

Epidemiological study of Burn patients and outcome of Management

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Abstract

Background: In India, morbidity and mortality due to burn cases are in rise. In addition to prevention, conservative and surgical management are the important modalities to manage burn patients. Epidemiological studies provide the valuable data for designing the preventing protocol for the burn management. **Aim and Objective:** To record the epidemiological data and outcome of conservative and surgical management in burn cases of Bhopal region. **Materials and Methods:** One hundred and eighteen burn patients were evaluated retrospectively at L.N.M.C and J.K. Hospital, Kolar road, Bhopal who were admitted to IPD in the duration of 5 years. Details on age, sex, socio-economic status, education level, area of residence, total body surface area involved, level of burn, type of burn, nature of burn, duration of hospital stay, associated co-morbidities, type of management given and surgery performed, and final outcome were recorded. **Results:** Out of 118 burn patients, majority of the burn patients 75 (63.56%) had age between 11-59 years, 76 (64.41%) were males, 79 (66.95%) belong to the rural area and 79 (66.95%) were illiterate. Majority were presented with burned body surface area burned between 10-30 % [54 (45.76%)] followed by 0-10% [38 (32.20%)]. Majority had deep burn 85 (72.03%). Most common was thermal burns 60 (50.85%). Most common cause was accidental (88.96%). Majority were discharged 113 (95.76%) and 5 patients died due to burn. Majority were treated with conservative (n=61) treatment whereas in 57 patient's surgery was performed. **Surgery procedure:** Majority were treated with conservative treatment whereas in 57 patient's surgery was performed. In our study different types of procedures were done like debridement done in 21 patients(36.84%), debridement with collagen dressing in 10(17.54%), fasciotomy in 8(14.03%), escharotomy in 2(3.50%), SSG in 6(10.52%), amputation in 6(10.5%)[finger & thumb 2 (3.50%), hand 1(1.75%), below elbow 1 (1.75%), above elbow 1 (1.75%), toes 1 (1.75%)], and flap surgery done in 4 patients(4.52%) [groin flap 1 (1.75%), abdominal flap 2 (3.50%), local transposition flap 1(1.75%)]. **Conclusion:** Burn management includes various modality of treatment ranging from resuscitation in early period to conservative and surgical management during the recovery phase. These patients also needs rehabilitation psychologically and functionally to improve the quality of life after recovery. Better treatment protocol for burn management after understanding the epidemiology is helpful for reducing the mortality and morbidity in burn patients.

Keywords: Burn, conservative treatment, surgical management, epidemiological study.

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Introduction

Burn is a one of the leading cause of trauma leading to mortality, disability and disfigurement worldwide. In context of India as a emerging and developing country, this development is creating the lack of safety measures in all walks of life leading to increased incidence of burn.

Globally in 2004, the incidence of burns severe enough to require medical attention was nearly 11 million people and ranked fourth in all injuries [31]. The three WHO regions with the greatest burden of Burn injury are the Eastern Mediterranean Region, the South East Asian Region, and the African Region, with the African Region bearing nearly two-thirds of the total burden [24].

In India approximately 70 lakh people sustain moderate to severe burns in India every year. More than 7 lakh burn injuries require admissions every year.

About 80% of admitted cases are due to accidents at home kitchen related mishaps. Out of which 1.4 lakh people are succumbed to death [29].

The causes for burn injury differ in various communities and regions, better understanding of epidemiology and statistical pattern in a particular community and region can help healthcare professional to understand the cause and mode of burn injury which is necessary not for preventive action but also to plan the management of the burn. The aim of the present study is to understand the demographic pattern and outcome of the conservative and surgical management of burn injuries in our locality.

Materials and Methods

Methods

Place of study

Department of Surgery, J.K. Hospital associated with L.N. Medical College Bhopal (M.P.).

Type of study

Retrospective study

Sampling Method

Consecutive

Sample collection

Data were collected from medical record department. 118 patients with diagnosis of burn.

Details of the patients' age, sex, socio-economic status, education level, area of residence, total body surface area involved, level of

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burn, type of burn, nature of burn, duration of hospital stay, associated co-morbidities, type of management given and surgery performed, and final outcome were recorded. Data was collected from medical records department of the hospital. A Performa was made to record the findings. All the burn patients were managed using conservative or surgical treatment. All the data was tabulated and analysed. Frequency distribution was performed to prepare the table.

Statistical Methods

Results were shown in tables, comparing their numbers and percentages by scientific calculator and standard appropriate statistical formula.

Ethical Permission

Yes

Results

Table 1: Showing demographic parameters of study

Parameters		Number of patient	Percentage
Age (years)	0-10 years	15	12.71
	11-59	75	63.56
	Above 60	28	23.73
Sex	Male	76	64.41
	Female	42	35.59
Residence	Rural	79	66.95
	Urban	39	33.05
Education	Illiterate	79	66.95
	Literate	39	33.05
Socio-Economic status	Lower class	71	60.17
	Middle class	29	24.58
	Upper class	18	15.25

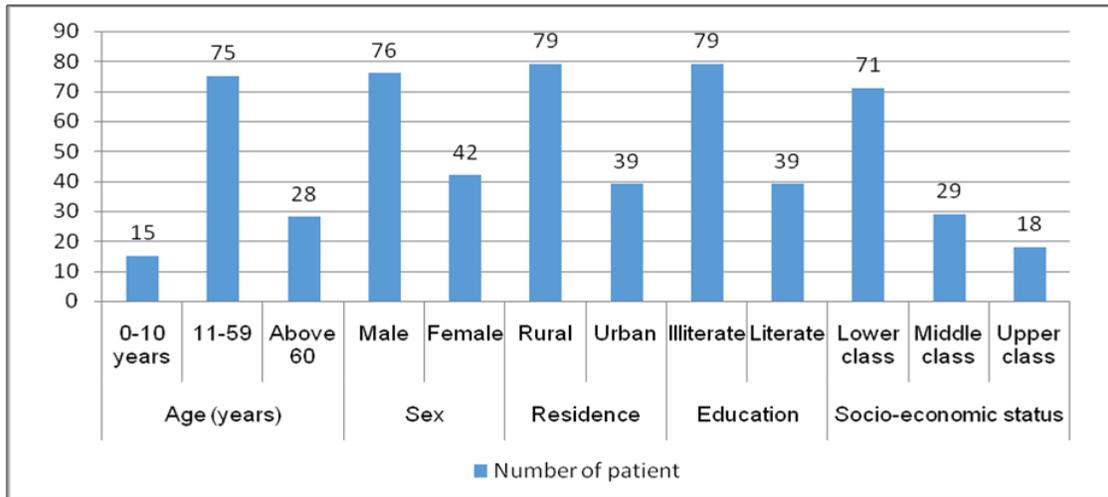


Fig 1: Showing demographic parameters of study

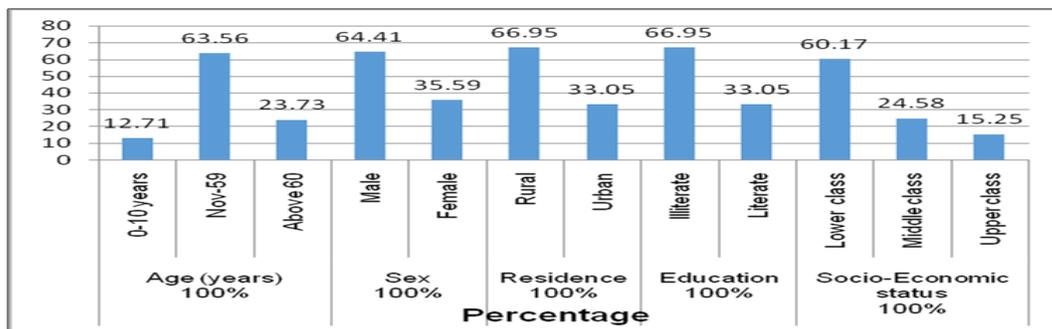


Fig 2: Showing demographic parameters of study

Table 2: Showing associated illness among patients presented with disease

Associated illness	No of patients	Percentage
Hypertension/cardiac	12	10.17
Diabetes	7	5.93
Asthma/COPD	3	2.54

Tuberculosis	3	2.54
Epilepsy	2	1.69
Psychiatric illness	3	2.54

*data recorded for 30 (25.42%) patients

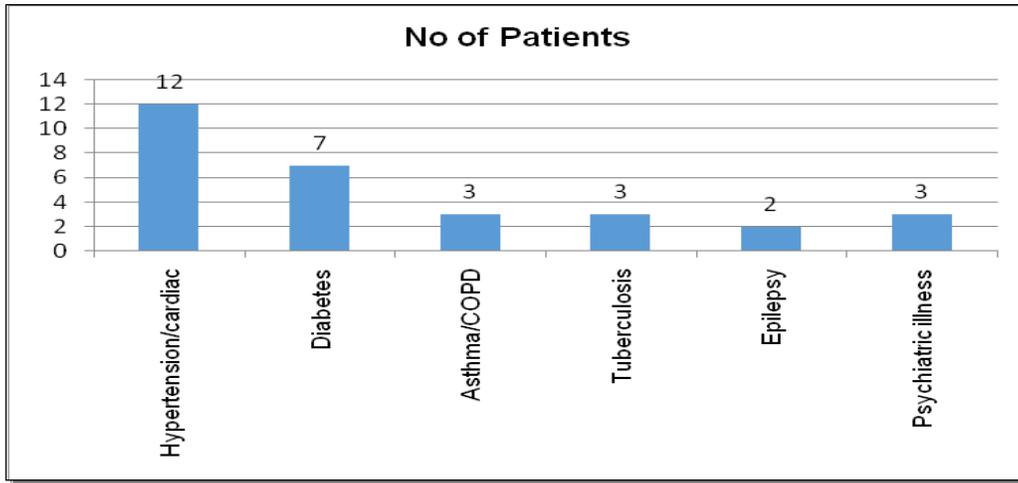


Fig 3: Showing associated illness among patients presented with burn

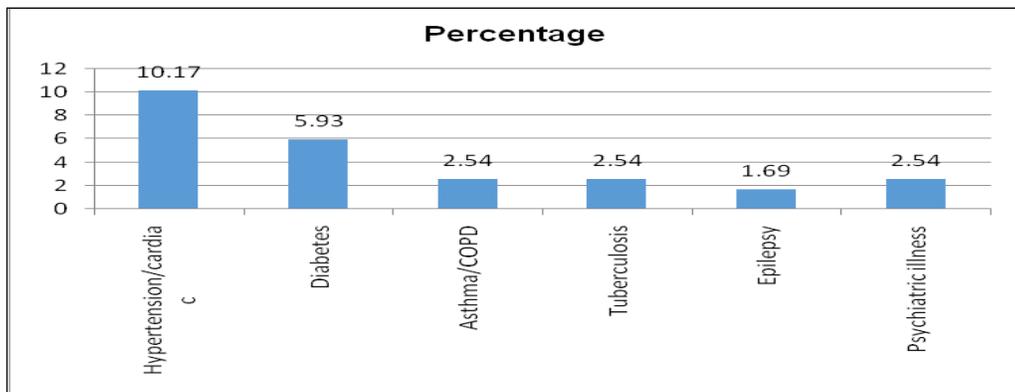


Fig 4: Showing associated illness among patients presented with burn

Table 3: Showing cause of injury among patients presented with burn

Cause of Injury	Numbers (%)
Accidental	111 (94%)
Suicidal	5 (4.2%)
Homicidal	2 (1.8%)

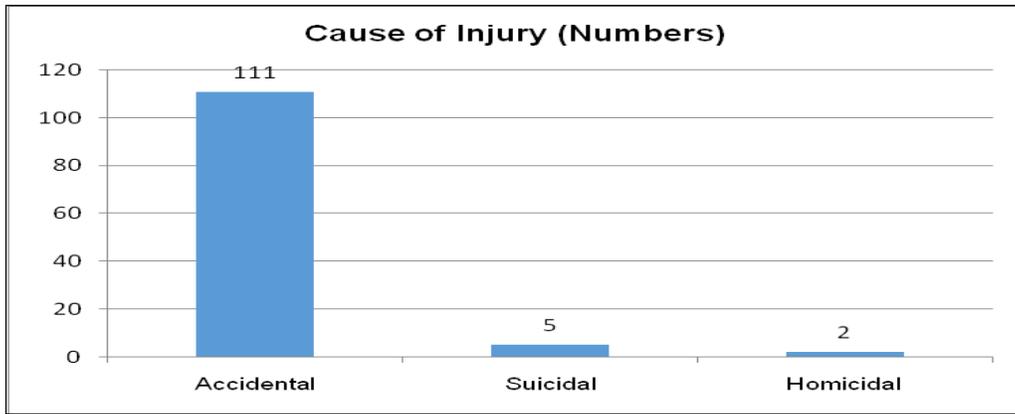


Fig 5: Causes of injury

Table 4: Showing clinical variable among burn patients presented at study place

Variable	No of patients	Percentage	
Type of burn	Thermal	60	50.85
	Scald	36	30.51
	Electrical	17	14.41
	Chemical	5	4.24
Depth of burn	Superficial burn	33	27.97
	Deep burn	85	72.03
Body surface area (%)	0-10	38	32.20
	10-30	54	45.76
	Above 30	26	22.03
Duration of hospitalization (days)	< 7	29	24.58
	7-21	33	27.97
	Above 21	56	47.46

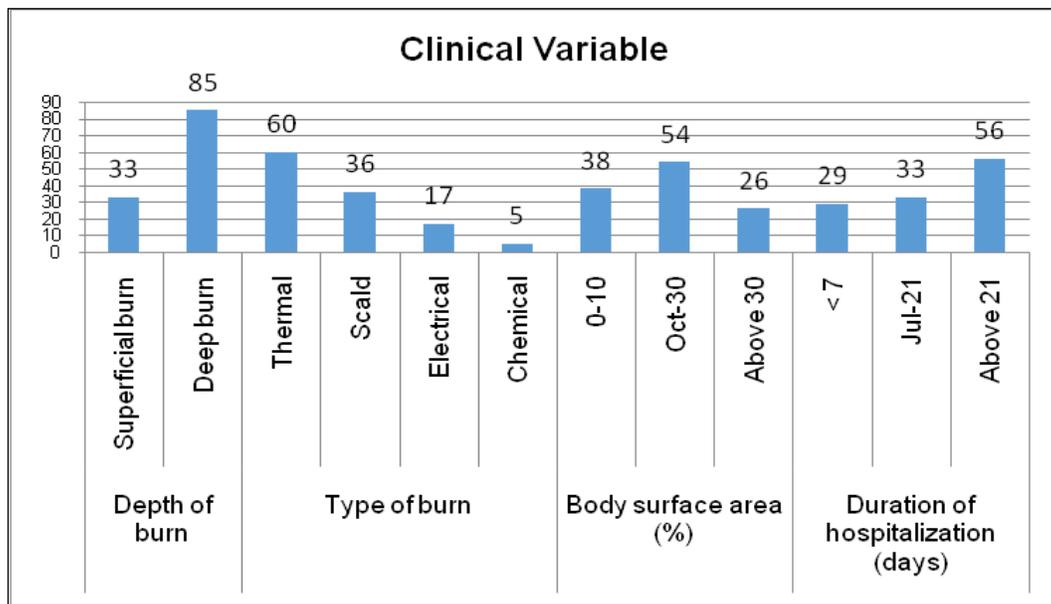


Fig 6: Showing associated illness among patients presented with burn

Table 5: Showing outcome of admission

Outcome of Admission	No of patients	Percentage
Discharged	113	95.76
Death	5	4.23

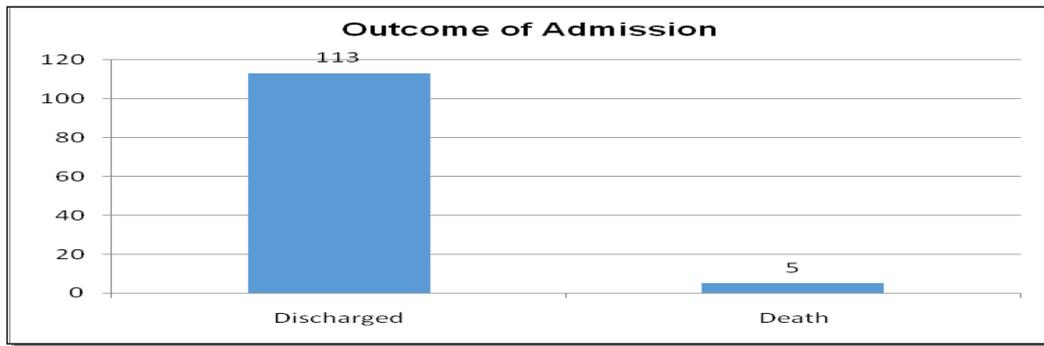


Fig 7: Showing outcome of admission

Table 6: Comparing outcome parameters between conservative and surgical procedure

Parameters	Conservative (n=61)	Surgical procedure (n=57)
Discharged	57(93.44)	56 (98.24)
Death	4 (6.55)	1 (1.75)

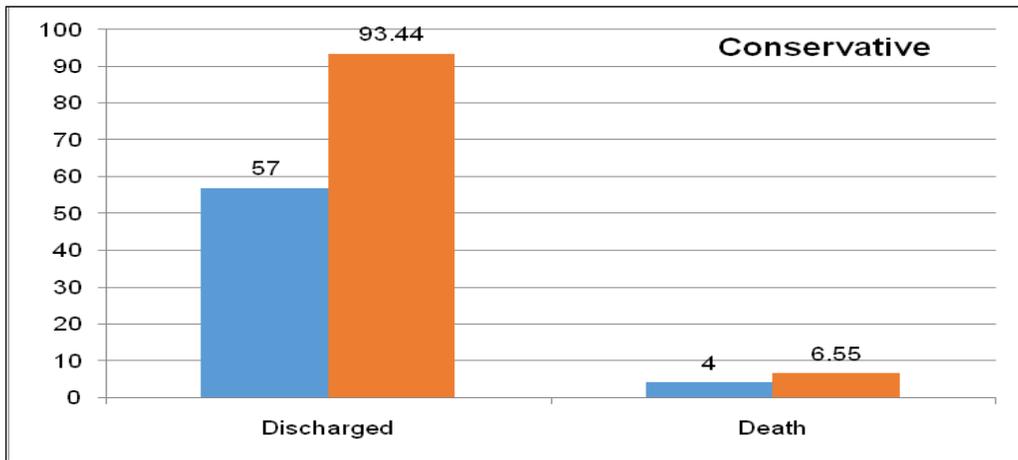


Fig 8: Comparing outcome parameters between conservative and surgical procedure

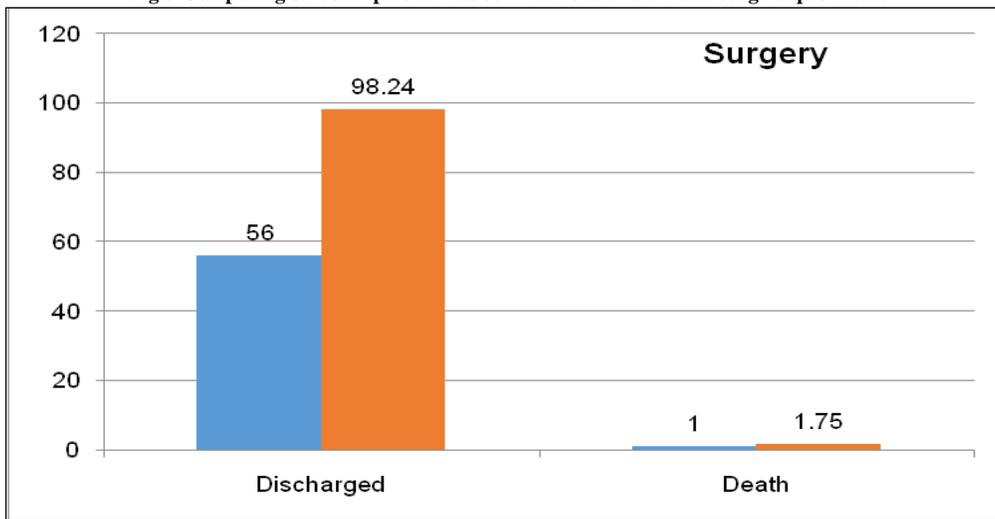


Fig 9: Comparing outcome parameters of surgical procedure

Table 7: Outcome of patients with burn who were admitted and discharged

Parameters		No of patients (n=57)	Percentage
Debridement		21	36.84
Fasciotomy		8	14.03
Escharotomy		2	3.50
Split skin grafting		6	10.52
Debridement and Collagen dressing		10	17.54
Amputation	Fingers and thumb	2	3.50
	Hand	1	1.75
	Below elbow	1	1.75
	Above elbow	1	1.75
	Toes	1	1.75
Flap surgery	Groin flap	1	1.75
	Abdominal flap	2	3.50
	Local transposition flap	1	1.75

**Total :
10.5%**

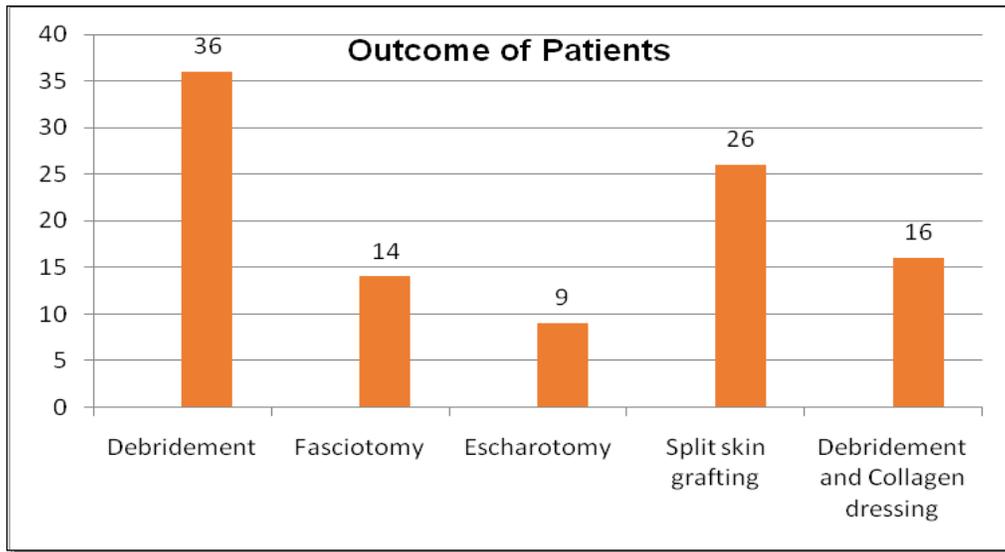


Fig 10: Outcome of patients with burn who were admitted and discharged

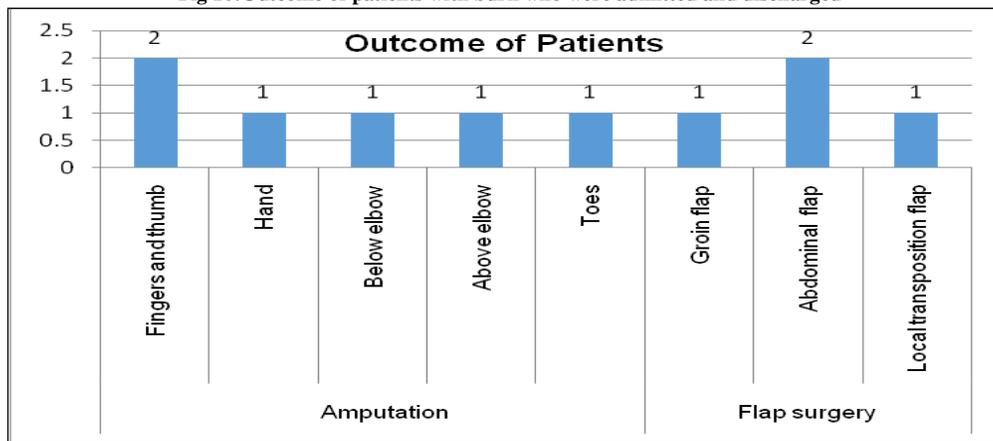


Fig 11: Outcome of patients with burn who were admitted and discharged

Discussion

Burns leads to a significant disturbing physical and psychosocial traumatic injuries. Burn injuries may be life threatening and sometime associated with long term disability and morbidity. Present study provides epidemiologic study of burns in Bhopal Madhya Pradesh India with a particular focus on outcome of conservative and surgical management. A total 118 cases were included and were observed age, sex, socio-economic status, education level, area of residence,

total body surface area involved, level of burn, type of burn, nature of burn, duration of hospital stay, associated co-morbidities, type of management given and surgery performed, and final outcome.

Age wise distribution revealed that most common age group affected with burn in present study was 11-59 years age group with a peak in between 20-40 year of age followed by above 60 year age group and 0-10 year of age group. This high incidence in age group of 11-59 years may be due to fact that the patients with this age group are more

physically active and frequently exposed to hazardous situations both at home and work places. Previous study by Gaffar et al, young adults in 13 to 25 years age group constituted maximum number of cases 41.5% of the total and least number of cases in the age group above 60 years was 1.2%[2]. Sex wise distribution analysis of data suggest male to female ratio was 1.65:1, with 64.41% male patients and 35.59% female patients. Male predominance in the present study might be due to that fact that males are generally more active in routine life and most of them encounter burn as the occupational hazards. Patients with electric burn in our study were predominantly male, who were working as electrician and often get electrical burn from high tension line during repair of electrical supply. These type of patients are also associated with other injuries like head injury, chest injury, abdominal injury etc. due to fall from electric pole. Some of the male patients were lab and factory workers who were indulge in any chemical industries, were accidentally got the chemical burn. Females are less likely to be affected in our region as most of them are affected by burn accidentally while cooking the foods using the kerosene stoves and firewood. Alipour et al in line with present study also male-to-female burn ratio was 1.22:1[5]. In contrast, Tasgaonkar V et al reported female predominance is due to the fact that female in India is more likely to expose to fire at home and hence more susceptible to burns[7]. In the present study, most of the burn victims were from rural areas. The reason for the increased incidence of burn cases among rural population in the present study is multifactorial. As previously explained that in rural areas due to unavailability of safe source of energy for cooking, most of the females uses kerosene stove and firewood for cooking, that is risky and hazardous and most of the time is the cause of accidental thermal burn. Most of the cases are affected by thermal burn in rural areas due to the use of chimney (kerosene lamp) due to unavailability of electrical supply. In line with the present study, Haralkar et al also observed the rural predominance due to style of living and low socioeconomic status [8]. Singh D et al showed 68% cases from urban area[9]. This might be due to different geographical locations of the hospitals and accessibility to the peoples. The present study shows that majority of the study cases were illiterates. These findings are in accordance with the studies conducted by Attia et al [12]. More incidence of burn in illiterate patients may be due to unawareness, ignorance and less knowledge about the safety measures for accidental burn in workplace and home. Illiteracy especially in rural areas also contribute in delay of treatment of burn injury as most of the cases are usually being treated by quacks and local doctors who are unaware about the burn management. This affects the outcome of burn when people reach the tertiary centre for treatment and contributes to the poor prognosis of patient in terms of mortality and morbidity. So this clearly indicates that educational level has definite impact on the incidence of burn.

In our study, lower socio-economic class was most affected strata followed by middle then higher class. Most of the patients with low socioeconomic status usually reside in over-crowded places with poor living standards, lower educational status, and sparse safety measures contributes for maximum cases from this class. A similar study from Solapur by Maske et al of 500 burn patients reported that prevalence was more among the patients with lower class (82%)[13]. Our study, infers that majority of patients (54) had total burn surface area between 10-30%. This is followed by 38 patients with 0-10% total body surface area. More than 30% burn total body was least common (22.03%) burn patients. Our study coincide with the study of Jayant D et al where the patients with less than 35% of total body surface area burn were 60%[14].

Depth of burn is difficult to assess at the time of presentation and assumption of burn depth can be evaluated clinically. Also most of the patient with high Total body surface area (>30%) have mixed burn with superficial to deep occurred predominantly in male because of electric burn, thermal burn and people from rural area those came late to the hospital. In our study, 85 deep burn patients were reported in majority. This may be because, patient with first degree burn tend to perform home remedies for burns and get relief at home and usually takes treatment on the outdoor basis. In most of the cases with

superficial burn in the present study who were admitted in our center involved the vital organs like face, hand, feet and genital region with second degree burns. These patients need observation and daily follow up for assessment of burn with hospital care. Some patients with superficial chemical and electrical burn were also admitted as per admission protocols of burn. On the other hand, patient with deep burns seeks hospital treatment as these patients need relief of pain and in most of them need immediate resuscitative management and dressing. In agreement to present study findings, a similar study was published by Arushi S et al who found 62.4% patients with deep burn while 37.6% had superficial burn[15].

Thermal burns(60) were most common burn in our study followed by scald burns (36), electric burns(17) and chemical burns (5). Majority of people in the rural areas still use dry woods and kerosene stoves for cooking purpose and chimney for lighting purpose which are the potential source of fire hazard and causes majority of burn related thermal injuries. Gupta et al also reported that majority of the patients had flame burns followed by scald burns, electrical burns and chemical burns[16]. In another study by Choudhary et al, majority of cases were accidental thermal burns which were mainly reported in females[17]. This may be due to the fact that in present study majority of the females were from the rural area food is mainly cooked in open chulha using wood or kerosene stove, due to that, probability of burn in females is more. Scalds were common after thermal burns in this study which were caused commonly by something wet like, hot water, hot milk, hot tea, hot cooking oil, steam, others are flames, hot metals etc.

Electric burns occurred more commonly in male in comparison to females because male were more active in outdoor.

Chemical burns patients (5) less in number were reported this occurred due to exposure to corrosive substance (strong acid, base or oxidizer) or cytotoxic agents (mustard gas, lewisite or arsine). Most of these patients with chemical burn in our study were exposed to high sulphuric acid which is commonly used in cleaning of toilets and utensils. The present study showed that the majority of burn cases were due to accidental causes other than suicidal and homicidal. Arushi et al also reported similar results to present study that majority of the (88.6%) burns were accidental while (8.6%) were with homicidal and (2.8%) were with suicidal intension. [15]. It was observed from present study that the accidental being the most common cause of burn involving greater number of male than females while in suicidal cases females were greater in number than males because of more suicidal tendency and psychiatric illness. (34). Reason behind homicidal and suicidal death in female is due to the pathetic social status of females in Indian society, dowry system, alcohol habit of husband and ill treatment by in laws etc.

The duration of hospital stay was less than 1 week in 24.58% cases, 27.97% cases required hospitalization for 2-3 weeks and 74(47.46%) cases needed hospitalization for more than 3 weeks. Hospital stay was consistent with the degree of burn, percentage of total body surface area involved, site of burn, age, associated co-morbidities i.e. diabetes, hypertension, and resultant disabilities. In our study 12 patients were found to have hypertension and 7 had diabetes while 3 patients had respiratory illnesses. These co morbidities tend to prolong the hospital stay of the patient and required more aggressive treatment strategies. The patients with respiratory illnesses have adverse effect of general anesthesia which delayed the surgery and the patients were to be kept on conservative management longer thus prolonging the morbidity and sometimes lead to mortality. While the patients of diabetes have slower rate of wound healing and lesser response to antibiotics which in return prolongs morbidities too.

In present study out of 118 burns patients, majority were discharged. The mortality rates in present study was 4.23%. cause of mortality in 2 patients were hypovolemic shock and other 2 patients sepsis and another one due to pulmonary oedema. Previous studies done by Arushi et al (46.2%)[15]and Choudhary et al (64%) [17] has shown higher mortality rates. Lower mortality rates in present study may be due to the transfer of 28 patients to higher centre and these patients

were mainly the severe cases which would have resulted in higher mortality in present study.

Surgical procedure

Conservative treatments of burn include emergency management to treat the hypovolumic, neurogenic and septic shock. Patient needs regular dressing with antiseptic ointment, antibiotic, analgesics, supportive and symptomatic treatment along with splintage and physiotherapy. Majority (61) were treated with conservative treatment. Ahuja et al reported that burn patients were largely treated by conservative techniques as compared to surgery [19].

In case of burn wound, surgical debridement is the mainstay treatment for removing the devitalized burnt skin and for wound bed preparation. Surgical techniques of debridement includes removal of blister, tangential excision of eschar or sharp debridement of dead skin. Early debridement and skin grafting should be done as early as possible to reduce the morbidity and mortality of burn patient, if patient is stable and fit for surgery. In our study, 21 patients (36.84%) underwent surgical debridement. Margarita et al also reported 147 (27%) patient need debridement in a series, supporting our study.[28]



Although amputation is an inevitable procedure, the loss of limb is the most serious complication of burn injuries. The physical and psychological complication leads to big difficulty for rehabilitation. These burned amputees are mostly men in working age and affected frequently in upper limbs, so rehabilitation program make essential importance to uplift function of daily life, labor activity and social joining [3]. These burned amputees are mostly men in working age and affected frequently in upper limbs, so rehabilitation program make essential importance to uplift function of daily life, labor activity and social joining [3].

Patients who developed gangrene or non functional limb especially in electric burn required the amputation to prevent the septicaemia.

Application of biological dressing like collagen is also important in burn wound management after debridement of blisters especially in scald burn for early recovery. Collagen dressings have advantages over conventional dressings in terms of ease of application and being natural, non-immunogenic, non-pyrogenic, hypo-allergenic, and pain-free [22]. In present study, 10 patients(17.54%) underwent debridement and collagen dressing mainly in scald and superficial burn patients. Singh et al 120 patients underwent collagen dressing in the series and supported our study.

An eschar in burn injury is a dead tissue and slough that cast off from the surface of the skin that may cause compartment syndrome especially over the chest and limbs that may cause respiratory failure, distal ischemia and gangrene of limbs. Escharotomy and fasciotomy are the recommended emergency procedures that relieves the compartment syndrome in burn patients. In the present study, fasciotomy done in 8 patients (14.03%) and escharotomy in 2(3.50%). Similarly piccolo et al 6 (11.3 %) patients had immediate escharotomies, while 4 (7.5 %) had immediate fasciotomies.

Amputation performed in 6 patients (10.5%). Similarly Ki un jang et al reported 379 (1.9%) out of 19,958 patients and main cause of amputation was electric type of burn [25].

Usually the patient of burn develops the raw area after recovery from burn injury. In this condition the coverage in form of skin grafting and flap surgery needed. Split skin grafting is the most common and usually done for nondependent areas of body like chest, abdomen, anterior aspect of limb. It was done when granulations tissue appears in wound. Split skin grafting reduces hospital stay and morbidity and promotes early recovery. SSG performed in 6 patients (10.52%) in the present study, similar results observed by margarita et al 18.27% patients.



Flap surgery is usually indicated for dependant area, functional joints, raw area with exposed bone and tendon. The choice of coverage depends on a variety of factors including the size and location of the defect, exposure of the vital structures, donor site morbidity, and the general condition of the patient. Flap surgery done in 4 patients (7.00%). Groin flap and abdominal flap were done for wound over the hand and wrist. Local transposition flap was done for wound over the elbow. Similarly Gi yeun hur reported flap surgery in 16 patients of burn [27].



Weakness of study

It is retrospective study and number of patients are less

Conclusion

As India is a country of diverse cultures and societies and every society has, its own epidemiological characteristics. Burn management includes various modality of treatment ranging from resuscitation in early period to conservative and surgical management during the recovery phase. These patients also needs rehabilitation psychologically and functionally to improve the quality of life after recovery. Better treatment protocol for burn management after understanding the epidemiology is helpful for reducing the mortality and morbidity in burn patients.

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