

## Analytical Study of Management and Outcome of Burns in Pediatric Age Group in SSMC Rewa

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### Abstract

**Background:** Fire has served as well as destroyed mankind. It is good servant but bad master. Since the evolution of man, he has created fire, which was a major source of energy for keeping warm under extreme temperature, source of cooking food and stay away from wild animal. But with advantage the injuries caused by fire has come as a necessary evil accompanying the good.

**Aims and Objective:** The present study aim to analyse to different aspect related to burn injury in paediatric age group and its preventive measure, magnitude of burn management and their outcomes in Vindhya region Rewa (M.P.).

**Materials and Methods:** This prospective analytical study was carried out on paediatrics patients admitted in Burn Unit of Surgical wards of Sanjay Gandhi Memorial Hospital associated with Shyam Shah Medical College, Rewa (M.P.) during of 1st June 2019 to 31st May 2020. The objective was to analyse the demographic characteristics and outcomes and patterns of electrical injuries, to assess the demography, degree of disability and loss of life due to electrical burn in paediatrics patients

**Result:** We had 112 patients (76 male and 46 female) of electric burns admitted in our centre. Most of the accidents leading to the electrical burn injuries could have been prevented.

**Conclusion:** Prevention is possible by increasing public awareness through primary education among the rural people and by taking adequate precautions such as the use of personal protective equipment's (insulated gloves and footwear.) and following national electrical codes.

**Keywords:** Atrial Fibrillation, Electric Burn, Electric Injury, Medical Management.

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### Introduction

Fire has served as well as destroyed mankind. It is good servant but bad master. Since the evolution of man he has created fire, which was a major source of energy for keeping warm under extreme temperature, source of cooking food and stay away from

wild animal. But with advantage the injuries caused by fire has come as a necessary evil accompanying the good.

Burns are the fourth most common and devastating forms of trauma, following traffic accidents, falls, and violence.

Paediatric burn injury constitutes near about one-fourth of the total burn accidents in India [1].

Burn injuries in children are the results of behaviour that can be closely related to developmental stages.

In India about 80% populations living in villages, most of villagers are illiterate, ignorant and poor. Child particularly in low socioeconomic group constitutes a significant part of the affected population. In developing countries burn injury are common, Burn patients typically comes from low socioeconomic class in rural regions, where fires are mandatory for daily routine activity.

Dermal layer of skin in children are thinner, so any given thermal burn injury will sustain a deeper burn than the adult [2].

Children's skin in comparison of adult skin is young and tends to burn quickly and deeply even at lower temperature Because of their dramatic physical effect, child has endured a member of painful surgical procedure over an extended period. Burn injury frequently causes deleterious psychological complication to the patients and to the family. It's also affected the patient physique, psyche and financial condition adversely. With recovery of the burn injury emotional and physical scarring of a child last a life time.

Paediatric burn injuries continue to be a great epidemiological problem around the globe. Almost a fourth of all burn injury occurs in childhood in paediatric age group. Scald burn is the most common in children at home. Globally, scalds account the highly treated burn that generally, results in less severe injuries[3]. The chances of paediatric burn injury in developing countries were primarily related with the variety of cooking equipment and type of cooking substance used. Unstable Utensils and kerosene stoves etc were linked with a significant number of injuries. Chief causative agents are hot liquid like water, milk, vegetables, steam. Other factors that

contribute to incidence of paediatric burn injuries in developing countries include poor architectural design of cooking areas with open fires at ground floor levels and occasionally in open place. The high incidence of paediatric burn injury is attributable to children's natural curiosity, impulsiveness, and lack of awareness, higher activity levels, and total dependency on their caregiver [4].

The incidence of paediatric burn injury tended to be higher in rural population in comparison of urban.

Burn is a type of tissue injuries produce on protective covering of the body that may be caused by exposure to extreme of thermal, chemical, electric, radiant agents. Burn injuries cause coagulative necrosis of the epidermis and underline tissue. Burn injuries are multidimensional injury which involve almost all system of the body and derange all functions in one way or other depending on the extent of the injury.

Burn injury in children's are managed by a team of paediatricians, general surgeon, plastic surgeon, anaesthesiologist, intensive's, nurses, respiratory therapists and other health care providers with a unique opportunity to make a multidisciplinary collaborative effect to help some of most vulnerable patients.

### Materials and Methods

The prospective study was carried out on patients admitted in Burn Unit of Surgical wards of Sanjay Gandhi Memorial Hospital associated with Shyam Shah Medical College, Rewa (M.P.) during of 1st June 2019 to 31st May 2020. The objective was to analyse the demographic characteristics and outcomes and patterns of electrical injuries.

**Inclusion Criteria:** All paediatrics patients (total 118 patients) admitted under the Department of Surgery, with a diagnosis of electrical burn injury. All age below 14 years groups and both sexes were included in this study.

**Exclusion Criteria:** Patients who presented to the accident and Emergency department with alleged history of sustaining electric injury without any obvious skin involvement were not included in this study.

### Result and Discussion

The present study entitled “Analytical study of management & outcome of burn in paediatric age group” was carried out in 117 patients of burn injury who were admitted in burn unit of Sanjay Gandhi memorial hospital associated with S.S. medical college, Rewa (M.P.) during the period of 1 June 2019 to 31 may 2020. According to the study of Natterer J et al usually the paediatric burns are nonfatal but the calamitous consequences of injury are possible for child as physical disabilities and psychological disturbance, as well as for the family in the form of significant investment in time and finances [5].

Burn wound on protective covering of the body produced by excessive heat, damaging the beneath tissues causing circulatory disturbances and mild to severe constitutional disturbances. If untreated burn injuries result in intense suffering and protected course of illness, possible disfigurement with physiological and psychological trauma to patients, huge cost and suffering to the patient’s family. Burn wound pose a great burden on health care infrastructure and burn unit of surgical wards, although morbidity and mortality has been decreased with better understanding of the physiology and greater stress on correction of fluids and electrolyte imbalance, improved methods of resuscitation. According to the study of A. Cohen et al Burn injury remains a serious threat to the wellbeing of paediatric population and still has major functional and cosmetic consequences. [6]

In present study 10346 patients admitted in surgery wards among which 429 patients had burn injuries. Total incidence of burn patients in the burn unit of surgical wards

was 4.14%. Total 117 patients were in paediatric age group (1 to 14yr) admitted in burn unit of surgical ward which was 27.27 % of total burn cases.

In the study of M. Peden et al Burn were the frequently seen in preschool childhood period and children’s aged between 0 and 4 yrs [7].

In this study the highest portion of burn was seen in infant and toddler age group, in combined it has the 50.39%. This is comparable to other studies by alemayehu S et al, who reported 64.1% it was highest proportion of burn in the 0-4 yr age group [8].

In the present study children with burn injury were admitted in burn unit of surgical wards with increased incidence in winter season. It evident from table no 6 highest incidence of pediatric burn admission was seen in January 2019 (15.38%) followed by June 2019 (11.96%), July 2019 (11.96%) and October and December 2019 has 10.25% incidence. Lowest incidence was seen in April 2019. In our study the seasonal incidence had a peak during the summer season. The peak in summer season was probably due to dryness of surrounding and flammability of objects.

Sinha et al (1971) observed two definite peak season, highest being in June and others October to January, the incidence also customary celebration of diwali (the festival of light) during this month. [9].

Burn is a dreadful condition which spares no age and no sex. Injury by heat sources in the form of burn or scald is inevitable, no sooner one comes in contact with it. However the incidence of burn in the different age group and sexes varies considerably. The factor which determine the age and sex incidence of burn injuries are variable in different countries depending upon the local climate and prevailing social customs, literacy, poverty and safe equipment etc.

It is obvious from the table no 1 that the incidence of burn was higher in males than female i.e. 71 cases were males children and 46 were females children with male female ratio 1.54:1.

The highest incidence was in toddler age group (1 to 3 year) which involves 42 cases out of 117 cases i.e. 35.89% in which male was more than female i.e. 31 was male patients in total 42 patients in this age group. The high incidence of children found in this age group.

The study done by Mehta MA et al observe male -to-female ratio was 1.4:1 [10].

The second most common age group from 3 yr,1day to 9 yr age group, which involve 31 children (26.39%) . in which 15 females and 16 were males patients . male female ratio is 1.06 this increase incidence of female children rather than other age group because they were commonly responsible for cooking food, lack of alertness and experience. Most of burn incidence are accidental due to ignorance while cooking and using unsafe fire place, faulty appliances and synthetic cloths which catch fire easily and stuck up easily and stuck up easily in body.

As for as sex incidence is considered O.K. Gupta, M Gupta (1991) from S.M.S. medical college Jaipur (India) reported a higher incidence in male less than 5 yr age group due to scalds [11].

Ying S Y et al (2001) from Hong Kong reported a higher incidence in male than in female, male to female (ratio): 1.76:1 [12].

In the present study the female patient accounted for 46(39.31%) of the total burn patients where were male patient accounted for 71(60.68%) with male to female sex ratio 1.54:1.

In the present study it was noted that majority of burn incidence between 7am to 10 am (35.89%).In the study of Lal and Bhatti, the majority of burn occurred in kitchen. Most of thermal burns were occurred between 7am to 10 am and 4pm to

8 pm, which correlate with the time of cooking food or preparation of hot beverages in the kitchen [13].

Similar study by by Drago DA and Natterer J, et al[5], in comparison to home environment, most of burns occur in kitchen involving food preparation and meal times.

In this region majority of population lives in villages and they belongs to low socioeconomic class, have low literacy rate and poor with ignorant. The late morning and evening time in burns were associated with cooking and serving food.

Time interval between incidence and hospitalization in present study majority of burn patients were brought to the hospital with in 4 hr of injury 44.44%. And 35.04% patients were hospitalized within 12 hour.

In the present study, a comparison between different religions communities was drawn and it was found that majority of patients were Hindu 96.58% and only 3.42% patients were Muslim. There was no case registered from Christians or Sikhs, because there population is small in this area.

In present study that the patients from rural area carry higher percentage 72.64% and in urban areas 27.32% only and 61.53% patients reported from joint family and 38.46% reported from nuclear family.

This difference in occurrence of burn cases between rural and urban population can be explained by simple explanation in this region about 80% population resides in rural area where as lack of electricity , LPG chulha, poverty and illiteracy also, only about 20% in urban population .

So majority of patients came directly or referred by primary health centre of rural areas.

A study conducted by Mehta MA et al, most of burn children were members of the medium or large size families. In our study

61.53% burnt patients belongs to joint family [10]

In the study of Lal and Bhatti[13] 56.8% of the children's was accompanied by a guardian during the time of injury. At the time of incident, 52% of pediatric burn patients, a parent was present and in the remaining other house members were present [13].

Scald (hot liquid):- the most common cause of burn was scald (70.94%). they occurred due to accidents spillage of boiling.

In the present study majority of burns 99.15% were accidental type. Only one case of homicidal was recorded. According to study of Sharma RK et al Approximately 90% of the pediatric burn injuries were occurred due to household accidents [1]

In our study vide observational table no 20 majority of patients 35.89% had 0-10 % of body surface area burnt and 29.05% patients had 11-20 % of body surface area burnt.

In this study, the upper extremities 52.99% were the most affected area; this finding was similar with a study conducted by S. Yilmaz et al in which 71.8% of burns occur in the upper extremities [14].

The upper limbs were most involved in 90.42% of the cases, as the study of I. O. Fadeyibi et al showed [15].

In our study vide observation table no 14, that the majority of patients (47.00%) had superficial + deep burn, while 35.89% had superficial burn and 17.09% had deep burn alone. Maximum cases (35.89%) recorded

in toddler group the depth of burn is dependent on the source of heat, thickness of skin, duration of contact and the heat dissipating capability of the skin. A scald in infant will deeper than in identical scald.

In similar study Peddi M et al most of patient's sustained partial thickness (50.5%).while 16.5% children had deep burn [16].

In our series epilepsy comes out to be the major factor resulting in burns 1.70% because of the convulsive episodes often fell nearby hot or burning equipment (open fire). Open fire used in plane for warming in winter season and only one case recorded of psychiatric illness, most patients fell in to nearby fire places.

In our study we found that out of 117 patients, 22.19% patients had developed various types of complications. Most commonly hyper granulation was developed in 8.54% of children, severe infection was observed on 5.12% children who were deeply injured by burn, in 6.83% patients were develop were contracture most commonly over neck axial or hands.

Gangrene in finger and in fingers of hands was seen in 2% cases who had electric burn or flame burn.

In our study 70.08% children were recovered from burn injury. In similar study by peddi et al 79.6 % children survived <sup>16</sup>. Recovery of patients depends on many factors like age, sex, cause and mode of injury, percentage and depth of burn and the part affected.

**Table 1: Distribution of cases according to development of complication**

S. No.	Complications	Total number of patients	Percentage
1.	Contracture	8	6.83
2.	Hyper granulation	10	8.54
3.	Infection	6	5.12
4.	Gangrene	2	1.70
	Total patient	26	22.19%

**Table 2: Distribution of cases according to the source of heat**

S. No.	Source of burn	Total numbers of affected patients	percentage
1	Hot liquid (milk, tea, vegetables, oil)	83	70.94
2	Hot surface (Contact burn)	3	2.56
3	Chimney	2	1.70
4	Chula	4	3.41
5	Cracker fire	2	1.70
6	Stove (kerosene)	4	3.41
7	Open fire	4	3.41
8	Electrocution	15	12.82

### Conclusion

In conclusion most of patients were discharged without complication and most susceptible to burn injury were those aged between 1 to 3 years. The most causative agent of these accidents was scald; upper extremities also were the most affected area. Domestic environment, winter season, Male gender, and low socioeconomic class were found to have an increased frequency of paediatric burn. The parent should advise to keep children away from kitchen during food preparation. Health education regarding first aid for burn and on fire safety should be given to the society.

Most of these paediatric burn injuries are occurring at home and most of them are preventable. To educate the people regarding risk of burn injuries campaigning should be conducted in different areas to educate the population at risk. Awareness should be created via social and print media (e.g. television radio, press, and posters). Schools are the good source for giving education about the prevention of burn injuries so that elder children's in their family take care of their younger siblings. Paediatric burn prevention programs should be started to established the knowledge of the parents/guardian and child education and awareness about hazard reduction. By simple preventive measures, we can eliminate paediatric burn injury. Public education is the most effective way.

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