



Unintentional Poisoning in Children Admitted to Tabriz Pediatric Hospital

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ABSTRACT

Background: Poisoning is a major cause of morbidity and mortality in children. Medicines and household cleaning products are responsible for the majority of cases. The aim of the present study is to analyze poisoning cases presenting to Tabriz children hospital.

Methods: The present descriptive cross-sectional study, of all poisoning cases presenting to the children hospital during January 2014 to July 2015 and children from one to twelve years of age were included. The data was collected through referring to all parents of the children and using a questionnaire that included demographic and poisoning characteristic information. The demographic features included gender, age, place of residency and type of poisons was investigated. Also parents were interviewed by using structured questionnaire containing information on socio-demographic factors, parental smoking, parental education level, child's behavior, and storage practices of hazardous substances of caregivers inside homes.

Results: Children poisoning was common among low educated family with parental smoker and was higher for boys (59%) than girls (41%). However, there was no mortality. Poisoning was unintentional and most of the poisoned cases, 63 (61.7%) of the children involved were below the age of four years i.e., between 1 and 3 years of age. Pharmaceutical products were the commonest agents accounting for 50% of all cases; followed by pesticides (15.7%), poisonous mushrooms (13.7%), Petroleum products (10.8%) and household detergents (9.8%).

Conclusion: Improvement in the socioeconomic status of parents and health education on proper/ safe storage of medicines, chemicals and household detergents will help in reducing the incidence of poisoning.

Introduction

Accidental injuries and poisoning are one of the most important cause of deaths among children over the world today.^{1,2} Poisonings are responsible for about 5% of all injury deaths in developing countries.³ However, the pattern of poisonings has changed during the past years.^{4,5} This change follows due to new poisonous products, higher accessibility and exposure of children and the increasing of new consumer products.⁴ Poisoning in toddlers and infants is almost unintentional, secondary to their explorative behavior and the pleasure of putting objects in their mouth. Although unintentional pediatric exposures to poisonous substances often present as an emergency, it is important to realize that approximately 97 % of such cases in the industrialized world have no or limited clinical effects⁶ and the child has usually a good

outcome with minimal intervention. In contrast, in the developing world, severe injury due to unintentional poisoning is a frequent occurrence in children and there are many difficulties to take care of the victims.^{7,8}

The most common poisons vary according to age, country, and whether the country is classified as 'developed' or 'developing'.⁹ Contrary to the situation in developed countries, kerosene is a source of poisoning in developing countries as a result of inadequate control of access to the substance. Drugs are another source of poisoning and the control of the production of these drugs is usually grossly inadequate.¹⁰ However, unintentional ingestion of a household cleaning product are the most common cause of pediatric poisonings.¹¹ Although the mortality rate for childhood poisoning is low, the morbidity and the high cost involved cannot be ignored. Public

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awareness/ education programs and also enforcing packaging regulations are essentials in reducing the incidence of unintentional ingestion of regulated products.

Determination more specifically the age period of highest risk for i.e. aged 1-3 years and the type of substances involved would further perform poisoning prevention. However, to date, no descriptive cross-sectional study has been conducted that investigates poisoning by 1- 12 age groups. Also to investigate the type of substance, the effects of sex, socio-economic status and remoteness of residence would result in a more accurate picture of the true unintentional poisoning risk for different age intervals. This study addresses the knowledge gap by using age as a proxy for development to predict the type of substance causing the poisoning. So, the aim of the current study was to describe the characteristics of unintentional poisoning in children in Tabriz pediatric hospital.

Materials and Methods

This research is a cross-sectional study included all children poisoning cases admitted to the pediatric hospital, Tabriz University of medical sciences during the period of Jan 2014 – July 2015. As an academic the hospital, it receives patient from an extensive regions. The parents of 102 children cases of unintentional poisoning with different agents and who fulfilled the inclusion as well as exclusion criteria were interviewed. The inclusion criteria was included: blew 12 year of age, unintentional poisoning, parental desire to take part in the study as well as their permission for children participation in research, signed consent form by child's parent. The exclusion Criteria i.e. intentional poisoning, withdrawal of parents from the study.

An interviewed questionnaire was completed for every parent. It covered demographic, toxic agent, behavioral, and risk factors of accidental poisonings (prepared by researcher). Toxic agents were classified as medical drugs, Poisonous mushroom, pesticides, cleaning agent, Petroleum products. To determine the validity of questionnaire was submitted to the 10 members of Medical Sciences Department of pharmacology faculty to examine and confirm the questions of the tools in terms of simplicity, clarity, and relevance. After their review, necessary amendments were performed in the phrases of the questionnaire. To evaluate the reliability of the questionnaire the internal consistency reliability method was used. Cronbach's alpha coefficient was calculated 0.7. The collected data was analyzed by using SPSS-13, descriptive statistics. The confounding variables such as parental education (educated or else), current parental smoking (yes or no), child's behavior, and storage practices of hazardous substances of caregivers inside homes.

Results

In this study 102 poisoned children aged 1-12 years were studied. Table 1 shows Demographic

Characteristics of the study participants by gender, age, residents and parental education and smoking, season of poisoning and storage status. Boys were more likely poisoned than girls (65.7% vs. 34.3%, $P < 0.001$), and about two-thirds of children were toddlers aged 1-3 years. The proportion of children poisoning was significantly high in urban areas compared to rural areas (58.8% vs. 41.2%). We also found an association for the variable "parent's education," as a risk factor. The poisoning was higher among children of less-educated parents than in children of more- educated once, also significantly higher during the season of autumn; parental smoking and drug storage were risk factors.

Table 2 shows the distribution of childhood poisoning by type of poisoning agents and age. Poisoning was unintentional and most of the poisoned cases, 63 (61.7%) of the children involved were below the age of four years i.e., between 1 and 3 years of age. Pharmaceutical products were commonest agents accounting for 50% of all cases; followed by pesticides (17%), poisonous mushrooms (11.7%), Petroleum products (11%) and household detergents (4%).

As shown in Table 3, risk of hospitalization due to unintentional drug poisoning significantly higher among children with illiterate parents compared to those with under diploma and highest parental education 58.8% , 23.33% and 17.45% respectively. Also poisoning with poisonous mushroom was among children with parents under diploma compared to those with higher educated 85.72% vs 14.27, however poisoning was not occur among illiterates families. Similarly pesticides poisoning was among children with parents under diploma and higher educated 56.25% vs 43.75%. Detergents were commonest agents accounting for 90% of poisoning only among children of higher educated family. In these connection petroleum products poisoning was seen only among children with illiterate as well as under diploma educated parents.

In Table 4, when the seasonal distribution pattern of poisonings was considered, an excess of poisoning in spring (42% of all poisonings) was observed. During summer the number of poisoning was 29 and Frequency of poisonings in other seasons was approximately similar (winter and autumn as 17 and 14, 17.34%, and 13.72%) of all patients respectively. The frequency of poisoning in spring was significantly higher than the other seasons.

Table 5 shows that the drug poisoning was significantly high in urban areas 72.54% as compared to rural areas 27.45% and poisonous mushrooms was significantly higher 85.71% in rural against 14.28% urban areas. However, pesticides poisoning most likely and significantly occurred in cities 75% as compared 25% in villages. The prevalence of detergents poisoning among the urban children was the highest (90%) and all of the Petroleum products children poisoning cases occurred in rural areas.

Table 1. Demographic characteristics of the study participants.

General Characteristics		Number	Percent
Sex	Male	67	65.7
	Female	35	34.3
Age	1-3	63	61.8
	3-6	24	23.5
	6-12	15	14.7
Residents	Urban	60	58.8
	Rural	42	41.2
Parenteral education	Illiterate	34	33.3
	Under diploma	40	39.2
	Diploma and higher	28	27.4
Season of poisoning	Spring	42	41.2
	Summer	29	28.4
	Fall	60	58.8
	Winter	14	13.7
Parenteral smoking	Yes	90	88.2
	No	12	11.8
Storage of the drugs	Unsafe place	85	83.3
	Safe place	17	16.4

Table 2. Distribution of childhood poisoning by type of poisoning agent and age.

Type of Poisoning Agent	Age			Total
	1-3 years	3-6 years	6-12 years	
Medication	51	0	0	51(50%)
Poisonous mushroom	12	2	0	14(13.7%)
pesticides	0	16	0	16(15.7%)
House cleaning products	0	6	4	10(9.8%)
Petroleum products	0	0	11	11(10.8%)
Total	63	24	15	102

Table 3. Parents level of education and children poisoning.

Toxicity Factor	Parents level of Education			Total
	Illiterate	Under diploma	Diploma And Higer Educations	
Drug	30(58.8%)	12(23.33%)	9(17.45%)	51
Poisonous mushroom	0	12 (85.72%)	2(14.27)	14
Pesticides	0	9(56.25%)	7(43.75%)	16
Detergents	0	1(10%)	9(90%)	10
Petroleum products	4(36.36%)	6(54.54%)	1(9.1%)	11
Total	34	40	28	102

Table 4. Seasonal distribution of acute poisonings.

Toxicity Factor	Season				Total
	Spring	Summer	Fall	Winter	
drug	23	13	12	3	51
Poisonous Mushroom	1	11	2	0	14
pesticides	8	5	2	1	16
Detergents	10	0	0	0	10
Petroleum products	0	0	1	10	11
Total	42	29	17	14	102

Table 5. Residential distribution of children poisoning.

Toxicity Fact	Residence		Total
	Rural areas	Urban areas	
Drug	14	37	51
Poisonous Mushroom	12(85.71%)	2(14.28%)	14
Pesticides	4(25%)	12(75%)	16
Detergents	1	9(90%)	10
Petroleum products	11(100%)	0	11
Total	42	60	102

Discussion

Causes of childhood poisoning are diverse but some are attributed to inadequate parental supervision and lack of health education or other supervision measurement.¹² Accordingly in this study ingestion was more common in boys while is comparable to other studies which found it also more common in boys.^{13,14} The predominant age was 1 to 3 three years which is the most vulnerable age for accidental poisoning.¹⁵⁻¹⁸ Research has shown that children aged 1-3 years have the highest levels of poisoning risk.¹⁹ In a study by Soori (2001) the results confirmed that boys (65%), and children aged 2-4 years (79%) had more poisoning than others. In 75% of cases, poisonous products were accessible.² Previous studies showed that accidental poisoning in children is related to the life-style of the households and the environmental factors.²⁰⁻²² Therefore, the differences between our findings and others' results might be because of the variations in different communities.

Similar data were found in a study on ingestion of medicines among children, conducted by Béria *et al.*, in which 62% of mothers of children who ingested medicines had 4-10 years of schooling. It is worth mentioning that children have the habit of imitating what adults do. Toxic exposures occur as a result of various factors and understanding these factors and their interrelationships allows a better interpretation of data and more accurate preventive measures.²³

In the present study drugs were responsible for more than half of poisoning cases (51%) between 1-3 years old. In the study conducted by Cheraghali and Taymori (2006) in Golestan province, during 1997 to 2002, from 563 cases of poisoned children, 305 cases were due to drug poisoning. Opium was responsible for 52% of the poisoning cases and 91% of mortality, among drug intoxicated children.²⁴ In another study by Schmetmann *et al.* (2012) the results clearly showed that children aged 24-41 months had significantly higher in risk of medicinal poisoning.²⁵ Most of the poisoning cases in young children are unintentional and in many cases their parents or guardians play a critical role in their intoxication, also it is entirely due to the negligence of their parents or guardians. Prevention of childhood poisoning is often focused on the unintentional ingestion of medicines or non-pharmaceutical household products. Medication is often stored in drawers, cupboards, refrigerators or is left on kitchen benches or shelves, all of which enable

children to gain easy access. In this study Pesticides were the most causes of poisoning In the children between 3-6 years old. In the study by conducted by Ul Hassan *et al.* (2013) the results showed that the most agents commonly ingested by young children include medicines, cleaning substances, hydrocarbons, pesticides and cosmetics.²⁶ Similarly in the study of Presgrave *et al.*, (2008) The products involved were bleach, petroleum derivatives, rodenticides and pesticides. The main causes were products within the children's reach, storage in soft drink bottles, food mixed with rodenticides, incorrect product use, and kitchen utensils used for measured cleaning products.²⁷ We also found an association for the variable "parent's education," reclassified as having studied up to incomplete high school²⁸ and high school up to higher education¹⁰ as a risk factor. Children with less educated, lower income parents and living in overcrowded areas are more predisposed to unintentional poisoning. Unsafe storage of medicines, chemicals and other hazardous substances is one of the leading causes for childhood poisoning.

In our results the most seasons was spring which is consistent with the results of Andyrán and Sarykayalar (2004) that indicated an excess of poisoning in spring (32.7% of all poisonings) was observed.²⁹

Most cases of drug toxicities were seen in urban residents, this is while most cases of mushroom and oil derivations toxicity are seen in rural communities. This is due to easy access of rural residents to above mentioned materials. Accessibility to mushroom is high in villages and considering that urban families tend mostly to use energy resources such as gas and electricity, so children have less access to oil products in urban families. The most important issue in the study was that, generally number of poisoned patients was more in cities compared to villages. This can be due to one of following reasons:

- Toxicity in urban areas is, in fact, more than rural areas which is considered as less important theory.
- Considering research environment which was located at the center of city, it is natural, that most cases of toxicity happened in rural areas are treated in rural centers or town's hospitals due to having not bad general health and then they are referred to the Province capital and this causes bias in statistical results.
- Due to problems of having access and economic issues, rural communities mainly tend to refer their

patients to Health and Treatment Centers.

Conclusion

Hereby, we conclude that lack of safe storage of poison products for about two-thirds of cases in this study would be an essential risk factor for childhood poisoning. As a prevention strategy, parents must ensure that all medicates, chemical households, and toxic products are kept in a safe place out of the reach of children, and teach them how to recognize toxic products. Furthermore, manufactures and traders must by law put certain toxic household products and drugs in child resistant containers, and mark toxic medicines with warning labels or signs. Knowledge of parents and caregivers on the prevention of children poisoning may play an essential role to prevent subsequent injuries. Therefore, it is very important to increase awareness/knowledge of parents through mass media campaign about the unwanted and serious effects of improper use of medicine to reduce the incidence of poisoning among children.

Conflict of interests

The authors claim that there is no conflict of interest.

References

- Avery J, Jackson R. Children and their accidents. London: Arnold Edward; 1993.
- Soori H, Naghavi M. Childhood deaths from unintentional injuries in rural areas of Iran. *Inj Prev*. 1998;4(3):222-4. doi:10.1136/ip.4.3.222
- World Health Organisation. World health statistics annual (1995-96). Geneva: WHO; 1996.
- Lamminpaa A, Riihimaki V, Vilkska J. Hospitalisations due to poisonings in Finland. *J Clin Epidemiol*. 1993;46(1):47-55.
- Marchi AG, Messi G, Loschi L. Evaluation of changing patterns in children poisonings and prevention. *Vet Hum Toxicol*. 1991;33(3):244-6.
- Von Mach MA, Habermehl P, Zepp F, Weilemann LS. Drug poisonings in childhood at a regional poisons unit. *Klin Padiatr*. 2006;218(1):31-3.
- Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Fazlur Rahman AKM, et al. World Report on Child Injury Prevention. Geneva: World Health Organization; 2008. p. 123-38.
- Mohammadi R, Ekman R, Svanstrom L, Gooya MM. Unintentional home-related injuries in the Islamic Republic of Iran: findings from the first year of a national program. *Public Health*. 2005;119(10):919-24. doi:10.1016/j.puhe.2005.01.012
- Bronstein AC, Spyker DA, Cantilena LR, Green JL, Rumack BH, Griffin SL. Annual report of the American Association of Poison Control Centers. National Poison Data System (NPDS): 26th Annual Report. *Clin Toxicol*. 2009;47(10):911-1084. doi:10.3109/15563650903438566
- United Nations Children's Fund: a league table of child deaths by injuries in rich nations. Innocent Report Card no2. Florence Italy: UNICEF Innocent Research Centre; 2001. doi:10.1136/ip.7.2.166-b
- Bronstein AC, Spyker DA, Cantilena LR, Green J, Rumack BH, Heard SE. 2006 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS). *Clin Toxicol*. 2007;45(8):815-917. doi:10.1080/15563650701754763
- American Academy of Pediatrics. The Injury prevention Programme-Guidelines. National Poison Prevention week March; 1998.
- Korb FA, Young MH. The epidemiology of accidental poisoning in children. *S Afr Med J*. 1985;68(4):225-8.
- Mehta A, Kasla RR, Bavdar SB, Hathi GS, Joshi SY. Acute poisoning in children. *J Ind Med Assoc*. 1996;94(6):219-29.
- Hincal F, Hincal AA, Muftu Y, Sarikayalar F, Ozer Y, Cevik N, et al. Epidemiological aspects of childhood poisoning in Ankara: a 10 year survey. *Hum Toxicol*. 1987;6(2):147-52. doi:10.1177/096032718700600207
- Lifsitz M, Gavrillov V. Acute poisoning in children. *Isr Med Assoc J*. 2000;2(7):504-6.
- Khare M, Bhide M, Ranade A, Jaykar A, Panicker L, Pathekar PN. Poisoning in children: an analysis of 250 cases. *J Postgrad Med*. 1990;36(4):203-6.
- Rfidah EI, Casey PB, Tracey JA, Gill D. Childhood poisoning in Dublin. *Ir Med J*. 1991;84(3):87-9.
- Schmertmann M, Williamson A, Black D, Wilson L. Risk factors for unintentional poisoning in children aged 1-3 years in NSW Australia: a case-control study. *BMC Pediatr*. 2013;13(1):88. doi:10.1186/1471-2431-13-88
- Aziz BH, Zulkifli HI, Kasim MS. Risk factors for unintentional poisoning in urban Malaysian children. *Ann Trop Paediatr*. 1993;13(2):183-8.
- Paritsis N, Pallis D, Deligeorgis D, Doxiadis S, Phylactou C, Vlachonicolis I. An epidemiological study of the factors influencing poisoning in children aged 0-5 years. *Paediatr Perinat Epidemiol*. 1994;8(1):79-89. doi:10.1111/j.1365-3016.1994.tb00437.x
- Towner E, Dowswell T, Jarvis S. Reducing childhood accidents. The effectiveness of health promotion interventions: A literature review. London: Health Education Authority; 1993.
- Béria JU, Victora CG, Barros FC, Teixeira AB, Lombardi C. Epidemiology of drug consumption in children of a urban center of the southern region of Brazil. *Rev Saude Publica*. 1993;27(2):95-104.
- Cheraghali F, Taymori M. Epidemiological study of drug intoxication in children. *Acta Med Iran*. 2006;44(1):37-40.
- Schmertmann M, Williamson A, Black D. Unintentional poisoning in young children: does developmental stage predict the type of substance accessed and ingested? *Child Care Health Dev*.

- 2012;40(1):50-9. doi:10.1111/j.1365-2214.2012.01424.x
26. Ul Hassan O, Qadri H, Mir U, Ahmed B. Unintentional childhood poisoning, epidemiology and strategies for the prevention and policy change in Pakistan. *J Ayub Med Coll Abbottabad*. 2013; 25(3-4):90-3.
27. Presgrave Rde F, Camacho LA, Villas Boas MH. A profile of unintentional poisoning caused by household cleaning products, disinfectants and pesticides. *Cad Saude Publica*. 2008;24(12):2901-8. doi:10.1590/s0102-311x2008001200019
28. Penden M, Mcgee K, Sharma G. The injury chart book: a graphical overview of the global burden of injuries. Geneva: World Health Organization; 2002.
29. Andiran N, Sarikayalar F. Pattern of acute poisonings in childhood in Ankara: what has changed in twenty years? *Turk J Pediatr*. 2004;46:147-52.