

ORIGINAL STUDY

Assessment of the Pattern, Management, and Outcomes of Acutely Unstable Poisoning Patients in the Emergency Department of Menoufia University Hospitals

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Abstract

Objectives: To evaluate the pattern, management, and outcomes of acute unstable poisoning cases at the Emergency Department of Menoufia University Hospitals.

Background: Drug overdose is a medico-social issue worldwide that may occur intentionally or unintentionally. It is one of the most common reasons for emergency department visits, and it is also a frequent cause of morbidity and mortality globally.

Methods: This was a prospective study performed in the Emergency Department of Menoufia University Hospital. It was carried out on 84 patients triaged to the resuscitation room with toxicological history from March 2022 to March 2023. Full history including personal data, circumstances, and type of poisonous substance were obtained from the patients or their relatives. Assessment of their condition, their management, and outcomes were collected.

Results: A total of 84 poison-exposure cases were recorded. The age of studied cases ranged between 11 years and 80 years, as the mean age was 32.49 (± 13.39) years. The highest incidence of poisoning was seen in those aged between 31 and 40 years (33.3%). Most cases of poisoning (66.7%) were suicidal attempts. Aluminum phosphide was the most common type of poison that was found in more than half of the cases (52.4%). The mortality rate was 40.5% and about 97.1% were mainly from aluminum phosphide poisoning.

Conclusion: The majority of the intentional poisoning occurred in married cases mostly due to aluminum phosphide.

Keywords: Acute unstable poisoning, Assessment of the pattern, Management and outcomes

1. Introduction

Poison is defined as any agent that can injure, kill, or impair normal physiological function in humans, producing general or local damage or dysfunction in the body [1].

Poisoning is a global medico-social problem. Acute poisoning is a common reason for visits to emergency departments and hospitalizations worldwide, and it is a common cause of morbidity and mortality worldwide. Understanding the epidemiology of poisoning and its changes is

important to both emergency physicians and public health practitioners [2].

Poisoning may occur either intentionally or unintentionally. Intentional poisoning is the result of a person taking or giving a substance with the intention of causing harm, which may be homicidal or suicidal, while unintentional poisoning occurs if a person taking or giving a substance did not mean to cause harm [3].

The incidence of poisoning cases is increasing due to changes in the lifestyle and social behavior of humans. According to a report from WHO, there

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were 346,000 deaths worldwide from unintentional poisoning in 2004. Of these deaths, 91% occurred in low- and middle-income countries [4].

The prevalence and types of poisoning vary considerably across the world and depend on socioeconomic status and cultural practices, as well as on local industrial and agricultural activities. Household chemical agents and prescribed drugs are the most common poisoning agents in the developed world [5].

Poisoning is very common in developing countries, and because of weak regulations and poor healthcare services, the consequences of poisoning are much worse than in the developed world. Pesticides are the most common chemicals used to inflict self-harm in developing countries [6].

Management of acute poisoning consists of prevention of cross-contamination, identification of toxins through history or physical examination, supportive and symptomatic care, decontamination, elimination, and antidote therapy [7].

The nature of poisons used varies in different parts of the world and may vary even in different parts of the same country depending on the socioeconomic factors and cultural diversity. It is important to know the nature and severity of poisoning in order to take prompt appropriate measures to save lives and reduce morbidity and mortality [8].

The current study aimed to evaluate the pattern, management, and outcomes of acute unstable poisoning cases at the Emergency Department of Menoufia University Hospitals.

2. Patients and Methods

This study was performed in the Emergency Department, Menoufia University Hospitals from March 2022 to March 2023. This study protocol was approved by the Local Ethics Committee of the Menoufia University. Full consent was obtained from all patients. Data were collected in a pre-organized data sheet; from patients fulfilling inclusion and exclusion criteria.

Each patient was subjected to the following: Full history taking, such as: mode of poisoning, type of poison including the amount, physical state, route of exposure, marital status, occupation, and education state. Medical history, current medications, and allergies were obtained from family or friends if the patient was unable to give the information. Examination of skin, breath (pattern, odor), ear, nose, and throat. Systemic examination of the lungs, heart, abdomen. Neurologic Assessment included: level of consciousness, pupils, seizures. Management by the

ABCDE approach: airway and cervical spine control, breathing, circulation, and disability. Exposure: Laboratory investigations including complete blood count, coagulation profile, liver function tests, kidney function tests, electrolytes such as Na, K, and Mg, cardiac enzymes such as troponin and arterial blood gases (ABG).

Toxicological screening, 12-lead ECG. Radiological investigation including eFAST, chest radiograph, CT if needed. The outcomes of each patient were recorded; they were in the form of ICU admission, ward admission, intermediate care admission, outpatient, and mortality rate.

2.1. Statistical analysis

Data were analyzed using the IBM Statistical Package for the Social Sciences software (SPSS), (Version 26.0. Armonk, NY: IBM Corp). Continuous data were expressed as mean \pm standard deviation while categorical data as numbers and percentage. Inferential analyses were done for quantitative variables using Mann–Whitney U in cases of two independent groups with nonparametric data. Inferential analyses were done for qualitative data using the Chi-square test for independent groups.

3. Results

Overall 84 patients with toxicological history were triaged to the resuscitation room in Emergency Department of Menoufia University Hospital. The age of the studied cases ranged between 11 years and 80 years, as the mean age was 32.49 (\pm 13.39) years. The highest incidence of poisoning was seen in those aged between 31 and 40 years (33.3%), followed by 21–30 years (29.8%) and 11–20 years (15.5%) age groups. There were 42 (50%) males and 42 (50%) females with a male-to-female ratio of 1:1. Most cases (67.9%) were married. Concerning education, 71.4% of cases got secondary education, 11.9% were illiterate, 9.5% cases got higher education, and 7.1% cases got primary education. [Table 1](#).

Regarding clinical data concerning poison among the studied cases, it was found that aluminum phosphide was the most common type of poison that is found in more than half of cases (52.4%), followed by carbon monoxide in 22.6% of cases, then organophosphates in 11.9% of cases, the less frequent other types were antipsychotic (risperidone), alcohol, morphine (opioid), snake bite, and theophylline (two cases in each). More than half of the cases (58.3%) were in solid state, 22.6% of cases in gas state, 9.5% of cases in liquid state, and 9.5% of cases in powder state. The mean amount of poison

Table 1. Distribution of the studied patients as per demographic data ($n = 84$).

| Description | Studied patients (N = 84) |
|-------------------------------|---------------------------|
| Age (years) | |
| Mean \pm SD | 32.49 \pm 13.39 |
| Range | 11.0–80.0 |
| | N (%) |
| Age group | |
| 11–20 years | 13 (15.5%) |
| 21–30 years | 25 (29.8%) |
| 31–40 years | 28 (33.3%) |
| 41–50 years | 10 (11.9%) |
| 51–60 years | 5 (6.0%) |
| >60 years | 3 (3.6%) |
| Sex | |
| Male | 42 (50.0%) |
| Female | 42 (50.0%) |
| Marital status | |
| Married | 57 (67.9%) |
| Single | 26 (31.0%) |
| Divorced | 1 (1.2%) |
| Occupation | |
| Employee | 52 (61.9%) |
| Not Employee | 32 (38.1%) |
| Education | |
| Illiterate | 10 (11.9%) |
| Literate, primary education | 6 (7.1%) |
| Literate, secondary education | 60 (71.4%) |
| Literate, higher education | 8 (9.5%) |
| Residency | |
| Rural | 74 (88.1%) |
| Urban | 10 (11.9%) |

(tablet) detected was 3.39 ± 9.9 . Oral administration was the most frequent route of exposure found in most (72.6%) cases. Most cases of poisoning (66.7%) were suicidal attempts, while 33.3% of poisoning were accidental [Table 2](#).

Regarding the management, it is shown that 61.9% cases were managed by advanced airway while all cases needed oxygen therapy; 57.1% of cases needed fluid resuscitation, while vasopressors were used in 63.1% cases. Gastric lavage was used in 73.8% cases, activated charcoal was used in 35.7% cases, potassium permanganate was used in 20.2% cases, and paraffin oil was used in 39.3% cases. Dialysis was needed in 2.4% cases. Pharmacological treatment was used in 98.8% cases. Regarding antidote, atropine was used in 11.9% cases, antivenom in 2.4% cases, naloxone in 2.4% cases, and ethanol in 1.2% cases. [Table 3](#).

The mortality rate was 40.5% cases, 25% cases needed ICU admission, 21.4% cases were referred to outpatients; 6% of the cases needed intermediate care and 6% cases needed ward admission [Table 4](#), and there was a high statistically significant relation between the type of poison and outcome ($P < 0.001$) as aluminum phosphide was the most frequent type that was found in dead cases (97.1%). [Table 5](#).

Table 2. Distribution of the studied patients as per clinical data concerning poison ($n = 84$).

| Description | Studied patients (N = 84) |
|--------------------------|---------------------------|
| | N (%) |
| Type of poison | |
| Aluminum phosphide | 44 (52.4%) |
| Carbon monoxide (CO) | 19 (22.6%) |
| Organophosphates | 10 (11.9%) |
| Antipsychotic | 2 (2.4%) |
| Alcohol/ethanol | 2 (2.4%) |
| Morphine | 2 (2.4%) |
| Snake bite | 2 (2.4%) |
| Theophylline | 2 (2.4%) |
| Unknown | 1 (1.2%) |
| Physical state of poison | |
| Gas | 19 (22.6%) |
| Liquid | 8 (9.5%) |
| Powder | 8 (9.5%) |
| Solid | 49 (58.3%) |
| Amount of poison (tab) | |
| Mean \pm SD | 3.39 \pm 9.9 |
| Range | 1.0–60.0 |
| Unknown | 37 (44.0%) |
| Route of exposure | |
| Dermal | 2 (2.4%) |
| Inhalation | 19 (22.6%) |
| Injection | 2 (2.4%) |
| Oral | 61 (72.6%) |
| Mode | |
| Accidental | 28 (33.3%) |
| Suicidal | 56 (66.7%) |
| Homicidal | 0 (0.0%) |

Regarding the relation between the mode of poisoning and marital status, there was significant statistical relation as $P = 0.044$. [Table 6](#).

4. Discussion

Acute toxicity management is a major medical problem in the whole world as poisoning is one of the most common causes of coming to hospital emergency departments [9].

The pattern of poisoning in a region depends on various factors, which include availability and access to the poison, socioeconomic status of an individual, cultural and religious influences, etc [10].

Many clinical factors can affect the prognosis and outcome of the poisoned patients and affect the decision of admission to the ICU, such as the type of toxic agent, delay in time to come to the hospital, and multiorgan failure that needs immediate advanced life support which can lead to high mortality [11].

The study included 84 patients with toxicological history triaged to the resuscitation room in the emergency department. The age of the studied cases ranged between 11 years and 80 years, as the mean

Table 3. Distribution of the studied patients as per management (n = 84).

| Description | Studied patients (N = 84) | |
|---------------------------|---------------------------|--|
| | N (%) | |
| Advanced airway | | |
| No | 32 (38.1%) | |
| Yes | 52 (61.9%) | |
| O ₂ Therapy | | |
| No | 0 (0.0%) | |
| Yes | 84 (100.0%) | |
| Fluid resuscitation | | |
| No | 36 (42.9%) | |
| Yes | 48 (57.1%) | |
| Vasopressors | | |
| No | 31 (36.9%) | |
| Yes | 53 (63.1%) | |
| Antidote | | |
| No | 32 (38.1%) | |
| Antivenom | 2 (2.4%) | |
| Ethanol | 1 (1.2%) | |
| Atropine | 10 (11.9%) | |
| Naloxone | 2 (2.4%) | |
| Gastric lavage | | |
| No | 22 (26.2%) | |
| Yes | 62 (73.8%) | |
| Activated charcoal | | |
| No | 54 (64.3%) | |
| Yes | 30 (35.7%) | |
| Potassium permanganate | | |
| No | 67 (79.8%) | |
| Yes | 17 (20.2%) | |
| Paraffin oil | | |
| No | 51 (60.7%) | |
| Yes | 33 (39.3%) | |
| Dialysis | | |
| No | 82 (97.6%) | |
| Yes | 2 (2.4%) | |
| Pharmacological treatment | | |
| No | 1 (1.2%) | |
| Yes | 83 (98.8%) | |

age was 32.49 (\pm 13.39) years. The highest incidence of poisoning was seen in those aged between 31 and 40 years (33.3%), followed by 21–30 years (29.8%) and 11–20 years (15.5%) age groups. There were 42 (50%) males and 42 (50%) females. It is in contrast to the results of Zaghary *et al* [11]. In which most cases aged 16–30 years and 63% of cases were females while 37% were males.

Table 4. Distribution of the studied patients as per outcome (n = 84).

| Description | Studied patients (N = 84) | |
|-------------------|---------------------------|--|
| | N (%) | |
| Outcome | | |
| Died | 34 (40.5%) | |
| Survived | 50 (59.5%) | |
| ICU admission | 21 (25.0%) | |
| Intermediate care | 5 (6.0%) | |
| Outpatient | 18 (21.4%) | |
| Referral | 1 (1.2%) | |
| Ward admission | 5 (6.0%) | |

Table 5. Relation between the type of poison and outcome.

| Description | Survived | Died | Chi-Square Test | Test value P value |
|----------------------|------------|------------|-----------------|--------------------|
| | (N = 50) | (N = 34) | | |
| N (%) | | | | |
| Type of poison | | | | |
| Aluminum phosphide | 11 (22.0%) | 33 (97.1%) | 46.02 | <0.001 |
| Carbon monoxide (CO) | 19 (38.0%) | 0 (0.0%) | | |
| Organophosphates | 9 (18.0%) | 1 (2.9%) | | |
| Antipsychotic | 2 (4.0%) | 0 (0.0%) | | |
| Alcohol/ethanol | 2 (4.0%) | 0 (0.0%) | | |
| Morphine (Opioid) | 2 (4.0%) | 0 (0.0%) | | |
| Snake bite | 2 (4.0%) | 0 (0.0%) | | |
| Theophylline | 2 (4.0%) | 0 (0.0%) | | |
| Unknown | 1 (2.0%) | 0 (0.0%) | | |

El Masry and Tawfik [12] found that the predominant age group in their study was from 15 to 40 years (69%) and 73% of the attempted suicide cases were females.

It was noted that most cases (67.9%) were married and 31% were single. This is in contrast to Mamun [13], who found that most acutely poisoned patients were single and more vulnerable to psychological distress and suicidal attempts.

Regarding the state of education, most patients had secondary-school education (71.4%) and 11.9% were illiterate. This is similar to the results of El-Sarnagawy *et al* [14].

It was found that in this study, aluminum phosphide was the most common type of poison that was found in more than half of cases (52.4%) followed by carbon monoxide in 22.6% of cases, then organophosphates in 11.9% of cases. The less frequent other types were antipsychotics (risperidone), alcohol, morphine (opioid), snake bite, and theophylline (two cases in each). This agrees with the study conducted by El-Sarnagawy *et al* [14]. The most common causative poison was phosphides (19.7%), followed by carbamates/organophosphorus compounds (17.7%), and then antipsychotic drugs (9.1%).

In our study, most cases of poisoning (66.7%) were suicidal attempts, while 33.3% of poisoning were accidental. El Masry and Tawfik [12] found that attempted suicide (49%) exceeded accidental (42.7%) poisoning exposure. This is in contrast to the Hegazy and Elfiky [15] study, where accidental poisoning was more prevalent than suicidal ones (84.4% versus 15.6%). In the study conducted by El-Sarnagawy *et al* [14], of all patients, 216 (85.04%) were caused by suicidal poisoning, while the other 38 (14.96%) were accidental exposures.

There were no homicidal cases recorded in our study, similar to the study conducted by Hegazy and Elfiky [15].

Table 6. Relation between the mode of poisoning and marital status.

| Description | Accidental | Suicidal | Chi-Square Test | |
|----------------|------------|------------|-----------------|---------|
| | (N = 28) | (N = 56) | Test value | P value |
| | N (%) | N (%) | | |
| Marital status | | | | |
| Divorced | 0 (0.0%) | 1 (1.8%) | 6.243 | 0.044 |
| Married | 24 (85.7%) | 33 (58.9%) | | |
| Single | 4 (14.3%) | 22 (39.3%) | | |

It was observed that there was no statistically significant relation between Sex, age, education, and mode of poisoning ($P > 0.05$).

It was observed in our study that the main route of exposure in the studied patients was oral poison ingestion at 72.6%. This finding was also observed in Ahuja *et al* [16] and those issued in the annual report of the American Association of Poison Control Centres in 2010 (79.5%) Bronstein *et al* [17].

Regarding the reasons for poisoning among the studied cases, 20.2% cases reported poisoning due to family disharmony, 13.1% cases due to marital disharmony, 9.5% cases due to psychiatric illness, 8.3% cases due to financial problems, and 7.1% cases due to unknown causes, 3.6% cases due to unemployment, 2.4% cases due to exam failure, while 1.2% cases due to escape from military services and bullying from friends.

Vinay *et al* [18] reported that poverty and inadequate income were responsible for a higher incidence of poisoning among laborers. Failure in the exams or inability to cope with the high expectation from parents and teachers has increased the incidence of poisoning among students.

Regarding the outcome in ED among the studied cases, the mortality rate was 40.5% of cases, 25% of cases needed ICU admission, 21.4% of cases were referred to outpatients, 6% of cases needed intermediate care, and 6% of cases needed ward admission; 1.2% cases had a referral.

Death rate in the study was 40.5%; this percentage was high when compared with other studies such as Zaghary *et al* [11]. In contrast, El Masry and Tawfik [12] recorded a lower mortality rate (0.3%); their report included nonattending, trivial therapeutic accidents and information-seeking cases reported through telephone calls and not only symptomatizing referred poisoning cases, making the comparison unacceptable.

The most frequent fatal poisons in this study were aluminum phosphide (33 of the studied cases), followed by organophosphates. This is in harmony with the results of Hegazy and Elfiky [15], who recorded death due to poisoning with aluminum and zinc phosphide in 60% of their deceased

patients followed by organophosphates. In contrast to the results reported by Abdelhamid [19], where the most frequent cause of death was organophosphates, 23.8% of the total number of deaths. Organophosphates used to be the first cause of poisoning-related deaths in Egypt for several years as documented by the 2011–2015 Ain Shams Poison Control Center annual reports.

Wahab *et al* [20] reported that the mortality rate from aluminum phosphide poisoning is highly variable, ranging from 37 to 100%, and can reach more than 60% even in experienced and well-equipped hospitals. The severity of poisoning from aluminum phosphide depends on the type of compound consumed. Fresh and active compounds (tablets) commonly affect the heart, lungs, gastrointestinal tract, and kidneys, causing severe metabolic acidosis and high mortality. Broken or granular forms of tablets cause mild hypotension and ECG changes, mild metabolic acidosis, and low mortality as the activity of the compound is less.

4.1. Conclusion

The majority of the intentional poisoning occurred in married cases mostly due to aluminum phosphide.

Conflict of interest

There are no conflicts of interest.

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