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Original Article

Analysis of the Pattern of Poisoning in Patients Admitted to a Large Teaching Hospital in Iran

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ABSTRACT

Introduction: Poisoning is one of the most common causes of hospital admission. This study aims at 1- to determine the characteristics of poisoning, 2-to discover the relationship of the patients' characteristics, and 3- to suggest a pattern of characteristics of poisoning.

Methods: The current cross-sectional study was conducted at Edalatian Emergency Center in 2016. Characteristics of patients with poisoning were extracted from the hospital information system (HIS) in a large teaching hospital. Gender, type of admission, the priority of admission, type of referral, cause of referral, insurance organization, age, and month of referral were the variables extracted. Data were analyzed using descriptive and analytical statistical methods in SPSS software version 21.

Results: Of the 15204 patients included in this analysis, 55.2% of the patients were men. Also, 68.5% had non-urgent triage level, and the cause of the 60.7% of the poisoning was medication overdose. Most of the patients (86.2%) aged from 20 to 30 years with the most frequent referral in May, June, July, and August.

According to logistic regression results, opium, toxin, alcohol and medication poisoning had the highest odds of being at urgent triage level (OR= 1.609, 1.559, 1.358, 1.218 respectively) and the food poisoning was the lowest cause of poisoning (OR=0.018). Triage level was found to be significantly different in months of the year (P<0.001). But, a routine trend was not observed.

Conclusion: The use of preventive measures from the occurrence of poisoning is necessary for the country because this problem occurs due to the lack of awareness about its causative factors. Regarding the more prevalence of intentional poisoning, the necessary steps are needed to be taken to identify the Psychological causes and prevent suicide in at-risk groups.

Introduction

Poison is a substance causing injury or illness, if eaten, drunk, being in contact with people, or inhaled.[1] Poisoning is one of the major public health problems worldwide and

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one of the most common causes of hospital admission. There are two types of poisoning: intentional and unintentional or accidental and non-accidental. Intentional type usually occurs in adults and may be done with the aim of suicide and death, and unintentional type is common in children.[2, 3] According to the World Health Organization (WHO), in 2012, 193,460 people died due to unintentional poisoning; of whom 84% belonged to low- and middle-income countries. It has been estimated that 370,000 people die every year in the world due to the intentional eatingof pesticides and poisons. In Iran also, the most common cause of hospitalization and the second cause of hospital death is poisoning.[3] In developed countries, household chemicals and prescribed medications are the most common causes of poisoning, while in developing countries, agricultural chemicals such as pesticides have a greater role in poisoning.[4,5] In Iran, 5,000 people die annually due to a variety of poisonings.[6] The highest number of poisoning in Iran accounts for medication poisoning with an annual rate of 700 people, which occurs due to the use of medication more than the prescribed dose and imposes a high cost to the family and state.[7]

Based on the statistics obtained from drugs and poisons information centers in the country, a high percentage of poisonings (56% of total poisoning) recorded in these centers still accounts for medication poisoning. According to the statistics reported by the Iranian Legal Medicine Organization about the mortality rate due to medication poisoning, over the past five years, on average, between 550 to 780 people have died annually due to medication poisoning.[8] So, with the industrialization of countries, there is a need for programs to control poisoning.[9]

The results of previous studies showed that unnecessary emergency visits due to poisonings may be reduced with the use of proper triage methods[10] As well, triage of toxicology patients is a challenge due to the complexity of patient status, underlying psychosocial issues, and additional pharmacological considerations.[11] Therefore, awareness of the poisoning pattern plays an important role in determining the risk factors and early detection of poisoning.[12]

Based on our best knowledge there is low scientific evidence related to the pattern of poisoning in patients in Mashhad. The present study was performed in the largest hospital in Mashhad as a metropolis city of Iran. Many patients, including patients with poisoning, referral to our case hospital for treatment from neighboring cities and provinces. Therefore, the results obtained in this study can be generalized to the whole country. This study aims at 1- to determine the characteristics of poisoning, 2-to discover the relationship of the patients' characteristics, and 3- to suggest a pattern of characteristics of poisoning in triage.

Methods

Study design

The current cross-sectional study was conducted at Edalatian Emergency Center from Jan 1, 2016 to Dec 31, 2016.The study employed a descriptive cross-sectional with a retrospective hospital information system (HIS) data review to determine the characteristics of the patients with poisoning.

Setting

Imam Reza hospital is currently the largest

hospital in eastern Iran, located in Mashhad. The Edalatian emergency center affiliated to Imam Reza hospital in Mashhad with a capacity of 70 ICU and 82 hospitalization beds is located in an area of 12,000 square meters with four floors based on the latest international construction standards. Almost all patients with poisoning in northeastern of the country refers to this case center.

Study Population and data source

All study subjects were extracted from HIS. No age and sexual limits were included in this study. Distorted data were excluded. To protect the confidentiality and privacy of the patient, the identification items were not included in the study.

Data analysis

This study aimed to investigate the factors related to the triage level of poisoned patients. The triage level was divided into "emergency" and "non-emergency" to simplify the model. Multiple regression can be used to explain a dependent variable using more than one independent variable.[13,14] Therefore, a multivariate logistic regression model was used for multivariate analysis with a significant level of 0.05. Given, the effectiveness of our variables on the triage level of the patients has been proven in the previous studies, the confirmatory method was conducted. All variables were entered simultaneously into the multivariable models using the Enter method. The data were analyzed using SPSS software version 21.

The current study aimed to identify the effective factors on Emergency Severity Index (ESI). The ESI levels were one of the extracted variables and was the response variable. ESI is a five-level emergency department (ED) triage algorithm that provides clinically relevant stratification of patients into five groups from 1 (most urgent) to 5 (least urgent) based on acuity and resource needs.[7] In this study, the variable of "ESI level" was categorized into two groups including "Immediate intervention (level 1-3)" and "Non-immediate intervention (level 4-5)". In the case HIS, the cause of poisoning was classified as following: medication, food, opium, alcohol, and toxin, others (drugs, pesticide and opioids) .This classification was adopted in the current study. Other extracted variables were age, gender, type of admission, type of referral, insurance organizations, and month and seasons of Referral. Since the effectiveness of the extracted variables from HIS on ESI were confirmed in the previous studies. The current study was conducted as a confirmatory study.

Results

The characteristics of patients with poisoning and variables relationships

In general, 15204 patients were admitted to the case emergency center due to poisoning. Most of the poisonings were at the non-urgent triage level (68.5%, n=10413). Majority of the poisoned patients were men (55.2%, n=8396). The highest rates of poisoning reason were medication (n=9232, %60.7), other poisoning (n=2676, %17.6), and opium (n=1693, %11.1), respectively. Most of the patients referred to the emergency department by accompaniment (n=8917, 58.6%). Most of the patients aged from 20-30 years (n=13113, 86.2%) (Table 1).

The number of patients in different months of the year was between 1390 (9.1%) and 1113 (7.3%). The highest number of visits was in May, June, July, and August. The lowest number of visits was observed in October (Table 1).

As shown in Table 2, among men (51.5%, n=4325) and women (72.1%, n=4907), medication poisoning was the most common cause of referral to the emergency center.

Table 1. The characteristics of patients with poisoning

Extracted variables	Subgroups	Frequency (%)
Triage levels	Non-urgent level	10413 (68.5)
	Urgent level	4791 (31.5)
Gender	Men	8396 (55.2)
	Woman	6808 (44.8)
Type of admission	Accompaniment	8917 (58.6)
	Pre-hospital emergency	6287 (41.4)
Type of referral	Accidental	129 (0.8)
	Non-accidental	15075 (99.2)
Insurance organization	Voluntary	14852 (97.7)
	Health services	155 (1.0)
	Armed Forces	20 (0.1)
	Social Security	164 (1.1)
	Other insurance	13 (0.1)
Age	0-10 year	1613 (1.1)
	10-20 year	138 (9.07)
	20-30 year	13113 (86.2)
	30-40 year	339 (2.2)
	>40 year	1 (0.0)
Month of Referral	April	1270 (8.4)
	May	1385 (9.1)
	June	1371 (9.0)
	July	1305 (8.6)
	August	1390 (9.1)
	September	1276 (8.4)
	October	1110 (7.3)
	November	1173 (7.7)
	December	1194 (7.9)
	January	1291 (8.5)
	February	1238 (8.1)
	March	1201 (7.9)

Table 2. Cause of poisoning in patients stratified by gender

Cause of poisoning	Gender (%)		Total
	Male	Female	
Medication	4325 (51.5)	4907 (72.1)	9232 (60.7)
Food	270 (3.2)	142 (2.1)	412 (2.7)
Opium	1278 (15.2)	415 (6.1)	1693 (11.1)
Alcohol	384 (4.6)	75 (1.1)	459 (3.0)
Toxin	372 (4.4)	360 (5.3)	732 (4.8)
Others	1767 (21.0)	909 (13.4)	2676 (17.6)
Total	8396 (100)	6808 (100)	15204 (100)

Table 3. Cause of poisoning in patients stratified by age

Cause of Poisoning	Age groups					Total
	0-10 (%)	10-20 (%)	20-30 (%)	30-40 (%)	>40 (%)	
Medication	883 (54.7)	53(38.4)	8193 (62.5)	103 (30.4)	0 (0)	9232 (60.7%)
Food	15 (0.9)	13(9.4)	374 (2.9)	10 (2.9)	0 (0)	412 (2.7%)
Opium	218 (13.5)	18 (10)	1306 (10)	151(44.5)	0 (0)	1693 (11.1%)
Alcohol	12 (.7)	2(1.4)	442 (3.4)	3 (0.9)	0 (0)	459 (3.0%)
Toxin	89 (5.5)	9(6.5)	627 (4.8)	7 (2.1)	0 (0)	732 (4.8%)
Others	396 (24.6)	43 (31.2)	2171 (16.6)	65 (19.2)	1(100)	2676 (17.6%)
Total	1613 (100)	138 (100)	13113 (100)	339 (100)	1 (100)	15204 (100 %)

According our results, the age ranges from 0-10 (54.7%, n=883), 11-20 (38.4%, n=53), and 21-30 (62.5%, n=8193), medication poisoning was the most common cause of patients' referral to the emergency center (Table 3).

Pattern of characteristics of patients with poisoning

The results of logistic regression revealed that the " Poisoning with opium " variable had the highest effect on the triage level. As shown in Table 4, gender, type of admission, type of referral, cause of referral, insurance organization, age, and month of referral were statistically significant. The admission chance for men was about 80% lower than women in urgent triage level. The chance of a patient referring due to medication poisoning to be placed at the urgent triage level was 1.218 times of a patient referring due to other poisonings. The chance of a patient referring due to opium poisoning to be placed at the urgent triage level was 1.609 times of a patient referring due to other poisonings.

Discussion

Poisoning is one of the most common causes

Table 4. Effective factors on the patients with poisoning

Variables	Variables Levels	B	S.E.	OR	95.0% C.I for OR		P-value
					Lower	Upper	
Gender Reference category : Female	Male	-.230	.040	0.795	0.735	0.860	< 0.001
Age Reference category: >30 years							0.005
	0-10 years	0.008	0.145	1.008	0.760	1.338	.955
	11-20 years	-.596	0.232	0.551	0.349	0.868	.010
	21-30 years	.070	.134	1.072	0.824	1.394	0.604
Type of admission Reference : Pre-hospital Emergency	Accompaniment	-.410	.041	.664	0.613	0.720	<0.001
	Accidental	-.671	0.194	0.511	0.350	0.748	<0.001
Cause of poisoning Reference : others							<0.001
	Medication poisoning	.197	.051	1.218	1.103	1.346	<0.001
	Food poisoning	-4.034	0.291	.018	0.010	0.031	<0.001
	Poisoning with opium	.476	.076	1.609	1.388	1.866	<0.001
	Poisoning with alcohol	0.306	0.118	1.358	1.077	1.712	.010
	Poisoning with Toxin	0.444	0.103	1.559	1.273	1.909	<0.001
Insurance organization Reference: Other insurance							<0.001
	Voluntary	-.022	0.751	0.978	0.224	4.262	0.976
	Health services	-.596	0.780	0.551	0.119	2.542	0.445
	Armed Forces	-.415	0.924	0.660	0.108	4.036	0.653
	Social Security	-.927	0.785	0.396	0.085	1.841	0.237
Month of referral Reference: March							<0.001
	April	.538	0.088	1.712	1.442	2.033	<0.001
	May	.899	0.089	2.458	2.063	2.928	<0.001
	June	1.041	0.092	2.833	2.366	3.391	<0.001
	July	1.230	0.096	3.421	2.833	4.132	<0.001
	August	1.145	0.094	3.143	2.617	3.776	<0.001
	September	.700	0.090	2.013	1.688	2.402	<0.001
	October	1.348	0.105	3.849	3.135	4.725	<0.001
	November	.691	0.091	1.996	1.668	2.387	<0.001
	December	.841	0.093	2.318	1.934	2.779	<0.001
	January	-.852	.084	0.427	0.362	0.503	<0.001
	February	-.977	.085	.376	0.318	0.445	<0.001

of hospital admission, also is a major public health issue, especially among the younger population. The use of preventive mechanisms from the occurrence of these diseases could be effective if the information is available about them and the factors affecting them. In the current study, we investigated the pattern of patients with poisoning and its' related factors in one of the largest teaching hospitals in the country. In the following paragraphs, the most

important results of the present study will be discussed.

Contrary to the findings of several studies[15-19] our results showed that the majority of patients were men with medication poisoning that they had non-urgent triage levels. According to our study most of the patients aged from 20 to 30 years with the most frequent referral in May, June, July, and August. In contrast to our results, the results of the study by Gasparim et al. showed that women more than 65 years old were exposed to digestive diseases.[16] As well, Chan et al. found out that medication poisoning was the most important cause of poisoning which was related to the women with the age ranges from 20 to 40 years, committing suicide with medication[17] In the line of the mentioned studies, the results of the study by Patil et al. revealed that women were poisoned with medication.[18] And also, Bari et al. reported that women with medication poisoning aged from 25 to 32 years.[19] When comparing our results to other studies, it seems the pattern of the positing had a difference in our study that was performed in a large teaching hospital in Iran as a developing country with the results of the mentioned studies that were conducted in other countries. A similar pattern of our results was obtained in studies by Maleki et al.,[20] Torkashvand et al,[21] and Aryaie et al.[22] There was a possible reason for these results. Easy access to medication and selling medication without prescription are the most important factors in medication poisoning in our country.

In line with previous studies, our results showed that the majority of the patient were men aged 20 to 30 years. For example, the same results were observed in the study by Islambulchilar et al.[23] The results of this study indicated that men with the age range from 20 to 29 years were poisoned with pesticides. They believed as men are more exposed to pesticides and toxins, and they recommended to observe the necessary precautions to prevent poisoning. Jailkhani et al. reported that men with the age range from 21 to 30 years were poisoned in rural areas.[24] Toxin poisoning in rural areas was also reported in the study by Azin.[25] A study was performed by Patil et al. this study shows that poisoning dependents a variety of factors, including age, the cause of poisoning, the rate of consumption, the patient's health status, initial hospitalization, and proper management.[18]

Poisoning with opium was the second reason for the hospital admission. Given, geographical situation and having a common border with the countries of Afghanistan and Pakistan, poisoning with opioids has a relatively high incidence in our country. Soltaninejadand Shadnia conducted a systematic review of opium abusers in Iran. They believed that the adulteration of opium is a new source of poisoning in Iran. As well, opium abuse is frequent and it could be a new health problem in the future.[26]

Furthermore various studies have been conducted on the pattern of poisoning. In the study of Shahin Shadnia, et al. in Hospital in Tehran the most acute poisoning was intentional and in the age range of 21–30 years.[27] In the review of Malihe Moradi et al psychiatric pharmaceutical drugs were known as the most common cause of poisoning in adults.[28] In the epidemiological study conducted by Omid Mehrpour, et al. in a single center in Birjand of Iran Pharmaceutical medication, opioids followed by pesticides

were the most common cause of poisoning.[29] Result of Farzad Gheshlaghi, et al. Research shows that the Drugs were the most common agents causing the poisoning in children.[30] In the study of Dhanya S.P, et al. of India The maximum number of poisoning was found in the age group 15-30 years. This was followed by common drugs. There was no significant difference in monthly trends of poisoning.[31] In the study of Mohammed Naseeruddin Nadeem, et al. in India the common poisoning agents were organophosphate compounds.[32] In the study of Gh. Mahdizadeh et al. about Prevalence and Causes of Poisoning in Patients Admitted to a Hospital of Babol the highest rate of poisoning was in young adults women, and the most common cause of poisoning was suicide.[33] In the study of Cahfer Gülogluand Ismail Hamdi Kara in turkey, admissions during April, May and July were more common in young age.[34] Study of Ashenafi Habte Woyessa and Thanasekaran Palanichamy in Western Ethiopia showed that the incidence of poisoning was varied with seasonal variations and Pesticide exposure and food poisoning were the common poisionint in western Ethiopia.[35] The results of different studies show that the causes of poisoning are specific to any regions. It is recommended similar studies will be conducted in different areas and countries.

Conclusion

To determine the characteristics of the problem, investigate the pattern of poisoning in different regions is important. Analyzing the trends in poisoning will assist the health care providers and policy makers in applying better management and effective prevention strategies like educational interventions and reduce morbidity and mortality related to poisoning. Regarding the more prevalence of intentional poisoning, the necessary Psychologic recommendation is needed to be taken to identify the causes and prevent suicide in at-risk groups.

Limitations

According to the research environment and patients' conditions in this study, there was no possibility to interview with the patients. By investigating the causes of these diseases and factors affecting them in other research, it is possible to obtain valuable results in this regard.

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Conflict of interest

The authors declare that they have no conflict of interest.

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