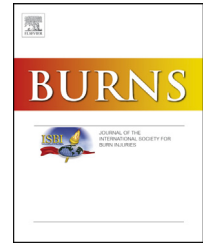


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Management of acid burns: Experience from Bangladesh



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ABSTRACT

Acid burn injuries in Bangladesh primarily occur as a result of intentional attacks although there are incidences of accidental acid burns in industry, on the street, and at home. A total of 126 patients with acid burns, 95 from attacks and 31 from accidents, were studied from July 2004 to December 2012. A diagnosis of acid burn was made from history, physical examination and in some cases from chemical analysis of the patients' clothing. Alkali burns were excluded from the study.

In the burn unit of Dhaka Medical College Hospital, we applied a slightly different protocol for management of acid burns, beginning with plain water irrigation of the wound, which effectively reduced burn depth and the requirement of surgical treatment. Application of hydrocolloid dressing for 48–72 h helped with the assessment of depth and the course of treatment. Early excision and grafting gives good results but resultant acid trickling creates a marble cake-like appearance of the wound separated by the vital skin. Excision with a scalpel and direct stitching of the wounds are often a good option. Observation of patients on follow-up revealed that wounds showed a tendency for hypertrophy. Application of pressure garments and other scar treatments were given in all cases unless the burn was highly superficial.

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1. Introduction

Chemicals are ever-present in household substances and used widely in industrial products. More than 65,000 chemicals are

currently marketed and roughly 60,000 new chemicals enter the market each year [1]. Approximately 25,000 of these products have been shown to be capable of producing tissue damage. Chemical burns, therefore, are extremely common and their effects can vary from innocuous damage to life-threatening

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injuries [2]. Chemical burns in Bangladesh result primarily from attacks with acids, but accidental acid burns also occur. Assaults of this nature have become more publicized, but a significant number of people also suffer accidental chemical injuries at home and at work.

2. Methodology

From July 2004 to December 2012, 126 patients with acid burns were studied. A total of 22,808 burn patients were admitted to the Burn Unit of Dhaka Medical College Hospital. Among them, 851 were acid burn patients; of that group, subjects selected for this study had reported to the hospital within 24 h; 95 patients were injured from attacks and 31 from accidents. Chemical burns constitute 3.7% of the total admitted patients at the Dhaka Medical College Hospital Burn Unit. In a prospective study, diagnoses of acid burns were made from history, physical examination and in some cases chemical analysis of the patients' clothing. Alkali burns were excluded from the study. After washing the burn wound with normal saline, hydrocolloid dressing was applied and kept on for 48–72 h, where reassessment of the wounds was performed. All full- and deep partial-thickness chemical burns were excised within the first week. Patients suffering more than 10% deep- or deep partial-thickness burns underwent multiple sessions of excision and immediate grafting. Delayed skin grafting was performed after 48 h in three cases of facial burn where the author was unsure of the adequacy of excision. Excision and direct suturing were performed in the few cases where the acid burn wounds were linear. Patients who presented late and with infected wounds were also excluded from the study (Figs. 1 and 2).

3. Results and observations

A number of observations were made regarding burns.

Females are more commonly attacked with acid. Individuals sustaining accidental chemical burns, however, are most often male. Among all patients with intentional burns, 53% were female.

Accidental burns primarily occur in the workplace. About 72% of accidental acid burns occur in industrial settings such as dyeing plants, fertilizer factories, and pharmaceutical companies.

About 16% of accidents resulting in burns occur in private residences to those who work on gold jewelry or car batteries, for instance. Women and children can sustain accidental chemical burns at home. About 11% of accidental chemical burns occur during transportation of acid substances. Most cases resulting from intentional incidence occurred in rural settings (74%) while 70% of the accidental burns occurred at factories (Fig. 3).

People in all age groups are affected by chemical attacks, but in Bangladesh, most victims who came under attack are relatively young in comparison to those suffering accidents. The mean age of those in the attack group was 27.04 ± 13.74 years, and the mean age of those in the accident group was



Fig. 1 – (a) Superficial acid burn, color light brown. (b) Superficial acid burn, color light brown. (c) Superficial acid burn, healed completely after application of hydrocolloid dressing. (d) Superficial acid burn, color light brown. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

32.9 ± 16.17 years. The highest incidence occurs in those between 26 and 30 (22%) years old; the next highest incidence occurs in those between 11 and 15 years old (16%). Adolescents and just-married women are the most commonly victimized groups. Children constitute 7.6% of all chemical burn cases (Fig. 4).

In most ($n = 50$) cases of intentional burns the type of acid used could not be determined; however, chemical analysis of the clothing and leftover pots that were found at the scene in other cases revealed that the attackers used sulfuric acids (in 39 cases), hydrochloric acids (4 cases) and nitric acids (1 case). In accident cases (total = 31), sulfuric acids ($n = 15$) were the most commonly used acid, followed by hydrochloric acid ($n = 6$), carbolic acid ($n = 5$), and nitric acid ($n = 4$). The type of acid used was undetectable in one case ($n = 1$) (Fig. 5).

Land dispute is the most common reason given for inciting an acid attack ($n = 30$), and disputes between family members or with neighbors is the second most common reason ($n = 22$). Denial of love or a rejected marriage proposal comes next ($n = 14$). Dowry issues and divorces is another leading cause of acid attacks ($n = 8$). Disputes over money = lending ($n = 2$) and

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