

PATTERN OF ACUTE TOXICITY AMONG CHILDREN AT ZAGAZIG UNIVERSITY HOSPITALS IN 2017: (CLINICAL AND DEMOGRAPHIC DATA)

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ABSTRACT

Background: Acute poisoning in children is still an important public health problem and represents a frequent cause of admission in poisoning treatment and emergency units. **Objectives:** The aim of this (retrospective) study was to describe various characteristics of poisoning in children; (clinical and epidemiological data.) **Patients and methods:** Sixty six cases of children (27 males, 39 females) up to 16 years old for suspected toxicity were studied retrospectively in a one year-long period starting from January until December 2017 with exclusion of patients with acute food poisoning. Detailed patients history was taken; their age, residence, date of admission, time, route and form of poisoning as well as type of causative agents. Also we analyzed their clinical presentation, lines of treatment and their outcome. **Results:** We found that female gender and rural residents were more affected, most cases were accidental, while suicidal and homicidal cases were less frequent. We found that time lapse from intoxication or ingestion of poison to hospital arrival was significantly less in survivors as compared to expired children. The route in most cases was by ingestion. Organophosphorus compounds were the commonest agents followed by medications. Other agents in reduced frequency were: rodenticides, kerosene, corrosives, snake bites, phenols and toothpaste. Neurological manifestations were more common than gastro intestinal, cardiac and pulmonary manifestations. **Conclusion:** Acute poisoning either accidental or suicidal is still a significant cause of hospital admission among children in our locality. The study recommended increasing awareness about potential toxins as well as appropriate storage of drugs and household cleaning agents to decrease the incidence of accidental poisoning. It also recommended as possible early management by supportive measures and antidotes to improve the prognosis of cases.

Keywords: poisoning, children, emergency, clinical

INTRODUCTION

Acute Poisoning in children is an important public health problem and represents a frequent cause of admission in pediatric emergency units. The incidence of childhood poisoning in various studies ranges from 0.33% to 7.6% [1]

Acute poisoning has also been the 3rd most common treated injury for children less than 16 years in the emergency units [2]

Accidental ingestion is one of the most important causes of poisoning in children and is most prevalent between 1-5 year olds [3]

During adolescence, medications used for committing suicide are the main cause of poisoning [4]

Common agents which cause poisoning in children are medications, household products such as detergents and bleaches, petroleum products and industrial substances, pesticides, opioid and herbal compounds [5]

More than 90% of toxic exposures in children occur inside the house and they mostly involve single substance. Ingestion

accounts for a vast majority of exposures, and a minority happens via dermal, inhalational, and ophthalmic routes. Approximately 50% of cases involve non medicinal substances such as cosmetics, cleaning solutions, plants, and foreign bodies. Pharmaceutical preparations account for the remainder of exposures, among which, analgesics, topical preparations, cough and cold products and vitamins are the most commonly reported categories [6]

The objective of our study was to describe demographic characteristics and identify the types and the outcome of childhood poisonings.

PATIENTS AND METHODS

This study was conducted as a retrospective study analysis of pediatric population attending Zagazig University Hospitals from January until December 2017. It was concerned with all cases of acute poisoning who visited and/or admitted in PICU at Pediatric Department and Poison Control Center at Zagazig University Hospitals.

Inclusion and exclusion criteria

Data of sixty six children (27 males, 39 females) up to 16 years old with suspected toxicity in a one year-long period from January until December 2017. Patients with acute food poisoning were excluded from the research group.

Study of this population included clinical history, clinical parameters, and laboratory or non-laboratory investigations, lines of treatment and data of the outcome.

Important and detailed history of all the patients including their age, residence, date of admission, time, route and form of poisoning as well as type of causative agents were obtained from their files

Statistical analysis

Data were entered into SPSS statistical program version 22, Chicago IL. Epi Info software program version 3.5.3 was also used for advanced statistics. Data were analyzed by Chi square and Mann Whitney tests. Ethical approval was obtained from the Medical Ethics Committee of Faculty of Medicine, Zagazig University, before the study.

RESULTS

Table (1) shows demographic data of studied cases regarding age, gender, residence and season. Mean age was 6.71 ± 5.43 years. Affected females were more than males (59.1% vs 40.9%), those in rural areas were more than urban ones (57.6% vs 42.4%). The table also describes the seasonal presentation of cases (highest incidence was in the summer 34.8%). Most cases (56.1%) were at age of 1-5 years and the second frequent age group was children more than 12 years old (table 2).

Table (3) shows that mean time of hospital arrival was 3.36 ± 1.88 hours post-exposure, poisoning manifestations occurred within 1-6 hours of exposure in 92.3% of cases. The mean time of hospital stay was 2.37 ± 1.34 days, 42.4 % of cases stayed for 1-3 days.

Figure (1) shows that most cases (75.8%) were accidental, 22.7 % were suicidal while 1.5% was homicidal.

Table (4) shows causative agents: 28.8% caused by organophosphorus compounds and 36.4 % caused by medications. Other agents

in reduced frequency were: kerosene, rodenticides, corrosives, snake bites, phenols and toothpaste. The route in most cases was by ingestion of tablet (31.8%), syrups (30.3%) or powder forms (27.3%). Amounts were unknown in 36.4% of cases.

Figure (2) shows types of medications in the 24 affected cases: 15% of them were antipsychotic drugs including trade names (psychodal, neurazin and clozapex) and 15% were exposed to benzodiazepines. Other agents included: anti-arrhythmic drugs, anti-spasmodics, multivitamins with or without iron, contraceptive pills, tramadol, motival, B-blockers, aspirin, diuretics, depakine and muscle relaxants.

Table (5) shows clinical profile in our cases. Neurological manifestations were the most common 39.4% as: disturbed consciousness, convulsions or abnormal movements. Cardiac signs as tachycardia and hypotension occurred in 33.3%, gastrointestinal findings like vomiting, diarrhea and abdominal pain occurred in 25.8% of cases, while chest findings as crackles occurred in 12.1% of cases. Other rare manifestations were noted as oliguria, miosis, skin burns and muscle fasciculations. Five cases were completely normal on examination.

Figure (3) shows different treatment modalities in affected patients. Charcoal administration was given in 46 cases, IV fluids were needed in 36 while gastric lavage was done in 29 of cases. Other treatment modalities needed in fewer frequencies were: anti-emetics, atropine, oxygen, toxogonin and different antidotes.

Table (6) shows comparison between survivors (n=60) and those cases who died (n=6). All dying cases were admitted to PICU. There was a significant difference between the 2 groups in length of hospital stay, time of hospital arrival. Accidental poisoning was dominant in both groups (76.7% and 66.7%) but with a statistical difference ($p < 0.05$). 5 out of the 6 died cases were exposed to organophosphorus poisoning.

Table (1): Demographic data of the studied poisoned children (N=66).

Demographic data	Studied patients (N=66)	
	No.	%
Age (years)		
Mean \pm SD	6.71 \pm 5.43	
Median (Range)	4 (1-16)	
Gender		
Male	27	40.9%
Female	39	59.1%
Residence		
Rural	38	57.6%
Urban	28	42.4%
Seasonality		
Summer	23	34.8%
Autumn	11	16.7%
Winter	17	25.8%
Spring	15	22.7%

Table (2): Distribution of the poisoned children according to the age (N=66).

Age	Studied patients (N=66)	
	No.	%
• <1 year	2	3%
• 1-5 year	37	56.1%
• 6-12 year	9	13.6%
• > 12 year	18	27.3%

Table (3): Time of hospital arrival, time lapse since poisoning and length of hospital stay in poisoned children (N=66).

Item	Studied cases (N=66)	
	No.	%
Time of arrival (h)		
▪ Mean \pm SD	3.36 \pm 1.88	
▪ Median (Range)	3 (1-12)	
Time since poisoning (N=65)		
▪ < 1 hour	2	3.1%
▪ 1- 6 hours	60	92.3%
▪ 6-12 hours	3	4.6%
Hospital length of stay (days)		
▪ Mean \pm SD	2.37 \pm 1.34	
▪ Median (Range)	2 (1-5)	
Duration		
▪ < 1 day	20	30.3%
▪ 1- 3 days	28	42.4%
▪ 3-6 days	18	27.3%

Figure (1): Bar chart showing pattern of poisoning in poisoned children at Zagazig University Hospitals from January until Decemper 2017 (N=66)

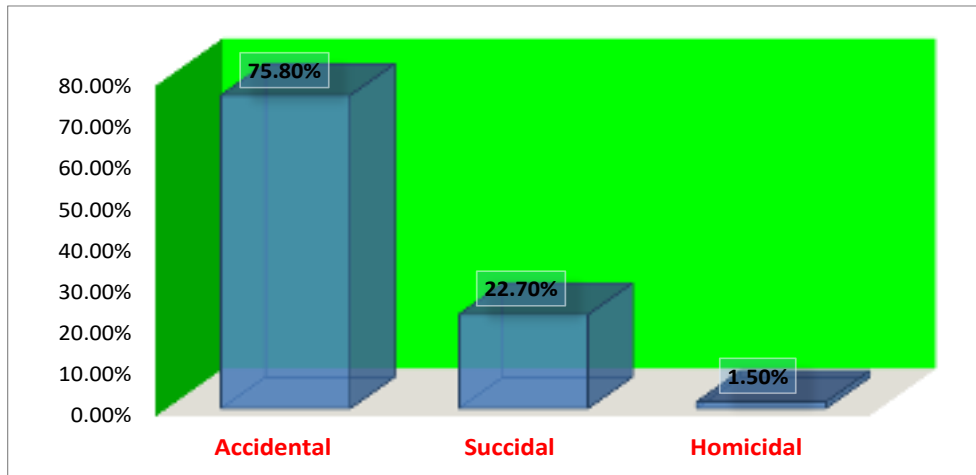


Figure (2): Pie diagram showing different types of drugs used among the medication poisoning group (N=24):

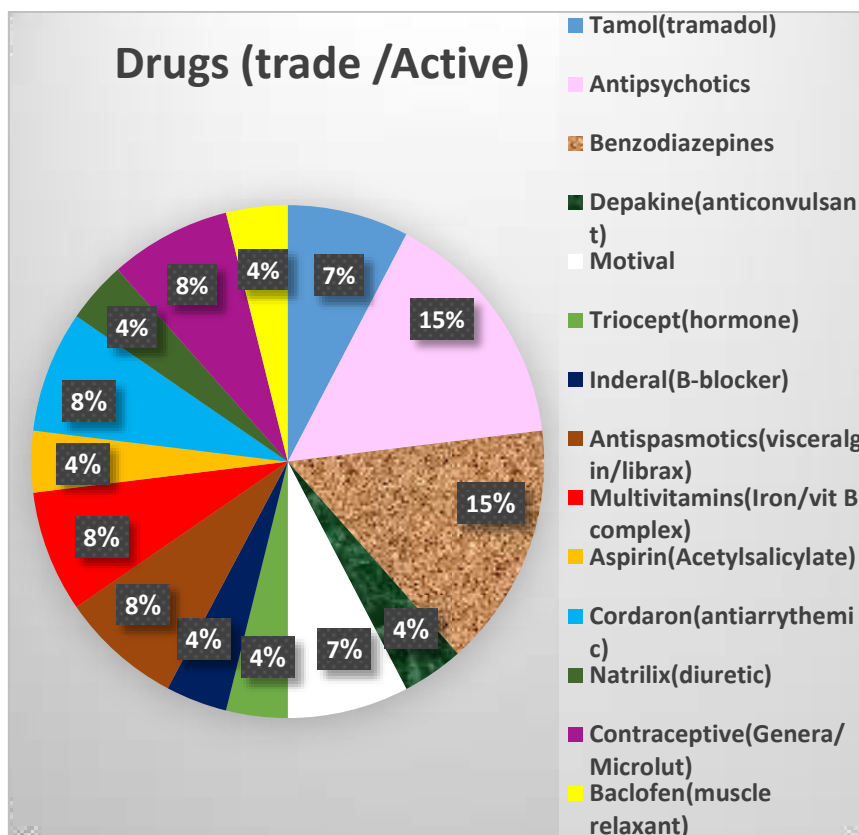


Figure (3): Bar chart showing frequency of treatment modalities (drugs and procedures) used for management of poisoned children (N=66).

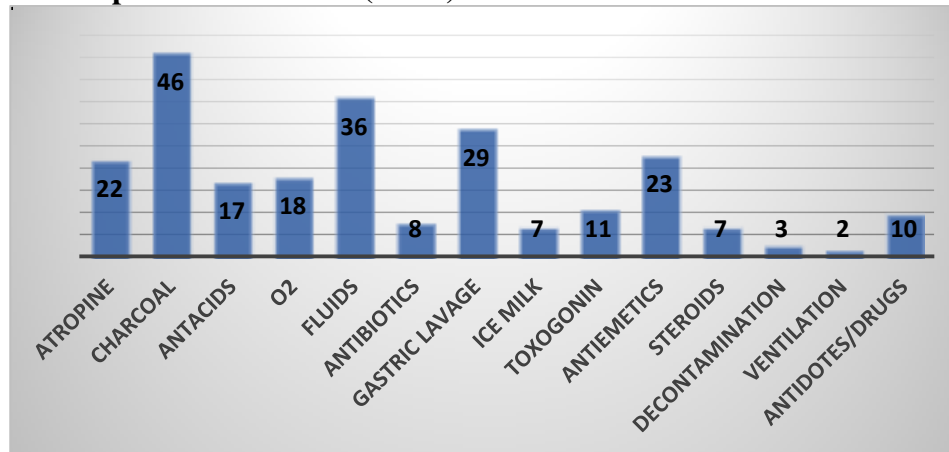


Table (4): distribution of causative poison, its trade name, form and amount in poisoned children (N=66).

	Studied patients (N=66)	
	No.	%
Type of poison(Trade)		
• Organophosphorus (cholinesterase inhibitor)	19	28.8
• Clorox: sodium hypochlorite	6	9.1
• Kerosene (hydrocarbon petroleum)	4	6.1
• Rodenticide(Carbamate)	3	4.5
• Corrosive (Sulphuric acid)	3	4.5
• Snakebite	3	4.5
• Quick (anti lice) (Malathion)	2	3.0
• Phenol (Carbolic acid)	1	1.5
• Tooth paste (Sodium fluoride)	1	1.5
• Drugs	24	36.4
Forms		
• Oral tablet	21	31.8
• Oral fluid	20	30.3
• Oral powder	18	27.3
• Contact Powder	4	6.1
• Bite	3	4.5
Amount		
• Known	42	63.6
• Unknown	24	36.4

Table (5): Distribution of the presenting clinical manifestations of poisoning among the involved children (N=66)

Systems	Studied patients (N=66)	
	No.	%
• CNS	26	39.4
• CVS	22	33.3
• GIT	17	25.8
• Respiratory	8	12.1
• Eye (Miosis)	6	9.1
• Skin burn	5	7.6
• Muscle fasciculations	1	1.5
• Renal	1	1.5
• Normal	5	7.6

Table (6): Comparison between the two outcome groups of poisoned children (discharge and mortality) as regard their demographic data, site of admission, time of hospital arrival after exposure, pattern of poisoning and the causative drug used (N=66). # Mann-Whitney test §Chi-square test. $P < 0.05$ is significant.

	Discharge (n=60)		Mortality (n=6)		Test	p-value (Sig.)
	No.	%	No.	%		
Sex						
Male	25	41.7%	2	33.3%	Fisher exact test	0.525 (NS)
Female	35	58.3%	4	66.7%		
Age						
Mean \pm SD	6.80 \pm 5.42		5.91 \pm 5.96		146.00 #	0.465
Median (Range)	4(1-16)		3.21(1.5-16)			(NS)
Admission site						
Ward	45	75.0%	0	0	Fisher exact test	0.001* (HS)
ICU	15	25.5%	6	100.0%		
Time of arrival (h)						
▪ < 1 hour	2	3.4%	0	0	2.341 §	0.310 (NS)
▪ 1- 6 hours	55	93.2%	5	83.3%		
▪ 6-12 hours	2	3.4%	1	16.7%		
Hospital length of stay						
▪ < 1 day	20	33.3%	0	0	10.638 §	0.005 (S)
▪ 1- 3 days	27	45.0%	1	16.7%		
▪ 3-6 days	13	21.7%	5	83.3%		
Pattern of poisoning						
Accidental	46	76.7%	4	66.7%	10.179 §	0.006 (S)
Suicidal	14	23.3%	1	16.6%		
Homicidal	0	0	1	16.6%		
Type of poison (Trade)						
Kerosene	4	6.7%	0	0	15.371 §	0.081 (NS)
Clorox	6	10%	0	0		
Organophosphorus	14	23.3%	5	83.3%		
Quick (anti lice)	1	1.7%	1	16.7%		
Rodenticide	3	5.0%	0	0		
Corrosive	3	5.0%	0	0		
Snakebite	3	5.0%	0	0		
Phenol	1	1.7%	0	0		
Tooth paste	1	1.7%	0	0		
Drugs	24	40%	0	0		

DISCUSSION

Poisoning is one of the most common medical emergencies in young children and accounts for a significant proportion of emergency department visits in adolescents. Incidence of childhood poisoning reported in various studies ranged from 0.33% to 7.6%. Cause of poisoning varies with age, gender, education, and cultural background and it also shows seasonal variations [7]

The results of the present study showed median age of 4 years among our patients, mean age was 6.71 \pm 5.43 years. The highest percentage of cases (56.1%) occurred at age of 1-5 years.

This was in agreement with Mehrpour study which was performed during period of 2006 to 2012 and reported that the highest incidence of poisoning was at age of 2-5 years [8]

A study by Abbas et al. [9] showed similar findings, with children <3 years having the highest incidence of poisoning (46.5%) in their studied sample.

Children at this age are not able to differentiate between safe or dangerous objects and have a greater tendency to explore their environments and to put any things into their mouths [2]

Regarding gender, the results showed that affected cases were predominant in females more than males (59.1% vs. 40.9%). This agreed with a Brazilian study performed in 2014 showed that the female gender showed a higher incidence of poisonings, in the age group of 1-19 years. [10]

Other studies showed that the incidence was more common in boys. [11,12]. However, some reports showed that distribution is nearly equal in males and females. [6,13]

This study showed that 57.6% of affected cases were from rural areas while 42.4% were from urban areas. This may be explained by the more liability for accidental exposure to agricultural insecticides which represents about 29% of our cases among rural residents.

This was similar to O'Connor study in which children poisoning admission rates had been consistently higher in rural areas than urban areas [14]

Regarding seasonality, we found more cases in summer and winter (34.8% and 25.8% respectively). However, there have been reports that, in most years, the highest number of poisonings occurred during the warm months [15]

Our results showed that 92.3% of cases were exposed to poisoning within 1-6 hour before admission; mean time of arrival to hospital was 3.36 hour.

Similarly, in Gheshlaghi et al study [13], 80%-95% of cases were referred to hospital within three hours.

On the other hand, the median time between poisoning and presentation to hospital in Wani et al. study was 5 hours [16]. Also, Sahin et al. [6] reported that 95.7% of patients presented within six hours following poisoning.

Mean duration of hospital stay in our patients was 2.37days (42.4% of the total cases stayed for 1-3 days) with a significant difference between survivors and those who died. Non survivors showed more prolonged hospital stay, all of them were admitted in ICU with two cases ventilated indicating their bad conditions in spite of intensive medical management.

This was different from another study in which mean duration of hospital stay in survivors was 1.6 days, while it was 9.6 hours in died cases. It showed that there was less hospital stay in expired children. This might be due to poor general condition at presentation of cases that died [16].

We found that time lapse from intoxication or ingestion of poison to hospital arrival was significantly less in survivors as compared to expired children. This suggests that supportive measures and antidotes are less effective if there is much delay in presentation to hospital after poisoning.

Similarly, Wani et. al. [16] study showed earlier arrival of survivors (6.7 hours) than the non survivors (15 hours)

The current study showed that accidental poisoning was dominant (75.8%) in comparison to suicidal and homicidal forms (22.7% and 1.5% respectively). This was in agreement -with different percentage- with a previous Indian study showing that the majority of cases (63.76%) were due to the accidental poisoning followed by suicidal cases (32.89%) and least was the homicidal poisoning seen in only (3.35%) of cases. [17]

In our study, suicidal cases were 15 adolescents (13 females and 2 males), 2 cases used rodenticides and the others used different medications in their suicidal attempts either single drug by large dose or different types of drugs. The commonly used drugs in the suicidal group were antipsychotics and tramadol followed by antiarrhythmic drugs.

Barraq and Farahat [18] conducted a study on pediatric patients in Riyadh, they found that about 25% of cases were suicidal. Suicidal intention was determined if reported in the documents, if patients took more than five tablets (or equivalent) or if an adult took materials known to be very toxic (e.g., Clorox

or rodenticides). They reported most of patients with suicidal attempts were females and the most common method used was medication mainly by acetaminophen although there were about 30 different medications used.

In another study, the suicidal poisoning rate was 23.8% among all poisoned patients, 98.9% of whom were adolescents. [4]

On the other hand, Pawlowicz et al. [19] also reported that poisoning was intentional in 75% of cases and was often due to intoxication by alcohol.

In this study, the more frequent pharmaceutical preparations among studied patients were oral tablets, syrup, and powder (31.8%, 30.3% and 27.3% respectively). This agreed with Ragab and Al-Mazroua study [20] which reported that the most common pharmaceutical preparations involved in the toxic presentation were tablets and syrup forms 41.7% and 20.7% respectively.

The results of the present study showed that organophosphorus compounds were the most common etiologic agents of poisoning (37.9%). It was found that cases were also affected by cleansing agents like domestic bleach (clorox: sodium hypochlorite), kerosene and sulphuric acid (10.6%, 6.1% and 4.5% respectively). The amount of ingested toxins was unknown in 39.4 % of our cases.

The results of the study agreed with Ravi and Afzal [17] who showed that maximum numbers of poisoning cases are due to the pesticides (55.04%) followed by house hold cleaners & detergents; (21.48%) and drugs; (11.41%). Other studies found that petroleum products especially kerosene were the most common source of poisoning. [21,22]. Cleansing products were the most common agents in France, and kerosene was the most common agent of acute pediatric poisoning in Nigeria and Kuwait [23]

In this study, medications constituted 36.4% in our cases, 15% of them were antipsychotics and 15% also benzodiazepines, and in less frequency we found intoxication with contraceptive pills, multivitamins with or without iron, anti-arrhythmics, antispasmodics, tramadol, motival, diuretics, β blockers, aspirin and muscle relaxants.

A study conducted in Tehran reported that benzodiazepines and then anti-depressants were the most common causes of drug poisoning. [24]

Isbister and colleagues stated that children potentially ingesting a toxic dose of antipsychotics or who are symptomatic should be considered for assessment in hospital. Most cases resolve with good supportive care [25]. Many studies listed analgesics and benzodiazepines as the most common drugs in childhood poisoning. [12, 26, 27]

In the clinical profile of studied cases, we noticed that neurological manifestations were the commonest (39.4%) as: disturbed consciousness, convulsions or abnormal movements. Two patients spontaneously recovered a normal neurological condition within the first 24 hours without an antidote treatment.

According to study of Tanné et al [28], the toxicology analysis is crucial to diagnose poisoning in an infant with an acute neurological deficiency who has no fever or known metabolic diseases, and an appropriate antidote treatment can be initiated if it is considered necessary.

In the current study cardiac signs as tachycardia and hypotension occurred in 33.35% of cases which necessitate close monitoring. While gastro- intestinal findings as vomiting, diarrhea and abdominal pain and chest findings in the form of crackles occurred in 25.8% and 12.1% respectively. Two cases needed mechanical ventilation.

On the other hand, Wani et al. [16] showed that vomiting was the most common clinical manifestation observed in more than half of their patients. They reported other common manifestations including drowsiness, increased salivation, tachypnea, miosis, seizures, mydriasis, coma, abdominal pain, diarrhea, and respiratory failure. They also found that on admission 6.2% of children were comatose, among them one-third required mechanical ventilation.

Another study conducted in Saudi Arabia revealed that the most common route was the ingestion of poison (75.5% of cases) and they showed that the most presenting symptoms were GIT upset and vomiting (24.9%). [18]

While Isbister and colleagues reported that unintentional antipsychotic ingestion in children can cause severe effects that last 1-3 days, often with one tablet including CNS depression, extrapyramidal symptoms (EPS) and cardiac effects (arrhythmia, hypotension).[25]

Five cases in our study were asymptomatic with normal examination; they were observed for 24 hours and discharged. Hassanian-Moghaddam and Farnaghi also recommended an observation time of 12 hours for all asymptomatic children who have ingested any dose larger than therapeutic one [29].

As regards treatment modalities used for management of poisoned children, supportive-symptomatic therapy was provided to them; activated charcoal was given for 46 cases, supportive intravenous fluids were used in 36, while gastric lavage was performed in 29 of them. Other treatment modalities were: antiemetics, oxygen, atropine, toxogonin (for organophosphorous poisoning) and other antidotes for different drugs toxicities.

Management schedules were different in other studies, according to involved toxin and clinical picture. Among the cases studied by Wani et al. [16], 34.5% received gastric lavage, and almost one fourth of the children with poisoning received atropine as antidote. Next to atropine 12.8% of patients received pralidoxime as another antidote. In another study charcoal/naloxone was administered for most of the patients [30]

In the current study, 68% of cases were admitted to the Poison Control Center at Zagazig University, while 32% attended pediatric intensive care Unit (PICU), with significant difference between survivors and non-survivors; all the non survivors needed ICU management. Sixty cases (91%) were discharged while mortality was reported in 6 cases (9%).

In a previous study carried up in Zagazig by Hassan and Siam [31], 86% of their patients completed the treatment period and were discharged properly; discharge against medical advice (DAMA) was done for 3.7%, while 10.3% of patients were admitted to the intensive care unit.

An Iranian research published on 2014 included records of 170 patients during 1998 and 147 during 2008 with acute poisoning were retrospectively evaluated and compared. They reported that mortality rate due to drug poisoning was 3-4 cases in both studies; but, non-drug poisoning mortality rate was higher [30]

CONCLUSION

Acute poisoning, either accidental or suicidal, is still a significant cause of hospital admission among children in our locality. Female gender and rural residence were more susceptible, most cases were accidental. Organophosphorus compounds, house-hold cleaning materials and medications were the most frequent causative agents; neurological manifestations were more common than cardiac, gastrointestinal and other manifestations.

The study recommended increasing awareness about potential toxins as possible early management by supportive measures and antidotes is important to improve the prognosis of cases. Also appropriate storage of household cleaning agents to decrease the incidence of accidental poisoning, the use of child resistant containers for medications and dangerous substances may be helpful. Protective measures should be taken during handling organophosphorous materials especially in rural areas. The considerable percent of suicidal cases indicates that designing programs for increasing the awareness of adolescents about the hazards of addicting drugs and good social and psychological support for them is highly recommended. A prospective study of pattern of poisoning in children and comparison of the results of studies in other governorates and other localities is also recommended

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نمط التسمم الحاد في الأطفال بمستشفيات جامعة الزقازيق، خلال عام 2017: (البيانات السريرية والبيانات الديموغرافية)

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المقدمة: لا يزال التسمم الحاد في الأطفال يمثل مشكلة صحية عامة هامة كما يمثل سببا متكررا لدخول وحدات علاج التسمم والطوارئ.

الأهداف: كان الهدف من هذه الدراسة الاستيعادية وصف مختلف خصائص التسمم والبيانات السريرية والوبائية لدى الأطفال المصابين بالتسمم.

المرضى والأساليب: تم دراسة ستة وستين حالة اشتباه تسمم في الاطفال الأطفال حتى عمر 16 سنة خلال عام احد يبدأ من يناير 2017حتى ديسمبر 2017مع استبعاد حالات التسمم الغذائي.

تم أخذ معلومات مفصلة عن جميع المرضى والتي شملت عمر المرضى, طرق الأصابة, طريقه التعرض للمادة السامة, الوقت بين الأصابة و دخول المستشفى, نوع المادة السامة, مدة الحجز بالمستشفى بالإضافة الى تحليل الأعراض و العلامات المرضيه و طرق العلاج نتائجه.

النتائج: وجدنا أن الإناث وسكان الريف كانوا أكثر تعرضا للتسمم، وكانت معظم الحالات عرضية، في حين أن حالات الانتحار والقتل العمد كانت أقل شيوعا، وكانت مركبات الفوسفور العضوية الأكثر شيوعا وتليها الأدوية العلاجية ثم العوامل الأخرى: مبيدات القوارض، الكلور، الكيروسين، المواد الكاوية ، لدغات الثعابين، الفينول ومعجون الأسنان. وكانت معظم حالات التسمم عن طريق الفم.

كانت الاعراض و العلامات المرضية العصبية أكثر شيوعا عن المعوية والقلبية والرئوية. كما وجدنا أن الفاصل الزمني بين التعرض للمادة السامة الوصول للمستشفى كان أقل بكثير في الناجين بالمقارنة مع الأطفال المتوفين.

الاستنتاج: التسمم الحاد –عرضيا كان أو انتحاريا- لا يزال سببا هاما في دخل و حجز الأطفال بمستشفيات جامعه الزقازيق.

وأوصت الدراسة بزيادة الوعي حول السموم المحتملة وكذلك التخزين المناسب لعناصر التنظيف المنزلية و الأدوية لتقليل حالات التسمم العرضي. وتوصي أيضا بالإدارة المبكرة قدر الامكان من خلال التدابير الداعمة ومضادات الترياق و تحسين تشخيص الحالات. كذلك أصت بزياده الوعي بمخاطر الأدوية لدى المراهقين و الدعم الاجتماعي و النفسي لمن أقدموا على محاولات انتحار . كما توصي بعمل دراسات مستقبلية للمزيد من تقييم أنماط التسمم في الأطفال في منطقتنا و مقارنتها بالمناطق الأخرى.