Rom J Leg Med [33] 135-140 [2025]
DOI: 10.4323/rjlm.2025.135

DETERMINATION OF THE OUTBREAK OF VARIANT POISONING IN PREGNANT WOMEN REFERRING TO RAZI HOSPITAL OF AHVAZ IN 2015-2019

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Abstract: ***Background.*** Understanding the patterns and factors associated with poisoning in pregnant women is essential, particularly in regions where specific socio-cultural factors may influence prevalence and causes. However, limited research has been conducted on this topic in Iran.

Objective. This study aimed to investigate the prevalence, types, and causes of poisoning among pregnant women referred to Razi Hospital in Ahvaz from 2015–2019, providing insights to support targeted preventive and healthcare strategies.

Methods. A retrospective, cross-sectional design was employed, analyzing hospital records of pregnant women diagnosed with poisoning. Demographic data, poisoning substances, intent, and clinical outcomes were collected and statistically analyzed using SPSS, with chi-square and ANOVA tests applied to examine associations between variables.

Results. Among 40 poisoned pregnant women, the mean age was 26.22 years, with the highest incidence in the 20–30 age group (50%). Poisoning was most common in the first trimester (42.5%) and was primarily intentional (90%). Benzodiazepines, NSAIDs, and organophosphorus pesticides were the most frequently used substances. Primary symptoms included nausea (40%), vomiting (27.5%), and drowsiness (17.5%). ICU admission was required for 65% of cases, and hospital stays averaged 24–72 hours.

Conclusion. The findings underscore a need for comprehensive support and monitoring systems for pregnant women, particularly in early pregnancy, to prevent intentional poisoning. This study highlights the importance of culturally sensitive prevention strategies and improved mental health resources for at-risk women, ultimately contributing to enhanced maternal and fetal health outcomes.

Keywords: poisoning, suicide, pregnancy.

INTRODUCTION

Acute pregnancy poisoning is a drastic challenge for health care providers because it is considered an immediate life-threatening factor and may have lifelong consequences for both the mother and the fetus, including the teratogenicity of the poisons and their antidotes (Zelner *et al*., 2015). After accidents and crashes, poisoning ranks third in terms of injury-related hospitalizations during pregnancy (McClure, Katz, *et al*., 2011; Weiss, 1999), closely followed by exposure to drugs, chemicals, or other xenobiotics through inhalation, ingestion, skin and eye contact, and injections (Eyasu *et al*., 2017; Zelner *et al*., 2015). Exposure to xenobiotics during pregnancy is common, and about 90% of pregnant women receive (with or without prescription) medications and a variety of vitamins and mineral supplements (Hoffman *et al*., 2015; Mehrpour *et al*., 2018). The American Association of Poison Control Centers (AAPCC's NPDS) provides statistics indicating that poison control centers in the United States report approximately 7500–8000 cases of pregnancy poisoning annually (Zelner *et al*., 2015). The deliberate use of medications, primarily non-prescribed

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painkillers and psychotropic drugs, accounts for about half of the acute poisoning cases among pregnant women referred to emergency care services (McClure, Katz, *et al*., 2011; Zelner *et al*., 2015).

Physiological changes during pregnancy significantly impact the pharmacokinetics and toxic effects of various substances. These changes—such as increased blood volume, altered gastrointestinal motility, and shifts in liver enzyme activity—can affect the absorption, distribution, metabolism, and excretion of toxins. For instance, increased plasma volume and reduced plasma protein concentrations may dilute toxins, altering their effective levels. Furthermore, toxicity symptoms can resemble pregnancy-related complications, complicating diagnosis and treatment. Understanding these physiological adaptations is crucial for optimizing maternal and fetal health, particularly in managing poisoning cases that can range from mild to life-threatening (Costantine, 2014; Frederiksen, 2001; Ibrahim & Younis, 2022).

Various studies have highlighted social, familial, and personal factors as significant contributors to the increased likelihood of deliberate self-harm during pregnancy. Factors such as a history of depression and mental illness can create a conducive environment for self-poisoning (Alizadeh *et al*., 2019; Ayre *et al*., 2023). Researchers have reported that poisoning, primarily through overdosing and the use of corrosive agents like bleach, is the most significant suicide mechanism among pregnant women in California (2, 3). Studies have reported that the peak rate of suicide attempts during pregnancy and its consequent death is in the third month, while there is a remarkable decrease in suicide attempts as pregnancy progresses (Eyasu *et al*., 2017; Hökenek *et al*., 2021; Shigemi *et al*., 2021).

Various studies indicate that the pattern of poisoning may vary across different countries and regions. For instance, organophosphate pesticides and air pollutants are among the common causes of poisoning in pregnant women (Eyasu *et al*., 2017; McElhatton *et al*., 1990). The importance of this issue and the limited research in Iran highlight the need for further investigations into pregnancy poisoning, given the varying patterns of poisoning in different countries. Therefore, in this study, we attempt to determine the prevalence of different kinds of poisoning in pregnant women referred to Razi Hospital in Ahvaz in 2015-2019 and provide detailed statistics in order to help improve the quality of treatment and exposure to pregnancy poisoning.

METHODS

We conducted this study as a cross-sectional study, surveying the records of pregnant patients referred to Razi Hospital due to poisoning between 2015 and 2019. We selected the sample for this study by examining all hospitalized pregnant women who were diagnosed with poisoning, based on their history and physical examination results. We collected samples by reviewing the archived hospital records of this medical center and incorporated patient information into the specially designed data collection form. We used descriptive statistical methods, such as frequency distribution tables, graphs, and numerical indices, to describe the studied variables after filling out the forms for data analysis. SPSS software then analyzed the data, using a t-test, a chi-square test, and a one-way ANOVA to check the association between the variables. The significance level for the mentioned test was considered 0.05.

RESULTS

Between 2015 and 2019, Razi Hospital in Ahvaz received referrals for 40 poisoned pregnant women. Among the participants, 20 (50%) were in the age group of 20–30 years, 14 (45%) in the age group of over 30 years, and 6 (15%) patients were in the age group of under 20 years. The youngest and the oldest patients were 13 and 37, respectively. The participant's average age was 26.22 years. In this study, poisoning occurred in 17 cases (42.5%) during the first trimester, 14 cases (35%) during the second trimester, and 7 cases (17.5%) during the third trimester of pregnancy. Additionally, two patients (5%) experienced poisoning during the postpartum period. In the conducted study, the number of pregnancies was also assessed, which includes: 12 (30%) first pregnancy, 12 (30%) third pregnancy, 6 (15%) fourth pregnancy, 4 (10%) second pregnancy, 3 (7.5%) fifth pregnancy, 2 (5) seventh pregnancy, and one (2.5%) was in the sixth pregnancy. In 36 (90%) participants, poisoning was a suicide attempt, and in 9 cases it was accidental. In this study, 3 (7.5%) persons had a history of addiction, and 13 (32.5%) had a history of neuropsychiatric illness. But none of them mentioned the previous suicide attempt. History Living Child Gestational Age Yes 30% One 42.5% Terimester1 50% 20-30 0% Suicide 10% Two 7.5% Addiction 30% Three 35% Terimester2 45% 30 < 32.5% Psychotic Disease 15% Four 7.5% Five 17.5% Terimester3 15% 20 > 2.5% Six 5% More Than Six 5% Post-partum 26.22 Mean.

The survey revealed that 33 (82.5%) patients had experienced single-drug poisoning, while seven (17.5%) participants experienced multi-drug poisoning. The most prevalently used substances for poisoning include insecticides and benzodiazepines (15.8% each), NSAIDs (14%), and then antibiotics (8.8%). Other causes of intoxication in order of prevalence were mineral supplements and gastrointestinal drugs (7%), herbicides (5.3%), detergents, antidepressants, sedative-hypnotic drugs, tramadol, muscle relaxants, and adult cold (3.5%), followed by raticides and crystal (1.8%). Besides, in 1.8% of cases, the type of consumable substance remained unknown (Fig. 1).

In 40% of cases, nausea was the most common primary symptom. Other primary symptoms observed in order of prevalence were: vomiting (27.5%), drowsiness (17.5%), seizures (17.5%), decreased level of consciousness (12.5%), headache and dizziness, abdominal pain, weakness (10% each), agitation (5%), respiratory distress, blurred vision, and drooling (2.5%). Furthermore, 5% of them had no symptoms at the time of referral (Fig. 2).

All the poisoned pregnant women were hospitalized for 6 hours at least. Duration of hospitalization was 24-72 hours in 25 patients (62.5%), more than 72 hours in 9 patients (22.5%), and 6-24 hours for 6 patients (15%). Overall, 26 (65%) cases were confined to the ICU, but 14 (35%) did not require ICU admission. In this study, one patient (2.5%) underwent surgery. One case of poisoning leading to IUFD and one case (2.5%) of poisoning resulting in death were observed. In our project, the relationship between age and type of consumed substance was analyzed using Chi-square, with p = 0.48. As a result, there was no significant relationship between age groups and type of substance consumed. The association between age and history of neuropsychiatric diseases was also investigated in this survey with the help of Chi-square, with p = 0.43. Therefore, no significant relationship was found between age groups and history of mental illness. Since there is no record of suicide among patients, its relationship with age and pregnancy rate cannot be checked. In this research, the correlation between the number of pregnancies and the history of neurodegenerative diseases was examined by T-Test. Based on p=0.38, no significant correlation between these two factors was reported. The relationship between the number of pregnancies and the type of consumed substance was analyzed by one-way ANOVA. Considering the p=0.39, no meaningful relationship was found. In the conducted study, the association between age and duration of hospitalization was assessed using one-way ANOVA. Altogether, there was a significant correlation between age and duration of hospitalization with p = 0.024. According to the Table 1, participants in the lower age groups were hospitalized for longer.

Table 1. Biographic Data in poisoned pregnant women referred to Razi Hospital of Ahvaz during 2015-2019

Age		Gestational Age		Living Child		History	
20-30	50%	Trimester 1	42.5%	One	30%	Yes	
				Two	10%	Suicide	0%
30 <	45%	Trimester 2	35%	Three	30%	Addiction	7.5%
				Four	15%		
20 >	15%	Trimester 3	17.5%	Five	7.5%	Psychotic Disease	32.5%
				Six	2.5%		
Mean	26.22	Post-partum	5%	More Than Six	5%		

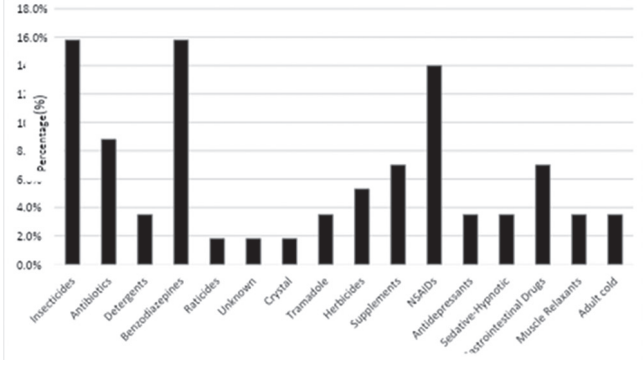

Figure 1. Frequency percentage of type of substance consumed by poisoned pregnant women referred.

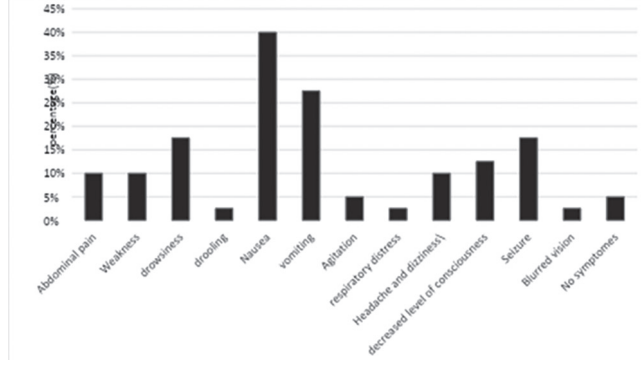

Figure 2.

DISCUSSION

This study highlights significant patterns in poisoning among pregnant women presenting to Razi Hospital in Ahvaz, providing insights into the demographic and clinical characteristics of these cases. The findings underscore the vulnerability of women, especially in early pregnancy, to various toxic exposures, with intentional poisoning being notably prevalent. This aligns with international research, which often attributes such cases to psychosocial stressors, mental health challenges, or unintended pregnancies. The higher frequency of poisoning in the first trimester observed in our study is consistent with findings from similar research conducted in Turkey and Ethiopia, suggesting that early pregnancy might be a particularly sensitive period. Additionally, the predominant use of substances like benzodiazepines, NSAIDs, and pesticides mirrors global trends, where these easily accessible agents often play a central role in poisoning incidents. However, the unique socio-cultural context of Iran, along with varying levels of healthcare access, could potentially shape the distinct patterns observed here.

The highest incidence of poisoning (50%) was in the age group of 20–30 years. That is consistent with the study of pregnancy poisoning by Karadas *et al*. in Turkey, which demonstrated that 74% of poisoning cases occurred in the age group of 21-34. Mebrahtu *et al*.'s studies yielded similar results. In 2017, studies conducted at four public hospitals in Addis Ababa, Ethiopia, and Karadas, Turkey, revealed that the third month of pregnancy is the peak period for suicide attempts and the resulting deaths. However, there is a remarkable decrease in suicide attempts as pregnancy progresses (Eyasu *et al*., 2017; Karadas *et al*., 2011). Younger pregnant women exhibit greater vulnerability among the pregnant population. In a study by Sakshi Goswami *et al*. (Goswami *et al*., 2020), women aged 26 to 30 were found to have higher lead exposure levels compared to both younger and older women. Additionally, studies by Chodorowski *et al.* (Chodorowski *et al*., 2005) indicated that drug-induced poisonings, particularly involving non-opioid analgesics and benzodiazepines, are prevalent among younger pregnant women and are often associated with suicide attempts, with factors such as unintended pregnancies playing a significant role. Overall, these findings highlight the complex interplay between age, substance use, and mental health in pregnancy-related poisonings. This age distribution likely reflects the peak reproductive years and potentially increased psychosocial stressors during this life stage.

A retrospective study by Zipursky *et al*. in Canadian also showed that the highest rate of poisoning occurred during the the first two trimesters of pregnancy, especially the third month (Zipursky *et al*., 2020). Moreover, in another study in California, Mcclure *et al*. showed that the deliberate poisoning rate was higher in the first weeks of pregnancy and decreased with the growth of gestational age (McClure, Patrick, *et al*., 2011). In this study likewise, the highest prevalence of poisoning was in the first trimester of pregnancy, and it significantly decreased with increasing gestational age and after pregnancy, which is consistent with the mentioned studies. This might be due to pregnancy denial in the first months, and poisoning could be done with the purpose of ending pregnancy, which is more likely in the first months.

Our study illustrated that 90% of poisoning cases were committed intentionally. There are a variety of reports in terms of poisoning causes. In 2015, a study was conducted by Zelner and colleagues in the United States. They declared that about half of acute poisoning cases among pregnant women involved deliberate attempts (Zelner *et al*., 2015). Karadas and colleagues also found that in 77% of pregnant women, poisoning was a suicide commitment (Karadas *et al*., 2011). In addition, Leonard *et al*. in a study on exposures reported among pregnant patients referred to the American Association of Poison Control Centers' National Poison Data System, indicated that 21.9% of these cases involved suicide attempts (Leonard *et al*., 2022). This variation in the prevalence of deliberate poisoning can be due to cultural differences and the extent of social harms or support for pregnant women in different communities. On the other hand, the high percentage of deliberate poisoning during pregnancy and the post-pregnancy period reveals the necessity of support and protection for pregnant women. According to the analysis, 82.5% of cases involved one substance, while 17.5% involved multiple drugs. While, in similar studies in the United States, more than one-third of poisoning cases involved exposure to multiple groups of drugs (Hoffman *et al*., 2015; Zelner *et al*., 2015). In our study, the most commonly used substances to cause poisoning were benzodiazepines, NSAIDs, and organophosphorus pesticides. Our results are consistent with Mebrahtu studies stating that the most causative factor for poisoning is exposure to drugs and chemicals, including organophosphorus pesticides (Eyasu *et al*., 2017), as well as the representing that poisoning cases are mostly resulted from consuming drugs (mainly benzodiazepine sedatives), herbal toxins, and plants

(Leonard *et al.*, 2022; Ossei *et al.*, 2020). The pattern of exposure to xenobiotics in pregnant women is generally similar to that of adults. However, according to AAPCC data, being exposed to detergents, pesticides, smoke, and vitamins is relatively higher, while exposure to sedatives, antidepressants, and cardiovascular drugs is somewhat low (Hoffman *et al.*, 2015). This contradicts the findings of our study. This differential pattern of poisoning in different countries varies depending on the toxins and drugs available to individuals and the socio-cultural factors of each community. For example, in developing countries, including Iran, pesticide poisoning, especially organophosphorus poisons, due to increased consumption and easy access, accounts for a high prevalence and is one of the major problems. Besides, high rates of poisoning with some medications in various societies might be due to their over-the-counter sales and increased access to these drugs. The most common primary symptoms of poisoning have consisted of nausea and vomiting.

These findings confirm the results of the study in India conducted for pediatric and adult populations, whose main symptoms were drowsiness, nausea, and vomiting (Hutchinson *et al.*, 1991). On the contrary, according to one study at the University Hospital of Helsinki, most of the primary manifestations of the study population included decreased levels of consciousness, respiratory failure, aspiration, and seizures (Ozkose & Ayoglu, 1999), whereas in our study these symptoms were less prevalent. We failed to find research investigating the prevalence of early symptoms of poisoning in pregnant women. All patients with potentially dangerous overdoses should be monitored at least 6–8 hours prior to discharge (14), although approximately 76% of patients receive well-established poisoning treatment in the emergency (Hodgkinson *et al.*, 1991). But in some cases, patients require a longer hospital stay and more supportive treatment (Underhill *et al.*, 1990). Among those vulnerable groups are pregnant women because there is a threat for both mother and fetus. In this study, all pregnant women referred to the hospital were monitored for at least 6 hours. The duration of hospitalization in most of them (62.5%) was 24-72 hours. This is consistent with a study at Urmia Taleghani Hospital, in which 80% of patients were hospitalized within 1–3 days (Barzegar *et al.*).

In this study, 65% of poisoned pregnant women were admitted to the ICU, which is similar to the results of studies at the Helsinki University Hospital (63% in ICU admission) (Ozkose & Ayoglu, 1999), while the study of Barzegar *et al.* Urmia (10.2% in the ICU) represents a much lower percentage. This variation could be attributed to various factors such as the vulnerability and sensitivity of the population under study, the type of substance consumed and the symptoms manifested, the specific hospital facilities involved, differences in treatment protocols, and so on. Unfortunately, similar studies in terms of hospitalization of pregnant women in the ICU are not available. Most xenobiotic exposure aims to terminate pregnancy. So, in the majority of cases, the severity of poisoning is minor, and in general, complete suicide (leading to death) rarely occurs during pregnancy (Hoffman *et al.*, 2015). The present study reports one case (2.5%) of complete suicide. It is a high percentage in comparison with AAPCC data, which reports about 1 to 2 deaths per year in pregnant women and also declares that about 1 out of 10,000 (ten thousand) deaths in pregnant women includes exposure to xenobiotics (Hoffman *et al.*, 2015). It could be due to the limited statistical population of the study or easier access to potentially dangerous toxins such as organophosphates. In this research, other hypotheses in pregnant women, including the number of pregnancies, history of addiction and neuropsychiatric diseases, prevalence of patients in need of surgery, and IUFD caused by poisoning, were also investigated, but similar studies were not found for comparison.

In conclusion, this work demonstrates the requirement of supporting pregnant women in the family and community, especially at the beginning of pregnancy. Given the higher prevalence of poisoning-related suicide compared to other methods, it is crucial to properly monitor and care for these women throughout their pregnancy and postpartum period. Given that medication is one of the primary causes of poisoning in pregnant women, we can prevent this by prescribing a minimal quantity of drugs or using similar medicines with lower risks for these individuals.

Conflict of interest

The authors declare that they have no conflict of interest.

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