



Epidemiologic and clinical evaluation of the acute intoxication in pediatric patients

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Abstract

Acute poisoning is a critical and emergent public health problem worldwide among pediatric age group. The common epidemiological observation is required to understand the characteristics of the pediatric intoxication for each location and important for management the poisoning cases. This retrospective study researched the epidemiology of poisoning among children. This study represented the epidemiology of poisonings of children admitted to the pediatric intensive care unit at Afyonkarahisar Health Science University Faculty of Medicine between February 2020 and May 2021. Fifty one pediatric patients were referred to the PICU due to acute intoxication. 58.9% of the analyzed patients were male and 41.1% were female. The mean age of all patients was 8.57 ± 7.6 . The majority of cases were due to drug-related poisonings. The average age of cases of suicidal poisoning was higher than accidental intoxication cases. Paracetamol was the most prevalent cause of drug-related intoxication and more common in children under 5 years of age and selective serotonin reuptake inhibitors were more frequent in adolescent group. All patients survived. Almost all of the patients were discharged from hospital within 3 days. Poisonings are still a serious reason for morbidity and mortality in developing countries among children. Early awareness of poisoning and appropriate management appeared to be effective and to decrease the mortality rate.

Keywords: Poisoning, intensive care unit, pediatric, management

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Introduction

Acute intoxication is a prevalent and significant fatal public health problem in children despite regulatory intervention and medical advances and also represents a frequent reason of admission in emergency departments, which contributes to additional costs of patient care [1]. Although poisoning may occur at any age, the incidence of childhood poisoning is most commonly observed at children younger than six years of age [2]. The cause of poisoning varies with age, gender, education, and cultural background, and also shows seasonal variations. House cleaning products poisoning is most common cause of intoxication agent at 3-5 years of age, drugs used for committing suicide are the primary cause of intoxication at school age groups [3]. Poisoning exposure usually causes minor symptoms or commonly asymptomatic on admission in young children; the mortality rate of poisoning is approximately 3-5% [3]. Epidemiological documentation of childhood poisonings for each region is very important for prevention and understanding of characteristics problem of poisoning and also these information contribute the development of health policies and treatment plans. In this article, we investigated the pediatric patients who were hospitalized because of acute poisonings in the pediatric intensive care unit (PICU). The main aim of this research was to present the epidemiology, pattern, duration and the outcome of management of poisoned patients.

Materials and Methods

The data of all patients aged 0-18 years who were hospitalized to the pediatric intensive care unit at Afyonkarahisar Health Sciences University Faculty of Medicine for acute poisoning between February 2020 and May 2021 were investigated systematically in this retrospective clinical study. The diagnosis of poisoning was based on the history taken from the patient or their relatives. Acute food poisoning patients were excluded. Age and sex of patients, time from poisoning to arrival at the emergency department, symptoms and signs on admission, substances responsible from intoxication, the way of intoxication (accidental or suicide), specific and supportive therapies performed in the emergency department or pediatric intensive care unit, length of stay in the PICU, and the outcomes were noted. The computerized automation system of the university hospital was used to obtain of the data.

Ethical statement

The study protocol was approved by Afyonkarahisar Health Sciences University Medical Faculty Ethical Committee. All patient information was protected and kept confidential.

Statistical analysis

In statistical evaluation, SPSS 22.0 Windows program was used. Independent samples t-test or Mann-Whitney U test was used for comparison of continuous variables and Fisher's exact test or chi-square test for categorical variables. A p value less than 0.05 was accepted statistically significant.

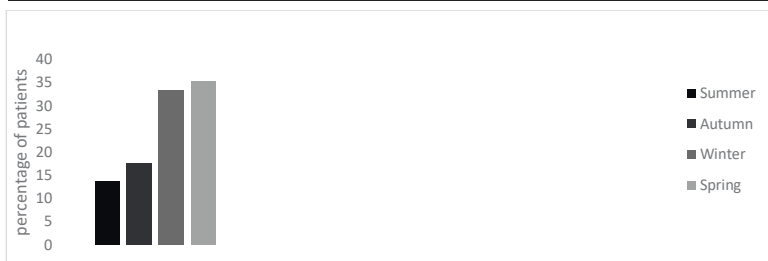
Results

A total of 51 acute childhood poisoning cases were admitted to the pediatric intensive care unit of our hospital between February 2020 and May 2021. The mean age of all patients was 8.57 ± 7.6 . Thirty-one (58.9%) of them were male. Twenty six children, forming 51% of all patients, were under the age of five. Suicidal poisonings were significantly common in the female patients ($p < 0.001$). 41.2% of all patients were over 10 years old ($n = 21$ patients). According to age groups, 55% of patients older than 10 years of age were females. The average age of cases of suicidal poisoning was older than accidental intoxication patients (15.3 years vs. 4.08 years; $p < 0.001$). The mean age of the cases presenting with suicide intoxication was 13.6 years.

Drug poisonings were the cause of poisoning in 86.2% of patients, although non-drug poisoning was encountered in 13.8% of patients. There was no significant difference in drug and non-drug intoxications by gender. Most of the cases (64.8%) were accidental poisoning. Thirteen poisoning cases occurred as a suicide attempt and 72.2% ($n = 18$) of these patients were girls. Twenty four children, forming 47% of all patients, were under five years of age and all these patients had accidental intoxication. 39.2% of all patients were older than the 10 years of age ($n = 20$) and 75% of these age group had suicidal intoxication (Table 1). Although poisoning occurred mostly in spring and winter months, there was no significant difference in overall seasonal distribution (Figure 1). While only 33.3% of patients referred to the emergency department within 60 minutes after initial poisoning incident, 68.7% referred within 2 hours, and 94.1% after 6 hours. The mean admission duration to the emergency department is 2.41 hours. Most cases of poisoning occurred at home 86.2% and

Table 1: Type of poisoning according to age groups

Age Groups	Suicidal n (%)	Accidental n (%)	Total
0-5	0	26 (78)	26 (51)
5-10	0	4 (12.1)	4 (7.8)
>10	18 (100)	3 (9.1)	21 (41.2)
Total	18 (100)	33 (100)	51 (100)

**Figure 1.** Seasonal distribution of poisoning cases

all intoxications were administered orally.

Drugs were the most common agents causing poisoning (84.3%) (Table 2). Paracetamol was the most prevalent cause of drug-related intoxication and more common in children under 5 years old. Selective serotonin reuptake inhibitors (SSRI) were the most common drug that causes poisoning older than 10 years of age and also among the cases of suicidal poisoning, SSRI were the most commonly ingested medication.

Gastrointestinal symptoms, nausea and vomiting, were the major complaint of patients at the admission to emergency department (38.8%), followed by neurologic symptoms like unconsciousness (%16.6).

In most cases management strategy was non-specific, including decontamination and supportive-symptomatic therapy. Gastric lavage was employed in 17 children and activated coal applied in 19 patients

Table 2. Agents causing poisoning

Agents	n (%)
Drugs	44
Alcohol	2
Corrosive Substances	3
Hydrocarbons	1
Insecticides	1

Table 3. Intensive Care Interventions for the Treatment of Intoxication

Interventions	n (%)
Gastric lavage	17(33.3)
Activated coal	19 (37.2)
Antidote	15 (29.4)
Alkalization	1(1.9)
Hemodialysis	2 (3.9)
Ventilatory support	1 (1.9)

who had ingested poison.

Esophagoscopy was performed only in 3 patients to evaluate the esophageal stricture who had ingested corrosive substances. Hemodialysis was performed in two patients who developed acidosis after alcohol intoxication. Mechanical ventilator support was applied to a patient with mefenamic acid intoxication due to respiratory failure. Alkaline therapy was administered to a patient with anticholinergic intoxication due to wide QRS tachycardia. N-acetyl cysteine was administered as an antidote to all patients with a history of toxic dose intake of paracetamol, although the blood drug level could not measure for technical reasons (Table 3). Fourty-four cases were discharged from health institution within 3 days. Seven cases hospitalized in PICU more than 3 days. Our patient's mortality rate was zero a result of poisoning.

Discussion

Acute poisoning is a well-known common problem in childhood period. Early and efficient intervention can reduce morbidity and mortality ratio. Recognition and documentation of epidemiological outlook and different factors for childhood intoxication is crucial for determining treatment choices and planning suitable preventive measures [4]. Epidemiological studies conducted for poisonings of all regions will provide better treatment for intoxication cases. Little information has been published concerning with childhood poisoning in our region. According to the World Health Organization (WHO), acute intoxication accounts for an estimated 45,000 deaths annually among pediatric age group and patients under the age of 20 years [5]. In Turkey poisoning range was between 0.21% and 6.2% [3].

In this study poisoning occurs more commonly in boys during the first five years of life and all of the cases were accidental poisoning. In older than 10 years age group, poisoning is more common in girls, usually involving suicidal intoxication type. Our findings of age group consistent with findings of previous studies. Ozdemir et al presented that poisoning were more frequent in males with younger than 5 years of age while in adolescent poisoning was more common seen in females [1]. Similar findings have been

reported from Sahin et al, male/female ratio was 1.06 in younger age patients and female predominance was present after ten years of age group [6]. Similar outcome have been reported several studies from Turkey and other developed countries [7-9].

Approximately eighty percent of our cases had been poisoned by drug-related agents. The same findings was reported in studies from developed and developing countries [1,6]. H Ozdogan et al presented that nearly two-third of their patients had been poisoned by other than pharmacological agents like foods, hydrocarbons, and pesticides [9]. Paracetamol was the first important cause of drug-related poisoning and more common among children under 5 years of age. Paracetamol and antidepressants were the most common causative agents of drug-related poisoning in the 1-4 age group in the study of Andiran et al [8]. Sertraline is one of the most frequently treatment modalities used in major depression, was the most common identified drug related poisonings older than 10 years of age in our study group. This was because of the antidepressant drugs were the medication of our patients so easy to access to agents. Tricyclic antidepressants were reported the most common intoxication agents in school-age children by Sahin et al [6]. The most spectacular results in Ozdemir et al study were the increasing ratio of amitriptyline intoxication, while decreasing ratio of salicylate intoxication and rising count of suicide attempts in pediatric age group over the 33 years [1]. Similar result was reached in a study made by Gunnell, in that study one of the most commonly identified drug was antidepressants [10].

In our study we found that incidents of poisoning occurred more frequently in winter and spring. Similar findings was reported from another study that most poisonings occurred in spring months [6]. Accidental intoxication happened more common in summer and less frequently during the winter season. In other words, intentional intoxications peaked in winter months, although occurring less commonly during the summer in Turkey [1].

The clinical presentation of poisoning is different and nonspecific. Usually, gastrointestinal and neurological symptoms were seen in our study, which was associated to the frequency of intoxications from ingesting drugs.

In most cases, non-specific therapy was applied, including decontamination and supportive treatment. Gastric lavage was applied in 17 (33.3%) patients, and activated coal was given to 19 (37.2%) patients who

came to emergency department within the first two hours following poisoning. Gastric lavage should be considered only within the first 60 minutes of ingestion and not performed routinely due to the associated with a 3% complication rate (12, 13).

In developed countries, average mortality rate is 1% as a result of acute poisoning, 3-5% in developing countries. In our study, none of our patients died (11). Our good prognosis in pediatric intoxication patients might be assignable to the fact that the more than half of poisoning patients involved accidental intoxications and visited emergency unit within 2 to 6 hours after poisoning.

Conclusion, most poisonings occurred in under five years old children via the accidental ingestion and drug-related ingestion was the leading cause of poisoning. Female adolescents' ratio were common among older age group. The result of this study facilitates especially paediatrician who work in Afyonkarahisar region to develop preparations for pediatric poisoning cases.

Study Limitations

There are three main limitations to our study. It was a single center retrospective study and conducted with a limited number of patients and almost all of our patients with mild clinical course.

Funding

This observational study not received any external funding.

Conflicts of Interest

All authors declare no conflict of interest relevant to this study.

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