Industrial burns in Jamshedpur, India: 
Epidemiology, prevention and first aid

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Abstract

Industrial burn injuries result in significant morbidity, infrequent mortality and man-hour loss, leading to loss of productivity. With a view to study the epidemiology of industrial burns in Jamshedpur and first aid awareness, we analysed 815 patients (142 inpatients and 673 outpatients) with industrial burns seen by us during the period from January 1993 to December 1996. 69% of these injuries were caused by contact with hot objects, while the rest were caused by flame, electrical and chemical agents. Our audio-visual awareness promotion programme for burns safety and first aid awareness amongst our officers and employees at various levels, has been successful in reducing the incidence of burns. The campaign has also popularised the use of cool water as the best first aid measure. © 1998 Elsevier Science Ltd for ISBI. All rights reserved.

Keywords: Industrial burns; Prevention

1. Introduction

Industrial burns are common in a steel industry since the job involves handling of hot finished products, molten metal and slag. When an otherwise healthy industrial worker gets burnt, the effect is compounded by substantial man-hour losses, reducing production. In our study, approximately 25000 man-hours were lost during 1995 because of burn accidents alone. This, along with the enormous cost of treatment, occasional mortality and considerable morbidity has made prevention of industrial burns essential.

Human factors like haste, fatigue and bypassing safety norms play an important role in causing burn accidents among industrial workers. Hence, education and awareness promotion are the first steps towards reducing the incidence of burns.

The main objectives of this paper are:

1. To highlight the incidence of industrial burns along with relevant statistical details.
2. To discuss our approach towards education and awareness promotion for prevention of industrial burns.

3. To emphasise the use of water as the best first aid measure for burn injuries, which helps to minimise depth of burn and reduce the hospital stay of inpatients.

2. Materials and methods

This study was carried out in the 835-bed Tata Main Hospital located at Jamshedpur, a steel town in India. It has a well-equipped 20-bed burn centre which caters for employees of the Tata Iron and Steel company, their families and a section of the population in and around Jamshedpur.

The study group comprised 142 inpatients and 673 outpatients with industrial burns treated at the burn centre during the period from January 1993 to December 1996. The patients were employees of the Tata Iron and Steel Company.

In our study, industrial burns formed 10.9% of the total admissions at the burn centre, compared with 12% in the Assam Oil Division Hospital, Digboi [1] and 12.3% in a hospital in Valencia, Spain [2]. However, a higher incidence of occupational burns has been reported from Hacettepe University Hospital, Ankara, Turkey [3]. Out of the total new outpatients treated at our burn centre during the study period,
34.3% were those of industrial burns (Table 1), 53.5% of the inpatients belonged to the age group of 25–35 years, and only two out of 861 were females.

The distribution of burns according to total body surface area involvement of the inpatients is shown in Fig. 1. There were 11 deaths in this group of 142 patients, out of which five had between 41 and 60% body surface area burn, and the remaining six had more than 61% body surface area involvement. Contact burns formed 69% of the study group, followed by 24% of electrical burns, and a small number of flame burns (5%), chemical burns (1%) and scald (1%).

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<td></td>
<td>(15.9%)</td>
<td>(12.6%)</td>
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<tr>
<td>Outpatients</td>
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<td>210/505</td>
<td>179/550</td>
<td>140/504</td>
<td>673/1960</td>
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<tr>
<td></td>
<td>(34.6%)</td>
<td>(41.5%)</td>
<td>(32.5%)</td>
<td>(28.7%)</td>
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Fig. 1. Industrial burn: distribution of inpatients according to TBSA involvement. \( n = 142 \).

3. Preventive aspect

Preventive measures have been implemented by the Burn Centre team with assistance from Occupational Health Services, the Personnel Division, Safety department and Fire Brigade unit of Tata Steel.

4. Training of trainers

This is a 75 min audio-visual session for the middle level officers conducted by the Burn Centre team. These officers, in turn, propagate the message to the lower category of employees in their respective departments. There is a video show to highlight burns safety appliances, prevention and first aid, along with lectures and discussions about the subject. Slide presentations of a serious burn sequel is also carried out, followed by interaction to clear their doubts. Six such sessions were held each year from 1994 onwards to educate a total number of 140, 152, 147 and 151 officers, respectively, every year. Pamphlets carrying the message for prevention and water for first aid are distributed at the end of each session.

5. Departmental visits

Our awareness promotion programme has been taken to the employees at the shop floor of various departments of Tata Steel. Six accident prone departments of the steel plant were visited by the Burn Centre team to conduct similar audio-visual presentations, covering a total of 550 employees so far. In these departments the employees are working close to molten metal, slag and hot finished products. This programme is conducted at regular intervals and is ongoing to educate all the vulnerable employees.

Posters displaying the message of burn safety were put up at strategic points inside the steel plant with the help of the safety departments. Such posters have been displayed in the waiting hall of the Burn unit where the industrial burn patients are treated.

6. Results

The overall incidence of industrial burns has shown a decline, particularly in 1996, as shown in Fig. 2. In 1996 there was not a single mortality due to industrial burn.

The number of patients who used water for first aid has been steadily increasing (Fig. 3). A total of 125 patients admitted with less than 20% body surface area burn were analysed with respect to the use of water as first aid, because they formed the majority of our admissions (86.6%). On admission into the burn centre the patient and the departmental supervisor were inter-
viewed regarding the use of water for first aid. In 1993, only 14 out of 32 patients, i.e. 37.8% had used water for first aid, which increased to 46.3% (19/41) in 1994, 51.6% (16/31) in 1995 and 75% (12/16) in 1996 (Fig. 4). Two groups of patients were studied, one group of 61 patients who used water for first aid and the other group of 64 patients who did not. Following treatment modalities remained the same for all patients of the study group.

1. Early excision and split skin grafting for deep dermal and deep burns within the 5th day post burn.
2. Conservative treatment using silver sulphadiazine cream for daily dressing for all partial thickness burns.

Fig. 4. Use of water for first aid-inpatients of industrial burns <20% TBSA, n = 125.
3. Patients were discharged after complete epithelialisation of the wounds.

The average hospital stay was 5.3 days in the group where water was used, as compared with 10.3 days in the other group where water was not used. With respect to the duration of hospital stay, it was observed that 54 out of 61 patients who used water stayed for <10 days, while in the group who did not use water 43 out of 64 had stayed for <10 days. In response to our campaign, safety showers have been installed in four departments of Tata Steel.

In general, the awareness about the prevention and first aid in burn injury has developed among most of the employees of the plant. Our continuous efforts have helped to generate an increased understanding among the Burn Centre team, Occupational Health Services and Safety Department about the need for such measures. The prevention and awareness programme has become a routine activity of the Burn Centre team and other relevant departments.

7. Discussion

Epidemiology forms an integral part of planning an effective prevention programme and assessing the impact of these measures through continuous monitoring. During various sessions of interaction with employees, it is found that most of them are not aware about the seriousness of burn injury. Therefore, it is essential to educate the target group about the magnitude of burn injury and the serious consequences.

In an era of fierce global competition, the pressure of achieving targets is enormous on employees in many departments. It is the corporate responsibility to ensure that safety norms like good housekeeping, provision of safety appliances and regular surveillance are enforced from time to time despite the pressure.

Often workers ignore safety norms and bypass steps of a procedure because of fatigue and exhaustion, leading to accidents. This factor has been narrated by many patients on interrogation. Hence, the elimination of human factors can go a long way in reducing the incidence.

In the present study, the incidence of contact burn is highest (69%) as compared with B. M. Caroll [4] (flash burn 60%) and B. P. Sarma [1] (scalds 57%). Employees of certain departments, such as the LD shop, Steel Melting Shop, Blast Furnace and Sheet Mill were commonly encountered because of accidental contact with hot finished products, molten metal and slag.

It is a well-known fact that the treatment of a burn is a painful and prolonged process and also involves a lot of expenditure. The only way to minimise suffering and contain cost is to bring down the incidence. It is the responsibility of the burn facility to initiate programmes for prevention and first aid.

Even the enlightened population is still wrongly obsessed with the use of blanket for first aid in burns, causing the victims more harm. The change over to the concept of water as the best first aid requires a lot of effort. Water as the best first aid for burns has been highlighted by Keswani [5] in 1977 and Beer and Komatscher [6] in 1976. When water is used adequately for first aid the burn depth was limited to deep dermal.

The impact of our measures, as seen in Table 1, is largely seen in inpatients as compared with outpatients. With our continuous effort we hope to bring down the incidence of minor burns also.

It is heartening to note that in 1996 there was not a single industrial burn with more than 20% body surface area involvement, nor a single mortality. There is still scope for improvement and our efforts will continue.

Acknowledgements

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References