Prevention and Aetiology of Burns

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THE majority of burns and scalds, in patients admitted to our hospitals are the result of domestic accidents due to unguarded fires and heating appliances. It is most unfortunate that children and our womenfolk should mainly bear the brunt of our indifference to insist on more rigid security measures to screen our fires, to protect our kitchens from prying children, and teach our womenfolk not to go about in the kitchen with loose ends of 'sari' flying in the air.

Whatever the causes, it is an eloquent testimony to our casualness and indifference to this problem, that more than 50,000 persons are treated for burns in our hospitals every year, but there are many more who die without any help in the sprawling wilderness of the country, and the number that are treated by general practitioners, naturopaths, quacks and "self help" can only be a matter of conjecture.

Incidence

The true incidence of burns and scalds in developing countries like ours is not known, and will probably never be known till all burns are made notifiable to the authorities by law. With the introduction of Panchayat system of administration in our country, it will not be impossible to collect all the necessary data.

But on a modest conjecture, it is believed that more than 100,000 people suffer from more than minor burns throughout the length and breadth of our country and about 10,000 people die every year of burns, majority of which are women and children.

Two "peaks" in seasonal incidence, have been observed, one in "May and June" the hottest summer months and the other between "December and February" the coldest months. The highest incidence noticed in our series was December and January. There is another minor peak near "Diwali" every year which falls in October or November.

Aetiology

Causes of burns in our country are many. In civilian life most of them are preventable and are caused by :

(1) Open (unguarded) flames—
  (a) Unguarded chulhas.
  (b) Dhibris—(earthenware lamp)
  (c) Borsis—earthenware vessels containing burning charcoal for warming in winter.

(2) Hot liquids—
  (a) Water—Rice water, Dal water,
  (b) Milk, tea etc.,
  (c) Ghee, Dalda etc. (edible fatty substances used for cooking),
  (d) Molasses,

(3) Highly inflammable building material

e.g. bamboo and straw, which in the summer are very vulnerable to flying sparks of fire or carelessly thrown buttends of lighted cigarettes and 'biri' (indegenous cigarettes).

(4) Wearing inflammable dress materials made of manmade fibres like Nylon, Terylene, Dacron, Rayon, 'Wash and Wear' fibres which are finished with cellulose nitrate lacquer are hazardous.

(5) 'Tap fuels'—like gas and kerosene are being increasingly used in modern kitchens in pressure kerosene stoves and gas burners.

(a) Pressure stoves—Operating on Kerosene are used particularly in middle class homes in big cities like Bombay and Calcutta, due to low initial cost, easy availability of Kerosene, compactness and good thermal efficiency. It is believed that one lakh pressure stoves are produced in our country every year.

The prospects of immediate returns appear to have encouraged unscrupulous business men to manufacture and market inferior quality stoves and burners without any consideration for the consumers. Inferior quality stoves and burners causes serious burns and are often fatal.

In a recent Symposium on burns held in Bombay earlier in the year, a delegate said that 'some pressure stoves used in India were like bombs'. It may be recalled that last year 26 people died of stove fires in a single week in Bombay. A recent Bombay survey indicates that 74% of burn accident occur at home of which 41% are caused by pressure stoves.

(6) Gas burners-with the increasing use of gas as fuel in kitchens, incidence of burns from gas burners are increasing. Recently cases have been reported from Calcutta, where the whole family perished from burns caused by faulty gas burners.

(7) Electrical burns—Due to increasing use of electricity in urban homes, incidence of contact electric burns is rising. Mass rural electrification has brought in its wake increasing incidence of electric burns from its high tension cables. Lack of appreciation of potential dangers of electricity, ignorance and unhealthy curiosity are the usual contributory causes.

(8) Chemical Burns

(a) Acid and alkali burns—are quite common in industry and some occupations e. g. gold smith.

(b) Acid thrown on the face out of frustration in love or jealousy is not uncommon.

(9) Physical burns—

(a) Radiation burns in civilian life are limited to occupational hazards in Radiology and Radiotherapy.

(b) Solar burns—are not of much consequence in our country.

(10) Occupational hazards—

(a) in automobile industry—people working with inflammable liquids.

(b) people engaged in welding, soldering etc.

(11) In Industrial burns—apart from burns

from acids and alkalies, molten metal causes deep burns.

(12) Epileptics—during fits, if they are any where near open fire, stands the risk of extensive burns.

An analysis of 484 cases of burns treated during last 5 years in the Department of Plastic Surgery, Patna Medical College Hospital, where acute burns cases are admitted twice a week, show that

(a) **Age**—The largest number of victims are children, between the ages up to 10 (38.8%).

(b) The second largest group is between the age group of 21-30 and accounts for 23.7%.

Sex—Male ... 37.5%
Female ... 62.5%

Table 1

Age		Number
0—10	...	188
11—20	...	100
21—30	...	115
31—40	...	40
41—50	...	19
51 onwards	...	22
		484

Table 2

Sex		Number
Male	...	182
Female	...	302
		484

Table 3

	Number
Open flame—300 + 31 + 12+21 = (Chulha, Borsi, Dhibri)	364
Boiling fluids ...	65
Electric Burns ...	8
Tap fuels (Kerosene and Petrol) ...	15
Acid Burns ...	3
Gas ...	6
Stove ...	6
Clothes (Cotton) — 10	
Synthetic fibre — 7 =	17
	484

Analysing the aetiological factors, open flames alone account for 75.2% ; while boiling fluids account for the second highest i. e. 13.4%.

The aetiological factors of Acid Burns, tap fuels, gas and Kerosene Stove are marginal. It is significant, compared to Bombay figures there was not a single case of burns due to pressure cookers. This goes to show that social milleau and habits have an important bearing on aetiological factors of burns.

In the present series, it appears that children upto the age of 10, and then young adults (21—30), presumably majority being females are victim of burns from open unguarded flames [Chulha (kitchen), Dhibri (lighting) and Borsi (warming) etc.].

In an unsophisticated agriculture—oriented society like the one in the present series under review, it appears that open unguarded flames, whether in kitchen or outside is the most important aetiological factor.

In a comparable survey at Bombay, pressure stoves accounted for 41.2%, hot liquids 26.67%, oil lamps 9.5%, Kerosene 8.1% and others 14.5%.

Prevention

Most of the civilian and domestic burns are preventable. The cost in terms of money and man-hours is high enough but the loss in terms of human misery is appalling. No mathematical calculation can adequately assess the profound suffering endured by patients with severe burns with frequent change of painful dressings and several resurfacing operations.

It is quite clear that no amount of safety precautions will completely eliminate burns, but a little care and fore-thought may reduce the incidence of burns.

An accident is generally not the outcome of a single factor, but an end result of several factors interacting with each other.

In burns, the agents may be in the form of pressure stoves, segrees, oil lamps, sulphuric or other concentrated heavy acids, molten metal, tar, inflammable materials, electricity, crackers and cigarettes.

The hosts are individuals who succumb to the accident due to physical ailments or handicaps, mental or psychological tension, time or atmospheric stress, unawareness of the hazard or technical ignorance.

The environment comprises both the human and physical shortcomings in the area in which the agent-host relationship functions. The type of home, pattern of living, the size of dwelling with the total number of occupants, the building materials, degree of fire safety and lastly the degree of accident-consciousness in the hosts are important.

A large percentage of the burns, both domestic and industrial, are preventable by simple modification of the agents or environment, and by public education.

The public, social workers, professional persons, industrialists, government and non-government agencies should undertake a programme for prevention of such accidents in urban and also later in rural areas. Such a programme is overdue, and would be entirely justified, not only in prevention of human suffering but also in terms of the vast financial savings that would be achieved.

Burns consciousness –

Anybody going or working near a fire should have the consciousness of "potential" danger and should be careful and always conscious while working near the fire.

Children, who cannot be expected to have this consciousness should be on no account be allowed anywhere near open fires i.e. kitchens, chulhas, stoves, burners, borsis, and dhibris.

It should be the legal onus of parents and other elders incharge to see that the children under their charge are not allowed near open fires. They should be held guilty of 'criminal negligence' of children and if necessary our laws of the land to be suitably amended. It should be the duty of health visitors and other social workers to propagate and ensure its compliance.

Clothing

Some materials like wool, pure silk and pure cotton are reasonably safe, they will burn when lighted but are not highly flammable. Nylon and Terylene melt when subjected to heat.

Artificial silks and certain man-made fibres like brushed rayon, flanellette and wash'n wear material which are finished with cellulose nitrate lacquer are hazardous.

Wearing material should be graded according to a rigid flammability test.

Building material

Fireproof materials, e.g. asbestos, for building should be introduced and chemicals to provide fire proof coating should be developed.

Electric Burns

Constant and sustained education of the public is necessary to ensure elimination of defective electric installations.

Before embarking on electrical installations in rural areas, dangers and hazards of electricity are to be explained, by public lectures and suitable audiovisual aids, Descriptive diagrams should indicate the potential hazards where high tension cables are situated.

Pressure stoves

In developed countries, legislation guarantees the manufacture of quality stoves. In our country, the Indian Standards Institution has laid down specification on design, material construction, flame stability, operational limits and safety requirements for such appliances but I.S.I. has no powers to ensure compliance. As a result unscrupulous and shoddy businessmen, indifferent to the hazards their products produce, manufacture substandard and lethal appliances.

A number of fatal burn cases have occurred on account of spilling of hot fuel, failure of the airpump, fuel creep at soldered points, overheating and bursting of stove oil tanks and other forms of defective workmanship.

Like other developed countries, it should be possible to ensure manufacture of standard appliances according to strict specifications, by passing suitable legislation.

In a country like ours, where the quantum of public consciousness and education is undeniably low, compliance of these social changes have to be necessarily enforced by law.

The stove presently in the market, being on a tripod base is inevitably unstable. A new and safer type of stove has been designed and recommended by Burns Association of India which is more stable, has a wider base and a lower centre of gravity, and its fuel tank away from the burner.

Gas burners

The practice of cooking by gas is comparatively new in India and other tropical developing countries and like all new innovations, has brought in its wake plenty of hazards. Ignorance of its use, ignorance of dangers of leaking gas, its extreme inflammability extracts its tolls

regularly in the shape of severe burns, sometimes fatal.

Before installation, its precise method of use, its dangers should be explained to the actual users. Changing of cylinders, regular and periodic inspection of washers, tubes and joints by qualified mechanics should be insisted upon.

No child or inexperienced person should ever be allowed to operate gas installations.

Ladies should refrain from wearing sarees or dresses made with man-made material while cooking. The practice of using a saree, dupatta or 'Jharans' to lift cooking vessels is dangerous and should be totally eschewed.

Bursting of sulphuric acid jars and leakage of steam from pipes have been responsible for the majority of industrial burns. Both types of accidents can be readily prevented by simple improvement in the methods of conveyance of acid jars and proper lagging of pipes. This can be achieved creating awareness of the problem among the industrialists, workers, as well as the factory inspectors.

Over 30 per cent of domestic burns can be ascribed to cooking at floor level. The majority of these can be prevented by cooking on a raised platform and utilizing the space beneath it for storage. While it may not be possible to construct raised platforms in the single room tenements occupied by low-income groups, it should be possible to encourage the housewife to store hot food and liquids at a height, out of reach of young children. New tenements should be provided with a built-in platform as part of the primary construction, if necessary with the help of legislation.

Public education by all available channels of publicity, such as Press, hoardings, radio and films necessary to increase the public awareness of the danger of burns accidents and their prevention. A comprehensive programme for the prevention of burns needs to be undertaken on a nationwide basis.

There is also an urgent need for improvement in first aid, transport and hospital care of major burns injuries. It has been shown that the present facilities are totally inadequate. There is a need for training of doctors, nurses and ancillary workers in the care of burns. Special units for the treatment of burns should be established in hospitals receiving a large number of such accidents. Only by such specialized attention can there be an improvement in the general standard of the care of burns injuries. This would also result in financial saving due to a reduction in the period of hospitalization as a result of decrease in infection, early and extensive skin grafting, and prevention of contractures.

A survey of 'Burns Accidents in the City of Bombay' was undertaken by P.M. Somaya under the research project on 'Rehablitation in Burns' with a grant from the Vocational Rehabilitation Administration under the guidance of Dr. N.H. Antia, F.R.C.S,, Tata Department of Plastic Surgery, Bombay.

I feel that such surveys should be carried out in all big cities and which may be financially assisted by governments, corporations or other private agencies.

Money spent on nation wide public relations by public lectures, showing lantern slides and films and kindling national awareness of the burns problem will be money spent on a good cause.

The formation of a National Association of Burns is a step on right lines.

Recommendations :

1. An all out effort has to be made to educate public opinion and to develop "Burns Consciousness" This may be done by establishing special "Burns Centres" throughout the country; one of its functions would be to train health visitors and social workers and arrange for public lectures and audiovisual demonstrations.

2. Children should not be allowed to go near open fires. It should be the legal onus of parents and other elders incharge to see that the children under their charge are not allowed near open fires. They should be held guilty of criminal negligence of children and if necessary our law of the land to be suitably amended with regard to above.

3. It should be prohibted for children to use garments of man-made fibres.

Women and men who have to work near fires should be advised not to wear clothings of man-made fibres.

This could be achieved by public education by audiovisual aids and by showing the hazards in short films, while screening films in cinema houses.

4. Efforts to be made to develop cheap and economical fire proof material for house building specially in villages. Here is an instance, where Industry can cooperate with health authorities to their mutual benefits.

5. Potential hazards of electricity to be brought to the notice of all users of electricity by public education.

6. Rigid specifications are to be insisted for manufacture of pressure stoves by passing suitable legislation as is the case in most developed countries.

7. Proper use of gas burners and their potential hazards to be explained to all users of gas.

8. Cooking at floor level should be forbidden and Municipal laws should insist a high platform for cooking, when passing house plans.

It is only by constant vigil and sustained public education, that most of the cases of burns could be prevented.

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