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Original Research Article

Socio-clinical profile of burn patients in Odisha: a cross-sectional study

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ABSTRACT

Background: Burn injuries remain a major global health issue that can be prevented, with countries like India seeing a concerning increase in cases. The objective of this research was to examine the sociolect-demographic traits and trends of burn injuries in patients who were hospitalized at a tertiary care facility.
Methods: During a three-month timeframe, a hospital based cross-sectional study was conducted using semi-structured questionnaires, after obtaining consent from patients or their caregivers. Clinical evaluations were also carried out to ascertain the proportion of total body surface area (TBSA) impacted and the body part most severely affected. Data on sociolect-demographic features, burn cause, severity and type, time to seek medical care, and results were also collected.
Results: Of the 84 burn victims, the majority were women between the ages of 20 to 40, following the Hindu faith, residing in rural regions (66.6%). The majority of burns (97.61%) resulted from heat, were unintentional, and took place in kitchens (62.3%). Men were more susceptible to electrical burns, whereas women were more prone to flame burns. Following receiving thorough treatment, 51.1% of burn patients were released from care, whereas 17.8% of them died.
Conclusions: This research highlights the susceptibility of women to fire burns, often resulting from incorrect cooking methods. Preventing burn incidents in homes can be achieved through safety precautions and increased knowledge especially in rural regions. In the tertiary care setting, starting treatment early, and adhering to established protocols can all aid in decreasing mortality rates. The experienced burns specialist should assess the advantages and risks of integrating AI into clinical practice before deciding to do so.

Keywords: Burn injury, Clinico-epidemiogy, Hospital based study, Prognosis

INTRODUCTION

Burn injuries occur all throughout the world and have had a negative impact on humanity since antiquity. Burns represent a significant medical and psychological challenge within any community, with far-reaching economic and social implications for individuals, families, and society as a whole.[1] In low-income countries, burn injuries are especially serious because of the costly treatment and lack of access to specialized healthcare facilities.[2] Because of the high rates of death, morbidity, and disability associated with burn injuries, young and middle-aged people represent a serious public health problem. Additionally, burns have social implications, whether they result from accidents, suicide attempts, or homicidal actions. Burns contribute significantly to morbidity due to the resulting disfigurement, leading to emotional distress and stigma. Annually, approximately 180,000 individuals worldwide lose their lives due to burn injuries, with 6-7 million people in India alone suffering from burns.[2]

The high death, morbidity, and disability rate of burn injuries among youth and middle-aged individuals make

them a significant public health concern. Burn wounds may also involve a societal element and can happen unintentionally, through self-infliction, or as a consequence of homicide. Burn injuries lead to notable health issues due to deformities, causing mental anguish and social shame, and are the main reason for disability adjusted life years (DALYs) lost in lower-income nations. It also has a substantial socioeconomic impact because of the direct costs of hospitalization, surgery, and rehabilitation; indirect costs include lost wages, extended care, and psychological difficulties induced by deformity. Burn risk factors include inadequate safety measures at work and home, poverty and overcrowding, underlying medical conditions such as epilepsy, peripheral neuropathy, and physical and cognitive disabilities, alcoholism and smoking, easy access to weapons of mass destruction, and the use of kerosene (paraffin) as fuel.

Preventing burns is crucial. Taking steps to prevent and provide care for burn victims can greatly decrease burn-related deaths, illnesses, and disabilities. The National Program for Prevention, Management, and Rehabilitation of Burn Injuries (NPPMRBI) is a government program designed to provide preventive, curative, and rehabilitative care for burn victims.[3]

Despite their clinical and societal importance, burns remain poorly researched in India. Data on burn injury and its size in Odisha, India's eastern state, is rare, particularly in the state's resource-constrained periphery medical institutions. This study aimed to analyze the epidemiology, clinical symptoms, and prognosis of burn patients, as well as to determine the factors affecting their outcomes. Also, this research aimed to investigate the underlying causes of burn injuries, both material and social, and to assess the demographic and clinical characteristics, as well as the effectiveness of treatments.

METHODS

The research was carried out at a hospital over a three-month period, spanning from January to March 2024, as a cross-sectional investigation. During this time, eighty-four burn patients admitted to the burn unit at the All India Institute of Medical Sciences in Bhubaneswar were included in the study. Information was obtained through interviews with the patients or their family members using a pre-tested and pre-designed questionnaire after obtaining prior consent. For pediatric patients, consent was obtained from their parents or guardian. Various documents such as entry registration, referral notes, and bed head tickets were reviewed. The burn assessment involved evaluating multiple factors such as burn modality, source, location, hospital admission, complications, and outcomes. To determine the extent of the burn in terms of total body surface area (TBSA) affected, a physical examination was conducted using Wallace's "Rule of Nine" or the "Lund and Browder" chart for adults.[4]

Inclusion criteria

During this time frame, all patients admitted to the burn unit of All India Institute of Medical Sciences, Bhubaneswar were included in the study.

Exclusion criteria

The patients are unwilling to participate, and they were admitted outside the specified time frame. The burn afflicted patients brought dead, or died just after admission.

Statistical analysis

SPSS was used to evaluate the acquired data after they were input into an MS Excel spreadsheet. The chi-square test was used to determine the statistical significance of the results, with a p-value of less than 0.05 being considered statistically significant.

RESULTS

The findings in Table 1 shows that out of 84 burn patients, 8.33% were infants,13.9% were aged 1 to 5 years, and 4.76% were in the geriatric age group. The majority (67.85%) were females, came from rural areas (61.9%), identified as Hindu (92.8%), were literate (79.76%), homemakers (66.60%), and had a monthly family income below Rs 5000 (48.8%).

Burn injury intent

The majority of burns were accidental (97.61%), with 63% occurring in the kitchen and 31% at home. These burns were mainly thermal (86.90%) in nature (Table 2).

Clinical finding

Throughout the duration of the study, fifteen of the 84 patients, or 17.8%, passed away. The majority of the deceased patients suffered from severe burn injuries, ranging from eighty to one hundred percent. In terms of causes, scald was the leading cause of burn damage in the population, accounting for 61.90%, followed by flame at 23.50%. The kitchen was the most common location for burn injuries, accounting for 63%, followed by the residence at 31%.

The burn injuries ranged in severity, with 32 instances affecting up to 38% of the total body surface area (TBSA), and a small proportion (11.9%) involving more than 90% of TBSA. In 42.8% (n=36) of cases, the upper limbs were the most severely impacted body part. while head and neck injuries accounted for only 2.3%. In our study complications arising from burn injuries included infection which is the highest complication (66.6%) (n=56) seen in most of the burn injury cases and amputation in 10.7% cases. However, 22.6% of

individuals did not experience any complications. In most cases, severe burns and infections resulted in death.

Table 1: Distribution of burn patients according to socio-demographic profile (n=84).

Category	Frequency (n=84)	Percentage
Sex		
Male	27	36
Female	57	67.8
Age (years)		
<1	7	8.33
01-5	11	13.90
6-14	10	11.90
15-19	14	16.60
20-40	22	26.19
40-60	16	19.04
>60	4	4.76
Income per month (INR)		
<5000	41	48.80
5000-10000	26	30.95
>10000	17	20.23
Religion		
Hindu	78	92.80
Muslim	6	7.10
Residence		
Urban	32	3.80
Rural	52	61.90
Marital status		
Single	16	19.04
Currently married	30	35.70
former married	38	45.23
Educational status		
No formal education	17	20
Primary school	33	38.80
Secondary school	25	39.70
Graduate and above	9	10.50
Occupation		
Unemployed	4	4.70
student	11	12.90
skilled worker	6	7.10
Housewife	56	66.60
service	4	4.70
Others	3	3.50

Analyzing time lapse and length of stay

The researchers attempted to determine the time elapsed between the burn incident and the first visit to a healthcare facility. Their findings showed that 46.4% of individuals arrived at the hospital on the same day, while 28.57% sought medical attention within 2-4 days. Additionally, 19.4% of people sought care within 5-7 days, and 5 patients sought treatment a week after the burn occurred.

Table 2: Distribution of burn patients according to medical causes (n=84).

Place of burn	Frequency (n=84)	Percentage
Home	26	30.90
Kitchen	53	63.00
School	1	1.10
Work	4	4.76
Cause of burn injury		
Thermal	73	86.90
Electrical	11	13.09
How did the injury happened?		
Accidental	82	97.61
Intentional	2	2.30
TBSA involved		
0-30	32	38
31-60	24	28.50
61-90	18	21.40
>90	10	11.90
Severely affected body parts		
Trunk	27	32.10
Upper body	36	42.80
Lower limb	11	13
Head & neck	2	2.30
Others	8	9.52
Complication		
Infection	56	66.60
Amputation	9	10.70
No complication	19	22.60
Time lapse and length of stay		
Same day	39	46.42
2-4 day	24	28.57
5-7 day	16	19.04
> 7 day	5	5.95
Outcome		
Discharged	43	51.90
LAMA	26	30.95
Death	15	17.80

Table 3: Association between cause of burn and gender (n=84).

Cause of burn	Male (n=27) Frequency (%)	Female (n=57) Frequency (%)	P value
Thermal*	19 (70.4)	52 (91.2)	0.0003
Electrical	8 (29.6)	5 (8.8)	

*Including scald, kerosene/petrol and flame

Outcome

Out of 84 patients, 51.1% of the burn cases were discharged from the hospital after receiving full treatment, while 17.8% succumbed to their injuries and 30.95% left against medical advice (LAMA). The

majority of the 84 burn incidents were reported as accidental (98%), with 2.30% being intentional.

A significant statistical variance was observed between gender and the cause of burns (p<0.0003) (Table 3).

DISCUSSION

A recent study undertaken at a tertiary care hospital in Bhubaneswar, Odisha shed light on burn injuries in the region, however there is insufficient information on the subject. The study had a relatively limited sample size, but it demonstrated significant trends in burn injuries among reported instances.

In the present study, the largest portion of the 84 patients with burn injuries (26.19%) fell within the 20 to 40 age range, which aligns with findings from studies conducted by Chakraborty et al, Kuiri et al, Chatterjee et al at tertiary care hospitals in Kolkata, Bankura, and Burdwan of West Bengal, as well as by Goswami et al in Jamsedpur, Jharkhand.[5-8] The age group most at risk is the one that engages in both indoor and outdoor activities. In the current research, a significant proportion of 8.3% consisted of infants, and 13.9% were aged 1 to 5 years, highlighting a lack of preventive care and support for this specific age group within households. A study carried out in Kuwait revealed that 3.4% of burn patients at a plastic surgery unit were young individuals in need of reconstruction.[9] Similarly, a study conducted by Bailey et al in Bangladesh indicated that the vulnerable group comprises children under 8 years of age.[10] A large portion of Odisha's population lives in rural areas, where women work largely as housewives. Unsafe cooking practices in these rural communities include the use of primitive stoves (chullas) and kerosene lamps, which expose women to flame burns and kerosene-related burn injuries. These variables may contribute to the increased number of female patients reporting burn events to the hospital.

Home activities including cooking, heating, and using electrical devices are often linked to burn injuries. The kitchen is a particularly dangerous area due to the fact that a large number of household burn incidents result from cooking-related activities. Burns in this area are frequently caused by hot liquids, steam, and contact with heated surfaces, for instance. These risks can be increased by improper use or malfunctioning cooking appliances such as stoves, microwaves, and ovens and work environments are the main places where burns happen.[11]

A study from various countries, such as Ethiopia and Bangladesh, indicates that 80-90% of burn injuries takes place within the household.[12] Accidents can occur frequently in houses, even though they are generally considered safe environments. Young women between the ages of 16 and 35 are especially affected by burn injuries that often occur as a result of their participation in cooking, typically in hazardous kitchen settings.[13]

The study revealed that most burn victims (67%) were women, potentially due to their participation in fire-related household activities. According to our research, the kitchen was the most common location for burn injuries (63%), followed by the residence (31%). Jain et al conducted a one-year study that involved all 499 patients admitted to the Burn Unit of the Department of Surgery, SGMH, Rewa (Madhya Pradesh). According to the study findings, burn injuries predominantly impact women, and the kitchen is identified as the most frequent location (67.53%).[14]

The impact of burn injuries on females were highlighted in various studies conducted across the country.[5,6] In contrast, a study conducted by Bhansali et al in Pune's tertiary hospitals and Gupta et al in Punjab presented different perspectives.[15,16] The majority of burn patients (62.65%) in our study hailed from rural areas, had received only primary education, and belonged to lower socioeconomic status, which aligns with the findings of a study by Moses et al in Indore, where the majority of burn victims were also uneducated and from low-socioeconomic backgrounds.[17] However, this study's observations on patient literacy were consistent with those reported in a study by Zopate et al in Central India.[18] In 97% of cases, our investigation revealed that burn injuries were predominantly accidental, which was consistent with the findings of Kuiri et al in West Bengal (87%) and Moses et al in Indore (85%).[6,17] Homemakers accounted for 66% of all victims in our study, followed by students, which is in line with findings from several other studies.[5,19]

In our study, 86% of burns were caused by heat, similar to the results found by Khasaba et al in Kuwait and Gilbart et al in Labanan.[9,19] Additionally, there were 13.9% cases of electrical injuries, which is in line with the findings of Bailey et al in Bangladesh.[10] The majority of participants in our research had burns that impacted less than 30% of their total body surface area (TBSA), with the next most common group having burns affecting 30-60% of TBSA. This is consistent with the observations of Moses et al in Indore, where 57% of burn patients had over 50% of the surface area involved.[17] In contrast, Kumar and colleagues reported a higher incidence of over 40% (>40%) TBSA involvement in their study.[20]

Our research revealed that burn injuries predominantly impacted the upper limbs and trunk, similar to the findings of Lal et al from Delhi.[2] Accidental burn injuries were prevalent in our study, with few homicides and no suicidal burn cases reported. This differs from the findings of Kumar et al in Lucknow, where suicide cases were more prominent.[20] It is possible that suicidal cases were under reported in our study and homicidal instances were misrepresented as unintentional incidents. Shanghavi et al reported a similar pattern in a previous study.[21]

Hospital stay duration was also influenced by the kind and degree of burns. In our study, we discovered that 46% of the patients sought medical attention at our tertiary hospital on the same day that the burn damage occurred. However, the majority of patients used home medicines like turmeric or oil, toothpaste, and only a handful went to unqualified practitioners. These data point to a lack of awareness regarding burn injuries and the far location of tertiary care institutions as possible explanations for this behavior. Regrettably, when burn victims arrive late to the hospital, their condition often worsens due to potential infections that may have developed.

In a similar research study, it was discovered that 46% of the individuals remained for a period of 4 to 6 days, with an average stay of 6 days. On the other hand, 38% of the participants who had over 70% of Total Body Surface Area (TBSA) affected stayed for 8 to 14 days, while 26% stayed for more than 14 days.[13] In addition, our research showed that those from lower socioeconomic classes were the most likely to sustain heat injuries, which mostly happened at kitchen and home. This vulnerability is particularly noticeable in the rural population, who often put off seeking medical attention, which can lead to difficulties. These results highlight how crucial it is to teach people especially women how to handle household appliances safely. It is imperative to recognize the constraints of our research, though. First off, the study's limited sample size and single-center design limit how far the results may be applied. A bigger sample size and multi center investigation would yield a more thorough picture of the state's burn injury epidemiology.

Furthermore, there is not much data in our study about suicidal and homicidal burns. Investigating these facets might enhance a more thorough examination of burn occurrences.

CONCLUSION

The research indicates that young adults experience more burn incidents, often caused by heat, with varying levels of severity. Factors such as the quality of hospital care, prompt access to healthcare, early treatment, proper referrals, and the impact of burns on mortality, morbidity, and disability all play a role. Individuals in remote areas may be less aware of the consequences of burns, leading to delays in seeking medical attention. In underserved communities, family caregivers are crucial. Implementing safety measures at home, like avoiding the use of lanterns or kupi, can help prevent accidents involving cooking fuel. Following standard management protocols in a hospital setting, including timely resuscitation, wound care, infection control, and early surgery if needed, can reduce mortality. It is important to provide comprehensive psycho social and rehabilitative care to survivors to improve their outcomes.

Recommendations

The education of individuals on safety measures, implementation of effective health and safety laws, development of appropriate equipment, prompt treatment of burn injuries, and provision of suitable referral services can significantly reduce the mortality, morbidity, and disability caused by burn injuries. It is surprising that a large number of people lack sufficient knowledge of first aid. Most burn injuries could have been prevented, and raising awareness about safety during cooking can help alleviate this problem. The societal impact of burn injuries can be tackled by improving literacy rates, empowering women, providing therapy, enacting suitable laws, and ensuring their proper implementation. This type of information will be valuable for shaping policies and programs focused on preventing burn injuries and providing acute and chronic care to patients in developing countries like India, where resources and efforts are limited. Educating people about health and safety, and improving heating and cooking technologies could be beneficial. Regularly maintaining cooking appliances and observing safety precautions can greatly benefit individuals. It is important to organize "Domestic Burn Prevention" and "Community Awareness" programs for women and adolescent girls on a regular basis.

Providing appropriate health education for first aid is crucial for eliminating risky behaviors. The field of AI is rapidly evolving and has great potential in burn care, including improving diagnostic and treatment accuracy, care efficiency, and healthcare professional workflow. It is essential for clinicians to receive education in digital medicine as AI becomes more widely used. AI engineering principles and digital health literacy should be incorporated into graduate healthcare programs. Major burn organizations should encourage their members to conduct research in this area by providing financial support through grants and organizing conferences with AI as the main theme. AI can help doctors analyze burn surface, determine burn depth, guide fluid resuscitation, and accurately predict complications and prognosis. Educating and promoting AI technologies is crucial for providing burns care in a more rational, efficient, and personalized manner. However, technology cannot replace the compassionate care provided by skilled healthcare professionals. The findings of this study should guide healthcare officials in identifying gaps and implementing community efforts. Further research is needed on the traditional and alternative methods used by caregivers to treat burn injuries.

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