https://doi.org/10.29309/TPMJ/2024.31.08.8258

The Professional Medical Journal
www.theprofesional.com
2024, Volume, 31 Issue, 08

ORIGINAL ARTICLE

Clinical spectrum of acute poisoning among children visiting emergency at national institute of child health.

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Article Citation: Ismail F, Ashfaq M, Hussain W, Bader-U-Nisa. Clinical spectrum of acute poisoning among children visiting emergency at national institute of child health. Professional Med J 2024; 31(08):1200-1205. https://doi.org/10.29309/TPMJ/2024.31.08.8258

ABSTRACT… Objective: To determine the clinical spectrum of acute poisoning among children visiting emergency department. **Study Design:** Cross-sectional study. **Setting:** Department of Emergency, National Institute of Child Health, Karachi, Pakistan. **Period:** July 2023 to December 2023. **Methods:** Children of either gender, aged below 12 years and presenting with acute poisoning were analyzed. Demographic, clinical characteristics and final outcomes of children were reported. **Results:** In a total of 264 children, 139 (52.7%) were boys. The mean age was 4.79±2.02 years. Mode of poisoning was intentional in 31 (11.7%) children. Non-pharmaceutical exposure was reported in 183 (69.3%) children. Route of poisoning was through oral route in 178 (67.4%) children. The mean time to reach hospital was 80.95±77.77 minutes. Respiratory distress, drowsiness, vomiting, and cough were the most frequent presenting complaints, noted in 111 (42.0%), 43 (16.3%), 38 (14.4%), and 32 (12.1%) children, respectively. Type of poisoning substance were found to have significant association with age ($p<0.001$), time of presentation ($p<0.001$), mode of poisoning ($p=0.011$), place of poisoning ($p<0.001$), route of poisoning ($p<0.001$), first aid given ($p<0.001$), ambulance carrying the child to hospital ($p<0.001$), and final outcome ($p<0.001$). No mortality was reported. **Conclusion:** Acute poisoning most commonly affects children up to 5 years of age. Non-pharmaceutical exposure was reported in majority of acute poisoning cases. Respiratory distress, drowsiness, vomiting, and cough were the most frequent presenting complaints.

Key words: Cought, Drowsiness, Poisoning, Respiratory Distress, Vomiting.

INTRODUCTION

Acute poisoning in children is considered to be a major public health issue causing emergency admissions resulting in increased rate of morbidity, mortality and recurrent emergency department visits throughout the world.[1,2] Data from developing world reports incidence of fata poisoning as high as 4 folds when compared to the developed regions.[3] According to "World Health Organization", approximately 345,814 deaths were reported from the world due to accidental poisoning, out of which 13.0% were below the age of 20 years.[4]

Acute poisoning in children is on the rise due to various factors such as rapid industrialization, the development of highly toxic medications and health products, children's easy access to these substances, psychiatric issues in children, increased screen time, and crucially, inadequate parental supervision, which heightens the risk of poisoning.[5,6] The "American Association of Poison Control Centers" reported that personal care products, household cleaning agents, analgesic agents, and foreign body items were the most common causes behind acute poisoning among children.[7,8] The emergency department physician must be well-versed in managing poisoning cases, which includes decontamination, enhanced elimination, administering antidotes, and providing supportive care.[9] Additionally, there is also a need that treating physicians should be ready to anticipate most commonly occurring modes and agents of acute poisoning cases among children in a particular area.[10,11]

Different researcher worked on acute poisoning among children and reported different clinical

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Article received on: 02/04/2024
Accepted for publication: 07/06/2024

pattern of acute poisoning. A study by Bork T, et al. reported the 96.8% accidental and 3.2% intentional poisoning. Pharmaceutical poisoning (55.5%) was most commonly reported cause of poisoning followed by non-pharmaceutical poisoning (44.5%).[10] Nafei Z, et al. reported the 51.4% cases of pharmaceutical poisoning.[11] Lee J, et al. reported the pharmaceutical poisoning in 41.4% children. Outcome of treatment in children was discharged from hospital 80.6% followed by admitted at ward 13.6%, admitted at PICU 3.6% and escape 2.2%.[12] Shirkosh S, et al. reported the 97.0% cases of unintentional poisoning, 56.1% cases of pharmaceutical poisoning.[13] This study was designed to determine the clinical spectrum of acute poisoning among children visiting emergency department.

METHODS

The cross-sectional study was conducted in emergency department of "National Institute of Child Health (NICH), Karachi", Pakistan, from July 2023 to December 2023. The sample size was calculated to be 264 taking the proportion of pharmaceutical poisoning in 55.5% children as the leading cause of poisoning[10], by taking confidential level 95% and margin of error as 6%. Non-probability, consecutive sampling technique was adopted. Inclusion criteria were children of either gender, aged below 12 years and had acute poisoning. Exclusion criteria were children who suffered from poisoning during treatment.

This study was performed after taking permission from "institutional Ethical Review Board of NICH" (IERB-39/2021, dated 26-06-2023). Informed and written consents were taken from parents/ guardians. Demographic details of each child was noted including gender and age. Vital signs of each child were obtained. Presenting clinical complaints were also noted. Details about poisoning mechanisms such as time of poisoning, mode of poisoning, place of poisoning, substance involved in poisoning, route of poisoning, provision of first aid, time to reach hospital, and transportation through ambulance were also be obtained. Chest X-ray (CXR), Relevant laboratory investigations were performed and all cases were treated according to institutional protocols. All the data were recorded on a special proforma.

Acute poisoning was labeled as intentional or unintentional exposure of the child to toxic substances for shorter period of time (< 24 hours). Pharmaceutical agent exposure was labeled if involvement of any pharmaceutical substances (medicines) either accidentally or intentionally. Non-pharmaceutical exposure was described as to any non-pharmaceutical substances (detergents, soaps or insecticides) either accidentally or intentionally. Venom was named if exposure to any poison either snakebite, stung or bitten by bees, insects, or animal. Site of poisoning was categorized as either poisoning at home or outside the home. Route of poisoning was labeled as either oral (ingestion through mouth), inhalation (breathing though nose), parental (snakebite, stung or bitten by bees, insects, or animal), or topical (through contact). Mode of poisoning was named intentional if it was for suicide or harming him/her self purpose. Or, it was named as unintentional if accidental poisoning occurred. Children were treated as per institutional protocols. Outcome was labelled as death, discharged, shifted to ward, pediatric Intensive Care Unit (PICU) admission, or leave against medical advice (LAMA).

Data analysis was performed employing IBM-SPSS Statistics, version 26.0. Quantitative data were shown as mean and standard deviation. Frequency and percentages were calculated for categorical data. Effect modifier like gender, age in groups, time to report poisoning, mode of poisoning, place of poisoning, substance used for poisoning, route of poisoning, provision of first aid before reaching hospital and transportation through ambulance were controlled by stratification. Post-stratification chi-square test was applied by taking $p \leq 0.05$ as significant.

RESULTS

In a total of 264 children, 139 (52.7%) were boys. The mean age was 4.79±2.02 years, ranging between 2-10 years. There were 87 (33.0%) children who presented with fever. The mean heart rate, respiratory rate, systolic blood pressure, and diastolic blood pressure were

102.50±13.49 beats/min, 31.01±11.33 breaths/min, 88.98±15.71 mmHg, and 53.27±9.26 mmHg, respectively. Mode of poisoning was intentional in 31 (11.7%) children. Pharmaceutical substance exposure was noted in 71 (26.9%) children. Non-pharmaceutical exposure was reported in 183 (69.3%) children. Route of poisoning was through oral route in 178 (67.4%) children. The mean time to reach hospital was 80.95±77.77 minutes. Table-I is showing characteristics of children presenting with acute poisoning.

Characteristics		Number (%)
Gender	Boys	139 (52.7%)
	Girls	125 (47.3%)
Age (years)	≤5	184 (69.7%)
	>5	80 (30.3%)
Temperature >100 ^{0}F		87 (33.0%)
Time at presentation	6am-12pm	48 (18.2%)
	12pm-6pm	90 (34.1%)
	6pm-12am	107 (40.5%)
	12am-6am	19 (7.2%)
Mode of poisoning	Intentional	31 (11.7%)
	Unintentional	233 (88.3%)
Place of poisoning	Home	210 (79.5%)
	Outside home	54 (20.5%)
Poisoning substance	Pharmaceuticals	71 (26.9%)
	Non-pharmaceuticals	183 (69.3%)
	Venom	10 (3.8%)
Route of poisoning	Oral	178 (67.4%)
	Inhalation	76 (28.8%)
	Parenteral	10 (3.8%)
First aid given		33 (12.5%)
Ambulance carried the child to hospital		80 (30.3%)

Table-I. Characteristics of children (n=264)

There were 80 (30.3%) children who did not have any complaints at the time of presentation. Respiratory distress, drowsiness, vomiting, and cough were the most frequent presenting complaints, noted in 111 (42.0%), 43 (16.3%), 38 (14.4%), and 32 (12.1%) children, respectively. Figure-1 is showing frequency of most common presenting complaints.

Type of poisoning substance were found to have significant association with age (p<0.001), time of presentation (p<0.001), mode of poisoning (p=0.011), place of poisoning (p<0.001), route of poisoning (p<0.001), first aid given (p<0.001), ambulance carrying the child to hospital (p<0.001), and final outcome (p<0.001), and the details are shown in Table-II. No mortality was reported.

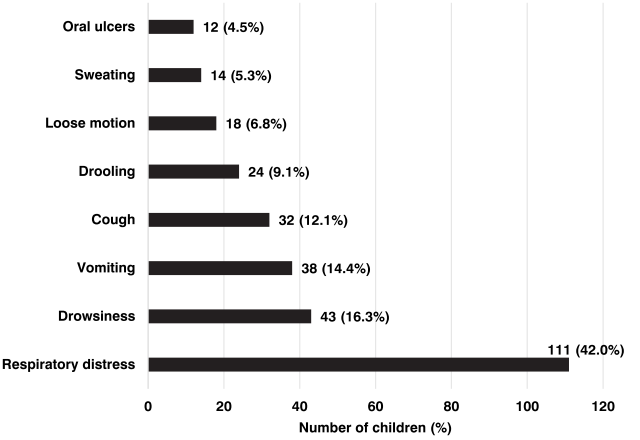

Figure-1. Frequency of most common presenting complaints

DISCUSSION

We found that 52.7% of acute poisoning cases in this study were boys. A recent study from Vietnam analyzing 771 children with acute poisoning showed that 55.3% children were boys.[14] Our results are very similar to another recently published study from Romania where 51.7% children with acute poisoning were boys.[15] Local data from Peshawar also revealed that 69.0% children with acute poisoning were male.[16] Some researchers have also reported a slight female gender predominance among children with acute poisoning[17] but most researchers are in consensus that male gender is mostly affected by acute poisoning among children. The present study showed that the mean age of children presenting with acute poisoning was 4.79±2.02 years. A study from Iran analyzing children with acute poisoning at a referral center reported the mean age of the children to be 3.4±2.4 years.[18] Lee et al from Taiwan showed that the mean of children with acute poisoning was 5.07±5.02 years.[12] Local data where the authors showed the mean age of the children with acute poisoning to be 3.03±2.56 years.[16] This study found that 69.7% children with acute poisoning were aged between 2 to 5 years. Data from Iran reported that 71% children with acute poisoning were aged between 1-5 years.[19]

Study Variables		Substance Type			P-Value
		Pharmaceutical (=71)	Non-Pharmaceutical (n=183)	Venom (n=10)	
Gender	Boys	44 (62.0%)	90 (49.2%)	5 (50.0%)	0.184
	Girls	27 (38.0%)	93 (50.8%)	5 (50.0%)	
Age (years)	≤5	61 (85.9%)	123 (67.2%)	-	<0.001
	>5	10 (14.1%)	60 (32.8%)	10 (100%)	
Fever (temperature>100 ^{0}F)		24 (33.8%)	63 (34.4%)	-	0.077
Time at presentation	6am-12pm	11 (15.5%)	37 (20.2%)	-	<0.001
	12pm-6pm	29 (40.8%)	56 (30.6%)	5 (50.0%)	
	6pm-12am	27 (38.0%)	80 (43.7%)	-	
	12am-6am	4 (5.6%)	10 (5.5%)	5 (50.5%)	
Mode of poisoning	Intentional	15 (21.1%)	16 (8.7%)	-	0.011
	Unintentional	56 (78.9%)	167 (91.3%)	10 (100%)	
Place of poisoning	Home	65 (91.5%)	145 (79.2%)	-	<0.001
	Outside home	6 (8.5%)	38 (20.8%)	10 (100%)	
Route of poisoning	Oral	71 (100%)	107 (58.5%)	-	<0.001
	Inhalation	-	76 (41.5%)	-	
	Parenteral	-	-	10 (100%)	
First aid given		6 (8.5%)	17 (9.3%)	10 (100%)	<0.001
Ambulance carried the child to hospital		5 (7.0%)	65 (35.5%)	10 (100%)	<0.001
Outcome	Discharged	62 (87.3%)	42 (23.0%)	-	<0.001
	Shifted to ward	-	113 (61.7%)	5 (50.0%)	
	Shifted to PICU	-	19 (10.4%)	5 (50.0%)	
	LAMA	9 (12.7%)	9 (4.9%)	-	

Table-II. Association of substance type with study variable (N=264)

Pharmaceutical substance exposure was noted in 26.9% children with acute poisoning whereas 69.3% children had non-pharmaceutical exposure. Venom exposure was reported in 3.8% children with acute poisoning in this study. Our findings are in contrast to what Lee and colleagues documented where pharmaceutical ingestion were the most common cause behind acute poisoning.[12] In children up to 5 years of age, poisoning from substances like pharmaceutical agents often derive from the imitation of the parents behaviors.

Data from Ethiopia reported venomous agents to be the most common cause of acute poisoning among children which could be due the fact that most of the children (65.9%) in that study were from rural areas where exposure to venomous species is common.[20] This study revealed that mode of poisoning was unintentional in 88.3% children. This is in agreement with a study by Nguyen et al where they reported that 82.1% children with acute poisoning had unintentional mode.[14]

There were 80 (30.3%) children who did not have any complaints at the time of presentation. Contemporary data from Italy has depicted that 48.6% children with acute poisoning were asymptomatic at the time of presentation in the emergency department.[21] Respiratory distress, drowsiness, vomiting, and cough were the most frequent presenting complaints, noted in 42.0%, 16.3%, 14.4%, and 12.1% children, respectively. Presenting complaints are closely related to the type of substance involved in the acute poisoning. The literature reports mixture of gastrointestinal, neurological and cardiorespiratory symptoms to be the most common ones `among children with acute poisoning.[21,22]

Single center study design with a relatively modest sample size were some of the main limitations of this study. This study explored demographic and clinical details about the children presenting with acute poisoning at an pediatric emergency

department. The present study adds valuable insights to the existing body of literature about aspects of acute poisoning in children.

CONCLUSION

Acute poisoning most commonly affects children up to 5 years of age. Most common mode of poisoning was unintentional. Non-pharmaceutical exposure was reported in majority of acute poisoning cases. Respiratory distress, drowsiness, vomiting, and cough were the most frequent presenting complaints. Overall outcome was excellent among children with acute poisoning as no mortality was reported.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Muhammad Ashfaq	Concept and design, Critical revisions, Final approval.	
3	Wajid Hussain	Interpretation of data, critical revisions, Final approval.	
4	Bader-U-Nisa	Interpretation of data, critical revisions, Final approval.	