

## CHANGING PATTERN OF CHILDHOOD POISONING (1970-1989): EXPERIENCE OF A LARGE NORTH INDIAN HOSPITAL

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### ABSTRACT

*The epidemiology of acute poisoning in children aged 0-15 years hospitalized between 1970-1989 was retrospectively investigated. Two hundred and seventeen children were admitted during this period with 134 in 1980-1989 vs, 83 in 1970-1979. Two distinct patterns were observed : accidental poisoning in under 11's and adult pattern and self poisoning in children over 11 s. More children belonged to urban areas (72.3%) as compared to rural areas. In both decades more than half of children belonged to middle income group followed by lower income group and least to upper income group. The overall mortality was low (12.5%), with majority of deaths (78%) occurring in older children. The incidence of kerosene ingestion was noticed to have dropped by more than half between 1980-1989 as compared to 1970-1979 (14.9% vs 42%). The study highlights the unacceptable high rate of preventable accidental poisoning in young children and suicide and parasuicide in older children (11-15 years age group).*

**Key words:** Poisoning, Accidental, Suicidal.

Acute poisoning in children is an important pediatric emergency and is a world-wide problem. It has been the subject of considerable study in the past decade in Europe(1,2), the United States of America(3), Australia(4), and South Africa(5) and has shown an increasing incidence as well as change in pattern. The causes and types of poisons vary in different parts of the world depending on accessibility of poisoning to children which depends upon factors such as demography, socio-economic status, education, local beliefs and customs. Though poisoning in children below 5 years age tends to be accidental especially in the 18 months to 3 years olds, it is more often deliberate self poisoning in older children(6). It can also occur following accidental administration of overdoses of therapeutic drugs by parents or pharmacists(2). Rarely it can be caused by deliberate administration of poisoning by parents as a form of child abuse(7).

According to WHO(7), mortality due to poisoning in children upto 4 years age varies between 0.3 to 7.0 per 100,000 population in various countries. However, no such information is available from India though in hospitalized children(8-19) accidental poisoning accounts for 0.68 to 7.6% of admissions in

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*Received for publication: July 11, 1994;*

*Accepted: October 4, 1994*

a few reports. Although retrospective analysis of admitted children below 12 years of age between 1970-1979 has been published(8), the objective of the present study was to retrospectively analyze admitted children between 1980-1989 and compare with 1970-1979 to determine incidence and change in pattern, if any.

### Material and Methods

Hospital records of all children upto 15 years age who were admitted between 1970-1989 with diagnosis of acute poisoning formed the study material for this retrospective analysis. The records of those children who had food poisoning, toxic or idiosyncratic reaction to prescribed drugs and snakebites were excluded from analysis. The analysis focussed on age, sex, type of poisoning, agent involved, demography, time interval between ingestion and arrival to hospital, socio-economic status and outcome.

### Results

*Age and Sex:* The mean ( $\pm$  SD) age was  $6.69 \pm 5.4$  years (range 1/365-15 years). One hundred and thirty children were between the 0-5 years age, 25 between 6-10 years and 62 between 11-15 years of age. Boys outnumbered girls (146vs71).

*Socio-economic Status:* We arbitrarily divided them in three groups depending on parental income. Between 1970-1979 the lower income group had monthly income <500 rupees, middle ranging between 500-1500 rupees and upper >1500 rupees. These were revised in 1980-1989 to lower as <1000 rupees, middle 1000-3000 rupees and upper

>3000 rupees, respectively. Between 1970-1979, 29 children belonged to lower income group, 50 to middle income group whereas the corresponding figures in 1980-1989, were 40 and 92, respectively. Only 3 children belonged to upper income group and in 3 the exact socio-economic status could not be determined.

*Time Interval Between Ingestion and Admission to Hospital:* The mean time interval was 6.77 hours (range 15 min to 72 hours). Children from urban areas were brought to hospital earlier than from rural areas (mean 4.27 h vs 12.33 h). Similarly children belonging to higher income groups had significantly shorter time lapse. However, there was no difference in time interval between those who survived and those who died.

*Type of Poisoning:* In 164 children, poisoning was accidental whereas in 50 it was suicidal and in 3 homicidal (*Table I*). The various toxic agents involved and their mortality are shown in *Table II*. Routine household items accounted for 27.6% cases with kerosene being the commonest agent. Chemicals, pesticides and fumigants were involved in 35.5% cases. Of these aluminium phosphide (13.3%) and organophosphorus compounds (10.1%) were the most commonly involved agents. Therapeutic drugs were responsible for 25.8% and opium given to children with diarrhea below 1 year age was responsible for 4.1%. Poisonous seeds (dhatura) and mushrooms were responsible for 3.2% patients and in 3.2% agent remained undetermined.

*Mortality:* There were 27 deaths.

**TABLE I-Distribution of 217 Children Depending on Age and Type of Poisoning**

Age (years)	Accidental	Suicidal	Homicidal	Total	Percentage
<1	24	0	0	24	11.05
1	40	0	0	40	18.43
2	30	0	0	30	13.82
3	15	0	0	15	6.91
4	13	0	0	13	5.99
5	8	0	0	8	3.68
6-10	22	0	3	25	11.52
11-15	12	50	0	62	28.57
Total	164	50	3	217	100.00

**TABLE II- Various Toxic Agents and Their Mortality Rate**

Toxic agent	No. of patients	Percentage	Deaths	Percentage
Kerosene oil	55	25.34	1	0.4 6
Aluminium phosphide	29	13.36	17	7.8 3
Barbiturates	26	11.98	0	0
OPC compounds	22	10.13	1	0.4 6
Phenothiazines	13	5.99	0	0
Opium	9	4.14	0	0
Corrosive acid	8	3.68	4	1.8 4
Corrosive alkali	4	1.84	0	0
Copper sulphate	7	3.22	1	0.4 6
Miscellaneous*	39	17.05	3	1.3 8
Total	217	100	27	12.44

\*Methanol = 1#, Gasoline = 1, Dilantin = 4, Mushroom = 5, Iron = 6, Diazepam = 2, Codeine = 1, Ethanol = 3 [1#], Dhatura = 2, Belladonna = 3, Phenol = 1, Mercury = 1, Eucalyptus oil = 1, Vitamin D = 1, Naphthalene = 1, Organochlorine = 1, Zince phosphide = 2 [1#], Liquid ammonia = 1. # = died.

Most of these were in older children who had consumed aluminium phosphide (58.6%). In younger children

fatalities were due to corrosive acid (n=4), kerosene (n=1), dhatura (n=1), ethanol (n=1), and methanol (n=1)

ingested accidentally. In one child the agent remained undetermined.

*Demography:* More children belonged to urban (n=157) than to rural habitat (n=60).

### Discussion

The poisoning in childhood constituted 19.5% of all poisoning cases admitted in this hospital between 1970-1989 and accounted for <1% of all pediatric admissions below 12 years age. This low incidence could be because our hospital is a referral centre- and only serious cases get admitted and also because cases of allergic reaction to drugs, drug toxicity and snake bites were excluded from analysis.

In contrast to adults where accidental poisoning constituted 26%, it accounted for 78% of all poisoning admissions in children. Majority of them (79%) belonged to 0-5 years age group. Boys outnumbered girls at a ratio of 2.05:1.0. The high risk children are typically independent, active, restless and more often boys(20). Children between 1-3 years age are most vulnerable to accidents as they are mobile, inquisitive, and cannot differentiate between harmful and harmless things. In our study they constituted 1/3rd of all cases which is comparable to other reports(2,8,20).

Twenty five children in the age group of 6-10 years were admitted. Children in this age group have better understanding of dangers associated with drugs and chemicals and also they spend more time outside home. The pattern observed in our study conforms to that observed by others(21).

In 11-15 years age group 80% (50/62) were cases of deliberate self poisoning (DSP) with a pattern similar to that of adults. A similar pattern has also been observed by others(21-24). DSP can be suicidal or just an adolescent cry for help. Reports on DSP are scanty(7,25,26). The possible risk factors are: stress of school work, bullying at school, failure at school, failure in love and conflicts with parents. In our study, 8 suicides occurred following fight with a parent and in 2 following fight with a sibling. Failure in examination, love affair, chronic illness and poverty accounted for one suicide each. In 37 cases, the cause could not be determined.

Thus the present study brings out two distinct patterns of poisoning: accidental in under 11's and adult pattern and DSP in children over 11 years age.

Majority of poisoning were due to household products. Kerosene which is used -as cheap cooking fuel in urban households and for lighting in rural areas accounted for 25.34% cases. However, its incidence dropped by half in 1980-1989 as compared to 1970-1979. This could be due to increasing use of liquefied petroleum gas for cooking in urban households and better availability of electricity in rural areas.

Therapeutic drugs accounted for 21.8% cases. Barbiturate and dilantin overdose occurred mostly in epileptic children or in those children belonging to families where at least one family member was epileptic. Phenothiazine overdose was encountered in young children with vomiting who had been administered a dose higher than

indicated. Opium overdose mostly occurred in children with diarrhea belonging to rural households where opium is still used by many to reduce frequency of stools.

Though overall mortality was low (12.5%), it occurred mostly in older school going children between 11-15 years age and highest mortality was due to aluminium phosphide ingestion. In younger children mortality was low (7/27) as they generally consume one mouthful of liquid poison or make a small bite of toxic agent.

There was marked difference in incidence of poisoning in children belonging to the lower and middle income group as compared to those belonging to higher income group (211 vs 3). This could be due to better living environment and greater awareness of hazards in later group. Majority of children came from urban areas. This could be because of transport difficulties in rural areas with majority of these children being treated at rural dispensaries or district hospitals and only more serious cases reaching at our hospital. ,

The present study demonstrates the unacceptably high rate of accidental poisoning in young children and also highlights poisoning due to self intent in older children. These can be reduced by improving living conditions, use of child resistant containers for drugs(27), safer storage of chemicals and kerosene in household and reducing stress at school. Even though our study cannot give complete pattern of poisoning in community as being based on hospital admissions, it points towards trends. There is urgent need for community

surveys to find out causes and nature of acute poisoning in children and to design appropriate health education programme for prevention of acute poisoning both accidental and suicidal to general public and in schools.

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