ORIGINAL ARTICLE

Prevalence of symptoms in patients poisoned with iron in Ahvaz Razi Hospital in 2014-2017

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Abstract

Background: Iron is an important element for normal cell metabolism, but in excess amounts is quite cytotoxic, and even deadly. Iron poisoning is a calamity repeated many times in the world. Iron tablets are specifically tempting to children because they can look similar to candy. Iron overdose in adults is usually to attempt suicide.
Methods: The present study is a descriptive-analytic study based on hospital information, that was conducted among the patients affected with iron poisoning admitted to Razi hospital (a referral medical setting for poisoning treatment in southwest Iran) during 2014-2017. Patient information has been extracted and inserted in the inquiry form and data were analyzed by SPSS software.
Results: In this study, 52 patients (94.2% female) were studied. 5 (9.6%) of the women were pregnant. The majority of them (69.2%) were between 15-25 years of age. Nausea and vomiting (50%) are two of the most common side effects. 5 patients (9.6%) received deferoxamine. All patients who received deferoxamine had a symptom onset of less than 6 hours. Most patients were hospitalized between 6-24 hours post ingestion. 25% of patients took vitamins simultaneously with iron. The serum iron level in 3 patients (5.8%) was above 300 µg/dL. In this study, one patient expired.
Conclusion: In this study, the prevalence of iron poisoning was examined based on demographic and clinical characteristics. Considering the prevalent iron poisoning in young age groups (96.2% suicides), more research in the psychological and social problems is critical for preventative behaviors.

Keywords: Poisoning, Iron, Deferoxamine, Patient, Iran

How to cite this article: Rahmani AH, Molavinia S, Boustani F. Prevalence of symptoms in patients poisoned with iron in Ahvaz Razi Hospital in 2014-2017 . Asia Pac J Med Toxicol 2020; 9(3):104-107.

INTRODUCTION

Iron poisoning is a frequent occurrence in children and can be accidental or deliberate. Overdose of iron-containing products can be fatal in children(1). Over the past ten years, parent education and healthcare have led to a dramatic reduction in iron poisoning. The first report of iron-poisoning was in the mid-twentieth century(2). Iron is an essential element for organ function in the body, but in excess quantities causes cytotoxic and lethal effects. It affects virtually all organ system in the body(3). The only clinical indication for iron intake is the treatment or prevention of iron deficiency anemia. Iron deficiency is predominantly seen in people with an increased need for iron. These include premature infants, children of growing age, pregnant and lactating women, and those with chronic renal failure. Inadequate absorption can also lead to iron deficiency. The most common reason for iron deficiency in adults is bleeding and losing blood(4). Treatment with oral iron should be continued for 3 to 6 months. This will not only correct the anemia but also restore the body's iron stores(5). There are various forms of iron salts. The most prevalent iron formulations in tablets are 325 mg ferrous sulfate (which contains 65 mg of elemental iron), 300 mg ferrous gluconate (which contains 36 mg of elemental iron), and 100 mg ferrous fumarate (which contains 33 mg of elemental iron)(6). Iron is not toxic in doses of less than 20 mg/kg. Ingestion of 20 mg/kg to 60 mg/kg is a moderate hazard and more than 60 mg/kg leads to severe toxicity(7,8). The clinical symptoms of iron poisoning are based on five clinical stages, including gastrointestinal symptoms (vomiting, bloody diarrhea, abdominal pain), a short period of relative stability, then cardiogenic shock, liver failure, and scarring of the gastrointestinal tract(9). The treatment of iron poisoning includes supportive care measures, whole bowel irrigation, orogastric lavage, and the use of deferoxamine (DFO)(10,11). Patients with iron levels over 800-1000 mg/dL, GI symptoms, use of deferoxamine, shock, coma, or metabolic acidosis, should be admitted to the hospital(12,13). In this study, the prevalence of iron poisoning was determined based on age, gender, the reason for use, hospitalization time, ICU admission, clinical signs, serum iron concentration, use of

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antidote, coingestion with other drugs, underlying medical conditions, mortality and the relationship between these variables. Given the lack of studies in Khuzestan province, the main purpose of this study was to further investigate the risk and complications of iron poisoning.

METHODS

The present study is a descriptive-analytic study based on hospital information that was conducted among patients with iron poisoning admitted to Razi hospital (a referral medical setting for poisoning treatment in southwest Iran) during 2014-2017. Subjects suspected of iron poisoning were excluded from the target population. Finally, 52 cases of iron poisoning patients admitted to Ahvaz Razi Hospital were investigated. After studying the case files of the study population, the checklist was completed based on age, gender, the reason for use, the need for antidote, duration of hospitalization, required hospitalization in ICU, symptom onset, first symptom, co-administration with other drugs, underlying disease, and mortality. Descriptive statistics methods including graphs, frequency distribution tables, measures of central tendency, and dispersion were used in order to analyze the data. Using the Chi-square test, the relationship between variables group was performed. Statistical significance was set at $p < 0.05$. The data were analyzed using the SPSS software, version 18.0 (SPSS, Inc., Chicago, IL, US).

RESULTS

Table 1 indicates the demographic and clinical characteristics of persons with iron poisoning. In this report, the number of iron-poisoned patients admitted to Razi Hospital from the beginning of 2014 to the end of 2017 was 52. Of these, 3 patients (5.8%) were male and 49 patients (94.2%) were female. Of the female patients, 5 (9.6%) were pregnant. Regarding age, 18 patients (34.6%) were 15-20 years, 18 patients (34.6%) were 21-25 years, 9 patients (17.3%) were 26-30 years, and 7 patients (13.5 %) were 31-35 years. In this investigation, 2 cases were recorded as accidental (3.8%) and 50 cases as suicidal (96.2%). The onset of symptoms was as follows: 31 patients (59.6%) had symptoms in the first 6 hours after poisoning, while 21 patients (40.4%) had symptoms between 6 to 24 hours after poisoning and returned to the hospital. As shown in table 2, 26 patients (50%) had nausea and vomiting, 3 patients (5.8%) had lethargy, 5 patients (9.6%) had drowsiness, 7 patients (13.5%) had abdominal pain, 3 patients (5.8%) had diarrhea, 3 patients (5.8%) had headache, 3 patients (5.8%) had dizziness, and 2 patients (3.7%) had other symptoms, such as weakness. 5 patients (9.6%) received deferoxamine. 16 patients (30.8%) were admitted to ICU. The duration of admission in 7 patients (13.5%) was less than 6 hours; in 25 patients (48.1%) between 6 to 24 hours; and in 20 patients (38.5%) was longer than 24 hours. The serum iron concentration was not measured in 28 patients (53.8%) and was not included in the file. Serum iron level in 18 patients (34.6%) was between 95-150, in 3 patients (5.8%) was 151-300, and in 3 patients (5.8%) was above 300. There were underlying diseases in 7(13.5%) cases: 3 cases of mental illness, 3 cases of heart disease, 1 case of thyroid disease, and 2 cases of diabetes. In an examination of the co-ingestion of iron poisoning with other drugs: 13 patients (25%) took vitamin supplements, including folic acid, B12, etc. 8 patients (15.4%) took antidepressants, 6 patients (11.5%) antipsychotics, and 11 cases took other drugs such as

Table1. Frequency distribution of the variables in patients with iron poisoning treated at Razi Hospital during 2014-2017 (n = 52)

Variable	Frequently (%)
Gender	
Female	49(94.2%)
Male	3(5.8%)
Age group (year)	
15-20	18(34.6%)
21-25	18(34.6%)
26-30	9(17.3%)
31-35	7(13.5%)
Intention of poisoning	
Suicidal	50(96.2%)
Accidental	2(3.8%)
Symptom after ingestion	
<6	31(59.6%)
6-24	21(40.4%)
ICU admission	
Yes	16(30.8%)
No	36 (69.2%)
Time admit	
<6	7(13.5%)
6-24	25(48.1%)
>24	20(38.5%)
Use of Deferoxamine	
Yes	5 (9.6%)
No	47(90.4%)
Serum level of iron	
No	28(53.8%)
95-150	18(34.6%)
151-300	3(5.8%)
>300	3(5.8%)
Underlying disease	
Yes	7(13.5%)
No	45(86.5%)
With other drugs	
Yes	38(73.1%)
No	14(26.9%)
Mortality	
Yes	1(1.9%)
No	51(98.1%)

Table2. On-admission clinical findings of the patients with iron poisoning treated at Razi Hospital during 2014-2017 (n = 52)

Symptoms	Frequently (%)
Nausea and vomiting	26 (50%)
Lethargy	3 (5.8%)
Drowsiness	5 (9.6%)
Abdominal pain	7 (13.5%)
Diarrhea	3 (5.8%)
Headache	3 (5.8%)
Dizziness	3 (5.8%)
Other symptoms	2 (3.7%)
Total	52 (100%)

diarrhea, 3 patients (5.8%) had headache, 3 patients (5.8%) had dizziness, and 2 patients (3.7%) had other symptoms, such as weakness. 5 patients (9.6%) received deferoxamine. 16 patients (30.8%) were admitted to ICU. The duration of admission in 7 patients (13.5%) was less than 6 hours; in 25 patients (48.1%) between 6 to 24 hours; and in 20 patients (38.5%) was longer than 24 hours. The serum iron concentration was not measured in 28 patients (53.8%) and was not included in the file. Serum iron level in 18 patients (34.6%) was between 95-150, in 3 patients (5.8%) was 151-300, and in 3 patients (5.8%) was above 300. There were underlying diseases in 7(13.5%) cases: 3 cases of mental illness, 3 cases of heart disease, 1 case of thyroid disease, and 2 cases of diabetes. In an examination of the co-ingestion of iron poisoning with other drugs: 13 patients (25%) took vitamin supplements, including folic acid, B12, etc. 8 patients (15.4%) took antidepressants, 6 patients (11.5%) antipsychotics, and 11 cases took other drugs such as acetaminophen, antibiotics, cardiovascular drugs, and cold tablets. Only 14 cases (26.9%) took tablets of ferrous sulfate. Moreover, mortality was reported in one case (1.9%), in which antidepressants were co-ingested. There were no significant correlation between the variables of age and cause of iron poisoning, age and serum iron concentration, gender and the onset of first symptoms, the onset of first symptoms and the time of onset of symptoms, the time of onset of symptoms and the duration of hospitalization, and the time of onset of symptoms and serum iron concentration in patients. Based on the result of the evaluation, the p-value was greater than 0.05.

DISCUSSION

According to the results obtained from the study, the following can be deduced: The most common gender in iron poisoning is female (94.2%). In a study conducted in Loghman Hakim's hospital on adult poisoning, 62.7% of patients were female(14). In a study done by Scott Kroeker (15), 80% of the patients were female, which was consistent with the results of our study. In our research, 5 female patients (9.6%) were pregnant. According to a study by W Rayburn (16), the most commonly used drugs during pregnancy were analgesics (acetaminophen), vitamins, iron, antibiotics, and antihistamines, which justifies the prevalence of pregnant mothers in this study. In our survey, suicidal behavior (96.2%) was the most common cause of iron poisoning. The most affected age group was between 15-25 years old (69.2%). In a study in India, there was a significant outbreak of accidental poisoning with iron in the pre-school age group(17). In studies conducted in the United States, accidental iron poisoning in children under 6 years old is common(18), which is in agreement with the results obtained in our study. The most common clinical symptom in this study was nausea and vomiting (50%). In a study done by PA Chyka and colleagues(19), the most common symptom was gastrointestinal symptoms (47.8%). 32.6% of patients had central nervous system changes, and 13% of patients had no symptoms. In our study, 69.3% of patients had gastrointestinal symptoms (diarrhea, abdominal pain, nausea, and vomiting). 21.2% had lethargy, headache, dizziness, and drowsiness. In a study conducted in Loghman Hakim Hospital (14), there was a change in the level of consciousness(1.3%). Out of 78 cases with iron poisoning, 77 patients were alert and conscious. One patient was in the first stage. The results of this experiment are consistent with the results of our study. In the current study, 5 patients (9.6%) received deferoxamine. In the study done by WF Westlin (20), out of 172 patients, only 4 patients received deferoxamine. Table 3 indicates that, of the 31 patients whose symptoms started less than 6 hours post ingestion, only 5 patients (16.1%) received the antidote. In the 21 patients whose symptoms began between 6-24 hours after the ingestion, none had received the antidote. Considering that the p-value is 0.05, there is a significant relationship between time of symptom onset and antidote use. In all patients who received the antidote, symptom onset was less than 6 hours. Therefore, these patients were clinically significant for deferoxamine. In our study, 16 patients (30.8%) were

Table 3. Frequency distribution of the variables of the time of onset of symptoms and the use of antidote in patients with iron poisoning treated at Razi Hospital during 2014-2017 (n = 52)

Deferoxamine	Symptoms		P-Value
	6-24 hr Frequently (%)	<6 hr Frequently (%)	
Yes	0(0%)	5(16.1%)	
No	21(100%)	26(83.9%)	0/05
Total	21(100%)	31(100%)	

admitted to ICU. 7 patients (13.5%) were monitored for less than 6 hours, 25 patients (48.1%) were monitored between 6-24 hours, and 20 patients (38.5%) were monitored for longer than 24 hours. In a study done in India among 21 children, 18 patients were admitted to PICU(21). Serum iron concentrations in our study were not measured in 28 patients (53.8%), so there is no record in the files. Serum iron level in 18 patients (34.6%) was between 95-150 µg/dL, 3 patients(5.8%) was between 151-300 µg/dL, and 3 patients (5.8%) had serum iron concentrations above 300 µg/dL. In a study by KK Burkhart and colleagues(22), 6 adults ingested 20 mg/kg of elemental iron. All 6 cases had symptomatic gastrointestinal toxicity. 4 patients needed IV fluids. The maximum serum iron concentration in these patients was 300 µg/dL, which was 2-4 hours after the ingestion of iron. Other findings in this study (the symptoms of iron poisoning, underlying disease, and co-administration with other drugs) were not comparable due to the limited resources and lack of adequate information on iron poisoning in Iran. In the present study, the prevalence of iron poisoning has been examined in the Khuzestan region of southwestern Iran. Iron-drug interactions may occur in many cases. Most studies have examined the mortality rates in children and few studies have been conducted on adult iron toxicity. One death was reported in our study, though iron had been taken simultaneously with antidepressants. From the available data, it can be concluded that adults have lower mortality rates than children. However, iron poisoning is more common in young adult groups, in which 96.2% are suicide attempts. Analysis of data significantly affects the community. Hence, further studies in psychological, social, and behavioral issues are needed for suicide prevention and to obtain reliable prevalence rates.

ACKNOWLEDGMENTS

This research was supported by the Deputy of Research of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

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