

Profile of scald injury among Paediatrics patient attending tertiary care hospital

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Abstract

Background: Scald injuries among children are a significant cause of mortality and morbidity. This is compounded by the additional risk factors such as poverty, higher birth order and urban slums which are seen in developing countries. But very few studies are available regarding the burden of this issue. This study seeks to assess the same. **Methods:** A prospective observational study was conducted in a tertiary care hospital for one year. A total of 66 children less than 12 years of age were included. Their demographic profile and treatment outcome were studied. **Results:** Most participants were less than 10 years old and almost half had first degree burns. Hot water scalds were the most common etiology followed by household liquid foods such as sambar and kanji. Most burns affected the front of the body. Silver nitrodiazine was the most common treatment followed by collagen application and open dressing. After treatment 81.5% improved. The mortality was 16.7%. **Conclusions:** Scald injuries are a common cause of morbidity among young children. Most incidents occur at home and are preventable. This indicates the need for parental education and the child safety measures for reducing mortality and morbidity due to scalds.

Keywords: Scalds, Burns, Paediatric-injuries

Introduction

Scald injuries are an issue of significant public health importance. It is also one of the major contributors of significant mortality and morbidity in the world [1]. It has multiple adverse sequelae such as pain and a protracted duration of treatment which may extend up to a life time in some instances. Approximately one-third to a half of all the burn injuries among high- and middle-income countries are due to scalds and 5% of all the deaths due to burn are scald injuries [2,3].

Although the incidence of burn injuries has considerably declined in the developed countries, there is still a need for information regarding the epidemiology of burn injuries and the potential risk factors. Children in the pre-school age experience a higher proportion of mortality when compared to other age groups. The mortality rate due to scald injuries among children under 4 years of age was 46.9%. The mortality reported in the current study was much higher than the reported mortality of 12.9% among older children reported by a previous study [2]

Scald injuries have multiple economic consequences as well. In a report by Miller et al observed that scald injuries and deaths among children less than 14 years of age alone account for \$2.1 billion dollars expenses in the United States each year [3]. In a report by the British Burns Association, a case of serious bath water scald on intensive treatment would cause an expenditure of \$280,000 [4].

Various studies have been conducted regarding the risk factors for injuries among children. A study by Bijur P et al identified problem drinking among mothers and problem drinking among both parents to be associated with an increased risk of injuries [5]. Other factors such as male gender, deprived urban neighborhood, number of older siblings and increased distance from the hospital were also found to be risk factors for scald injuries among children [6]. A study by Shah et al (2013) identified that the risk for scald injuries was greatest at 13 to 24 months of age compared to older children [1]. This is probably due to the fact that preschool children are more dependent on their mothers while at home [7]. Previous history of perinatal depression was also found to be a risk factor for scald

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injuries among children [1]. Since majority of the scald injuries occur at home, the etiology are mostly household items. Earlier in developed countries, tap water at high temperature was the commonest etiology of scald injuries [8]. But the profile has changed in recent times, to include other causes as well. In a study by Agbenorku et al found that hot water was the commonest cause of scald injuries among children amounting to 68.1%. Other factors were hot soup (15.6%), hot tea (4.3%), hot oil (9.2%), hot stew (9.7%) and hot stock (2.1%)[9].

Despite the vast information available on scald injuries in the pediatric age group, very few studies have been done in developing countries such as India. Knowledge of the epidemiology of pediatric scald injuries will enable the planning of appropriate preventive measures. These may include parental education, identifying the households at risk and implementation of child safety measures. This study seeks to assess the burden of scald injuries and the associated factors.

Objectives

1. To analyze the demographic and clinical profile of scald injuries presenting to a tertiary care teaching hospital
2. To analyze the treatments procedures done and the treatment outcome in pediatric patients presenting with scald injuries.

Methods

Place of study: Department of Paediatric surgery in a tertiary care teaching hospital

Type of study: Prospective observational study

Results

A total 66 people participants were included in the analysis. The mean age was 54.09 ± 38.4 in the study population, minimum age was 9 months and maximum age was 144 months.

Table-1: Descriptive analysis of demographic parameter in study population (N=66).

Demographic parameter	Frequency	Percentages
Age group (in year)		
below 1 year	3	4.50%
1 to 2 years	22	33.30%
3 to 5 years	17	25.80%
6 to 10 years	19	28.80%
Above 10 years	4	6.10%
Gender		
Male	31	47.00%
Female	35	53.00%

Study population: Children presenting with scald injuries to the study setting

Sampling methods: All the study subjects were selected in to the study sequentially

Data collection period: The data collection for the study was done between January to December 2017, for a period of 12 months

Inclusion criteria

- Children below 12 years,
- Both genders,
- presenting or referred to the study setting with scald injuries

Exclusion criteria

- Children aged More than 12
- Children with mixed burn injuries

Statistical methods: Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis [10].

Demographic parameters like (age, gender), severity, agent, BSA (%), BSA (%) group, methods (silvernitrodizaine cream local application, collage application, open dressing, closed dressing), site involved front, site involved, side involved back, site involved, final outcome participants were considered as the outcome variables of interest.

Among the study population, 3 (4.50%) participants were aged below 1 year, 22 (33.30%) participants were aged between 1 to 2 years, 17 (25.80%) participants were aged between 3 to 5 years, 19 (28.80%) participants were aged between 6 to 10 years and 4 (6.10%) participants were aged above 10 years. Among the study population, 31(47%) participants were male, and remaining 35 (53%) participants were female. (Table 1)

Table- 2: Descriptive analysis of severity in study population (N=66)

Parameter	Summary
Severity	
1°	38 (57.5%)
2°	23 (34.8%)
2° deep and 3°	3 (4.54%)
Agent	
Hot water	24(36.36%)
Hot tea	10 (15.15%)
Hot sambar	7 (10.60%)
Hot flame	18 (27.27%)
Hot Kanji	7 (10.60%)
BSA (%) group	
Less than 10	17 (25.80%)
11 to 30	34 (51.50%)
31 to 50	7 (10.60%)
51 and above	8 (12.10%)

Among the study population, 38 (57.5%) participants had severity of 1°, 23 (34.8%) participant had severity of 2° and 3 (4.54%) participant had 2° deep and 3°. Among the study population, in 24(36.36%) participants the cause of scald injury was hot water, in 10 (15.15%) subjects it was hot tea, in 7 (10.60%) it was “Sambar”.

The number of children injured by hot flame and hot “kanji” were 18 (27.27%) and 7 (10.60%) respectively. Among the study population, 17(25.80%) participants had less than 10% of body surface area, 34(51.50%) participants had 11 to 30% of body surface area, 7(10.60%) participants had 31 to 50% of body surface area, and 8(12.10%) participants had 51% and above. (Table 2)

Table-3: Descriptive analysis of front in study population (N=66).

Front	Frequency	Percent
Side involved front	63	95.50%
Site involved		
Abdomen	23	34.80%
Face	11	16.70%
Chest	22	33.30%
Upper limb	29	43.90%
Lower limb	20	30.30%
Perineum	13	19.70%
Back		
Side involved back	18	27.30%
Site involved		
Head	2	3.00%
Chest	9	13.60%
Upper limb	7	10.60%
Lower limb	8	12.10%
Perineum	10	15.20%
Abdomen	8	12.10%

Among the study population, 63(95.50%) participants were affected in front side involved, 23(34.80%) participants were affected in abdomen, 11(16.70%) participants were affected in face, 22(33.30%) participants were affected in chest, 29 (43.90%) participants were affected in upper limb, 20(30.30%) participants were affected in lower limb and 13(19.70%) participants were affected in perineum. Among the study population, 18(27.30%) participants were affected in back side involved, 2(3%) participants were affected in head, 9(13.60%) participants were affected in chest, 7(10.60%) participants were affected in upper limb, 8(12.10%) participants were affected in lower limb, 10 (15.20%) participants were affected in perineum and 8(12.10%) participants were affected in abdomen. (Table 3)

Table-4: Descriptive analysis of method and final outcome in study population (N=66).

Methods	Frequency	Percentages
Silvemitrodizaine cream local application	46	69.70%
Collagen application	20	30.30%
Open dressing	14	21.20%
Closed dressing	1	1.50%
Final outcome		
Improved	54	81.80%
Discharge	1	1.50%
Expired	11	16.70%

Among the study population, 46(69.70%) participants had silvemitrodizaine cream local application, 20(30.30%) had collagen application, 14(21.20%) had open dressing and 1(1.50%) had Closed dressing. Among the study population, 54 (81.80%) participants had improved, 1 (1.50%) participants had discharge, and 11 (16.70%) participants had expired (Table 4).

Discussion

Socio-demographic profile of the study participants:

Almost three-fourths of the participants belonged to the age group of 13 months to 120 months. The mean age was 54.09 months. The mean age is similar to the study by Palmieri T. L et al (57.6 months) and is higher than in the study by Rimmer RB et al (20.7 months) and Agbenorkuet al (26.16 months). The mean age is slightly lesser than the mean age in the study by Yeoh et al (1994) where the mean age was 40.14 months [9, 11-13].

There was a slightly higher proportion of females (53%) compared to males (47%) in the study population. The male:female ratio was 1:0.88. The gender distribution is similar to the study by Palmieri T. L et al where the male: female ratio was 1:0.96. The male: female ratio is lesser than in the studies by Shah et al(1.22:1), Rimmer RB et al (1.08:1), Yeoh et al (1.19:1) and Agbenorku et al (1.23:1). The proportions of males were higher in these studies compared to females [1,9,11,12,13].

Etiologic agents of scald injuries: With regards to the etiologic agents of scald injuries, similar to other studies, hot water is the most common cause [8, 9, 14]. In developed countries, bath water scald injuries were more common while in this study, scald injuries in the

kitchen were more common. This was similar to the study by Delgado et al who mention that kitchen is a common site for occurrence of pediatric scald injuries [14]. Household liquid food items such as sambar and kanji were some of the etiologic agents of scalds. Furthermore, there were no reported cases of scalds due to non-accidental causes in this study [1, 11, 15].

Body surface area affected by scalds: The mean body surface area affected by burns in this study was $26.8 \pm 19.99\%$. This is much higher than the estimate by Morrow et al where the mean body surface area affected by scalds was $15.1 \pm 0.7\%$. Rimmer et al estimated the mean body surface area affected to be 8% in their study while Millan et al (2012) estimated it to be 10%. Marashi et al estimated the mean body surface area affected by burns in their study to be $12.29\% \pm 21.18\%$ [2, 13, 15, 16]. This indicates that the pattern of pediatric scald injuries among the developing countries like India are much different from those in the developed countries. A greater percentage of body surface area is affected by scald injuries compared to results from studies conducted in developed countries.

The upper limb especially in the front was the most common site of involvement in this study. The findings

are similar to the study by Millan et al where the upper limb was involved in 54.1% area. Involvement of Head and neck along with trunk are lesser in the current study compared to Milan et al. Head and neck was involved in 46.9% in the study by Milan et al compared to 16.7% & 3% in the anterior and posterior aspect respectively in this current study. The involvement of trunk was slightly higher according to Milan et al estimated to be at 45.9%. In this study 33.3% of anterior aspect and 25.7% of posterior aspects were involved. A greater percentage of body surface area in lower limb and perineum was involved in the current study estimated at 50% & 27.30% in the front and back respectively. This is higher than the 33.7% estimated by Millan et al [15].

Treatment outcomes of pediatric scald injuries: More than half the participants had first degree burns and mostly were managed by local application of silver nitrodiazine cream. Collagen application was used in 30.30% of the participants, 21.20% were managed by open dressing and 1.5% were managed by closed dressing. The type of management was similar to the study by Millan et al (2012) who mention that 41.8% were managed by topical application and dressing. The rest of the participants needed further surgical management.

When the final outcome was observed, 81.8% of the participants improved. 1.5% were discharged while 16.7% expired. The mortality was higher than the study by Yeoh et al, where the mortality rate was 1.47% and Morrow et al (1996) with mortality rate of 4.7% and Agbenorku et al, where the mortality rate was 9.2% [2, 9, 11]. Compared to other studies, the current study has a higher mortality among pediatric patients with scald injuries. This may be due to the fact that a high proportion of patients (22.7%) had burn injuries affecting 30% or above of the body surface area. Burns affecting 30% or more of the BSA has been found to be associated with an increased risk of mortality [9].

With regards to morbidity, this study had a higher proportion of discharged or improved patients (83.3%) compared to the studies by Yeoh et al (1994) where the discharge rate was 53.1% and Agbenorku et al where 58.9% of the patients were discharged [9,11].

Conclusion

A majority of the scald injuries occur in children who are less than 10 years of age with more than half occurring in the under 5 age group. More than half were first degree burns with majority affecting the front of the body. The common etiologies were hot water and

other hot edible items. The etiologic agents of pediatric scald injuries are different from those found in the studies conducted in developing countries. Despite treatment, 16.7% expired. Kitchen is the most common site of occurrence of scalds. This necessitates childhood safety measures and health education to the mothers and care givers of the child regarding preventive measures.

In addition, this study provides scope for further studies to assess the risk factors for this increase in mortality. This would help in reducing the morbidity and mortality from scald injuries in the pediatric age group.

Addition of new knowledge

- Liquid food items are the most common sources of pediatric scald injuries
- Majority of scald injuries occurs in children less than 5 years of age
- Front of the body especially the upper limbs are commonly affected areas
- A higher proportion of patients have more than 30% BSA affected by burns compared to other studies, in addition to a higher mortality rate due to scalds

Author contribution: Dr.S. Prabakaranis the only author, who has conceptualized the study, conducted data collection, prepared and reviewed all the drafts and had prepared the final version of the manuscript.

Declarations

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Ethical approval: the study was approved by the institutional human ethics committee

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