

Profile of Medico-Legal Deaths Due to Thermal Burn Injury in Tertiary Care Centre of Northern Madhya Pradesh

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Abstract

Introduction: Fire is one of the greatest discoveries in the history of mankind. It fully transforms the way of living of humans. But just like a double edged sword it also affects the human life in a negative way. Fire is easy and dangerous weapon in kitchen to be used for suicide for females in developing country like India. Due to this, thermal burn is a big problem and have significant share in medico-legal autopsies.

Aim and objective: The aim of present study is to provide a brief analysis of thermal burn mortality across all age group brought in the mortuary of GRMC, Gwalior and to study the various medico-legal aspects of fatal thermal burn cases.

Material & Method: This is a retrospective analysis of 82 cases of thermal burns which were brought for medico-legal autopsy at Forensic Medicine & Toxicology department in Gajra Raja Medical College, Gwalior (Madhya Pradesh) during the whole year. The data was compiled, tabulated and analysed statistically.

Results: 3.6% of total medico-legal autopsies are of thermal burn. Most of the thermal burn cases fall in the age group of 21-30years. 57.3% victims are female. 81.1% of the victims are married. Most of the victims (64.6%) showed total body surface area involvement between 71-100%. Most of the cases (39%) survived for 7 days or more. Most common cause of death (74.4%) in this study is Septicaemia. About 69.5% of thermal burn cases were accidental manner.

Conclusion: In most of the cases thermal burn is totally preventable and manageable. Education at school level plays a key role. Most of the accidental thermal burns can be avoided if, people know the proper safety measures for using fuels for cooking.

Keywords: Thermal burns, married females, young age group, accidental burn, suicide.

Introduction

Fire is one of the greatest discoveries in the history of mankind. It fully transforms the way of

living of humans. Today, without fire the existence of humans is next to impossible. But just like a double-edged sword it also negatively affects human life.

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Globally, thermal burns are one of the major causes of disability. It causes more than 8 million disability-adjusted life-years (DALYs). The majority of the incidences happened in low-income and middle-income countries (LMICs).¹ It is observed that, in South Asia where the festive season of Diwali, is celebrated each year in October or November, there is an increased incidence of thermal burns especially in children.² In 2019 more than 23000 fire-related deaths were reported in India which is about 20% of the global mortality burden.³ The thermal burns which involve more than 40% of TBSA (total body surface area) are associated with major morbidity and mortality.⁴ If thermal burn patient survives; they become financially distressed, vocationally challenged, and socially excluded.⁵ In India, Women (aged 15–49 years) are 3 times more susceptible to getting thermal burn injury as compared to men.³ These high susceptibility in women are due to unsafe cooking and kitchen practices, suicides, and homicides associated with domestic violence and dowry-related conflict.⁵ Prevention of thermal burns requires attention to gender-based inequities and upstream social determinants of health. In developed countries, the incidence, severity, mortality, and morbidity due to thermal burn injury have reduced significantly due to advancements in prevention, management, and rehabilitation; whereas in LMICs, particularly in the Indian subcontinent, the burden continues to be high.⁶ Thermal burns are preventable. Efforts for prevention and care of the victims can reduce thermal burn-related mortality, morbidity and disability significantly. For the preventive, curative and rehabilitative care of thermal burn patients, GOI launched an initiative named as National Programme for Prevention, Management and Rehabilitation of Thermal Burn Injuries (NPPMRBI).⁷

Aim & Objective

The aim of present study is to provide a brief analysis of thermal burn mortality across all age group brought in the mortuary of GRMC, Gwalior during a period of 2023 and to study the various medico-legal aspects of fatal thermal burn cases.

Material and Method

This study is a retrospective analysis of 82 cases (out of total 2306 autopsies performed during the study period) in which cause of death was thermal burn injury and its complications, which were brought for medico-legal autopsy at Department of Forensic Medicine and Toxicology in Gajra Raja Medical College, Gwalior (Madhya Pradesh). The duration of the study was from 1st January 2023 to 31st December 2023. Data were collected from Post mortem registers/records, Inquest papers and Post mortem reports maintained in the department by keeping confidentiality strictly intact. The data was tabulated and analysis was done. Descriptive results are presented in table form.

Result and Discussion

Table 1 Total autopsy and thermal burn cases done in year 2023

Total Post-mortem done in 2023	2306
Number of thermal burn cases	82
% of total thermal burn cases	3.6

Table 2 Age wise distribution of thermal burn cases

Age group (in years)	Thermal burn cases	%
1-10	8	9.8
11-20	8	9.8
21-30	32	39
31-40	14	17
41-50	8	9.8
51-60	5	6.1
61-70	5	6.1
>70	2	2.4
Total	82	100

Table 3 Gender wise distribution of thermal burn cases

Gender	Thermal burn cases	%
Male	35	42.7
Female	47	57.3
Total	82	100

Table 4 Age and gender wise distribution of thermal burn cases

Age group (in years)	Male		Female		Total
	N	%	N	%	
1-10	5	14.3	3	6.4	8
11-20	3	8.6	5	10.6	8
21-30	11	31.4	21	44.7	32
31-40	6	17.1	8	17	14
41-50	4	11.4	4	8.5	8
51-60	3	8.6	2	4.3	5
61-70	2	5.7	3	6.4	5
>70	1	2.9	1	2.1	2
Total	35	100	47	100	82

N: number of thermal burn cases

Table 5 Month and gender wise distribution of thermal burn cases

Months	Male	Female	Total thermal burn cases
January	06 (17.1%)	07 (14.9%)	13 (15.9%)
February	03 (8.6%)	04 (8.5%)	07 (8.5%)

March	03 (8.6%)	02 (4.3%)	05 (6.1%)
April	06 (17.1%)	04 (8.5%)	10 (12.2%)
May	00(00)	02 (4.3%)	02 (2.4%)
June	02 (5.7%)	04 (8.5%)	06 (7.3%)
July	02 (5.7%)	08 (17%)	10 (12.2%)
August	02 (5.7%)	01 (2.1%)	03 (3.7%)
September	01 (2.9%)	05 (10.6%)	06 (7.3%)
October	03 (8.6%)	01 (2.1%)	04 (4.9%)
November	07 (20%)	07 (14.9%)	14 (17.1%)
December	00 (00%)	02 (4.3%)	02 (2.4%)
Annual thermal burn cases	35 (42.7%)	47 (57.3%)	82 (100%)

Table 6 Marital status wise distribution of thermal burn cases

Marital status	Thermal burn cases		
	Male	Female	Total
Married	28 (80%)	39 (83%)	67(81.7%)
Un-married	7(20%)	8(17%)	15(18.3%)
Total	35	47	82 (100%)

Table 7 Survival period and total burn surface area wise distribution of thermal burn cases

Survival period	Total burn surface area				Total
	31-70%		71-100%		
	N	%	N	%	
Brought dead	00	00	3	5.7	3 (3.6%)
<24hrs	1	3.4	12	22.6	13 (15.9%)
24 to <72hrs	3	10.3	6	11.3	9 (11%)
72hrs to <7days	10	34.5	15	28.3	25 (30.5%)
7 days and more	15	51.8	17	32.1	32 (39%)
Total	29 (35.4%)	100	53 (64.6%)	100	82 (100%)

N: number of thermal burn cases

Table 8 Cause of death wise distribution of thermal burn cases

Cause of death	Thermal burn cases	%
Shock	21	25.6
Septicaemia	61	74.4
Total	82	100

Table 9 Manner of death wise distribution of thermal burn cases

Manner of death	Thermal burn cases	%
Accidental	57	69.5
Suicidal	22	26.8
Homicidal	3	3.7
Total	82	100

As per table no. 1, a total of 2306 autopsies were conducted in the department, out of which 82 cases (3.6%) were died of thermal burn injury. About 20% thermal burn cases were observed by study conducted by Harid as SV et al.⁸

As per table no. 2, most of the victims were belonging to 21 to 30 years age group (39%) followed by 31 to 40 years age group (17%). Similar findings were also observed by Haridas SV et al.⁸, where more than 50% cases comes from 21-40 years age group. Minimum number of cases seen in above 70 years (2.4%). The youngest victim in our study was 10months old female baby and the oldest one was 80yrs female.

As per table no. 3, most of the victims are female (57.3%) followed by male (42.7%). As per table no. 4, Predominance of female cases were seen in age group 21-30 years (44.7%) followed by 31 to 40 years (17%) which is similar to the findings of Buchade D et al.⁹, Mazumdar A et al.¹⁰, Harshitha K et al.¹³, and Dhoble SV et al.¹⁴ Involvement of most of the female in this age group is because female get married and involve in cooking in kitchen. In contrast, Memchoubi et al.¹⁵ reported slight male preponderance in their study. Male also dominates in the age group of 21-30 and 31-40 years i.e. 31.4% and 17.1% respectively. High incidence may be explained by the fact that young adults are generally active and exposed to hazardous situations both at home and at work.

As per table no. 5, most of the thermal burn cases came in the month of November (17.1%) followed by January (15.9%). Similar finding observation made by Tandon R et al.² Since, in South Asia where festive season of Diwali, celebrated each year in the months of October or November, there is an increase incidence of thermal burns specially in children. Minimum number of case in May and December i.e. 2.4%. Most of the male cases came in the month of November (20%) followed by January and April (17.1%). Most of the females were victim came in the month of July (17%) followed by January and November i.e. 14.9%.

As per table no. 6, most of the victims are married (81.7%). Similar observation were made by Vaghela PC et al.¹², Harshitha K et al.¹³, and Dhoble SV et al.¹⁴ The proportion of married male was 80% whereas married female was 83%.

As per table no. 7, victims of total burn surface area of 71 to 100% were 64.6%, similar to the observations by Buchade D et al.⁹, Mazumdar A et al.¹⁰, DhobleSV et al.¹⁴, Zanjad NP et al.¹⁶, and Bhore DV et al.¹⁷ Most of the thermal burn victims died after 7 or more days of hospitalization i.e. 39% (51.8% with less total burn area and 32.1% if the total burn area is more than 71%). Similar results were observed by Buchade D et al.⁹, DhobleSV et al.¹⁴ and Bhore DV et al.¹⁷ In contrast, 60.8 % of cases in Kumar V et al.¹⁸, 59% cases in Mishra PK et al.¹¹, and 58% cases in Ragheb SA et al.¹⁹ died within a week.

As per table no. 8, the most common cause of death were septicaemia (74.4%) followed by shock (25.6%). Septicaemia was the cause of death in which there was hospitalization for 3 or more days. Similar results were noted by Buchade D et al.,⁹ DhobleSV et al.¹⁴, Bhore DV et al.,¹⁷ and Dasari H et al.²⁰ In contrary, shock was found to be most common cause of death in study done by Mishra PK et al.¹¹ Deaths due to Shock (neurogenic, hypovolemic) occurs in up to 3 days of hospitalization.

As per table no. 9, most of the thermal burn cases were of accidental manner (69.5%) followed by suicidal (26.8%) and least belong to homicidal (3.7%). Similar results were noted by Buchade D et al.⁹, Mazumdar A et al.¹⁰, & Usma B et al.²¹ In contrary, Masud U et al.²² found that most of thermal burn cases died due to homicidal thermal burn (59%).

Conclusion

In most of the cases thermal burn is totally preventable and manageable. Education at school level plays a key role. Most of the accidental thermal burns are avoided if, people knows the proper safety measures for using fuels for cooking. Standard Operating procedures are needed to ensure prompt resuscitation, wound care, infection control, and early surgery if needed. This will reduce the mortality in a tertiary care centre.

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Conflict of Interest: None

Ethical Concerns: As per the law of India, if an autopsy is performed in a medico-legal case the consent of the family member is not desired. Identity

and credentials of the victims are kept confidential and the clearance from the institutional ethics committee is not warranted.

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