ORIGINAL ARTICLE

Circumstances Surrounding Accidental Poisoning in Children

B H O Azizi, MRCP*
H I Zulkifli, M Med*
M S Kassim, FRCP**
* *Department of Paediatrics, Faculty of Medicine, Universiti Kebangsaan Malaysia Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur*
** *Jabatan Kanak-Kanak, Institut Pediatrik, Hospital Kuala Lumpur, Jalan Pahang, 50586 Kuala Lumpur*

Summary

Circumstances surrounding accidental ingestion of poisons were investigated in families of 70 hospitalised children. Indian children were more likely to be hospitalised for poisoning. Poor safety measures directly contributed to poisoning incidents. Poisons had not been stored safely and only in 12.9 per cent of families were the poisons allegedly kept in cupboards. Kerosene had been ingested from soft drink containers in 70 per cent of instances. Medications had been taken mainly from plastic envelopes (57.9%) or bottles (31.6%).

Safety practices in the homes of cases and 140 controls were compared. As a whole parents of victims had poor safety practices when compared with parents of controls.

Poisoning incidents were discovered by mothers in 75.0 per cent of the cases. Vomiting was induced by parents in 32.3 per cent of cases involving medications and non-volatile items, and in 41.6 per cent of kerosene ingestions. Before hospitalisation 59.4 per cent were brought to general practitioners and 22.7 per cent to government clinics. Mothers were the main attendants when children were brought for medical care.

This study highlights the need for measures to prevent childhood poisoning and reduce its morbidity. Household products and medications should be made safer to children through improved packaging, prescribing instructions and education. Safety and first aid education may be directed towards parents, particularly mothers, through the media and health facilities.

Key Words: Poisoning, Children, Safety practices, Attendants

Introduction

Accidental poisoning is an important cause of morbidity in children. Although most cases are mild, mortality occurs when the poisoning involves highly toxic substances. Hospitalisation of victims results in emotional distress and increased economic burden to the families and the community. Preventive efforts need to be intensified particularly in developing countries where health care facilities have already been overburdened by other problems.

In planning preventive measures, knowledge of the epidemiology of poisoning is important. In developing countries household products, such as kerosene and detergents, are the most commonly implicated items, but medications are becoming more important[1,2]. Most poisoning incidents involve children in the lower socio-economic group indicating that living standards have a major influence on the incidence. Lack of living space and household storage facilities, the need to use kerosene as a cheap cooking fuel and the increasing availability of modern medications combine to increase the risk of poisoning in young children. Psychosocial, educational, cultural and ethnic factors may contribute as well[3, 4, 5, 6, 7].

To further understand factors responsible for childhood poisoning we performed a hospital-based study to examine the socio-cultural and environmental risk factors for accidental poisoning. This paper presents results pertaining to safety practices involving household products and medications in families of poisoning victims as well as the immediate care given by adults to victims. A case control analysis of risk factors has been reported elsewhere[8].

Methods

Mothers of 70 children below the age of eight years admitted for accidental ingestion of poisons to the Paediatric Department of the Universiti Kebangsaan Malaysia at the Kuala Lumpur General Hospital were interviewed by two trained interviewers using a standard questionnaire. The cases consisted of 45 boys and 25 girls. Most of the children were less than three years of age, the modal age being one year. There were 31 Malays (44.0%), six Chinese (8.6%), 32 Indians (46.0%) and one Indonesian. The children had ingested kerosene (36 cases), medications (19 cases), insecticides (eight cases) and other household items (seven cases). There was no fatality. In addition to personal and demographic data the questionnaire was designed to collect data on safety practices involving medications and household products and the events before and after the discovery of poisoning. For comparison, children hospitalised for other acute illnesses during the same week as the subjects were recruited as controls. They were matched for age with the cases and had no previous history of accidental poisoning. For each case two control children were selected and their mothers were interviewed in the same manner as those of cases.

Analysis of data was performed using SAS Version 5 statistical package. Statistical analysis was performed using the Chi-square test or the two-tail Fisher exact test.

Results

Patient characteristics

Table I shows the demographic and social characteristics of cases and controls. There were no differences between the two groups with regard to age, sex, paternal education and family income. However, there were more Indian children in the poisoning group than in controls ($p < 0.001$).

Safety practices

Poisons were easily accessible to the victims. Only in four cases (5.7%) were the poisons kept in allegedly locked cupboards and a further five (7.2%) in unlocked cupboards. In the majority, poisons were kept on top of cupboards and, in the case of household items, on the floor of the kitchen or other parts of the house. Of the 19 cases of medication ingestion, parents reported that the medications were in child resistant containers in two cases (10.5%), bottles in six cases (31.6%) and plastic envelopes in 11 cases (57.9%).

Table I
Characteristics of case and control children

Variable	Prevalence (%) Cases (n = 70)	Controls (n = 140)	p
Age < 2 years	48.7	45.7	0.696
Male	64.3	64.3	1.000
Indian race	45.7	18.6	<0.001
Low paternal education (≤ 6 years)	21.4	15.7	0.306
Family income < MR300	14.3	10.0	0.357

Table II
Where medications were kept in the homes of case and control children

	% positive responses Cases (n = 70)	Controls (n = 140)	p
In locked cupboards	18.8	13.8	NS
In unlocked cupboards	4.4	5.1	NS
In refrigerators	29.0	41.3	NS
On top of cupboards	33.3	25.4	NS
Elsewhere	14.5	14.4	NS

NS = not significant

Kerosene was ingested from soft drink containers in all cases.

Since medications and kerosene were the two most important items in the poisoning incidents, safety practices with respect to these items among families of victims were compared with those of control families (Table II and Table III). Families of victims were more likely to leave medications in open places such as on top of cupboards and less likely to place them in refrigerators. However, these differences were not statistically significant.

Families of cases were more likely to use kerosene for fuel (56.5% vs 31.2%, p = 0.001). Among users of kerosene, they were also more likely to keep kerosene in soft drink containers and less likely to use other containers such as cans. The majority of both groups stored the kerosene containers on the kitchen floor. However, families of victims were less likely to keep their kerosene containers at higher places out of reach of children and more likely to leave them in open spaces outside the house or under the bed.

Care of victims

Mothers discovered the poisoning incidents in 51 (75.0%) cases. Relatives, baby sitters and others were the other adults first on the scene. Table IV shows the immediate actions taken by adult attendants. Vomiting was induced in 32.3 per cent of the cases involving medications, insecticides and non-volatile household items. Vomiting was also induced in 41.6 per cent of the children who ingested kerosene. Washing the mouth and giving the victim a drink were the other immediate actions taken.

Patients were taken for further medical care by both parents (41.4%), mothers alone (47.1%) or others (11.5%). Initial medical attention was obtained at general practitioners' clinics in 59.4 per cent of cases and government clinics in 22.7 per cent before the children were taken to this hospital. None of the children were taken to see traditional medical practitioners. The majority of children were admitted within three hours of the incident, the median time before hospitalisation being one and a half hours.

Discussion

Accidental poisoning is an important cause for hospitalisation in urban Malaysian children[2]. We reported earlier that Indian children were at greatest risk for poisoning and have now confirmed this finding[8]. There is no immediate explanation for the observed ethnic preponderance. Detailed analysis of risk factors indicated that, in addition to ethnicity, young parents (either parent younger than 21 years) and relatively short duration of residence at the present address (less than one year) increased the risk for poisoning. These findings imply that environmental, educational and socio-cultural factors are important in poisoning. Such factors act in complex ways to allow access to the potential poisons by children.

Table III
How kerosene was kept in homes of case and control children where kerosene was used as fuel

	% positive responses		
	Cases (n = 43)	Controls (n = 44)	p
CONTAINERS			
Soft drink bottles	72.1	36.4	<0.001
Cans	23.3	52.3	0.005
Others	4.6	11.3	NS
LOCATION			
On kitchen floor	60.5	58.1	NS
In cupboards	0	2.3	NS
At high places	7.0	27.9	0.011
At other open spaces	32.5	11.7	0.019

NS = not significant

Table IV
Actions taken by parents/guardians on discovery of poisoning according to type of poison

Action	% positive responses	
	Medications and others*	Kerosene
Induce vomiting (a)	8.8	19.4
Wash mouth (b)	14.7	8.3
Give a drink (c)	11.8	16.7
b and c	11.8	16.7
a, b and c	23.5	22.2
No action	29.4	16.7

** insecticides and non-volatile household items*

The likelihood of poisoning is increased when potential poisons are easily available and rendered more unsafe by poor attitudes and practices in the household. Among our children, household items, particularly kerosene, are the main agents involved. Kerosene is still used as cooking fuel by many urban dwellers with lower incomes. Its packaging and storage in lower income urban homes makes it an easy target for unsuspecting children and occasionally adults. The ready availability of medications in the community has not been paralleled by improved safety measures. The increasing involvement of medications in childhood poisoning is a cause for concern[2].

This study confirms the view that product factors are important in the causation of poisoning. Medications are generally not safely packed. The commonly used plastic envelopes provides easy access to potentially dangerous drugs. The risk is aggravated when parents lack awareness of safety or simply when the lower income household does not have proper storage space. The study found that very few parents locked up their medications and a high proportion leave them in open spaces. Refrigerators were a preferred storage place of medications in control families and this could have accorded some protection against poisoning. Although this finding was not statistically significant, placing medications in the upper and inner parts of a refrigerator could possibly make them more inaccessible to young children. This practice is dependent on the availability of refrigerators in the households and since we were unable to determine this in our study, future research should address this issue.

With regard to kerosene the safety behaviour of users among families of cases were significantly poorer than that of control families who also used kerosene. Significantly, more of index families kept their kerosene in soft drink containers and fewer in cans. Also, fewer of them attempted to store kerosene in places out of reach of children.

These findings indicate that in addition to unsafe presentation of products, poor safety practices in the household increase the risk for accidental poisoning. Safety awareness and practices may be influenced by environmental, financial, educational and socio-cultural factors[8]. Families at risk

need to be identified and interventional measures may then be focused on them. At the same time measures to improve packaging and presentation of medications and kerosene need to be considered. Storage instructions should be included on packages and continuing education by health professionals is essential. Passive preventive measures through legislation of product safety standards successfully reduced morbidity due to kerosene ingestion in Australia, and aspirin poisoning in the United States and the United Kingdom[9, 10, 11].

Most of the accidental poisoning incidents occurred when mothers were at home. Mothers were responsible for immediate care and, with the help of fathers in some cases, in the transfer of the victims to clinics and hospital. In general the response of adults was prompt but might not be appropriate as indicated by the induction of vomiting in many of the cases involving kerosene and in fewer of the cases not involving hydrocarbons. Therefore, educational measures may have to include components of secondary prevention such as immediate first aid measures. Mothers may need to be targeted for such purposes.

In summary, preventive measures in childhood poisoning should take into account families at risk, the safety aspects of product presentation, the safety awareness and behaviour of families at risk and knowledge of immediate care to victims. The prevention of childhood poisoning will take greater significance with further decline of hospitalisation due to infectious diseases in our country.

Acknowledgements

This study was part of a research project on children's health supported by research grant IRPA 3-07-03-04. We thank our paediatric colleagues for allowing us to study their patients.

References

1. Mahdi AH, Taha SA, Al Rifai MR. Epidemiology of accidental home poisoning in Riyadh (Saudi Arabia). J Epidemiol Community Health 1982;36 : 31-4.

2. Azizi BHO, Low SM, Nunis GV. Acute poisoning in childhood : a review of admissions to the UKM paediatric unit. Malaysian J Child Health 1988;1 : 36-41.

3. Sibert R. Stress in families of children who have ingested poisons. Br Med J 1975;3 : 87-9.

4. Eriksonn M, Larson G, Windblath B, Zetterstrom R. Accidental poisoning in preschool children in the Stockholm area. Acta Paediatr Scand 1975;275 (Suppl) : 96-101.

5. Sobel R. The psychiatric implications of accidental poisoning in childhood. Pediatr Clin North Am 1970; 17 : 653-85.

6. Sibert JR, Newcombe RG. Accidental ingestion of poisons and child personality. Postgrad Med J 1977; 53 : 254-6.

7. Nyman G. Infant temperament, childhood accidents and hospitalization. Clin Pediatr 1987;26 : 398-404.

8. Azizi BHO, Zulkifli HI, Kasim MS. Risk factors for accidental poisoning in urban Malaysian children. Ann Trop Paediatr 1993;13 : 183-8.

9. Pearn J, Nixon J, Ansford A, Corocran C. Accidental poisoning in childhood : five year urban population study with 15 years analysis of fatality. Br Med J 1984; 288 : 44-6.

10. Walton WW. An evaluation of the poison packaging act. Pediatrics 1982;69 : 362-370.

11. Sibert JR, Craft AW, Jackson RH. Child resistant packaging and accidental child poisoning. Lancet 1977; ii : 289-90.