

Futures and the outcome of treatment of poisoned children and adolescents admitted to emergency units in different areas of Saudi Arabia

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Abstract

Background: poisoning is a major problem in the pediatric and adolescents population. Poisoning is a main reason for children's admission to emergency units. Medications are the most common poisonous agent in children. **Objective:** to describe the, futures, and the outcome of treatment of poisoned children admitted to emergency units in different areas of Saudi Arabia. **Patients and Methods:** in this study, analysis of a retrospective data was done. Data were collected from mothers from different cities in KSA, during the period from 1st January to 31 March 2018. Cases of childhood or adolescents poisoning that were experienced by those mothers within the period were included. A structured close-ended online questionnaire was distributed to collect the relevant data. **Results:** the study included 96 cases. More than third (35.4%) of children aged 4-8 years, < 4 years constituted 24.0% and adolescents were 19.8%. Males were more than females (57.3% vs. 42.7%). Mode of poisoning was accidental in 91.8% and intended in 5.2%. As regards mood of administration of poisoned substance, 86.5% were by ingestion, 7.3% by inhalation and 6.2% by contact of eyes or skin. The type of poison was spoiled food in 55.2%, cleaning compounds, such as chlorine and others in 12.5%, drugs in 7.3%, insecticide in 6.2%, poisonous herbs in 4.2%, narcotic substance in 1% and other substances in 13.5%. Symptoms of poisoning was severe diarrhea, vomiting and excessive sweating by the same percent 31.2%, severe abdominal pain in 14.6%, breathing difficulties in 13.5%, redness of the eyes in 12.5%, fainting in 8.35 and convulsions in 2.1%. As regards outcome of treatment, 93.8% of the cases were improved and cured completely and the overall mortality rate was 3.1%. **Conclusion:** Accidental childhood and adolescents poisoning in KSA is just like in many other regions. there is thus, the need for public awareness on the proper storage of harmful materials and the need for immediate hospitalization if accidental ingestion occurs. We strongly recommended for regulatory policies on safe keeping drugs to reduce the morbidity and mortality associated with accidental poisoning.

Keywords: Accidental poisoning, childhood, adolescents, outcome.

Introduction

Injuries represent the leading cause of mortality and morbidity among children. One category of major importance is poisoning, it constitutes about 2% of all injury deaths in developed countries and about 5% in developing ones⁽¹⁾.

Accidental poisonings involve a person, usually a young child, 'accidentally' poisoning themselves without wanting to cause harm to their body. It is most common in young children as they are keen to explore their world and often learn about new things by putting them in their mouth⁽²⁾.

Medications are the most common poisonous agent in children. The prevalence and type of substance ingested vary from place to place and over time⁽³⁾. In **Sahin's et al.**⁽⁴⁾ study 48.4% of all poisonings were due to drugs.

Poisoning is a main reason for children's admission to emergency unit. Presenting features include vomiting and diarrhea, drooling of saliva and difficulty in swallowing, restlessness, weakness, and fever. Respiratory features predominated and include cough, fast and difficulty in breathing as well as abnormal chest findings on examination⁽⁵⁾.

The frequency and pattern of poisoning vary from place to place; depending on the environmental factors. Socioeconomic factors like not living with both parents and both parents being smokers are important risk indicators of accidental poisoning ⁽⁶⁾.

Lifshitz *et al.* ⁽⁷⁾ who aimed to evaluate the pattern of acute poisoning in children with relation to different age groups found that during the years 1994-98 a total of 1,143 children were admitted for acute poisoning to the Soroka Medical Center, the majority of cases occurred in children aged 2-5 and 14-18 years.

Knowing the epidemiology of poisoning is a key role in planning prevention, care and treatment of patients.

The purpose of this study is to describe the, futures, and the outcome of treatment of poisoned children admitted to emergency units in different areas of Saudi Arabia.

Patients and methods

It is a cross sectional study. In this study, analysis of a retrospective data was done. We collected 96 cases. Data were collected from mothers from different cities (Arar, Rafha, Hail, Jeddah, Khafji, Khobar, Dammam, Abha and Riyadh) in KSA, during the period from 1st January to 31 March 2018. Cases of childhood or adolescents poisoning that were experienced by those mothers within the period were included.

A structured close-ended online questionnaire was distributed to collect the demographic data, suffering from chronic or psychiatric disease, mode of poisoning, type of poison, mood of administration of poisoning substance, symptoms, degree of intoxication, place of management, stomach lavage and child condition on hospital leaving (outcome of treatment).

Ethical considerations:

Participants were informed about the study objectives and that participation is completely voluntary. No names were recorded on the questionnaires. All questionnaires kept safe.

Statistical treatment:

The data were entered, cleaned and analyzed using SPSS V.16.0 (SPSS Inc; Chicago, IL, USA). Descriptive statistics were used for the analysis.

Results

Table 1 shows the socio-demographic characters and suffering from chronic or psychiatric disease among the studied children. The study included 96 cases. More than third (35.4%) of children aged 4-8 years, < 4 years constituted 24.0% and adolescents were 19.8%. males were more than females (57.3% Vs. 42.7%). Illiterate mothers 8.3%, primary educated 7.3% but the majority (46.9%) had university or more education while 56.2% of the fathers were highly educated (university or more education). House wives constituted 62.5% of the mothers. 89.6% lived with his/her parents but 4.2% lived with step mother, 2.1% had one parent. Children suffering from chronic diseases constituted 5.2%, 3.1% were suffering from psychiatric disease, 3.1% had physical violence at home and 24% had babysitter.

Table 2 illustrates the poisoning related parameters among the studied cases. As regards mode of poisoning, 91.8% occur by accident and 5.2% intended (suicide). According to mood of administration of poisoned substance we found that 86.5% occur by ingestion, 7.3% by inhalation and 6.2% by contact of eyes or skin. Regarding the type of poison this study reported; spoiled food by 55.2%, cleaning compounds, such as chlorine and others 12.5%, drugs 7.3%, insecticide 6.2% poisonous herbs 4.2%, narcotic substance 1% and other by 13.5%. As regards symptoms of poisoning, severe diarrhea, vomiting and excessive sweating by the same percent 31.2%, severe abdominal pain 14.6%, breathing difficulties 13.5%, redness of the eyes 12.5%, fainting 8.35 and convulsions 2.1%. As regards outcome of treatment, 93.8% of cases improved and cured completely and the overall mortality rate was 3.1%.

Table 1: socio-demographic characters and suffering from chronic or psychiatric disease among the studied children

Age group (in years)	Frequency	Percent
- < 4	23	24.0
- 4-8	34	35.4
- 8-12	20	20.8
- 13-18	19	19.8
Sex		
- Female	41	42.7
- Male	55	57.3
Mothers' education		
- Illiterate	8	8.3
- Primary	7	7.3
- Read and write	11	11.5
- Secondary	18	18.8
- University or more	45	46.9
- Preparatory	7	7.3
Fathers' education		
- Illiterate	4	4.2
- Read and write	5	5.2
- Primary	1	1.0
- Preparatory	9	9.4
- Secondary	23	24.0
- University or more	54	56.2
Mothers' work		
- Working	36	37.5
- House wife	60	62.5
Economic status of the family		
- Low	3	3.1
- High	13	13.5
- Moderate	80	83.3
Parents marital status		
- Married	92	95.8
- Divorced	4	4.2
The child lives with		
- Parents	86	89.6
- Unwanted persons	5	5.2
- Step father	1	1.0
- Step mother	4	4.2
Recent delivery of new brother or sister		
- No	67	69.8
- Yes	29	30.2
Order of the child between siblings		
- 1st child	15	15.6
- The last child	16	16.7
- In between	67	67.7
Health status of parents		
- Both are good	86	89.6
- One parent has chronic illness	8	8.3
- One parent died	2	2.1
Suffering from chronic diseases		
- No	91	94.8
- Yes	5	5.2
Suffering from psychiatric disease		
- No	93	96.9
- Yes	3	3.1
Child abuse (physical violence)		
- With friends	5	5.2
- At home	3	3.1
- At school	1	1.0
- No violence	87	90.6
Presence of babysitter in the home		
- No	73	76.0
- Yes	23	24.0

Table 2: poisoning related parameters among the studied cases

Mode of poisoning	Frequency	Percent
- Intended (suicide)	5	5.2
- Accident	91	91.8
Type of poison		
- Drugs	7	7.3
- Poisonous herbs	4	4.2
- Spoiled food	53	55.2
- Narcotic substance	1	1.0
- Insecticide	6	6.2
- Cleaning compounds, such as chlorine and others	12	12.5
- Other	13	13.5
Symptoms started:		
- Gradual	49	51.0
- Sudden	47	49.0
Mood of administration of poisoned substance:		
- By ingestion	83	86.5
- By inhalation	7	7.3
- By contact of eyes or skin	6	6.2
Symptoms (there is overlapping)		
- Sever diarrhea	30	31.2
- Vomiting	30	31.2
- Excessive sweating	30	31.2
- Sever abdominal colic	14	14.6
- Breathing difficulties	13	13.5
- Redness of the eyes	12	12.5
- Fainting	8	8.3
- Convulsions	2	2.1
Degree of intoxication		
- Mild	38	39.6
- Sever	13	13.5
- Moderate	45	46.9
Place of management		
- Emergency department	64	66.7
- Emergency department then admitted to the hospital	17	17.7
- Intensive care unit	1	1.0
- Home remedy	14	14.5
Stomach lavage		
- Yes	33	34.4
- No	63	65.6
Child condition on hospital leaving		
- Improved	90	93.8
- Referral to other medical center	3	3.1
- Died	3	3.1
Bringing the Toxic substance with the child		
- Yes	16	16.7
- No	80	83.7
Place of the child at poisoning time		
- Kitchen	32	33.3
- The outside arena of the home	16	16.7
- School	12	12.5
- Bathroom	13	13.5
- Next to a pillbox	6	6.2
- Restaurant	4	4.2
- Garage	2	2.1
- At home		
Presence of other poisoned person		
- No one	59	61.5
- Another child	18	18.8
- Adult person	19	19.8

Discussion

Poisons, also known as toxins, are potentially harmful substances that can damage and injure the human body ⁽⁸⁾. Acute poisoning in children is a major preventable cause of morbidity and mortality in both developed and developing countries. It remains a major public health problem, particularly in children. Worldwide, every year, nearly one million children died from injuries ⁽⁹⁾. Children below the age of five years constitute about 15% of unintentional poisoning related deaths ⁽¹⁰⁾.

This cross sectional study conducted among 96 of studied children, KSA. The study aims to describe the epidemiology, pattern, and the results of treatment of poisoned children admitted to emergency units in different areas of Saudi Arabia.

Poisoning occurs when these toxins are either ingested, inhaled, or introduced through the skin, with exposure often occurring intentionally or accidentally in homes ⁽¹¹⁾.

Regards mode of poisoning, our study reported 91.8% occur by accident and 5.2% intended (suicide). In Riyadh, Saudi Arabia, a retrospective cross-sectional descriptive study conducted among 735 children with poisoning found that poisoning mostly occur by accident ⁽¹²⁾. In central Saudi Arabia, a retrospective cross-sectional carried out among 315 children; the majority of children were exposed to the poison product accidentally 92%, whereas 6% were due to over dosage of their prescribed medications (mainly in infants) and 2% were suspected cases of child abuse or suicidal attempt ⁽¹³⁾. In King Khalid University hospitals Riyadh, Saudi Arabia, a retrospective study conducted among 1161 cases, suicidal intention was reported among 297 cases (25.6%) compared to 816 (70.3%) who were accidentally exposed to toxic materials, however, 48 cases (4.1%) were unknown or had doubtful intention ⁽¹⁴⁾. Another study conducted among 281 patients, the majority (73.3%) of cases was accidental poisonings and seventy two cases (25.6%) of poisoning occurred as suicide attempts ⁽¹⁵⁾. In Addis Ababa, Ethiopia, a cross sectional study conducted among 128 children; accidental poisoning occur in 79.1% of the cases, intentional poisoning in 15.6% and 6.3% non-documented ⁽¹⁶⁾. **Paudyal *et al.*** ⁽¹⁷⁾ found that

the circumstances of poisoning were intentional (75%) and accidental (20%).

According to Mood of administration of poisoned substance our study found that 86.5% occur by ingestion, 7.3% by inhalation and 6.2% by contact of eyes or skin. In Riyadh another study reported, the route of poisoning was oral (98.8%) ⁽¹²⁾. This was closed to another study conducted in central Saudi Arabia which reported that the main exposure route was oral by 98% ⁽¹³⁾. Another study found that more than 92% of the studied cases were exposed through oral route compared to (6.9%), (1.6%) and (0.2%) cases through dermal, inhalation and injection, respectively ⁽¹⁴⁾. Another study reported that the most common route of poisoning was the ingestion of poison in (86.5%) patients and the remaining was poisoned by respiratory route (13.35%) ⁽¹⁶⁾.

Regarding to type of poison this study reported; spoiled food by 55.2%, cleaning compounds, such as chlorine and others 12.5%, drugs 7.3%, insecticide 6.2% poisonous herbs 4.2%, narcotic substance 1% and other by 13.5%. Another study reported that drugs were the most common type of poison (70.6%), followed by chemicals (29.2%) and food (2%) ⁽¹²⁾. According to the 2015 NPDS report, the most common poisons in children younger than 5 years were cosmetics/personal care products (13.6%), household cleaning substances (11.2%), analgesics (9.12%), foreign bodies/toys/miscellaneous (6.45%), and topical preparations (5.33%) ⁽¹³⁾. Another study found that drug poisoning was observed in 63% of cases, whereas chemical product poisoning was exhibited in 37%; in the drug poison group, the most common poison agents were antipyretics and analgesics (28%), whereas in the chemical group (36.2%) it was sodium hydroxide (a household product) ⁽¹⁴⁾. In Riyadh, another study reported type of poisoning include drugs among 76.7% of cases, household chemicals (e.g., Clorox, flash, cosmetics, etc) by 6.8%, industrial chemicals or hydrocarbon materials (e.g., petrol) by 4.3% and insecticides/rodenticides by 3.9% however, (6.0%) were exposed to poisoning episode because of stings and bites by wild or tamed animals ⁽¹⁵⁾. In Jeddah, a study conducted among 1954 children, 140

from them had accidental poisoning; Hydrocarbon ingestion accounted for the highest proportion of poisonings (56 cases, or 40%), followed by drugs in 48 cases (34.3%), household chemicals in 23 cases (16%), bleach sodium hypochlorite, Clorox was identified as the causative agent in 11 (7.9%) of the cases, and rat poison (warfarin) and insecticides were observed in 8 children (5.7%)⁽⁹⁾. A retrospective study reported; drugs were the most common agents causing poisoning (48.4%), followed by ingestion of corrosive substances (23.1%), carbon monoxide (CO) intoxication (12.5%), hydrocarbons (5.7%), insecticides (3.9%), plants (3.9%) and alcohol (2.5%)⁽¹⁷⁾.

Regards symptoms of poisoning our study reported severe diarrhea, vomiting and excessive sweating by the same percent 31.2%, severe abdominal pain 14.6%, breathing difficulties 13.5%, redness of the eyes 12.5%, fainting 8.35 and convulsions 2.1%. Another study found that most cases were asymptomatic, but some children developed gastrointestinal symptoms (e.g., abdominal pain, vomiting, and diarrhea), which were most common regardless of poisoning type, however, it was notable that neurological symptoms (e.g., dizziness, drowsiness, seizure, and sedation) were more common with drug poisoning⁽¹²⁾. In Jeddah another study reported different symptom according to type of poison for example of the 48 children with accidental drug; six (12.5%) children who had taken anticonvulsant drugs presented with symptoms of drowsiness, somnolence and dizziness, another six (12.5%) who ingested antihistamines presented with drowsiness and sleepiness and ingestion of antiemetic (metoclopramide) resulted in manifestations of oculogyric crisis in (10.4%) children⁽¹⁶⁾. In the same study among 56 children with hydrocarbon intoxication, 54 reported having consumed kerosene; of these, only 22 (40.7%) had mild symptoms, such as drowsiness, cough, vomiting, and tachypnea, another 19 children (35.2%) developed pneumonic changes with respiratory distress, and these symptoms were further accompanied by fever in a group of 15 children (27.7%)⁽⁹⁾. Another study reported nausea and vomiting was the most common complaint of cases at presentation to hospital

(42.3%), followed by unconsciousness (18.1%)⁽¹⁷⁾.

As regards outcome of treatment, in our study 93.8% of the cases were improved and cured completely and the overall mortality rate was 3.1%. Also in **Edelu et al.**⁽¹⁸⁾ the overall mortality rate was 3.1%. In Mahapatra et al.⁽¹⁹⁾ 98.51% of the poisoned children were cured completely and the overall mortality rate was 1.5%.

Conclusion and recommendations

Accidental childhood and adolescents poisoning in KSA is just like in many other regions. There is thus, the need for public awareness on the proper storage of harmful materials and the need for immediate hospitalization if accidental ingestion occurs. We strongly recommended for regulatory policies on safe keeping drugs to reduce the morbidity and mortality associated with accidental poisoning.

Acknowledgment:

The success and outcome of this work required support and assistance of many people and we are fortunate to have this all along the completion of the work. Our thanks go to **Dr. Nagah Mohamed Abo El-Fetoh** (Community medicine department), Faculty of Medicine, Northern Border University) for her help during the different steps of the research program.

References

1. **World Health Organization (1993):** World health statistics annual 1992. Geneva: WHO. http://www.who.int/gho/publications/world_health_statistics/EN_WHS10_Full.pdf
2. **Mowry JB, Spyker DA, Cantilena LR Jr, McMillan N, Ford M (2014):** Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 31st Annual Report. Clin Toxicol (Phila), 52(10):1032-1283.
3. **Mutlu M, Cansu A, Karakas T et al. (2010):** Pattern of pediatric poisoning in the east Karadeniz region between 2002–2006: increased suicide poisoning. Hum Exp Toxicol., 29(2):131-138.
4. **Sahin S, Bora C, Dinleyici E (2011):** Acute Poisoning in Children; Data of a

- Pediatric Emergency Unit. *Iranian Journal of Pediatrics*, 21(4), 479–484.
5. **Agarwal G, Bithu KS, Agarwal R (2016):** An epidemiological study of acute poisoning in children in a tertiary care hospital of western Rajasthan, India. *Int J Contemp Pediatr.*,3:1249-51.
 6. **Petridou E, Kouri N, Polychronopoulou A *et al.* (1996):** Risk factors for childhood poisoning: a case-control study in Greece. *Injury Prevention*, 2(3), 208–211.
 7. **Lifshitz M, Gavrilov V (2000):** Acute poisoning in children. *Israel Medical Association Journal.* ,2(7):504–6.
 8. **Thomas W, John H, William R (2007):** *Stedman's Medical Dictionary.* 28th ed. Lippincott William and Wilkins; New York.
 9. **Bronstein AC, Spyker DA, Cantilena LR *et al.* (2008):** 2007 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS):25th Annual Report. *Clin Toxicol (Phila)*, 46:927–1057.
 10. **Peden MK, Sharma G (2002):** *The Injury Chart Book: A graphical overview of the global burden of injuries.* Geneva: World Health Organization. whqlibdoc.who.int/publications/924156220X.pdf
 11. **Mowry JB, Spyker DA, Brooks DE (2014):** Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 32nd Annual Report. *Clin. Toxicol.*, 53(10):962–1147.
 12. **Alghadeer S, Alrohaimi M, Althiban A *et al.* (2018):** The patterns of children poisoning cases in community teaching hospital in Riyadh, Saudi Arabia. *Saudi Pharm J.*, 26(1): 93–97.
 13. **Mowry JB, Spyker DA, Brooks DE *et al.* (2016):** 2015 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 33rd Annual Report. *Clin. Toxicol. (Phila)*, 54(10):924–1109.
 14. **Alanazi MQ, Al-Jeriasy MI, Al-Assiri MH *et al.* (2015):** Hospital Performance Indicators and Their Associated Factors in Acute Child Poisoning at a Single Poison Center, Central Saudi Arabia. *Medicine (Baltimore)*, 94(52):e2339.
 15. **Al-Barraq A, Farahat F (2011):** Pattern and determinants of poisoning in a teaching hospital in Riyadh, Saudi Arabia. *Saudi Pharm J.*, 19(1):57-63.
 16. **Al Hazmi AM (1998):** Patterns of accidental poisoning in children in Jeddah, Saudi Arabia. *Ann Saudi Med.*, 18(5):457-9.
 17. **Paudyal BP (2005):** Poisoning: pattern and profile of admitted cases in a hospital in central Nepal. *J Nepal Med Assoc.*, 44:92–96.
 18. **Edelu B, Odetunde O, Eke C *et al.* (2016):** Accidental Childhood Poisoning in Enugu, South-East, Nigeria, *Ann Med Health Sci Res.*,6(3): 168–171.
 19. **Mahapatra S, Rath S, Ramani Y *et al.* (2017):** Incidence Prevalence Clinical Overview And Cost Analysis Of Pediatric Poisoning Cases In A Tertiary Care Setting Of Berhampur, Odisha, India. *Int. J. Adv. Res.*, 5(4): 916-922