ORIGINAL ARTICLE

A Retrospective Analysis of Acute Poisoning Cases Admitted to Alexandria Poison Center: Pattern and Outcome

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Abstract

Background: Exposure to poisoning can be accidental, suicidal, or homicidal. There is a progressive increase in the misuse of natural and unnatural toxins with increased morbidity and mortality rates. With insufficient databases about the pattern and the outcome of poisoning, no plans can be achieved for prevention and management. So, the aim of the present study was to outline the pattern and outcome of acute poisoning in Alexandria Poison Center (APC), Egypt.
Subjects and Methods: A retrospective cross-sectional study was carried out and included all patients admitted to APC from the 1st of June to the 31st of December in the year 2019.
Results: The total number of admitted poisoned patients in APC was 3881 in 6 months period. The highest incidence of poisoning occurred under the age of 10 years (32.9%) and females outnumbered males. It was noticed that there is significant difference regarding suicidal tendencies where it was higher in females (44.6%) than in males (21.2 %). The most common intoxications were by corrosives (34.9%) followed by pesticides (33. 7%), food poisoning (23.3%) and CNS drugs (23.1%). Most of the poisoned cases (99%) stayed for approximately 1.5 days. Full recovery was the outcome in 99.6% of cases, whereas 0.3% of males and 0.1% of females left without discharge and 0.1% of each gender suffered complications.
Conclusion: The highest percentage of poisoning occurred below the age of 10, with female predominance in poisoning and suicidal tendency. The most common agents involved were corrosives, pesticides, followed by medication overdose and food poisoning. The good outcome of cases was due to the availability of antidotes and trained personnel.

Keywords: Alexandria, Poison Centers, Acute Poisoning, Toxicology, Egypt.

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INTRODUCTION

Acute poisoning and/or drug toxicity are serious public health concerns in most of developing countries. Exposure to poisoning can be unintentional (accidental) or intentional (suicidal, or homicidal) [1]. Poisoning develops when a toxic substance or a toxic dose of a drug is introduced into the body by ingestion, injection, inhalation, or absorption through the skin[2].

There is a progressive increase in the misuse of natural and unnatural toxins due to rapid changes in the life-style and social behavior. That causes increased morbidity and mortality rates due to poisoning. The pattern of acute poisoning may influence the outcome in poisoned patients [3,4].

According to the World Health Organization (WHO), poisons are responsible for more than one million illnesses and 0.3 million deaths worldwide every year [5].

Egypt is an agricultural industrial country with approximately 100 million inhabitants. Drugs and chemicals, particularly pesticides, are widely used and easily obtained; hence the incidence of poisoning exposure is high[6]. Poisoning is considered a public health problem in Egypt, nevertheless, the exact total number and pattern of poisoning cases that occur annually is difficult to record since most of these events go unreported. So, the aim of the present study was to determine the pattern and outcome of acute poisoning cases in Alexandria Poison Center (APC) as a representative of poison centers in Egypt.

METHODS

1-Study Design: A retrospective cross-sectional research was carried out to outline the patterns and outcomes of acute poisoning at Alexandria poison center from the 1st of June, 2019 to the 31st of December 2019 to demonstrate the pattern of poisoning emergencies before the pandemic of COVID-19 that have begun in Egypt in the beginnings of 2020.

2-Data Collection:

Data were collected from APC patient's admission registries using a previously designed checklists to record

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studied variables. Those variables included admitted patient's demographic characteristics, types of incriminated poisons, circumstances, route of poisoning, antidotes used, intensive care unit admissions, duration of hospital stay as well as the outcome.

Pilot study was conducted before the fieldwork to assess the feasibility of data collection using the previously designed tools, completion of patient admission registry, and the best time of center visiting.

Ethical considerations: Confidentiality of data was ensured throughout the study work after the ethics committee's approval. (IRB NO: 00007555 - -FWA NO: 00018699)

Data Analysis

The collected data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Mann Whitney test and Monte Carlo tests were used. The quantitative data were also described using range (minimum and maximum), mean, standard deviation, and median, while the qualitative data were described using numbers and percentages. The significance of the obtained results was judged at the 5% level.

RESULTS

During the study period, the total number of cases admitted to APC, was 3903 patients where the data registry was complete only for 3381patiets. The age of the admitted patients ranged from less than one year up to 86 years. The highest incidence of poisoning occurred in the age group of 1 – <10 years (n=1113, 32.9% of cases) followed by 10 y-, 20 y- both were 782 cases (23.1% each), then 30 y – 399 cases (11.8%), 40 y- 173cases (5.1), where the age group of 50 years and more represents 2.8% of cases (93 patient). The older ages constituted small percentages of cases where the age group 60-70y represented 0.7% of total cases (22 patients), 70-80 y occurred in 13 patients (0.4%) and only 4 patients were over 80 years old.

Females significantly outnumbered males in the studied cases (60. 6%). The main route of administration of poisons was via oral ingestion, followed by other routes as inhalation and skin contact with significant difference between both genders. (Table1). Circumstances of poisoning were mainly accidental in both sexes; but it was noticed that there was a significant difference regarding suicidal tendencies where it was higher in females (44.6%) than in males (21.2 %) (Table 1).

Regarding the cause e of poisoning, the most common poisons involved were corrosives (34.9%) followed by pesticides (33.7%), food poisoning (23.3%) and centrally acting drugs (23.1%). (Table 2). Required laboratory investigations were carried out for all patients. Conservative treatment was performed in all cases, and specific antidotes or measurements were needed in only 1234 patients (Table 3).

Table 1. Distribution of the studied patients (n=3381) according to route and mode of administration of the poison and gender

Route of administration	Males N=1332		Females N=2049		p value
	N	%	N	%	
Oral	1211	90.9	1946	95.0	X^2=44.413 p^{MC}<0.001*
Inhalation	64	4.8	85	4.2	
Injection	2	0.2	1	0.0	
Skin	55	4.1	17	0.8	
Mode of exposure	Males N=1332		Females N=2049		p value
	N	%	N	%	
Accidental	1048	78.7	1135	55.4	X^2=193.764 p^{MC}<0.001*
Suicidal	283	21.2	914	44.6	
Homicidal	1	0.1	0	0.0	

P*: significant at level <0.05*
X2: Chi square test used to compare qualitative variables
PMC: Monte carlo significance of chi square test

Table 2. Distribution of the studied patients according to type of poison and gender

Type of poison		Gender			
		Males		Females	
	Total %	N	%	N	%
1.Food poisoning					
1a.all types except Salted Fish	19.2	128	9.6	197	9.6
1b. Salted Fish (feseekh)	4.1	20	1.5	53	2.6

Table 2. Continued

Type of poison		Gender			
		Males		Females	
	Total %	N	%	N	%
2. Alcohol	7.4	84	6.3	23	1.1
3.Pesticides					
3a. Insecticides	28.1	223	16.7	234	11.4
3b.Rodenticides	3	23	1.7	27	1.3
3c.Aluminum phosphide	2.6	15	1.1	30	1.5
4.Corrosives	34.9	297	22.3	259	12.6
5.Carbon monoxide CO	9	62	4.7	88	4.3
6.CNS drugs					
6a.Anticonvulsants	4.2	19	1.4	58	2.8
6b.Sedative hypnotics	15.1	64	4.8	212	10.3
6c.Antipsychotics	3.8	17	1.3	52	2.5
7.Cough syrup	1.6	13	1.0	13	0.6
8.Antibiotics	0.5	2	0.2	7	0.3
9. CVS drugs					
9a.Antihypertensives	4.9	14	1.1	77	3.8
9b.Cardiac medications	3.4	15	1.1	48	2.3
10.Antidiabetic medications	2.9	8	0.6	47	2.3
11.Aminophylline , theophylline	5.4	23	1.7	76	3.7
12.Analgesia	6.4	24	1.8	95	4.6
13.Other drugs : antithyroid, hormones, cold preparations , slimming tablets , vitamins	12.9	68	5.1	160	7.8
14a.Tramadol	0.8	7	0.5	7	0.3
14b.Heroin	0.25	3	0.2	1	0.05
14c.Hashish	0.9	9	0.7	4	0.2
15.Snake ,scorpion sting	4.3	48	3.6	15	0.7
16.Paints, cosmetics, toothpaste.etc	1.3	11	0.8	11	0.5
17.Unknown substance (usually children and parents did not know or lie)	12.8	120	0.9	243	11.9
18.Marine animal sting	1	10	0.8	4	0.2
19.Heavy metal (iron)	0.8	5	0.4	8	0.4

Table 3. Distribution of the studied patients according to type of received treatment

Type of treatment	Males N=1332		Females N=2049		p value
	N	%	N	%	
Conservative	725	54.4	964	47.0	X^2=59.100 p <0.001*
Conservative and gastric lavage	2	0.2	13	0.6	
Conservative and activated charcoal	104	7.8	320	15.6	
Conservative and antidote	495	37.2	739	36.1	
Conservative, gastric lavage and activated charcoal	6	0.5	13	0.6	

P*: significant at level <0.05*
X^2: Chi square test used to compare qualitative variables

Regarding the duration of hospital stay, most of the poisoned cases stayed in the center for approximately 1.5 days (mean, 1.4±0.7 for males & 1.4± 0.80 for females) with no significant difference between both genders (Table 4).

Table 4. Distribution of the studied patients according to duration of hospital stay and gender

Duration of hospital stay(days)	Males	Females	p value of Mann Whitney test
Mean± SD	1.4±0.7	1.4±0.8	P=0.648
Median	1.0	1.0	
Min-Max	1.0-12.0	1.0-21.0	

p*: p value significant at level at <0.05
Mann Whitney test: non parametric test used to compare quantitative variables in two groups

The total number of ICU admissions was only 58 patients (29 males and 29 female) with no significant difference between males and females (Table 5). It was noticed that the highest percentage of ICU admissions was among patients with unknown type and/or amount of the administrated poison (either the family did not notice, did not know, lied or tried to treat with home remedies) the cases arrived in a bad condition and that necessitate ICU admission (Table 6).

The outcome of studied patients was full recovery in 99.6% of cases, whereas 0.3% of male cases and 0.1 cases of females left without discharge and only 0.1% of each gender suffered from complications (Table 5).

DISCUSSION

Many people become ill or die yearly because of exposure to both manufactured chemicals and natural toxins. Most poisoning cases result from the lack of knowledge about risks, carelessness, misuse, or because of intended self-poisoning [4]. APC is the largest national poison treatment center in the north coast of Egypt, where thousands of poisoned patients are received yearly from different Egyptian governments. The current study included a total number of 3903 poisoned patients presented to the APC during 6 months period in the year 2019.

Age, Gender, and Circumstances of Poisoning:

The current study revealed that in APC, the most common age of poisoning occurred between the ages of 1 – <10 years (n=1113=32.9%), with accidental intentions in the majority. The females were (60.8%) of the total cases. Similar findings have been reported from developed and developing countries who stated that poisoning of children less than 5 or 6 years old constituted the highest percentage of all poisoned cases under accidental circumstances [7,8,9].

Table 6. Distribution of the studied patients according to type of poison and ICU admission

Type of poison	ICU admission	
	N	%
1.Food poisoning		
1a. Salted Fish (فسيخ)	1	1.7
2. Alcohol	2	3.4
3a. Insecticides	7	12.1
4.Corrosives	2	3.4
5.Carbon monoxide CO	1	1.7
6a.Anticonvulsants	1	1.7
6b.Sedative hypnotics	7	12.1
6c.Antipsychotics	3	5.2
9b.Cardiac medications	5	8.6
11.Aminophylline , theophylline	1	1.7
Other drugs : antithyroid, hormones, cold preparations , slimming tablets , vitamins	1	1.7
14a.Tramadol	2	3.4
14b.Heroin	1	1.7
15.Snake ,scorpion sting	2	3.4
17.Unknown substance (usually children and parents did not know or lie)	22	37.9

In 2011, Sahin [10] demonstrated comparable results where 49.1% of all their patients were under four years. Yet, contrary to the current results of APC, they stated that the male/female ratio was 1:06, below 10 years.

Table 5. Distribution of the studied patients (n=3381) according to outcome , ICU admission, and gender

Outcome	Males N=1332		Females N=2049		p value
	N	%	N	%	
Full recovery	1327	99.6	2045	99.8	X^2=4.710 p^{MC} =0.177
Permanent damage	1	0.1	2	0.1	
Escape	4	0.3	2	0.1	
ICU					
No	1303	97.8	2020	98.6	X^2=2.779 p=0.096
Yes	29	2.2	29	1.4	

P*: significant at level <0.05*
X^2: Chi square test used to compare qualitative variables
P^{MC}: Monte carlo significance of chi square test

However, female predominance was present in ages above 10 years.

The prevalence of poisoning at that young age may be explained by the nature of children; they are active and trying to explore the surroundings all the time by tasting or drinking any drugs or chemicals around. They also may imitate adults in some actions as taking the medications, but they have not any ability to understand the outcome of these actions. Mothers may not to describe medications as candies or buy candies that look like medications [7].

On the other hand, a previous Egyptian study in Ain Shams in 2019 noticed that the majority of cases (59.3%) were from 15 to 40 years old followed by the age group less than seven years (26.4%). They attributed the high incidence of poisoning at that age group to the great emotional, social, economic and political challenges in Egypt that may increase suicidal attempts [11].

Females' predominance seen in APC was in agreement with what was observed by Hewala [12] and with those findings in Ain Shams annual report in 2012 [13]. The same was found in a Turkish study by Kesapli in 2018 [14] which stated that females outnumbered males among poisoned cases. Female majority in our study could be due to high rate of family conflicts, domestic violence and emotional liability among young women that may lead to psychological stress. Young women have high tendency to prefer suicidal attempts using different poisons or drugs as a way of escape from reality [15].

Regarding the circumstances of poisoning, the high suicidal intentions among females that was noticed in the present study was in accordance with what was revealed by Hewala's study in 2018 [12] where 44.6% of suicidal cases were among females. Similar observation was reported in Ain shams report in 2013 [13]. This was in contrast to what was stated in the Maryland poison center annual report 2019 [16], which stated that most of the poisoned cases were unintentional (68%).

Route of Administration and Types of Poisoning:

In the current work, the most common route of intoxication was the oral route. A similar result met with the Maryland report, where oral exposure accounted for 58.0% of cases while skin exposure and inhalation accounted for 25.3% and 7.5% respectively [16]. This agreed also with Asawari's study in 2017 [17] where oral ingestion was the main route of exposure, this could reflect the increased possibility of suicidal attempts or household accidental exposure and decreased likelihood of environmental and occupational exposures in our study.

The most common causes of poisoning in the present study were corrosives, pesticides, food poisoning and centrally acting drugs. Similar results were mentioned by Hewala [12], Ain shams report [13], and Kepsali [14]. The wide availability together with the easy accessibility of many chemicals and drugs in the market in both developed and developing countries have played a major role in such poisoning problem [16,18]. Several studies and reports found that pesticides were among those chemicals, and they constitute a problem in many countries [19,20].

The Outcome:

Hospital stays in APC ranged from 1-21 days with a mean of 1.46 ± 0.80 days. We found that the hospital stays in APC were longer than those in non-specialized hospitals in Alexandria and 1234 of the patients were provided with specific antidotes. The outcome in APC was full recovery in 99.6% of cases, whereas 0.35% of cases left without discharge and 0.1% suffered complications.

More extended hospital stays were observed with Galvao and his colleagues in 2011 [21] during their study as ranged from 1-126 days. It is assumed that poison centers, with their trained team, should decrease the hospital stay and the cost for each patient, but this seemed to differ from country to country.

On the contrary, King's study in 2019 [22] stated that the presence of an in-patient medical toxicology service was associated with decreased patient stays in hospital and increased reimbursement for admitted patients. Differences may be attributable to improved patient care provided by medical toxicologists. Tak in 2017 compared the cost of services provided by poison centers and demonstrated economic value by reducing emergency department visits and associated charges [23]. The ICU admission in the present study was 1.49 % of both sexes. That result was better than Sulaj [24] who stated that 19.7% of the poisoned patients were admitted to hospital during their study, of which 10.2% were admitted to the ICU. Moreover, we obtained better results than Sharma [25], who carried out a study in India, where the average stay in the hospital was 12.53 ± 7.53 days, and mortality rate was 42 (8.31%). This can be explained by the availability of many poisons' antidotes for many poisons in APC.

CONCLUSION

This study established the magnitude of poisoning in a very special region of the north coast of Egypt. It revealed that young and middle-aged people were the most susceptible for acute poisoning. In addition, children younger than ten years accounted for about 33% of cases. Females outnumbered males. The foremost route of poisoning was ingestion and suicidal poisoning predominated. Corrosives and detergents were the most commonly involved toxic substances followed by organophosphates.

Recommendations:

Egypt requires a new governmental laws/policy to control household products and insecticides free availability as well as medication marketing. Collaboration between poison centers all over the country is essential to provide an accurate data and mapping of poisoning in Egypt and to outline a national protocol for management of different cases of poisoning. Patients with suicidal poisoning should undergo psychiatric consultation to decrease the risk of repeating those attempts. Health education and awareness programs for the community about hazards of household chemical agents and insecticides together with effective poison information center are considered important strategies for the prevention of these emergencies.

LIMITATIONS

Although the retrospective design of the study limited the data that could be collected and thorough follow-up of patients, we believe that the number of possible missed cases was low. Several physicians made the data collection, and the inter-rater variability is not known. Scanning of forms may lead to errors, which were avoided by manually entering the original forms. Poisoning severity score (PSS) is a simple tool for assessment and referral of cases, yet it was not used in the study as it was deficient in registries.

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