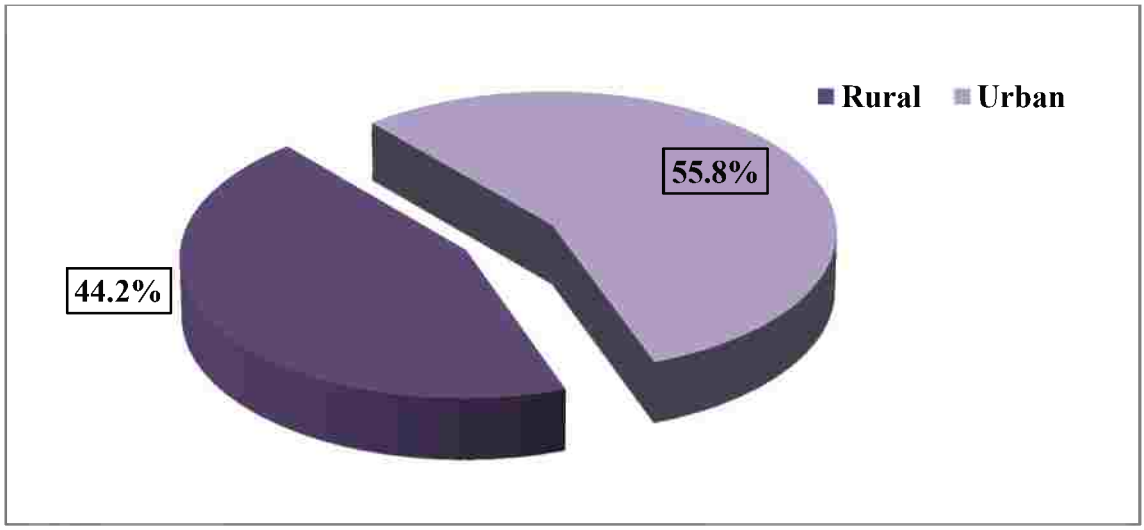

Figure (5): Distribution of the studied patients (n = 104) by residency.

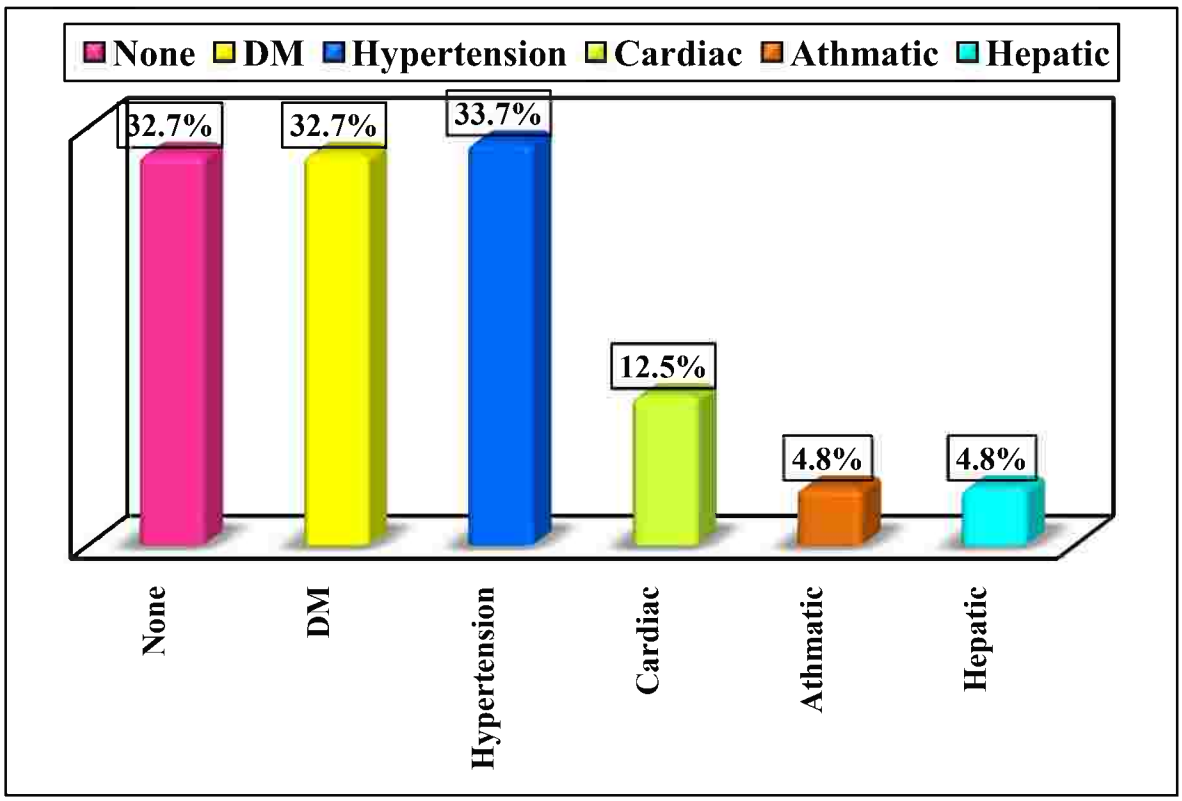

Figure (6): Distribution of the studied patients (n = 104) by history of chronic illness.

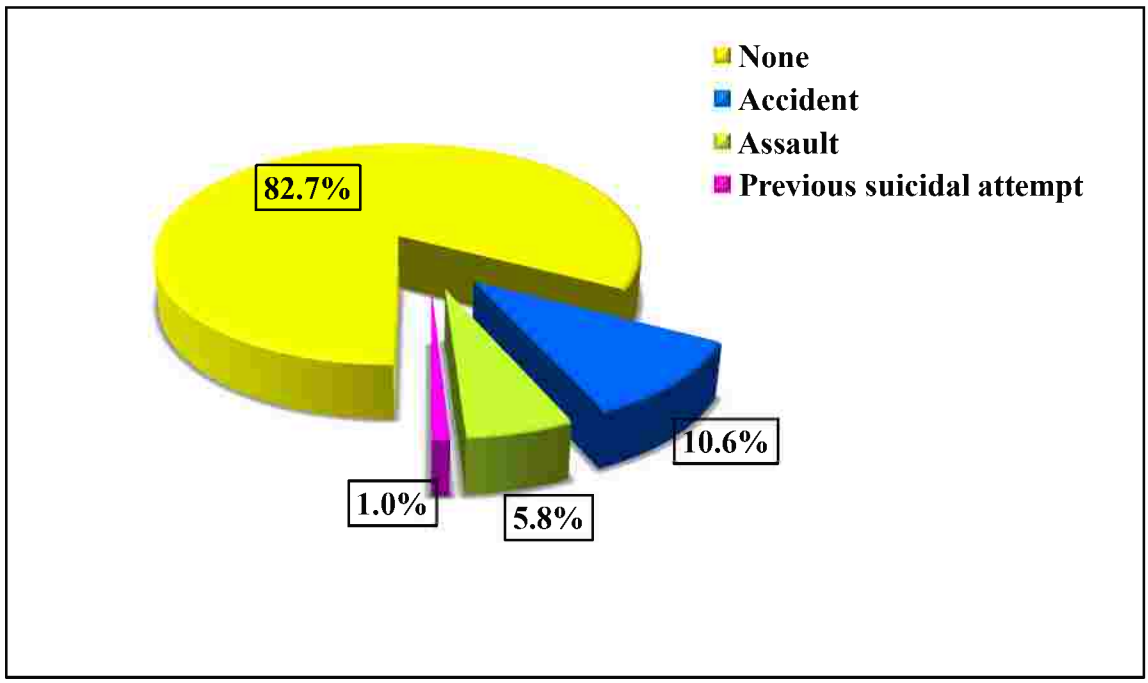

Figure (7): Distribution of the studied patients (n = 104) by history of previous injury.

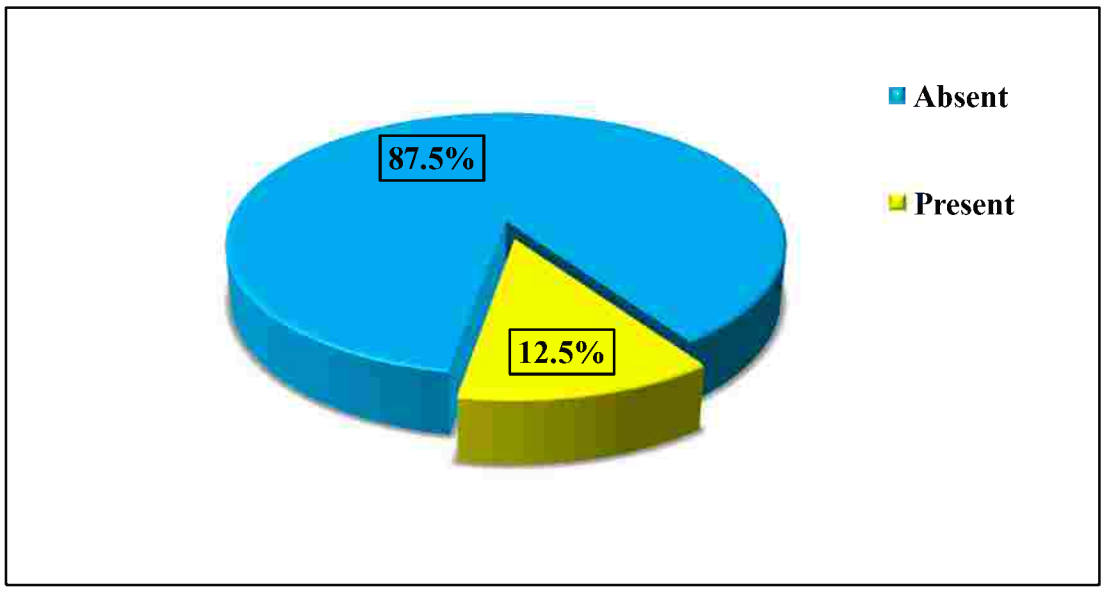

Figure (8): Distribution of the studied patients (n= 104) according to disability for daily activities.

II. Distribution of the studied patients according to data related to the injury:

Month of admission:

Figure (9) shows that the highest percentage of admission (21.2 %) was on October followed by September and December (18.3% each).

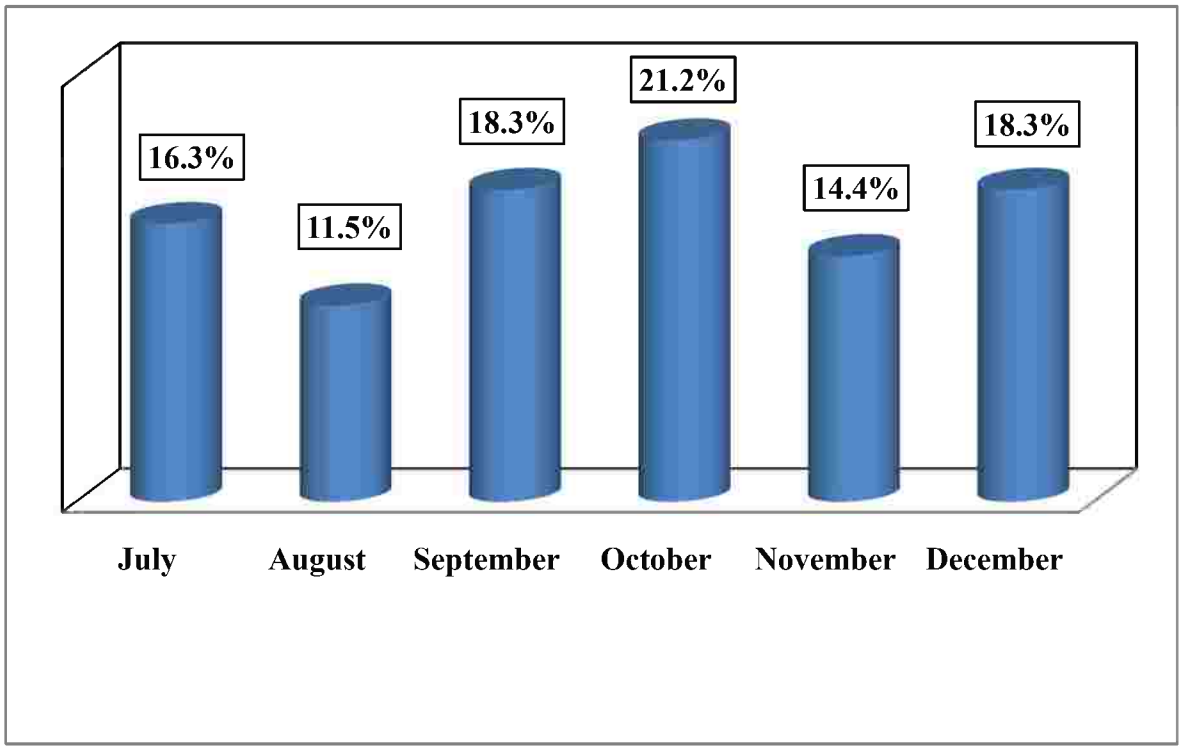

Figure (9): Distribution of the studied patients (n = 104) according to month of admission.

Place of injury:

Figure (10) shows that 60.6% of patients were injured outdoors, while 39.4% were injured indoors.

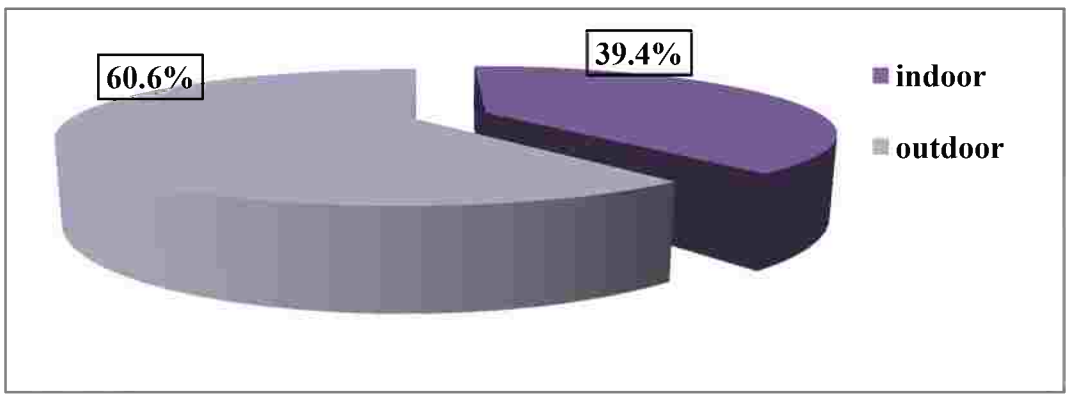

Figure (10): Distribution of the studied patients (n=104) according to place of injury.

Circumstances of injury:

More than two thirds of studied patients (80.8%) were injured accidentally, while the remaining 19.2% were non-accidentally injured (assaulted except for only one patient who attempted suicide) as shown in figure (11).

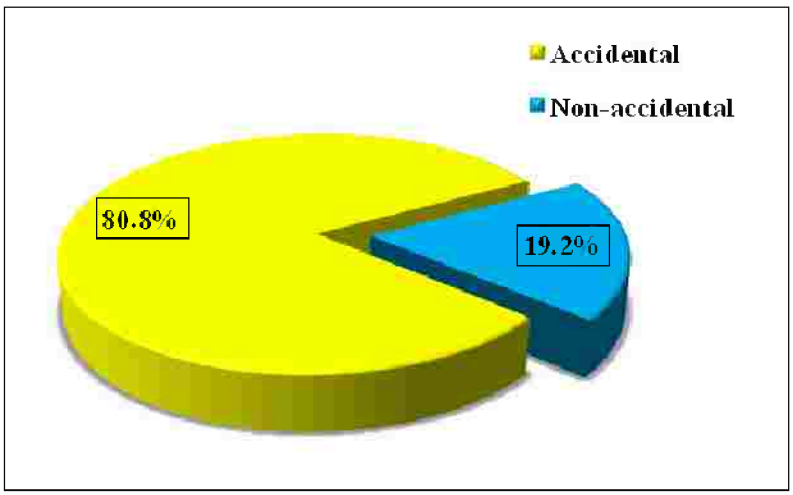

Figure (11): Distribution of the studied patients (n = 104) according to circumstances of injury.

Cause of the injury:

Falls (either falling down or downstairs or from height) took the upper hand (46.8%) in causing elderly injuries followed by motor vehicle accidents (30.8%) as shown in figure (12). Other causes were hitting by a blunt instrument (8.3%), scalds (4.8%), firearms and dry flame (3.8% for each), stabs and cuts (1.9% each).

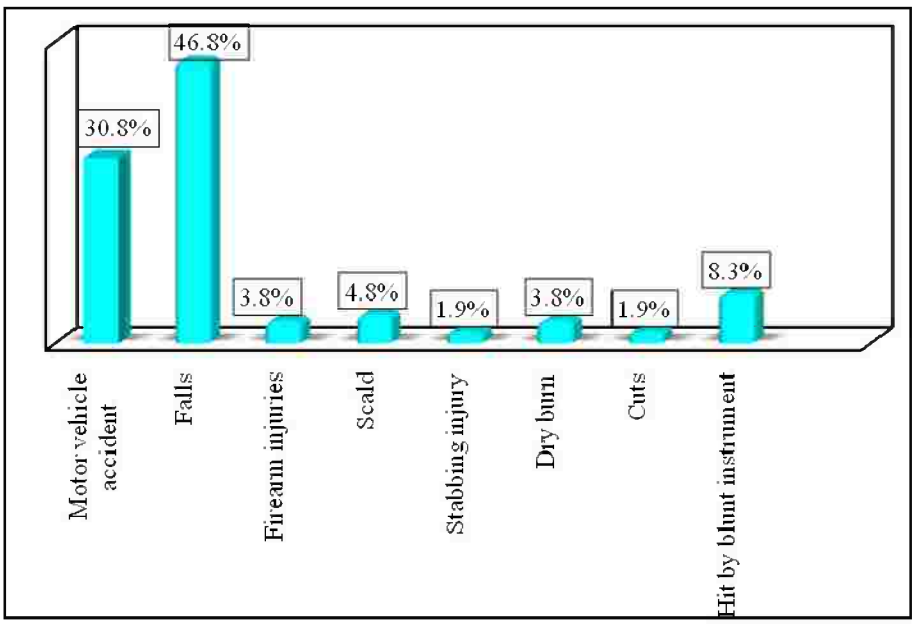

Figure (12): Distribution of the studied patients (n=104) according to cause of injury.

Site of injury:

Table (5) and figure (13) show that the most commonly injured sites were lower limbs (50%), upper limbs (42.3%) and head (41.3%). The least frequently injured sites were pelvis (4.8%) and neck (1.9%).

Table (5): Distribution of the studied patients (n = 104) according to site of injury

Site of injury	No.	%
Head	43	41.3
Neck	2	1.9
Chest	11	10.6
Abdomen	15	14.4
Pelvis	5	4.8
Back	7	6.7
Upper limbs	44	42.3
Lower limbs	52	50.0

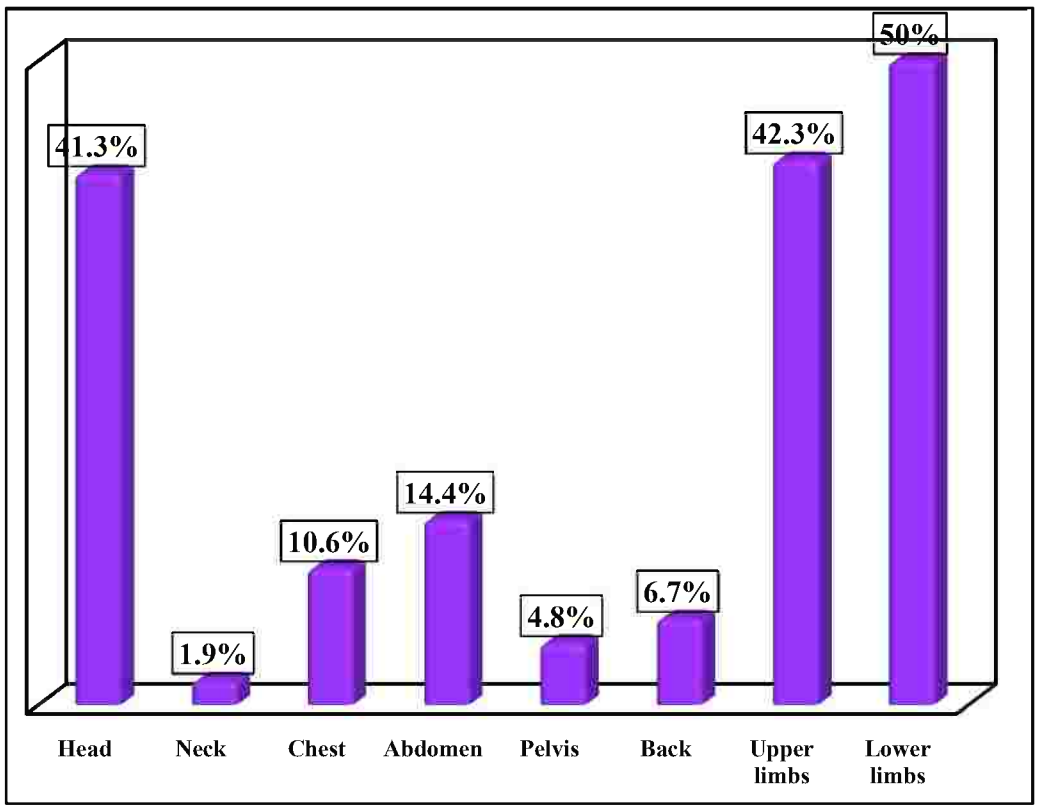

Figure (13): Distribution of the studied patients (n=104) according to site of injury.

Type of injury:

Different injuries were encountered in the studied patients; Table (6) and figure (14) reveal that contusions occurred in 48.1% of patients, followed by fractures and contused wounds (40.4% and 38.5% respectively), internal injury (34.6%) and the least type of injury observed was stab and cut wounds (1.9% each).

Table (6): Distribution of the studied patients (n = 104) according to type of injury.

Type of injury	No.	%
Abrasions	18	17.3
Burn	4	3.8
Contused wounds	40	38.5
Contusions	50	48.1
Crushed wounds	3	2.9
Cut wounds	2	1.9
Firearm injuries	4	3.8
Fractures	42	40.4
Internal injury	36	34.6
Scald	5	4.8
Stab wounds	2	1.9

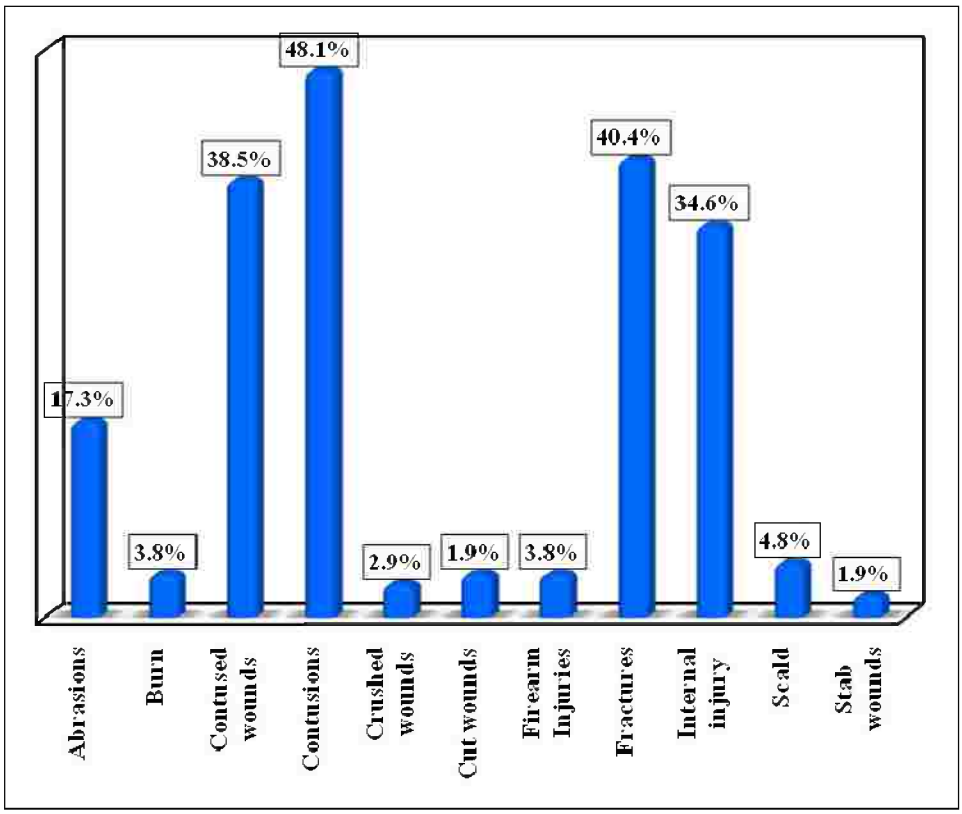

Figure (14): Distribution of the studied patients (n=104) according to type of injury.

III. The Trauma score-Injury Severity Score (TRISS)

The probability of survival (Ps) calculated with TRISS ranged from 0.3% to 99.7% with a mean value of 89.41 ± 25.71 as shown in table (7).

Table (7): Statistical analysis of TRISS

	Min. –Max.	Mean ± SD.	Median
TRISS (%)	**0.30 – 99.70**	**89.41 ± 25.71**	**99.45**

TRISS and age:

Table (8) shows that patients in the age group (65 - 70 years) had the highest mean value of probability of survival (Ps) calculated with TRISS (94.27±16.12). However, there was no statistically significant relation between the probability of survival (Ps) calculated with TRISS and age ($^{KW}\chi^2 = 1.865$).

Table (8): Relation between TRISS (%) and age

TRISS (%)	Age (years)			$^{KW}\chi^2$	p
	65 – 70 (n = 56)	71 – 75 (n = 21)	76 - 90 (n = 27)		
Min. – Max.	5.40 – 99.70	0.30 – 99.70	11.40 – 99.70	1.865	0.393
Mean ± SD.	94.27 ± 16.12	78.71 ± 37.73	87.65 ± 28.75		
Median	99.40	99.40	99.60		

$^{KW}\chi^2$: Chi square for Kruskal Wallis test

TRISS and the site of injury:

Table (9) demonstrates that the highest mean value of the probability of survival (Ps) calculated with TRISS was noticed with injuries of upper limbs (91.06%), followed by lower limbs and back injuries (83.76% and 83.79% respectively), while the lowest mean values were noticed with neck and pelvis injuries (51.5% and 45.84% respectively).

There was no statistically significant relation between Ps measured by TRISS values and the site of injury ($^{KW}\chi^2$**(p)** = 10.638 (0.155)).

Table (9): Relation between TRISS (%) and site of injury

Site of injury	TRISS (%)		
	Min-Max	**Mean±SD.**	$^{KW}\chi^2$**(p)**
Head (n = 43)	0.30- 99.70	83.24±32.45	10.638 (0.155)
Neck (n = 2)	3.60-99.40	51.50±67.74	
Chest (n = 11)	0.30-99.60	81.48±39.26	
Abdomen (n =15)	0.30-99.70	71.45±38.27	
Pelvis (n = 5)	5.40-99.60	45.84±49.07	
Back (n = 7)	0.30-99.70	83.79±36.86	
Upper limbs(n = 44)	3.60-99.70	91.06±24.41	
Lower limbs (n = 52)	3.60-99.70	83.76±30.61	

$^{KW}\chi^2$: Chi square for Kruskal Wallis test

TRISS and the type of injury:

Table (10) and Figure (15) shows that the highest mean values of Ps calculated with TRISS were associated with cut wounds (99.55%), scalds (99.5%), and stab wounds (99.4%) while the lowest mean value was encountered with victims of burn (41.5%). There was a statistically significant relation between TRISS values and the type of injury ($^{KW}\chi^2$**(p)** =38.480 (p <0.001*)).

Table (10): Relation between TRISS (%) and type of injury

Type of injury	TRISS (%)		
	Min-Max	**Mean±SD.**	$^{KW}\chi^2$**(p)**
Abrasions (n = 18)	0.30-99.70	83.22±35.70	38.480*(<0.001*)
Burn (n = 4)	3.60-99.00	41.50±41.08	
Contused wounds (n = 40)	3.90-99.70	91.05±24.55	
Contusions (n = 50)	0.30-99.70	90.90±25.52	
Crushed wounds (n =3)	41.20-97.80	78.87±32.62	
Cut wounds (n = 4)	99.40-99.70	99.55±0.13	
Firearm injuries (n = 4)	94.60-99.60	97.05±2.83	
Fractures (n = 42)	0.30-9.70	87.49±8.33	
Internal injury (n = 36)	0.30-99.60	80.89±2.59	
Scald (n = 5)	99.00-99.70	99.50±0.31	
Stab wounds (n = 2)	99.40-99.40	99.40±0.00	

$^{KW}\chi^2$: Chi square for Kruskal Wallis test *: Statistically significant at $p \leq 0.05$

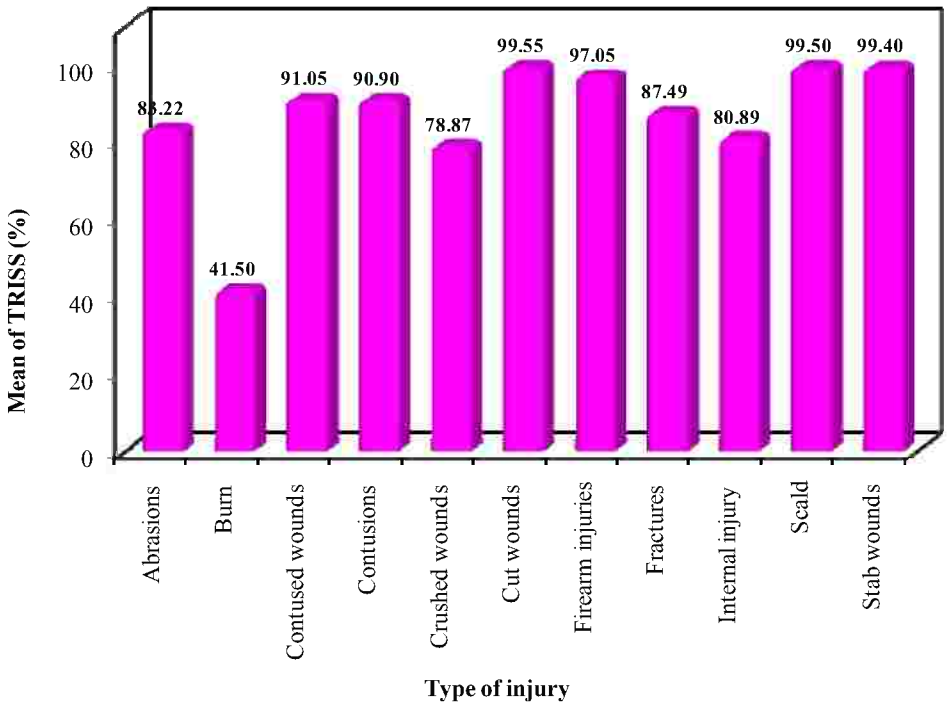

Figure (15): Relation between type of injury and TRISS (%)

IV. Investigations

Laboratory investigations that were routinely applied to these patients included; complete blood count, arterial blood gases, renal function tests, liver function tests and random blood sugar. Some deterioration in kidney and liver functions was noticed in the majority of patients as a normal finding in the aged people. **Radiological investigations** (X-ray, CT, ultrasound, etc.) were applied depending on the injured site.

V. Distribution of the studied patients according to treatment received:

As regards the treatment done to those patients after admission; 57 patients (54.8%) were treated conservatively while 45 of patients were undergone operative treatment (43.3%). Only 2 patients (1.9%) didn't complete their treatment as they escaped against medical advice as shown in figure (16).

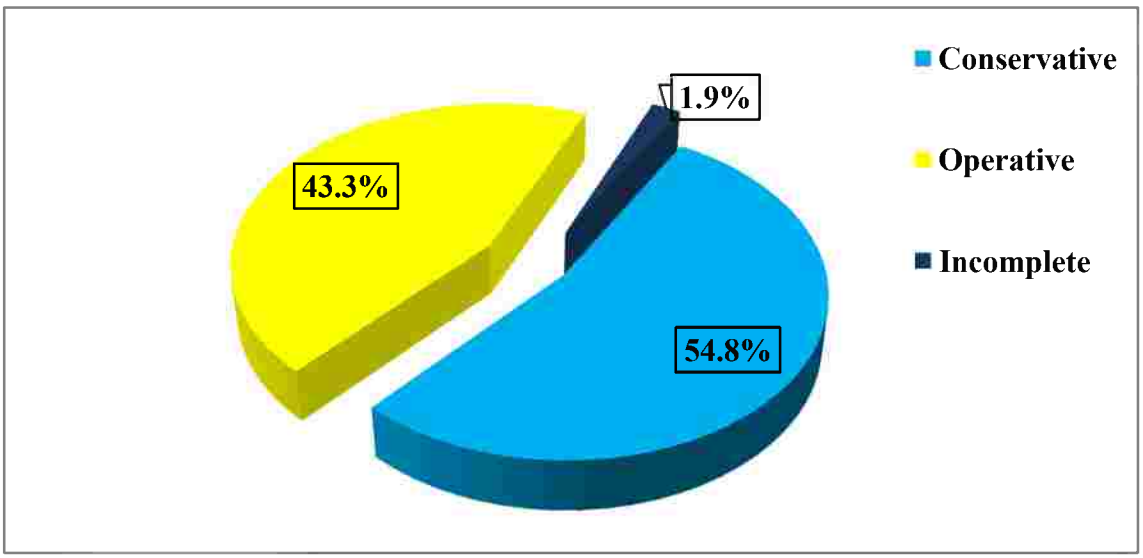

Figure (16): Distribution of the studied patients (n=104) according to treatment received.

VI. Duration of hospital stay:

The duration of hospital stay ranged from one day to 10 days with a mean of 1.68 ± 1.48 days as shown in table (11).

Table (11): Statistical analysis of hospital stay

	Min. –Max.	Mean ± SD.	Median
Hospital stay (days)	**1.0 – 10.0**	**1.68 ± 1.48**	**1.0**

Hospital stay (days) and TRISS:

There was a negative statistical correlation between the probability of survival measured by TRISS and duration of hospital stay as $r_s = -0.412^*$ ($p < 0.001$) (Table (12), Figure (17)).

Table (12): Correlation between hospital stay with TRISS (%)

		Hospital stay (days)
TRISS (%)	r_s	**-0.412***
	p	**<0.001**

r_s: Spearman coefficient
*: Statistically significant at $p \leq 0.05$

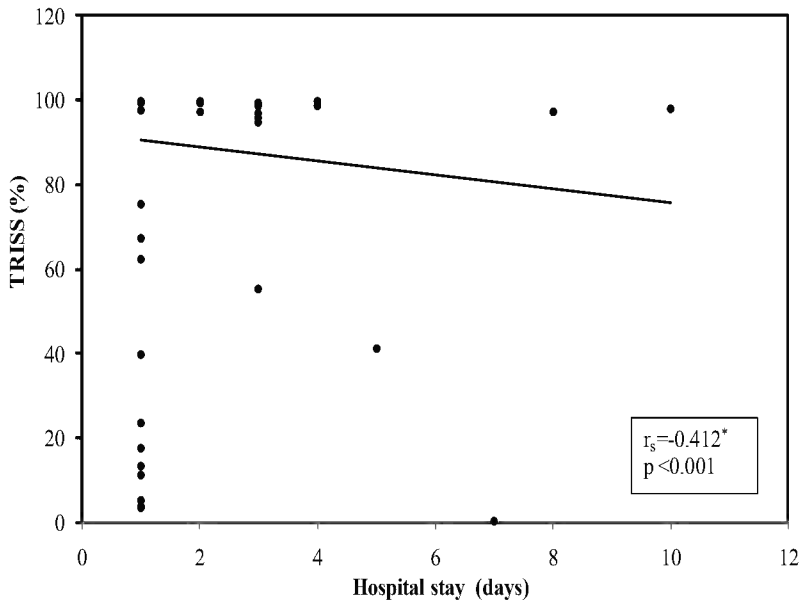

Figure (17): Correlation between hospital stay with TRISS (%)

Hospital stay (days) and age:

There was no statistically significant relation between the age of the patient and the duration of hospital stay as $^{KW}\chi^2$ = 0.879 (Table 13).

Table (13): Relation between hospital stay (days) and age

Hospital stay (days)	Age (years)			$^{KW}\chi^2$	p
	65 – 70 (n = 56)	71 – 75 (n = 21)	76 - 90 (n = 27)		
Min. – Max.	1.0 – 10.0	1.0 – 8.0	1.0 – 5.0		
Mean ± SD.	1.73 ± 1.48	1.90 ± 2.0	1.41 ± 0.93	**0.879**	**0.644**
Median	1.0	1.0	1.0		

$^{KW}\chi^2$: Chi square for Kruskal Wallis test

Hospital stay (days) and the site of injury:

In the present study, there was a non significant relation between the duration of hospital stay and the site of injury where $^{KW}\chi^2$ **(p)** = 11.811 (0.107) table (14).

Table (14): Relation between hospital stay (days) and site of injury.

Site of injury		Hospital stay (days)		
	Min-Max	Mean±SD.	Median	$^{KW}\chi^2$(p)
Head (n = 43)	1.00-8.00	1.84±1.57	1.00	11.811 (0.107)
Neck (n = 2)	1.00-1.00	1.00±0.00	1.00	
Chest (n = 11)	1.00-10.00	2.91±3.02	1.00	
Abdomen (n =15)	1.00-7.00	2.47±1.81	2.00	
Pelvis (n = 5)	1.00-1.00	1.00±0.00	1.00	
Back (n = 7)	1.00-7.00	2.71±2.14	3.00	
Upper limbs(n = 44)	1.00-10.00	1.59±1.50	1.00	
Lower limbs (n = 52)	1.00-8.00	1.75±1.36	1.00	

$^{KW}\chi^2$: Chi square for Kruskal Wallis test

Hospital stay (days) and the type of injury:

The longest mean duration of hospital stay was noticed with crush wounds (5.33±4.51 days). A significant relation between the duration of hospital stay and the type of injury was found where $^{KW}\chi^2$ **(p)** = 22.058 (p=0.015*) (Table (15), Figure (18))

Table (15): Relation between type of injury with hospital stay (days)

Type of injury	Hospital stay (days)			
	Min. -Max.	Mean± SD.	Median	$^{KW}\chi^2$(p)
Abrasions (n = 18)	1.00-8.00	2.11±2.11	1.00	22.058* (0.015*)
Burn (n = 4)	1.00-3.00	1.50±1.00	1.00	
Contused wounds (n = 40)	1.00-4.00	1.43±0.87	1.00	
Contusions (n = 50)	1.00-8.00	1.68±1.43	1.00	
Crushed wounds (n =3)	1.00-10.00	5.33±4.51	5.00	
Cut wounds (n = 4)	1.00-1.00	1.00±0.00	1.00	
Firearm injuries (n = 4)	1.00-3.00	2.00±1.15	2.00	
Fractures (n = 42)	1.00-10.00	1.90±2.05	1.00	
Internal injury (n = 36)	1.00-10.00	2.61±2.09	2.50	
Scald (n = 5)	1.00-4.00	2.20±1.30	2.00	
Stab wounds (n = 2)	1.00-1.00	1.00±0.00	1.00	

$^{KW}\chi^2$: Chi square for Kruskal Wallis test
*: Statistically significant at $p \leq 0.05$

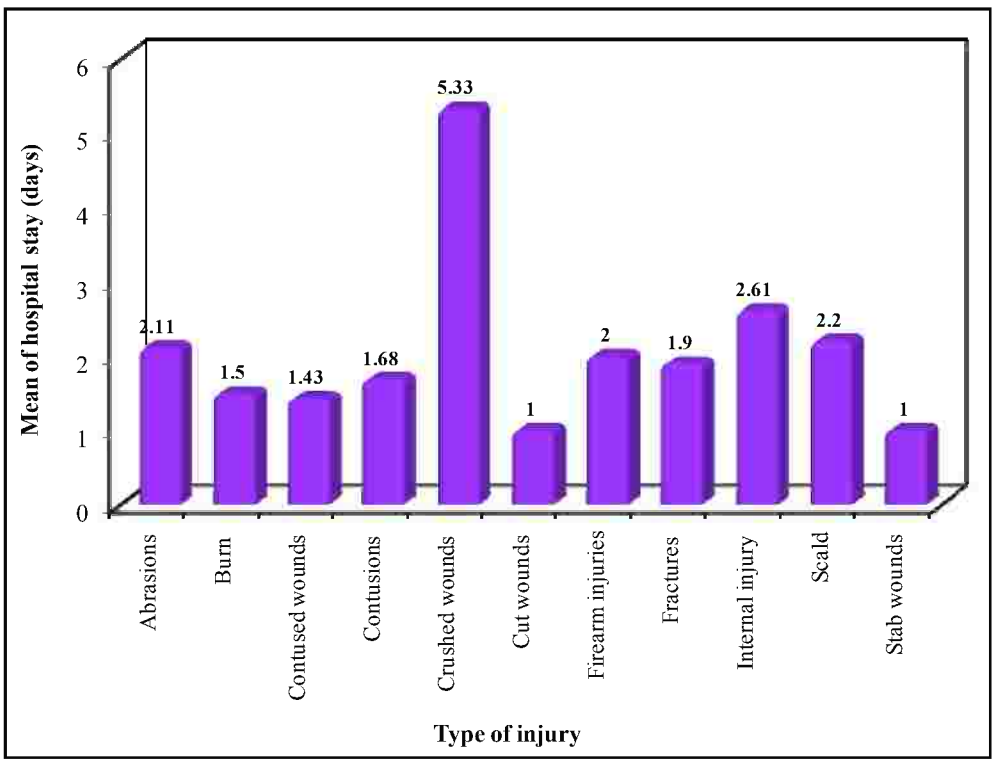

Figure (18): Relation between type of injury with hospital stay (days)

VII. Outcome:

Figure (19) reveals that about half of the studied patients (49%) improved, 26% were referred to ICU or other hospitals, 10.6% developed complications, 12.5% died, and 1.9% with unknown outcome (didn't complete their treatment and escaped against medical advice).

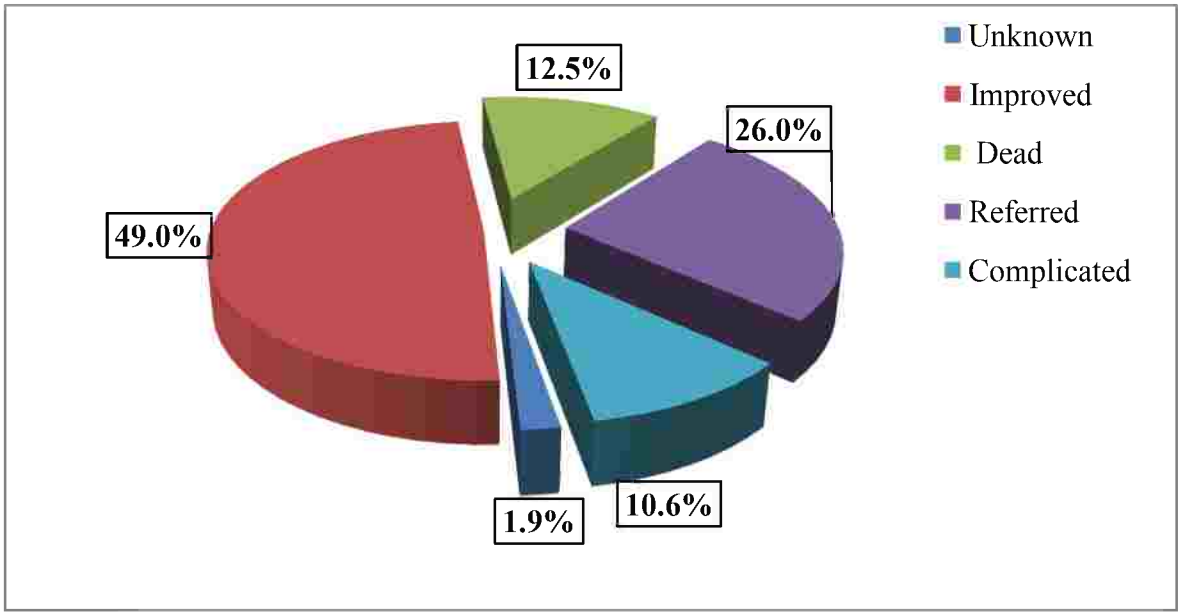

Figure (19): Distribution of the studied patients (n=104) according to the outcome.

Outcome and age:

The highest percentage of improved patients (58.8%) were in the age group 65 – 70 years similar to the patients who were referred to the ICU and other hospitals (51.9%), and patients who developed complications (63.6%). On the other hand, the highest percentage of patients who died (46.2%) was in the age group 71 – 75 years. There was no statistically significant relation between the age of the patient and outcome of trauma where χ^2= 11.819 (0.109) table (16).

Table (16): Relation between outcome and age

Age	Outcome									
	Unknown (n = 2)		Improved (n = 51)		Dead (n = 13)		Referred (n = 27)		Complicated (n = 11)	
	No.	%	No.	%	No.	%	No.	%	No.	%
65 – 70	1	50.0	30	58.8	4	30.8	14	51.9	7	63.6
71 – 75	1	50.0	10	19.6	6	46.2	2	7.4	2	18.2
>75	0	0.0	11	21.6	3	23.1	11	40.7	2	18.2
χ^2	11.819 (0.109)									

χ^2: Chi square test

Outcome and type of injury:

The highest percentages of patients who died (69.2%) and patients who developed complications (81.8%) were suffering from an internal injury, while fractures were found in the highest percentage of patients referred to ICU or other hospitals (92.6%). Contused wounds and contusions were found in a high percentage of improved patients (47.1% and 33.3% respectively) as shown in table (17).

Table (17): Relation between outcome and type of injury

Type of injury	Outcome									
	Unknown (n = 2)		Improved (n = 51)		Dead (n = 13)		Referred (n = 27)		Complicated (n = 11)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Abrasions	1	50.0	7	13.7	4	30.8	3	11.1	3	27.3
Burn	0	0.0	1	2.0	3	23.1	0	0.0	0	0.0
Contused wounds	0	0.0	24	47.1	3	23.1	8	29.6	5	45.5
Contusions	2	100.0	17	33.3	6	46.2	20	74.1	5	45.5
Crushed wounds	0	0.0	0	0.0	0	0.0	2	7.4	1	9.1
Cut wounds	0	0.0	4	7.8	0	0.0	0	0.0	0	0.0
Firearm injuries	0	0.0	2	3.9	0	0.0	0	0.0	2	18.2
Fractures	1	50.0	6	11.8	5	38.5	25	92.6	5	45.5
Internal injury	0	0.0	11	21.6	9	69.2	7	25.9	9	81.8
Scald	0	0.0	3	5.9	0	0.0	0	0.0	2	18.2
Stab wounds	0	0.0	2	3.9	0	0.0	0	0.0	0	0.0

Outcome and site of injury:

Head was the main site of injury in patients who developed complications (72.7%). Lower limbs followed by the head were the main sites of injury in patients who died (76.9% and 69.2% respectively). Also, lower limbs were the main site of injury in the highest percentage of patients who were referred to other hospitals (85.2%), while the upper limbs were the main site of injury in 52.9% of improved patients table (18).

Table (18): Relation between outcome and site of injury

Site of injury	Outcome									
	Unknown (n = 2)		Improved (n = 51)		Dead (n = 13)		Referred (n = 27)		Complicated (n = 11)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Head	1	50.0	21	41.2	9	69.2	4	14.8	8	72.7
Neck	0	0.0	1	2.0	1	7.7	0	0.0	0	0.0
Chest	1	50.0	5	9.8	2	15.4	0	0.0	3	27.3
Abdomen	1	50.0	4	7.8	5	38.5	3	11.1	2	18.2
Pelvis	0	0.0	0	0.0	3	23.1	2	7.4	0	0.0
Back	0	0.0	2	3.9	1	7.7	1	3.7	3	27.3
Upper limbs	0	0.0	27	52.9	4	30.8	8	29.6	5	45.5
Lower limbs	0	0.0	15	29.4	10	76.9	23	85.2	4	36.4

Outcome and TRISS:

Patients who died had the lowest mean value of Ps measured by TRISS (29.95%), while improved patients, patients who were referred either to ICU or other hospitals, and those who developed complications had the highest mean values of Ps (99.56%, 95.0%, and 97.04% respectively). There was a statistically significant relation between Ps measured by TRISS and outcome of trauma where $^{KW}\chi^2(p) = 58.611^*$ ($p < 0.001^*$) table (19) and figure (20).

Table (19): Relation between outcome and TRISS (%)

TRISS (%)	Outcome				
	Unknown (n = 2)	**Improved (n = 51)**	**Dead (n = 13)**	**Referred (n = 27)**	**Complicated (n = 11)**
Min. – Max.	99.60 – 99.70	98.90 – 99.70	0.30 – 97.20	41.20 – 99.70	94.60 – 99.70
Mean ± SD.	99.65 ± 0.07	99.56 ± 0.19	29.95 ± 29.74	95.0 ± 13.15	97.04 ± 1.83
Median	99.65	99.60	17.70	13.15	96.90
$^{KW}\chi^2(p)$	58.611^* ($<0.001^*$)				

$^{KW}\chi^2$: Chi square for Kruskal Wallis test
*: Statistically significant at $p \leq 0.05$

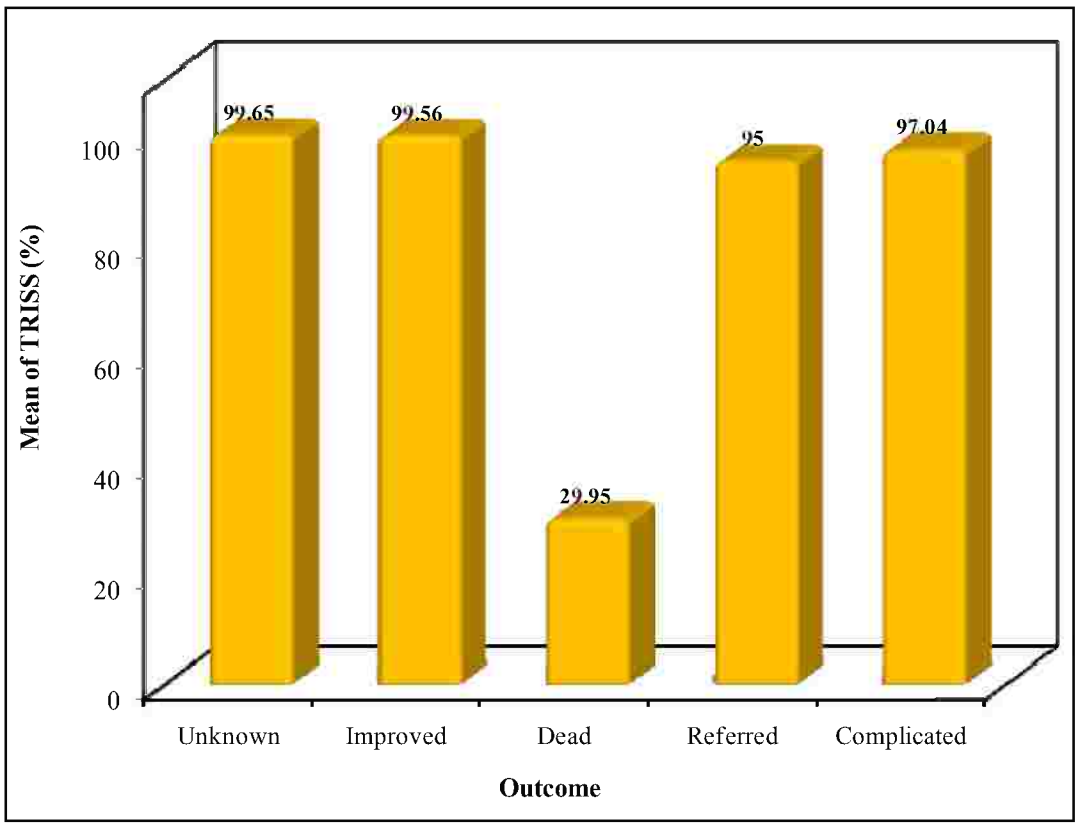

Figure (20): Relation between outcome and TRISS (%)

Outcome and hospital stay (days):

Patients who developed complications had the highest mean value of duration of hospital stay (3.82 days) followed by patients who died (2.31 days), then patients referred to the other hospitals (1.37 days) and improved patients (1.25 days). There was a statistically significant relation between the duration of hospital stay and outcome of trauma where $^{KW}\chi^2(p) = 38.704$ ($p < 0.001^*$) table (20) and figure (21).

Table (20): Relation between outcome and hospital stay (days)

Hospital stay (days)	Outcome				
	Unknown (n = 2)	Improved (n = 51)	Dead (n = 13)	Referred (n = 27)	Complicated (n = 11)
Min. – Max.	1.0 – 1.0	1.0 – 3.0	1.0 – 8.0	1.0 – 5.0	3.0 – 10.0
Mean ± SD.	1.0 ± 0.0	1.25 ± 0.63	2.31 ± 2.43	1.37 ± 0.97	3.82 ± 2.09
Median	1.0	1.0	1.0	1.0	3.0
$^{KW}\chi^2(p)$	38.704* (<0.001*)				

$^{KW}\chi^2$: Chi square for Kruskal Wallis test
*: Statistically significant at $p \leq 0.05$

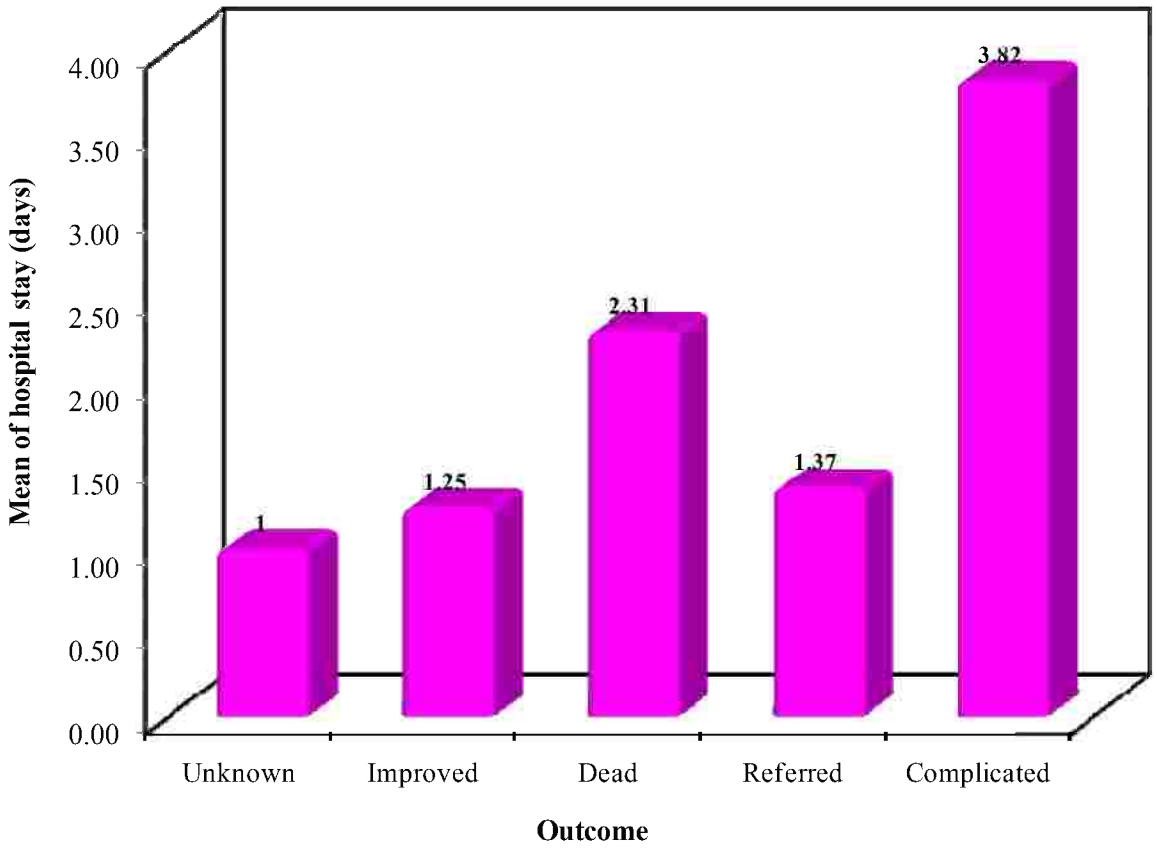

Figure (21): Relation between outcome and hospital stay (days)