



AN EPIDEMIOLOGICAL STUDY OF BURNS INJURIES IN INDIAN KITCHEN

Plastic Surgery

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ABSTRACT

Domestic burns, especially those occurring in the kitchen are a major cause of injury in the developing world. A prospective analysis of 403 patients (Outdoor and Indoor) who presented with kitchen related burn injuries to the Emergency and OPD was carried out from January 2015 to December 2016. All patients were analyzed in terms of mode of burns, type and severity of burns, age groups and gender involved, socio-economic status, literacy of patient and cooking appliances involved. Analysis of obtained results indicate that lack of education, low quality cooking appliances, lack of standardization of cooking appliances, improper technique of usage of cooking appliances, lack of awareness of possible hazards and lack of awareness about fire safety measures are common modifiable factors associated with kitchen related burns. Increasing awareness by means of audiovisual media, inclusion of Burns Safety protocol in school curriculum and media campaigns are proposed as remedial measures to this effect. Also proposed is strict adherence to laid down manufacturing criteria for kitchen appliances and standardization of appliances, installing smoke detectors in locations at risk for fire, following basic safety precautions especially while cooking and ensuring that infants and children are kept out of harm's way.

KEYWORDS

Kitchen burn, Primus stove, Pressure cooker, Gas cylinder, Epidemiology.

INTRODUCTION

In the developing world, burns are a significant cause of injury. They comprise the second largest group of injuries after road traffic accidents. In India, the estimated annual incidence of burns is 6-7 million¹. Mortality rates are much higher in the developing world as compared to the developed world^{2,3}. Most of such domestic burns are related to the kitchen.

Kitchen burns- Burns occurring in the Kitchen can be classified as- (a) Flame burns or scald burns, and (b) Accidental, suicidal, or homicidal Burns.

Causative agents –The items which cause Burns are Primus stove(Primus stove is a cooking appliance which uses pressurized kerosene as fuel and is widely used in developing countries), Liquefied Petroleum Gas stove, simple stove, electric stove, gas cylinder, firewood burns, hot food items, pressure cooker.

Primus stove burn injury- Primus stoves are widely used for cooking in developing countries and are responsible for a great proportion of kitchen related burn injuries⁴.

Primus stove is composed of a kerosene tank. (Figure 1) When air is pumped into the tank, it pressurizes the kerosene and causes it to ascend via the rising tube to the burner head. Conversely, there is a valve in the tank which will reduce pressure in the system if left open⁵, 6. Occasionally if the outlet is blocked and the pressure within the stove becomes excessive following which an explosion known as STOVE BURST can occur. Kerosene is an affordable and convenient fuel in many developing countries including India. It burns at 90 degree Centigrade and its low viscosity causes it to disperse rapidly once spilled⁷.

LPG GAS STOVE BURNS -Liquefied Petroleum Gas is an inexpensive alternative to kerosene and is becoming increasingly popular in India.(figure 2) LPG fires are more devastating to person and property than those of kerosene (8). In accidental burn injury, mechanism of injury can be: gas leak/ cylinder blast/ stove malfunction/ negligence^{9, 10, 11}. House wives should note every day the tubes and also see if there is any smell of gas before lighting the stove.

PRESSURE COOKER BURNS – Pressure Cookers are used every day to cook Rice. During cooking scald burns are usually caused by, failure of the vessel during cooking, failure of rubber seal during

cooking operation, opening the vessel before the pressure inside has equalised.

BRIDAL BURNS – Newly married women often use the kitchen items to commit suicide following quarrel with in-laws immediately following marriage. It is most common form of dowry deaths. Contentious tactics used by husband and in-laws include ingratiating, shaming, threats and violence leading to mutilation or death^{12,13}.

SPILLAGE –Hot items in the kitchen due to unawareness and hurry spill over the cooking individual and cause severe burns. It is the most common form of kitchen related injury. They are related either to preparation of food or serving of food¹⁴.

MATERIALS AND METHODS

The design of this study is a prospective study. The study includes total 403 patients treated at Civil Hospital, Ahmedabad which is one of the high volume Tertiary Burns Centre in India, either as indoor patients or as outpatient basis. our institute, Civil Hospital, Ahmedabad. Clinically relevant history was elicited at the time of admission from conscious and oriented patients and from accompanying relatives or companions in unconscious or disoriented patients. The exclusion criteria included patients who took Discharge against Medical Advice and patients in whom discrepancy regarding sequence of events leading to burns was obtained. Severity and extent of burns was assessed on initial examination and confirmed on a repeat clinical examination 48 hours after admission. The extent of burns was calculated by using the Lund & Browder chart. Initial fluid resuscitation was carried out in accordance with Parklands formula. Ophthalmologic and Internal medicine consultation was sought in patients with suspected or evident ophthalmologic injury and in those with respiratory burns. Patient care included proper positioning and splintage along with physiotherapy.

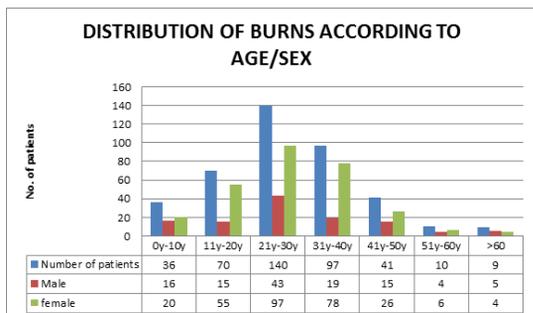
The duration of the study was of 2 years from January 2015 to December 2016. All patients included in the study were analyzed according to the manner of burns, severity of burns, age group, gender, and socioeconomic status, literacy of patient and cooking appliances used.

Observation and Discussion

Kitchen related burn injuries are a grossly under-reported aspect of burn injury. Like motor vehicle accidents, these can be either prevented to a large extent or their consequences mitigated by use of appropriate safety measures. Patients from January 2015 to December

2016 were included in study. 410 patients with kitchen related injuries of all ages and sex were attended to, of which 7 patients took discharge against medical advice. Hence, 403 patients were studied, with average of 16.79 cases per month. (Table - 1).

Table No.1 AGE/SEX



95.28% (384 of 403) were individuals below the age of 50 years. 70.72% (286 of 403) were female. (Table-2).

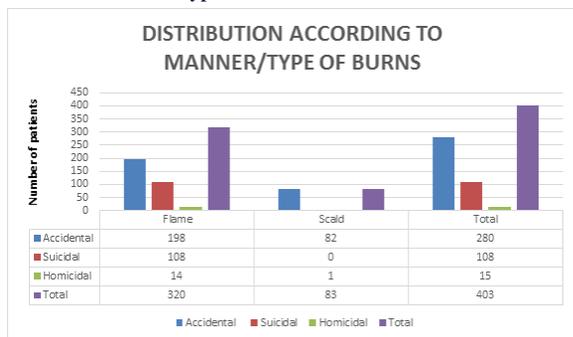
Table No.2 AGE/SEX

Age	Female	Male
<50	276	108
>50	10	9

Chi square 3.25 p<0.05

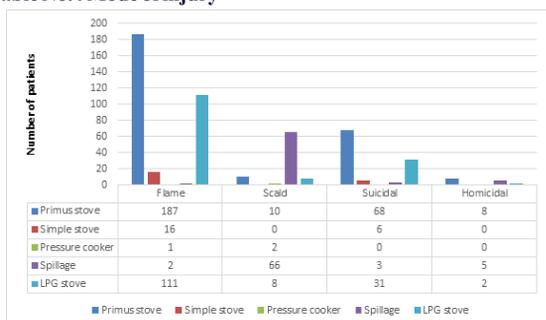
Young adults were the most commonly affected by kitchen related burn injuries while elderly patients were the least affected. Young adult females in the population segment was most commonly affected as these individuals are the one who are most commonly engaged in cooking and kitchen related activity. The absence of a statistically significant difference between elderly males and females could result from decreasing involvement of elderly females in kitchen activities with advancing age. Male and female children seem to be equally affected which corresponds to similar activities of daily routine in these individuals. Accidental flame burns registers the highest number of patients (198 of 313 i.e. 63.25%) (Table-3)

Table No.3 Manner/Type of burns



Leading causes of thermal burns are air pressurized (Primus) stoves, open flame (chulha) (Figure 3), spillage of hot liquids and gas stoves. (table-4).

Table No.4 Mode of injury

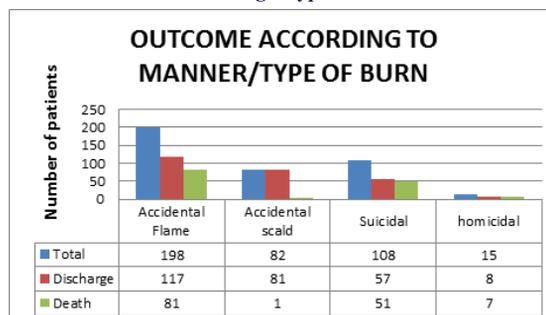


The Primus kerosene stoves are notorious for “Stove Burst” as

generating pressure within the fuel chamber is essential in operating the stove. The Primus stove was the most common cause of accidental flame burns. The rapid dispersion of kerosene also may play a role in causing more extensive burns. Use of standard gas stoves, combustion of wood and dry dung in closed spaces, especially in winter increases the risk of burn injuries many fold.

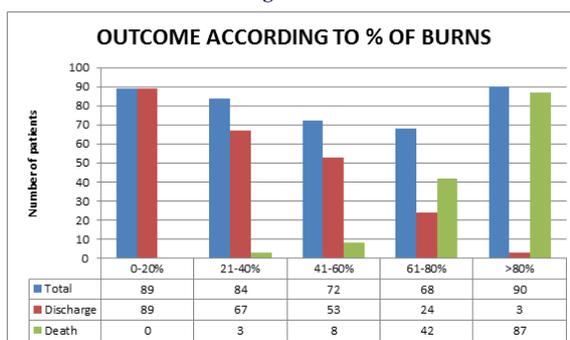
Highest number of deaths were observed amongst patients presenting with suicidal burns. (51 of 108 i.e. 47.22%). (Table-5)

Table No.5 Outcome according to type of burn



The highest incidence of death was seen in patients with suicidal burns as the extent of burnt surface area tended to be more extensive in such patients. (Table – 6)

Table No.6 Outcome according to % of burns



Chi square value 3.3653, p<0.05. There was statistically significant difference in death due to primus stove between male and female. Females were more commonly affected than males.(Table-7)

Table No.7 Death

Death	Primus stove	Others	Total
Male	24	15	39
Female	60	51	101
Total	84	66	140

Patients who expired were mainly those of Primus stove burns. As Primus stove uses pressurized kerosene as fuel and safety regulations are ignored most of the time, it causes higher percentage of burns as well as respiratory burns.

Young and middle aged women are mostly engaged in cooking and kitchen activities, especially in those belonging to lower socioeconomic strata. The use of defective stoves or open flame, and also Primus stoves coupled with traditional Indian loose fitting clothes (sari, dhoti) which catch fire easily and living in confined closed spaces all seem to result in a higher incidence of burn injuries as well as more severe consequences in this population segment. (Table-8)

Table No.8 socioeconomic class

Age group	Lower class	Middle class
<50	276	108
>50	14	5

The incidence of kitchen burns is statistically higher in married as compared to unmarried females. Possible explanations could be more supervised activity in the kitchen prior to marriage as compared to after

and because kitchen activities are by and large the domain of married women. The issue remains to be addressed satisfactorily. (Table-9)

Table No.9 Marital status

	Male	Female
Married	63	215
Unmarried	54	71

Chi square 17.63, $p < 0.001$

RESULTS

403 patients were studied, with average of 16.79 cases per month. 95.28% (384 of 403) were individuals below the age of 50 years. 70.72% (286 of 403) were female. Young adults were the most commonly affected by kitchen related burn injuries (34.7%). Young adult females were the population segment most commonly affected (24.06%). Male (44.44%) and female (55.56%) children seem to be equally affected. Accidental flame burns as a manner of burns consist of the highest number of patients (198 of 313 i.e. 63.25%). Highest number of deaths were observed amongst patients presenting with suicidal burns. (51 of 108 i.e. 47.22%). Patients who expired were mainly those of Primus stove burns (24 of 49 i.e. 48.98%).

CONCLUSION

Burn injuries are amongst the leading causes of morbidity and mortality in developing countries. Epidemiological factors vary according to locality. Planning and implementing safety programmes requires a coordinated and multi-disciplinary approach involving means of mass communication as well as inclusion in basic academic curriculum. Accidental burns were the most common followed by suicidal burns. Flame burns were the most common manner of burns followed by scald burns. Flame burns were most common in the 20-40 years age group while scald burns were most common in children below 15 years. The worst outcomes were seen in flame burns, while scald burns had the best outcome. Females were more affected as compared to males. The mortality in females was higher as compared to males. Extent of burns was more in flame burns as compared to scald burns. Kitchen related burns were more common in people of low socio-economic class and in illiterate people. Increasing awareness by means of audiovisual media, inclusion of Burns Safety protocol in school curriculum and media campaigns are proposed as remedial measures to this effect. Strict adherence to laid down manufacturing criteria for kitchen appliances and standardization of appliances, installing smoke detectors in locations at risk for fire, following basic safety precautions especially while cooking and ensuring that infant and children are kept out of harm's way are suggested to decrease morbidity and mortality pertaining to kitchen related burn injuries.



(Figure – 1) – Primus stove



(Figure – 2) – LPG stove

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