

Two-Year Epidemiologic Pattern of Acute Pharmaceutical and Chemical Poisoning Cases Admitted to Adama Hospital Medical College, Adama, Ethiopia

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Abstract

Background: Research on poisoning epidemiology in different regions is highly important for evidence-informed health planning. The present study was conducted with the aim of evaluating the two-year epidemiologic pattern of acute poisoning cases treated at Adama Hospital Medical College (AHMC) in Adama, Ethiopia.

Methods: In this retrospective descriptive study, medical records of emergency department patients with diagnosis of acute poisoning from the beginning of April 2013 to the beginning of April 2015 were reviewed.

Result: Data of 292 patients with acute poisoning were retrieved, of which 50.3% were women. The majority of the patients (83.6%) were below 30 years of age. The most common affected patients were in the 21-30 year age-group (39.5%). The highest number of patients were farmers (18.8%) followed closely by unemployed individuals (18.2%). Considering the location of residence, the majority of the patients lived in rural areas (68.8%). Organophosphates were the most commonly used toxic agents (52.1%), followed by household cleaning products (12.7%) and alcohols (10.3%). Four patients died (case fatality rate = 1.37 %) and all of them were due to complications of OP poisoning. Data analyses showed significant correlations between age-groups and intention of poisoning ($P < 0.001$), poison types and patients' gender ($P = 0.011$), and poison types and place of residence ($P = 0.010$).

Conclusion: In Adama, poisonings are more common in rural residents and young adults, and organophosphates are the leading cause of poisoning. These findings warrant social empowerment actions as well as educational programs on poisonings and their outcomes, which should be especially targeted on this stratum of the society (young adult rural residents).

Keywords: Epidemiology; Ethiopia; Organophosphates; Poisoning

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INTRODUCTION

Acute poisoning is a common situation in the emergency departments (EDs) all over the world and involves high medical attention and significant costs (1). The World Health Organization estimated that total number of acute unintentional poisonings throughout the world ranges from 3.5 to 5 million cases annually, of which 3 million cases are severe resulting in 20,000 deaths per year, while the estimated number of annual intentional poisonings is about 2 million cases resulting in 200,000 deaths (2). Moreover, self-poisoning with agricultural pesticides represents a major public health threat especially in developing countries and it accounts for approximately one-thirds of all suicides worldwide (3).

Hospital admissions due to acute poisoning are increasing day by day due to changes in the life style and sociopsychological pressures. Advances in technology and social development have resulted in easy availability of most drugs and chemical substances in different nations (4). Moreover, increased use of over the counter medicines and

uncontrolled use of chemicals and pesticides in agriculture have increased the incidence of poisoning (5,6).

Providing epidemiologic picture of a disease of concern (e.g. poisonings) in a specific region is one of the key elements in evidence-informed health policy-making (7). However, research on poisoning epidemiology in African countries is neglected and only a few epidemiologic studies on the pattern of poisonings in African countries have been published, so far (8-15). In Ethiopia, as the same way, only a couple of studies have reported the epidemiology human exposures in particular regions, to date (14,15). The present study was conducted with the aim of evaluating the two-year epidemiologic pattern of acute poisoning cases treated at Adama Hospital Medical College (AHMC) in Adama, Ethiopia with respect to sociodemographic features of patients, pattern of toxic agents used and reasons behind poisoning events.

METHODS

Setting

This retrospective descriptive study was performed at

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AHMC. The hospital is founded in Adama town located 98 km east of the Ethiopian capital city of Addis Ababa (Figure 1). It was established in 1946 and was called “Hailemariam Mamo Memorial Hospital” by then. The hospital’s name was changed later to Adama Referral Hospital and recently renamed to Adama Hospital Medical College (AHMC) by Oromia regional state health bureau after beginning to train medical students in 2011. AHMC is one of the referral hospitals in the country that serve to large size of population from mid-east and southern Oromia, Afar, Somali, Southern Nation, Nationalities and Peoples (SNNP) and some parts of Amhara region. AHMC currently has a catchment population of about 5 million serving as a referral hospital for all nearby hospitals and the adjacent regions. The hospital has various departments including outpatient, emergency, laboratories, radiology, ophthalmology, internal medicine, gynecology and obstetrics, surgery, orthopedics, psychiatric, pharmacy and pediatric and has a total of 220 beds. In ED, the patients will be evaluated on arrival and after stabilization they will be referred to the appropriate department.

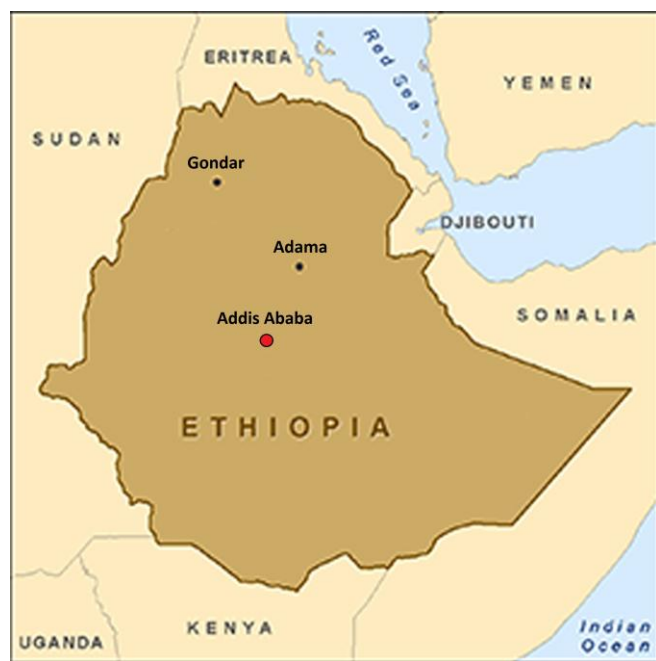


Figure 1. Map of Ethiopia and the catchment area

Ethics

Ethical clearance was obtained from the department of pharmacy, Ambo University. Permission to use medical records was obtained from the AHMC’s medical director. Confidentiality on the content of the records was kept by the investigators and information was only utilized for the research purpose.

Data collection and analysis

Based on the study objectives, medical records of ED patients involved with acute poisoning from the beginning of April 2013 to the beginning of April 2015 were reviewed. Diagnosis of poisoning was based on patients’ (or their relatives’)

history and clinical findings. The medical records were retrieved from the main registration office of the hospital by an authorized hospital staff. For this purpose, the card numbers in the ED registration book were used. After selecting the cards, the necessary and available information was collected and entered into a pre-designed data checklist. Data collected included patient’s age, gender, marital status, place of residence, poison types, intention behind poisoning, treatments delivered to the patients, and final outcomes. Toxic agents were classified as drugs, household cleaning agents, carbon monoxide (CO), alcohols, rat poison, contaminated food, kerosene, organophosphates (OP) and other pesticides. Poisoning with natural toxins including venomous animal envenomations, plant intoxications, and mushroom poisonings were excluded from our evaluation. All data were analyzed using SPSS software version 20 (IBM Corp., Armonk, NY, USA). The data are expressed with frequency and percentage for qualitative variables and with mean \pm standard deviation (SD) for quantitative variables. Relationship between qualitative variables was analyzed using the chi-squared test. P values less than 0.05 were considered statistically significant.

RESULTS

Sociodemographic profile of patients

During the study period, a total of 298 patients with diagnosis of acute poisoning were treated at AHMC. However; only 292 medical records contained complete information of the patients. There was a minor predominance of women ($n = 147$, 50.3%) with a female-to-male ratio of 1.01:1. Mean (SD, min-max) age of the patients was 23.1 (11.6, <1-80) years and the majority of the patients (244, 83.6%) were below 30 years of age (Figure 2).

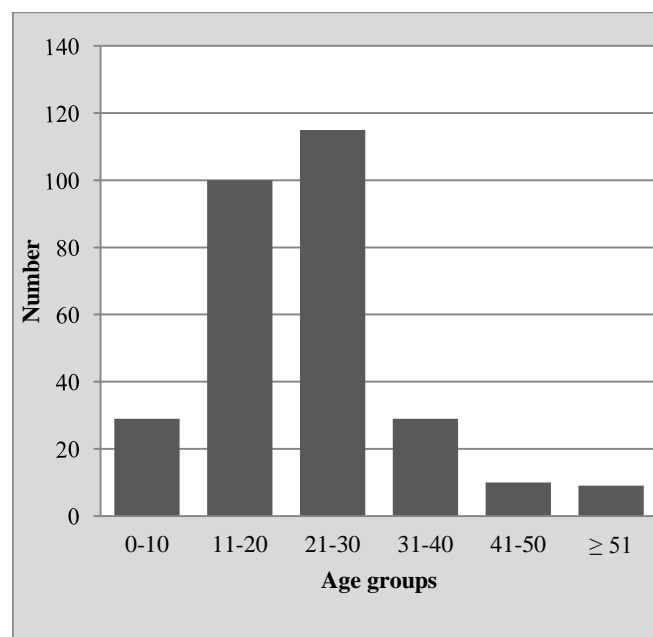


Figure 2. Frequency (n, %) distribution of the patients according to age-groups

Table 1. Sociodemographic characteristics of the patients (n = 292)

| Variables | N (%) |
|---------------------------|------------|
| Marital status | |
| Single | 162 (55.5) |
| Married | 116 (39.7) |
| Divorced | 14 (4.8) |
| Occupation | |
| Farmer | 55 (18.8) |
| Unemployed | 53 (18.2) |
| Daily laborer | 38 (13.0) |
| Students | 31 (10.6) |
| Housewife | 25 (8.6) |
| Government employee | 22 (7.5) |
| Private employee | 16 (5.5) |
| Unreported | 54 (5.5) |
| Place of residence | |
| Rural | 201 (68.8) |
| Urban | 91 (31.2) |

The marital status of the patients showed that the majority were single (162, 55.5%) (Table 1). Based on reported employment status, the highest number of patients were farmers (55, 18.8%) followed closely by unemployed individuals (53, 18.2%). Considering the location of residence, the majority of the patients lived in rural areas (201, 68.8%).

Type of poisons and circumstances of poisoning

Figure 3 illustrates the type of poisons used by the patients. As can be seen, OPs were the most commonly used toxic agents (152, 52.1%), followed by household cleaning products (37, 12.7%) and alcohols (30, 10.3%).

In 211 cases (72.2%), the intention behind poisoning was reported, and in 104 cases (35.6%) was "accidental" whereas in 107 cases (36.6%) was "deliberate self-poisoning". According to history by the patients or their relatives, the underlying causes of suicidal poisonings were social conflict with family or friends in 63 cases followed by alcohol abuse in 26 cases, and mental illness in 16 cases.

Treatments and outcomes

The treatments delivered to the patients included gastrointestinal decontamination for 162 (55.6%) poisoned patients, specific antidote and atropine for 110 OP-poisoned patients (37.8%) and high pressure oxygen for 5 CO-poisoned patients (1.7%). The vast majority of the patients improved and discharged in good condition; and only 4 patients died (case fatality rate = 1.37 %), all of whom were due to complications of OP poisoning. Twenty-four patients (8.2%) were referred to psychiatric department.

Analysis of correlations

Table 2 shows intention of poisoning (in reported cases) plotted against age-groups and gender. As can be seen, the intentions behind poisoning were significantly different between age-groups (P < 0.001). In this respect, in patients

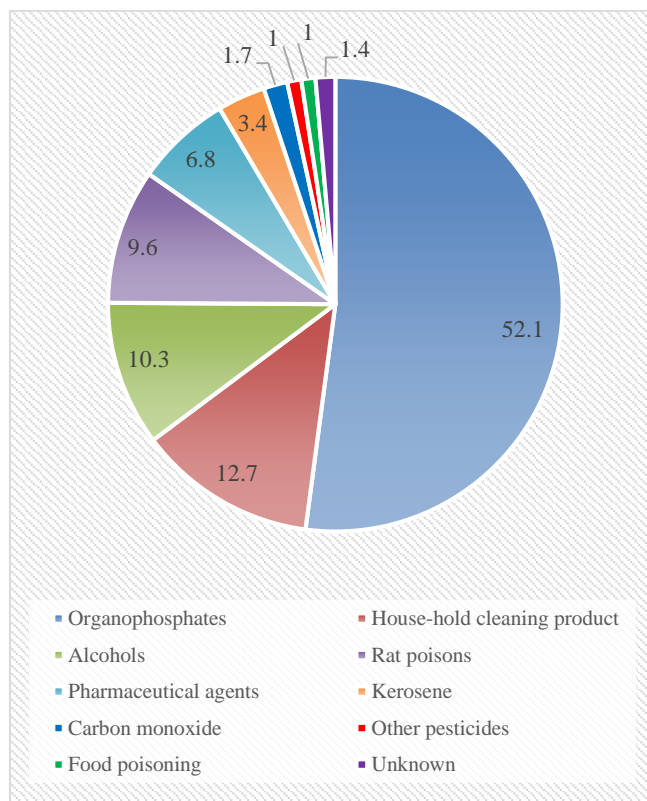


Figure 3. Frequency distribution (%) of toxic substances used by poisoned patients treated at AHMC; 2013-2015 (n = 292)

with less than 10 years of age, no suicidal intention was reported. On the other hand, the majority of poisoned patients with 21-30 years of age had suicidal intention. Although suicidal intention was more common in women, no significant difference between genders according to intention of poisoning could be established (P = 0.147).

By plotting gender and place of residence against poison types, it was found that poisons used for poisoning were significantly different between men and women (0.011), as well as rural and urban residents (0.010). Accordingly, men were more commonly affected by OPs, alcohols, and kerosene, whilst women were mostly affected by household cleaning products, rat poison, CO and contaminated food (Table 3). In addition, considering the place of residence of the patients, use of OP compounds, rat poison, household cleaning products and kerosene for poisoning was significantly more common in rural patients, while CO poisoning was only observed in urban residents.

DISCUSSION

In this study, a two-year epidemiologic pattern of acute poisoning in 292 patients treated at AHMC, Adama (in northeast Ethiopia) from April 2013 to April 2015 was provided. The frequency distributions of gender variables were nearly similar (50.3% women vs. 49.7% men) in the present study, which was unlike the other two hospital-based epidemiologic studies on poisoning in Ethiopia, i.e. female predominance in the study carried out in Gondar University

Table 2. Cross tabulation of age-groups and gender with reported intention behind poisoning in poisoned patients treated at AHMC, 2013-2015 (n = 211*)

| Variable | Total, n | Intention, n (%) | | P value |
|-------------------|------------|------------------|------------|---------|
| | | Suicidal | Accidental | |
| Age-groups | | | | |
| <10 | 29 | 0 (0.0) | 29 (100.0) | < 0.001 |
| 11-20 | 66 | 30 (45.5) | 36 (54.5) | |
| 21-30 | 85 | 62 (72.9) | 23 (27.1) | |
| 31-40 | 20 | 8 (40.0) | 12 (60.0) | |
| 41-50 | 5 | 4 (80.0) | 1 (20.0) | |
| >50 | 6 | 3 (50.0) | 3 (50.0) | |
| Gender | | | | |
| Male | 107 | 49 (45.8) | 58 (54.2) | 0.147 |
| Female | 104 | 58 (55.8) | 46 (44.2) | |
| Total | 211 | 107 | 104 | |

* In 81 cases, the intention of poisoning was not reported

Table 3. Cross tabulation of gender and place of residence with type of the poisons responsible for poisoning in poisoned patients treated at AHMC, 2013-2015 (n = 292)

| Variable | Poison type, n (%) | | | | | | | | | | P value |
|---------------------------|--------------------|-----------------------------|-----------|------------|-------------------------|-----------|-----------------|------------------|-------------------|----------|---------|
| | Organophosphates | Household cleaning products | Alcohol | Rat poison | Pharmaceutical products | Kerosene | Carbon monoxide | Other pesticides | Contaminated food | Unknown | |
| Gender | | | | | | | | | | | |
| Male | 85 (55.9) | 1 (33.3) | 20 (66.7) | 13 (46.4) | 9 (24.3) | 6 (60.0) | 1 (20.0) | 8 (40.0) | 0 (0.0) | 2 (50.0) | 0.011 |
| Female | 67 (44.1) | 2 (66.7) | 10 (33.3) | 15 (53.6) | 28 (75.7) | 4 (40.0) | 4 (80.0) | 12 (60.0) | 3 (100) | 2 (50.0) | |
| Place of residence | | | | | | | | | | | |
| Rural | 113 (74.3) | 2 (66.7) | 16 (53.3) | 20 (71.4) | 25 (67.6) | 9 (90.0) | 0 (0.0) | 13 (65.0) | 1 (33.3) | 2 (50.0) | 0.010 |
| Urban | 39 (25.7) | 1 (33.3) | 14 (46.7) | 8 (28.6) | 12 (32.4) | 1 (10.0) | 5 (100) | 7 (35.0) | 2 (66.7) | 2 (50.0) | |
| Total | 152 | 37 | 30 | 28 | 20 | 10 | 5 | 3 | 3 | 4 | |

Hospital (53.7% women) located at Gondar in northwest Ethiopia (14), and in the study performed in Black Lion (Tikur Anbesa) Hospital (64.6% women) located at Addis Ababa in central Ethiopia (15). This was also contrary to the results of the studies performed in Bangladesh and India where men slightly outnumbered women (1,4).

Mean age of the patients in this study (23.1) was similar to the two mentioned studies in Ethiopia, i.e. 22 in Gondar Hospital and 21 in Black Lion Hospital (14,15); and was close to the mean age of patients (22.6 years) in the study performed in Rift Valley Provincial General Hospital, Nakuru, Kenya (13). In addition, higher incidence of poisoning in patients in the 21-30 year age-group in the present study was replicated in many other poisoning epidemiology studies carried out either in African or in Asian

Pacific countries (1,4,8-17). Suicidal ideation behind the poisoning event was also more prevalent in these ages. These two facts further confirm that people at these ages are more vulnerable to commit risk taking behaviors as they are more affected with stress. To put it in other words, 21 to 30 year people may experience higher socio-economic burden as the majority of them are under pressure to support themselves and their families. Other reasons for committing suicides could be alcohol and drug abuse (1,18,19). Besides, intentional poisoning was more common in women in the current study resembling a study in India (20). This can be explained by the fact that more socio-economic pressure might be laid on women in developing societies. Moreover, women might be more sensitive to socio-psychological problems such as marital disharmony, family conflicts and loss of family members (21).

In this study, OP compounds were the most common poisonous substances consumed by the patients followed by household cleaning agents. This is similar to the findings by Abula and Wondmikun demonstrating OPs as the most commonly used poisons in Gondar, Ethiopia (14). Similarly in Nakuru, Kenya, pesticide poisonings accounted for highest number of cases (13). In contrast, in the study done by Desalew et al in Addis Ababa, Ethiopian capital (15), in a study by Ouédraogo et al in Burkina Faso (10), in a multi-center study by Malangu in Botswana, South Africa and Uganda (11), drugs and household chemicals were the commonest agents used for poisoning. This may attributed to the fact that most of the poisoned patients in our study were rural residents. Poisonous agents used by patients can be linked to geographical variables, as their availability somehow depends on the living location of patients. In other words, rural residents who are commonly engaged with agricultural activities have more access to agrochemicals (3,4). In urbanized (and developed) regions, however; drugs, household chemicals, CO and alcohol are the most common responsible causes of poisoning (22-25). CO poisoning only occurred in urban residents in the present study. This can be explained according to the Ethiopian scenario of the common use of coal as the heating agent especially for cooking and most commonly by women. Tahouri et al similarly reported higher prevalence of CO poisoning in urban areas and women in Morocco (26). In the same direction we found that there is a gender preference in the poison types responsible for poisoning. In this respect, for example, OPs were more commonly used by men while women were more affected by household cleaning products. Again, accessibility to the poisons may have a role in this gender preference, as cleaning agents are mostly used by women at homes and agrochemicals by men in farmlands. In the present study, the case fatality rate was 1.37% which was much lower compared with 8.6% in Black Lion Hospital, Addis Ababa, and 2.4% in Gondar Hospital, Gondar (14,15).

LIMITATIONS

Because our study was a hospital-based retrospective evaluation of acute poisonings, the results may not be representative of the general population. In addition, as a cross-sectional study design, definitive cause and effect relationships may not be determined. Furthermore, regarding the retrospective nature of the study, some medical records lacked completeness and study variables could not be completely collected and analyzed. In this respect, intention behind poisoning was not reported in 81 medical records. The type of poisons presented in this study were only obtained from patients' (or their relatives') history, because specific laboratory facilities for investigation of the poisons in blood or urine were not available in the hospital.

CONCLUSION

The knowledge of the general pattern of poisoning in a particular region would help to identify the risk factors and allow early diagnosis and management of such cases, which in turn can result in reduction of morbidity and mortality. In Adama, poisonings are more common in rural residents and

young adults, and OP compounds are the leading cause of poisoning. These findings warrant social empowerment actions as well as educational programs on poisonings and their outcomes, which should be especially targeted on this stratum of the society (young adult rural residents in Adama).

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