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Risk Factors for Acute Accidental Poisoning in Children: A Case Control Study

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ABSTRACT

Background: *Acute accidental poisoning can be defined as taking or being otherwise exposed to a substance or substances injurious to health. Inspite of success of some interventions to prevent acute accidental poisoning in children, toxic ingestions continued to be a common occurrence.*

Objectives: *To find out the risk factors responsible for acute accidental poisoning in children admitted to Child Center Teaching Hospital in Baghdad. Patients and* ***Methods:*** *A case control study was conducted on one hundred and eighty-three cases of acute accidental poisoning admitted to the emergency unit in the Child Center Teaching Hospital in Baghdad and another one hundred and eighty children attended the emergency department for any acute illness other than poisoning as a control group, during period (November – 2022 to February 2023). A special questionnaire was used including : age , sex , residence , mother age ,education and job , family size (sequence of child in family) , place where poisoning occurred , time when poisoning occur , type of poisoning , container of poison (locked or not) , history of poisoning for the same child or other sibling.* ***Results:*** *Hydrocarbons poisoning was the commonest type mainly kerosene (85 case , 46.4 %) followed by drugs poisoning (68 case, 37.15 %) then house hold products (14 case ,7.6 %) , rat killers (11 case , 6.01 %) then insecticides (4 case , 2.18 %) , plant (1 case ,o.5 %) . This study showed sex distribution was similar both in cases and control group with a male: female ratio of 1.26:1Vs 1.1:1 which is statistically not significant (P- value 0.571). The main age was between 1-3 years there was(99 cases 54 %) followed by 3-5 years (46 case, 25.1%).This was statically significant (P- value 0.00001).Urban residence, being from large size family (4-7), being the fifth order child , mother aged between (20 – 25) years and housewives mothers were found to be statistically, significant risk factors (P- value 0.001, 0.0002, 0.00047,0.003 respectively), While mother education found to be not significant (P- value 0.707). History of poison of the same child was 6 cases (3.27%) and in other sibling were 13 cases (6.55%). All families of patients with acute accidental poisoning used inappropriate methods of poison storage and placing.*

Conclusion: *significant risk factors including younger age child, larger family size, younger age mother, early afternoon occurrence of poisoning, non employed mother and history of poisoning in the same family are the common risk factors for acute accidental poisoning.*

Keywords: ***Acute Accidental Poisoning, Children, Risk Factors***

1. INTRODUCTION

Acute poisoning remains a prevalent medical emergency in the pediatric population despite extensive teaching programs and public awareness initiatives to prevent it (1) , According to a survey published by the American Association of Poison Control Centers (AAPCC), children under the age of six account for over half of all poisoning cases. The majority of incidents are inadvertent and could be attributed to young children's tendency to put anything in their mouths (2). This resulted in less adult supervision. Family-based assistance may have been limited as a result of the absence of communication with extended family members. Household incomes decreased as a result of the pandemic's economic effects and its containment measures, These are important risk factors for children's accidental poisoning , There might have been a rise in some forms of poisoning (3). The number of poisoning cases is rising daily as a result of alterations in social behavior and way of life. Most medications and chemicals are now readily available in the community as a result of technological and societal advancements (4) , The development of detrimental effects as a result of exposure to an alien substance or xenobiotic is known as poisoning, Poisoning cases are increasing day after day due to changes in the life style and social behavior. Advanced in the technology and social development have resulted in the availability of drugs and chemical substances in the community (5) , Unintentional poisoning statistics often group young children together but children aged 0–4 years do not constitute a homogenous group in terms of poisoning risk(6), The following are the main causes of unintended injuries: burns, falls, poisoning, and injuries from auto accidents. Road traffic accidents are the primary cause of death for children under the age of 14 years old. Lower respiratory infections are the primary reason for children to report to the emergency room (7) , The awareness about risk factors is of great importance in preventing the acute poisoning (8). Accidental poisoning predominately seen in children under ages of 5years but older children may be involved if they are developmentally delayed. The peak ages between 1-4 years, more boys than girls take poisons accidentally. Many children die from poisoning each year but the number of deaths has fallen over recent years, probably because of better treatment and because of the child resistant container regulator (9). Younger children (under 1 year) were more likely to ingest household and personal care products, with increasing age

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ingestion of medications became more. It was suggested that age related development and its impact on accessibility of products was likely to be the explanation for the relationship between substance and age(10) Kosovain study found that 74.98% of AAP cases where aged between 1-3 years (6) Although Habib from Iraq found predominance the same age group 1-2 years old (50.9%), but the second most common age group was below 1 year (21.8 %) (11). Children may take a variety of substances accidentally, these are conveniently divided into medicines prescribed and non prescribed, household products and plants. The majority of children, who take poisons do not have serious symptoms, may be of low toxicity like oral contraceptive pills, antibiotics. Intermediate toxicity cause symptoms in young children or potential toxicity (12).

Objectives: To find out the correlation of various risk factors (age, geder, residence, mother age, education and job, order of child in the family and family size) with acute accidental poisoning in children admitted to Child Center Teaching Hospital in Baghdad.

2. METHODOLOGY

A case control study was done on one hundred and eighty-three cases of AAP admitted to the emergency unit in the central teaching hospital for children in Baghdad and another one hundred and eighty children attended the emergency department for any acute illness other than poisoning as a control groups over a period of four months from November – 2022 to February 2023. A special questionnaire was used including: age, sex ,residence ,mother age, job and education, family size (number of children in family and sequence of the child in the family), place where poisoning occurred, time when poisoning occurred, type of poisoning , container of poison (locked or not) and period of exposure in cases of poisoning. History was taken from the parents; no toxicological study had been done. Those with food poisoning were excluded from the study. The collected data was analyzed using chi square method. P- value is considered significant if it is less than 0.05 and highly significant if less than 0.001.

3. RESULTS

This study showed no signifciant differences in the sex distribution between cases and control groups, with a male: female ratio of 1.26:1.0 and 1.1:1.0, respectively, (P.value>0.05). The age distribution in AAP child cases ranged between 6 months and 10 years, however, AAP was more frequent in toddler (1– 3 years, 99 case, 54 %) followed by preschool age (3.1-5 years,

46 case, 25.1%) (P. value<0.001). A significant difference was noticed between cases and control regarding residence where most of poisoning cases occur in urban area (171 cases, 93.4 %), (P. value=0.001). The peak incidence of AAP occurred in children belong to mothers aged 20-25 year (75 cases 40.9%), (P. value<0.001). Other finding was the low percentage of cases belong to mothers less than 20 years of age (4.9 %). Regarding mother education, no significant differecne was found between cases and controls. The present study showed significant difference between cases and controls and peak incidence of poisoning occur in children of housewives' mother, (P. value<0.05). Family size found to be important risk factor that the majority of children with AAP belong to family size 4-7 (95cases, 51.9%), (P. value<0.001). The sequence of majority of the children with AAP were fifth and more, (P. value<0.001). The peak incidence of cases was found at 12 – 4 P.M (64cases, 34.9%) and followed by time between 8-12 A.M (63 cases, 34.4 %).

Hydrocarbons mainly kerosene constitute the most common poisoning (85 case – 46.4%) followed by drugs then house hold products, rat killers, insecticides, plants in a percentage of 37.15%, 7.6%, 6.01%, 2.18 % respectively as shown (**Table 1**).

The study showed only 6 (3.27%) of children have recurrence of poisoning in the same child and 13 (6.55 %) of poisoning recurred in other sibling while all families of controls deny previous history of poisoning for the child or other sibling, as shown in (**Table 2**). The place where poisoning occurs, this study showed that (51cases, 82.51%) occur at child homes. (22 cases, 12 .02%) occur at relative houses during visit them. 15 cases 5.49% occur in other places as shown in (**Table 3**). Results in (**Table 4**) shows that 134 cases cared by mother and 39 by grandparent, 10 cases by others. All poisoning materials are stored in places other than proper ones. It has been found that those who were poisoned with kerosene cases (66 cases, 46.4%)was drank kerosene that kept in juice or oil bottle sand glasses used for drinking water, tea, pots ,while in (10 cases 5.46%) of containers are open barrels, Only 9 cases(4.91%) kerosene poisoning occurred accidentally by using rubber tubes as transferring kerosene from place to other, imitating parents. No drug was stored in a locked place or child resistant packaging. (64 cases , 94.1%) occurred due to unlocked containers. Majority of cases (35 case, 51.4%) containers put on (**Table 5**), and on low cabinet and 14 cases(20.5%) inside hand bag,

12cases(17.6%) under the pillow and only 3 cases (4.41%) of containers put in closed cabinet. The household products (14 cases, 7.65%). The insecticide were put under or behind furniture in1case (25%), other cases (3 cases, 75%) the insecticide were put in bottles. The rat killing poison (11 cases, 6.01%) was put in a plate under or behind furniture. Plant poisoning (1case, 0.54%) occur during playing in the garden, as shown in (**Table 5**).

Table 1. Type of poisoning among AAP child cases

Rank	Type of poison	No. of cases	%
1	Hydrocarbons	85	46.4
	• Kerosene	81	44.2
	• Gasoline	4	2.18
2	Drugs	68	37.15
3	House hold products	14	7.6
4	Rat killer	11	6.01
5	Organophosphorus insecticides	4	2.18
6	Plant	1	0.54

Table 2. Previous history of poisoning in the same child or other sibling among AAP child cases

Previous history of poisoning	No. of Cases	%
Same child	6	3.28
Other sibling	13	7.10
None	164	89.62
Total	183	100.00

Table 3. Places of poisoning incidents among AAP children

Place of poisoning	No.	%
Child house	151	82.51
Relatives house	22	12.03
Others	10	5.46
Total	183	100.0

Table 4. Distribution of child caregiver during accidental poisoning

Caregiver	**No.**	**%**
Mother	134	73.22
Grandparent	39	21.31
Others	10	5.47
Total	183	100.0

Table 5. The storage place of poisonous material

Type of poisoning and Place of storage	No. of cases	%
Kerosene/ Gasoline	**85**	**46.4**
• Drank from bottles (juice or oil bottles) & water glasses	66	77.6
• Opened barrels	10	11.7
• Imitating parents in transferring kerosene from place to other by rubber tubes	9	10.5
Drugs	**68**	**37.15**
• Accidentally given by mother	4	5.8
• Put in an unlocked container	64	94.1
○ On Table / low cabinet	35	51.4
○ Inside hand bag	14	20.5
○ Under the pillow	12	17.6
○ Closed cabinet	3	4.41
House hold products	**14**	**7.65%**
Organophosphorus	**4**	**2.18**
○ Put under or behind furniture	1	25
○ Put in bottles	3	75
Rat killer / Put in place behind or under furniture	**11**	6.01
Plant/ During playing in the garden	**1**	0.54

4. DISCUSSION

Findings of the present study revealed that ingestion of hydrocarbons, particularly kerosene, was the most common type of poisoning among AAP child cases, contributted for 46.4%, followed by drugs (37.15 %), these findings were close to other studies from Saudi Arabia, Kuwait & Ahwaz (14,15,16). An Iraqi study conducted by Habib K.D. in Baghdad found

hydrocarbon ingestion in 50.9% of AAP cases, which is relatively higher than our reported rate, followed by drugs in 36.3 % of cases (10).This difference could be attributted to the change in the socioeconomic status and lifestyle in different communities. But important point to be aroused that our percentage of kerosene ingestion (46.4%) which is lower than Habib's study in Baghdad (10) may reflect some changes in Baghdadian society, unsafe storage, insufficient supervision, small living space, low socioeconomic status, low maternal education, and a lack of family support are risk factors for children's kerosene oil poisoning (10,13). Home cleaning such as bleach and detergents in this study accounts (14 case ,7.6 %) of the total cases studied and this is agree with study done by Mehmedali et al., (14) in Kosovo in which household products constitute about 6.06% of total cases studied and this much lesser than study done by Habib K.D(10)in which household products constitute 12.7% . this is might related to high use of these substances and its easier availability in each home. In this study it has been found that rat killer poisoning constitute about 6.01 % and this is higher than study that don by Habib K.D. in Baghdad in which the percentage was 2.7%, also higher than result of France study by Berny et al.,(15) as it constitute o.6% of total cases studied. This is attributed to higher use of rat killer in our community. Insecticide poisoning constitute (4 cases ,2.18%) in our study and three of these cases occurred in rural areas and this is attributed to wide use of these substances by farmers and it is easy to be available in most rural households, being stored in empty medicine bottles and this is predisposing young children to accidental poisoning. these results disagree with Shivani et al.,study in which insecticide were the most common cause of poisoning ,This is difference may be attribute to the high percentage of those residing in rural area in the Indian study (16). Many studies reported that children less than 5 years (mainly between 1- 3 years) which is the same as in this study in which 54% of children of AAP aged 1-3 years. This is explained by the fact that this age group the children used to explore the surrounding environment and to put small foreign objects in their mouths(13, 17, 18). Regarding the sex although male to female ratio was (1.26 : 1) which is similar in control group which was statistically not significant , this is agree with Rodriguez in the United States, Paritsis et al., & Petridou et al., (19-21) in Greece , while Habib study showed male predominance(18) this may be related to that those studies were a retrospective rather than case control ones,

Urban environment considered more hazardous since the availability and the use of poisonous substances is more than rural areas. All poisoning material are stored in improper place as in Manzar et al., that found 76 cases from 100 cases with AAP the storage place of poison was easily approachable (21).

5. CONCLUSIONS

Significant risk factors including younger age child, larger family size, and younger age mother, early afternoon occurrence of poisoning, non-employed mother and history of poisoning in the same family are the common risk factors for AAP.

Ethical Approval:

All ethical issues were approved by the author. Data collection and patient's enrollment were in accordance with Declaration of Helsinki of World Medical Association, 2013 for the ethical principles of researches involving human. Consent was obtained from each participant and data were kept confidentially.

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