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Retrospective Statistical Study of Thermal injury Patients in Al-Azhar University Hospitals

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ABSTRACT

Background: Thermal injuries are one of the leading causes of disability and death, particularly in low and middle income countries, yet its epidemiology in Egypt is under- reported. Thermal trauma is a significant health problem that has physical, psychological, and economic repercussions on affected patients.

Objective: Our aim was to analyze the epidemiological and clinical features of thermal injury patients.

Patients and methods: This retrospective study was done on one hundred patients with thermal injuries admitted to Al-Azhar University Hospitals. Data were collected from patient's files.

Results: The highest incidence of thermal injuries was seen in 3rd and 4th decade age group (65 cases) while the lowest incidence was those < 10 years (5 cases). Fire predominates in both genders (more than 50%) followed by hot liquids. Electrical injures represented the lowest cause**.** The most commonly injured part was upper limbs. Thermal injury covering less than 10% of total body surface area (TBSA) represented 28% of studied cases, while 40% of studied cases had injury covering 10-20% of TBSA and those with 21-30% injury of TBSA were 25% of cases. Majority of cases had thermal injuries of third degree (62 cases). Eighteen cases died; 8 cases died early from dehydration and shock, 6 cases from infection and 4 cases from surgical interventions.

Conclusion: Thermal injuries are public health problem accounting for a substantial proportion of all trauma admissions at Al-Hussein Hospital. These injuries and deaths are preventable, provided a community-specific preventive program is implemented with a strong educational component.

Keywords: Al-Azhar University Hospitals, Thermal injuries.

INTRODUCTION

Thermal injury is, caused by heat, cold, electricity, chemicals, friction, or radiation to the skin or other tissues. These thermal injuries are the most severe form of trauma that has afflicted humanity since ancient time [(1).] Heat, cold and electricity are some of the 'physical agents' that can cause non-kinetic injuries to the body. Energy is transferred from a physical or chemical source into living tissues, which causes disruption of their normal metabolic processes and commonly leads to irreversible changes that end in tissue death [(2)]**.**

Burns are a major cause of injury worldwide. The World Health Organization estimates that the lifetime incidence of severe burns is 1% and that more than 300,000 people die annually from fire-related burns worldwide. In addition, the prevalence of burns is significantly higher in developing countries than in developed ones. Due to damage to the skin and other organs, burns can lead to open wounds, disability, death, major economic consequences, severe emotional and psychological complications, and economic burden [(3)]**.**

Damage to the tissues arising from the application of heat is commonly encountered in forensic pathology, which may have serious criminal aspects [(4)]**.**

The aim of the present study was to study clinical and epidemiology of thermal injury cases in Al-Azhar University Hospitals, e.g. age, gender and etiology of thermal injuries, to find out the degree, sites, and percent of injuries, complications and cause of mortality.

PATIENTS AND METHODS

Our study is a retrospective statistical study included one hundred cases who were hospitalized due to thermal injuries. This study was based on analysis of data in medical files in Al-Azhar University hospitals. Epidemiological and clinical analysis of the collected data was done as regards age, gender, cause of thermal injuries, site and degree, complications and cause of death.

Ethical approval:

An approval of the study was obtained from Al-Azhar University Academic and Ethical Committee. Every patient signed an informed written consent for acceptance of the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis:

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test (χ^2) was used to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean ± SD (Standard deviation). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P value ≤ 0.05 was considered significant.

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RESULTS

Table (1): Age and sex

Age (years)	Females		Males		Total	
	N	%	N	%	N	%
0-10	2	3.2%	1	2.6%	3	3%
11-20	4	6.5%	3	7.9%	7	7%
21-30	23	37.1%	14	36.8%	37	37%
31-40	18	29.0%	10	26.3%	28	28%
41-50	12	19.4%	8	21.1%	20	20%
51-60	3	4.9%	2	5.2%	5	5%
Total	62	100%	38	100%	100	100%

Regarding age and sex, the highest incidence of thermal injuries in studied cases occurred to 3rd and 4th decade age group (65 cases) with female predominance. Lowest number of cases were those < 10 years age group (5 cases) as shown in table (1).

Table (2): Cause of thermal injuries

Cause of burn	Females		Males		Total	
	N	%	N	%	N	%
Fire	30	48.4%	19	49.9%	49	49%
Oils & hot water	23	37.1%	8	21.0%	31	31%
Electric	9	14.5%	11	28.9%	20	20%
Total	62	100%	38	100%	100	100%
X^2	**5.59**					
P-value	**0.133**					

Table (2) showed that fire, as a cause, predominates in both genders (more than 50%) followed by hot liquids. The incidence of thermal injury from fire is higher in female cases (30 female cases versus 19 male cases). Scalds were also more predominant in females (23 females versus 8 males). Electrical injures represent the lowest cause and male patients were more than females.

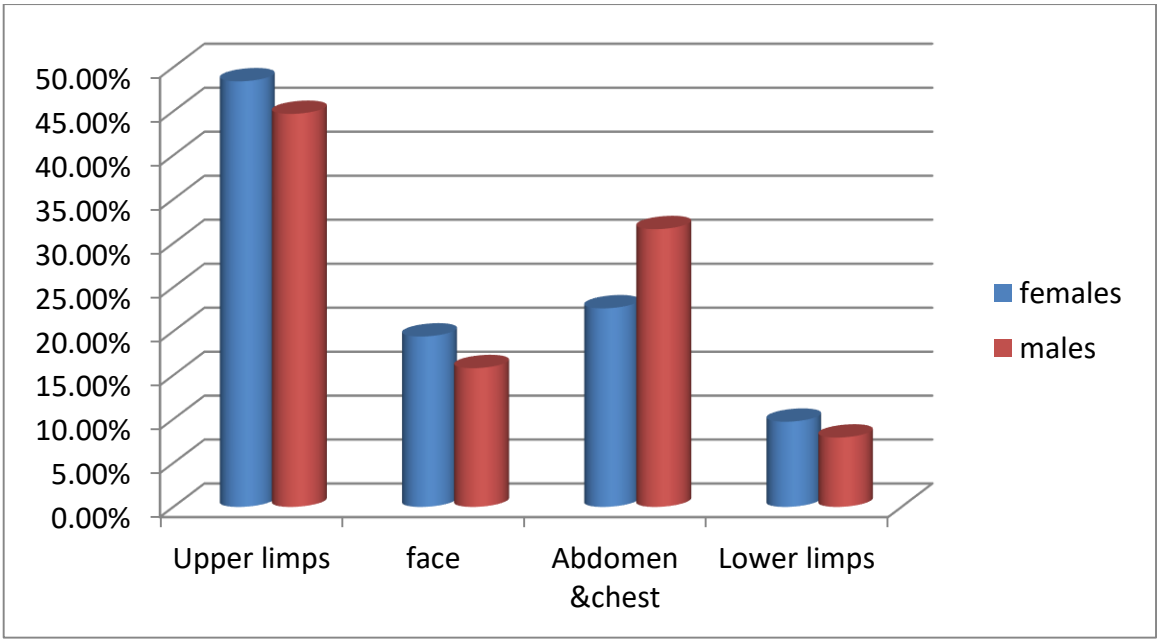

Figure (1): Site of thermal injury

Figure (1) showed that the most commonly injured part was upper limbs followed by trunk and the lowest affected areas of body were lower limbs.

Table (3): Percent of burn

Percent of burn	Females (62)		Males (38)		Total	
	N	%	N	%	N	%
Less than 10%	18	29 %	10	26.3%	28	28%
10 – 20 %	25	40.3%	15	39.5%	40	40%
21 – 30 %	15	24.2%	10	26.3%	25	25%
More than 30 %	4	6.5%	3	7.9%	7	7%
Total	62	100%	38	100%	100	100%
X^2	0.17					
P-value	0.98					

Cases that had thermal injury covering less than 10% of total body surface area (TBSA) represented 28% of studied cases, while 40% of studied cases had injury covering 10-20% of TBSA and those with 21-30% injury of TBSA were 25% of cases. Those with severe thermal injury more than30% were seen in 7% of cases (Table 3).

Table (4): Degree of burns

Depth of thermal injuries	Females (62)		Males (38)		Total	
	N	%	N	%	N	%
First degree	4	6.4%	3	7.9%	7	7%
Second degree	20	32.3%	11	28.9%	31	31%
Third degree	38	61.3%	24	63.2%	62	62%
Total	62	100%	38	100%	100	100%
X^2	0.16					
P-value	0.92					

Table (4) showed that the majority of cases had thermal injuries of third degree 62 cases with female predominance, while males who had second degree were more than females.

Course after admission:

Figure (2) showed that 38.7 % of females cured in relation to 15.8% of males and 41.9% of females had complications compared to 60% of males (12% of males died).

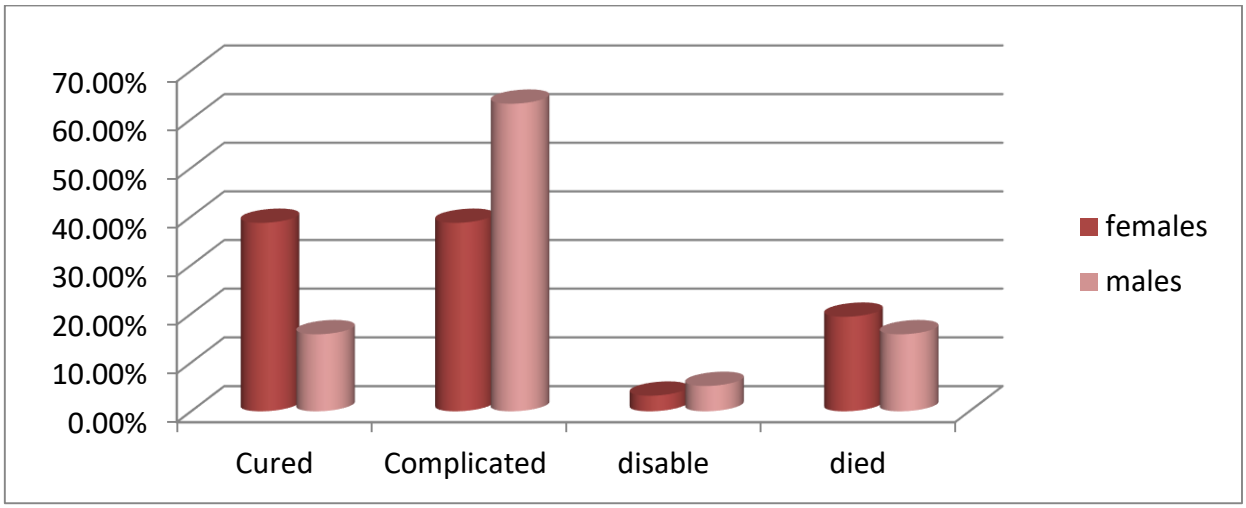

Figure (2): Course after admission

Causes of death:

Eighteen cases died (12 female cases versus 6 male cases). Eight cases died early from dehydration and shock (severe injuries), six cases from infection and septicemia and 4 cases from surgical interventions.

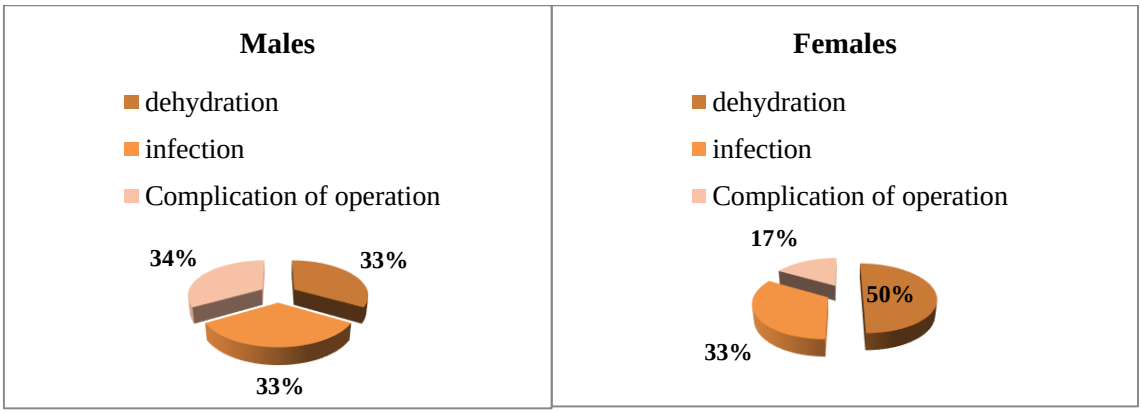

Figure (3): Cause of death

DISCUSSION

Thermal injuries are a major source of morbidity and mortality in the developing world and among the most common injuries presenting to the emergency department. While thermal injuries especially large ones may be associated with significant morbidity and mortality, most are minor and can be managed by emergency practitioners and discharged home with close follow-up. In contrast, patients with large burns require aggressive management [5].

Our study found that highest incidence of thermal injuries of the studied cases occurred to 3rd and 4th decade age group (65 cases) with female predominance and lowest number of cases were those < 10 years age group (5 cases). In contrary, **Taha *et al.*** [6], reported that children 12 years or less accounted for 48.9% of cases, Teens were 11.6%, adults from 20 to 50 years were 34.0% and elderly patients more than 50 years were (5.5%) and there was no significant difference between age groups regarding their gender. Similarly, **Buja *et al.*** [7] found that the largest number of cases were children (0–15 years old, in 52.9%), while adults represented 47.1%. **Blom *et al.*** [8] showed that the highest overall incidence was found in the 0–4 age group where boys and girls were relatively equally affected. In agreement with our study **Tripathee *et al.*** [9] found that female patients were 55.6% and male patients were 44.4% and the most frequently hospitalized patients were in age group 16–59 years, which accounted for 65.5% of patients. Study **of Kandeel** [10], demonstrated that males slightly outnumbered females and victims with the age group between 20-40 years were most affected followed by those less than 10 years (35.4% and 28.3%respectively). **Hashish *et al.*** [11] reported that the mean age of patients was 17.5 ± 17.2 years and children less than 5years of age were more exposed to thermal injuries (35.6%) than other age groups.

In our present study, fire, as a cause, predominates in both genders (more than 50%) followed by hot liquids. The incidence of thermal injury from fire was higher in female cases (30 female cases versus 19 male cases). Scalds were also more predominant in females (23 females versus 8 males). Electrical injures represent the lowest cause and male patients were more than females. **Taha *et al.*** [6] and **Hashemi *et al.*** [12] reported that the cause of thermal injury was different with age. In children, the most common was scald. **Buja *et al.*** [7] found that 24.9% suffered from flames; petroleum and oil flames, and gas flames, 54% by steam scalding, 4.2% by contact with hot objects and 16% by electricity. **Tripathee *et al.*** [9] found that flame was the cause in 65.2%, scald in 19.8% and electricity in 13% respectively. **Kandeel** [10] found that 85% of cases were due to flame followed by scalds (14.1%) and the least percentage was due to electricity (0.9%).

The present work showed that the most commonly injured part was upper limbs followed by trunk and the lowest affected areas of body were lower limbs. While, the study of **Taha *et al.*** [6] differently showed that head was the most frequent area affected in all age groups. **Buja *et al.*** [7] confirmed that 56% of thermal injuries affected the head, 23.7% at the neck, 43.6% at the trunk, 79% at the upper limbs, 43.2% at the lower limbs and 3.3% at the genitalia. **Tian *et al.*** [13] reported that the most frequent burned areas were lower limb, followed by the trunk. Compared with female patients, male patients tended to get burned more easily on the face and neck, upper limb, hand, and foot.

The present work showed that cases with thermal injury covering less than 10% of total body surface area (TBSA) represents 28% of studied cases while 40% of studied cases had injury covering 10-20% of TBSA and those with 21-30% injury of TBSA were 25% of cases. Those with severe thermal injury (more than30%) were seen in 7% of cases. **Tripathee *et al.*** [9] found that the average % TBSA involved for flame burn, scald burn, electric burn, acid burn and contact burn were 19.9%, 10.5%, 9.5%, 1% and 1% respectively. **Kandeel** [10] reported that 69.9% of victims had more than 50% of TBSA while 30.1% of victims sustained burns of less than 50% of TBSA**.** While, **Hashish *et al.*** [11] found that majority of cases (72.6%) showed a percentage of total body surface area (TBSA) less than 20%. Upper extremities were most commonly affected (58.2%).

In the present study, the majority of cases had thermal injuries of third degree (62 cases) with female predominance while males that sustained second degree were more than females. **Khan *et al.*** [14] found that most of the burns were partial thickness. While, **Wardhana *et al.*** [15] found that the majority of their studied cases suffered from third degree burn.

In the studied cases, 18 cases died; 12 females versus 6 males, 8 cases died early from dehydration and shock (severe injuries), 6 cases from infection and septicemia and 4 cases during and after surgical interventions. These results are in accordance with **Nath *et al.*** [16] study, which showed that shock was the main cause of death. Shock was more common in 1-2 days period after burn injury [17]**.** While, infection needed longer duration (an average of 5 to 7 days). On the contrary, **Kandeel** [10] found that septicemia was the leading cause of death (52.2%), followed by shock (23.9%)**.** In **Tripathee *et al.*** [9] study, the major cause of death was septicemia and pneumonia, which accounted for 68.1% (49 cases), followed by multiple organ dysfunction syndrome 23.6% (17 cases). The remaining 6 cases (8.3%) died due to multiple causes. Similar findings were found by other studies as **Dasari *et al.*** [18] and **Vidhate and Pathak** [19]. Also **Taylor *et al.*** [20] found a significant association between septicemia in burn cases and occurrence of death.

In a study by **Afify *et al.*** [21] they reported that after postmortem examination, the majority of burn incidents were accidental (55.7%) followed by suicidal (22.6%) and homicidal (21.7%) and the percentages of burns (TBSA) were over 50%**.**

CONCLUSION

Thermal injuries are public health problem accounting for a substantial proportion of all trauma admissions at Al-Hussein Hospital. These injuries and deaths are preventable, provided a community-specific preventive program is implemented with a strong educational component. More research and advancement as well as a survey at national level in this neglected field are mandatory to decrease morbidity and mortality in our population.

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Conflict of Interest: Nil.

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