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Comparison of first-time and repeated self-poisoning attempts: a cross-sectional study of the associated factors in central Iran

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ABSTRACT

This study aims to identify determinants of repeated self-poisoning compared to first-time self-poisoning at a referral poisoning center in Iran. A cross-sectional study was conducted at a referral poisoning center in Iran from January 2015 to December 2019. Demographic characteristics, toxicological data, and self-reported histories of self-poisoning behavior, self-harm, psychiatric disorders, and family history of self-poisoning were extracted from medical records. Univariable and multivariable logistic regression analyses were performed to identify factors associated with repeated self-poisoning. Out of 4256 patients, 936 (21.99%) had a history of previous self-poisoning. Females had more repeated attempts (61.2%) and fewer first-time attempts (54.5%) than males (38.8% and 45.5%, respectively) ($p < 0.001$). Pharmaceutical drugs accounted for the most common cause of acute poisoning ($N = 666$, 71.2%). Multivariable logistic regression showed that female sex (OR: 1.44, 95% CI: 1.08–1.92; $p = 0.01$), psychiatric disease history (OR: 3.85, 95% CI: 2.95–5.01; $p<0.001$), self-harm history (OR: 5.35, 95% CI: 3.70–7.77; $p < 0.001$), and suicide family history (OR: 2.17, 95% CI: 1.41–3.32; $p < 0.001$) were independent predictors of repeated self-poisoning. In this hospital-based sample of patients, it was found that female patients, having a history of psychiatric disease, self-harm and a family history of self-poisoning were predictors of repeated self-poisoning. Interventions to decrease recurrence rates for self-poisoning should be directed towards these specific factors. However, self-poisoning that occurs in the community may be under-represented in the data. Gender differences in self-poisoning may reflect variations in help-seeking behavior or reporting rather than true differences in recurrence risk.

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Introduction

According to the World Health Organization (WHO), suicide remains a major global public health concern, and a preventable cause of death, accounting for over 727,000 deaths worldwide each year (In, 2021), equating to one life lost every 45 seconds (Pirkis et al., 2024). This makes suicide one of the leading causes of premature mortality worldwide, with a disproportionate burden in low- and middle-income countries, where over 77% of these deaths occur (WHO, 2021). Reports have shown that self-poisoning occurs about 10 to 20 times more frequently than completed suicide (Diekstra & Gulbinat, 1993), and 16% of those who survive an episode of self-harm will return to the hospital within a year (Oh et al., 2015).

Self-poisoning is recognized as one of the common methods of attempted suicide (Finkelstein et al., 2015; Langlois & Morrison, 2002). It is also a common method in many Asian countries, where it accounts for more than half of all deaths (Alinejad et al., 2017; Konradsen et al., 2003). Recent epidemiological evidence reveals a significant regional burden and concerning temporal trends. In Egypt, a comprehensive registry study of 7,398 patients documented an incidence of suicide attempts by deliberate self-poisoning of 26.10 per 100,000 population (Kasemy et al., 2022), which during the COVID-19 pandemic further amplified this burden, from 7% to 26.5% (Elhawary et al., 2023). Self-poisoning can result from a wide range of substances, including pesticides, medications, and household chemicals (Runeson et al., 2010), and has been identified as a major contributor to suicide-related hospital admissions (Finkelstein et al., 2015; Hawton et al., 2012). The risk of subsequent suicide is 40 times higher in patients with the first presentation of self-poisoners compared to population-based controls (Finkelstein et al., 2015). Additionally, individuals who survive an episode of self-poisoning are at an increased risk of subsequent self-poisoning, which may involve more lethal methods (Beautrais, 2003; Kuo et al., 2012; Owens et al., 2005).

In many low- and middle-income countries, including Iran, self-harm via self-poisoning represents one of the most common methods of intentional self-injury, largely due to accessibility of medications and toxic agents, limited regulation, and sociocultural factors (Alinejad et al., 2017).

A review study found that pharmaceutical drug toxicity is prevalent in many regions of Iran (Alinejad et al., 2017). The process of suicide seems to be influenced by, geography, cultural settings and demographics (Choi et al., 2013). For instance, according to a study suicide rates are higher in rural regions and among American Indian and Alaska Native populations compared to other races. On the other hand, multiple self-poisonings have a higher likelihood of being single, having a family member who has attempted suicide and having a lower achievement level (Choi et al., 2013). Hence, the identification of a high-risk group may also provide an opportunity to decrease the risk of early death in this population (Martin Reith et al., 2003).

Despite the importance of this issue, comprehensive studies investigating the factors contributing to repeated self-poisoning via acute poisoning in our region are lacking. Understanding the factors contributing to recurrent self-poisoning is essential for identifying high-risk individuals and implementing targeted preventive interventions. This study aimed to compare the demographic, clinical, and toxicological characteristics

between first-time and repeated intentional self-poisoning patients using data from a referral center in Isfahan, Iran.

Methods

Study design and participants

This cross-sectional study was conducted at the poisoning center of Khorshid Hospital, the sole specialized poisoning referral center in Isfahan province, Iran, serving a catchment population of approximately five million. In routine clinical practice, the majority of individuals with self-poisoning who present to primary or secondary hospitals are referred to this center for further evaluation and management, irrespective of initial clinical severity. Consequently, the study population encompasses a broad spectrum of self-poisoning cases, rather than being limited to medically severe presentations.

Data were obtained from the established poisoning of Khorshid Hospital, which retrospectively records information on all patients presenting with deliberate self-poisoning under standardized clinical protocols. Patients were eligible for inclusion if they were aged 18 years or older, had a confirmed diagnosis of deliberate self-poisoning by clinical toxicologists based on medical history, physical examination, and laboratory parameters when necessary. During this five-year period, a total of 6217 medical records were reviewed.

As this was a comprehensive data collection study, no prospective sample size calculation was performed; all available eligible cases during the study period were included. To ensure data quality, patients with incomplete medical records exceeding 20% missing data were excluded from the analysis. After applying the inclusion and exclusion criteria, 1951 were excluded (due to accidental poisoning = 704, overdose = 324, other = 45, unknown = 875, combination = 3 and incomplete data = 10), finally 4256 patients with intentional acute poisoning were included in our study. The study followed the Declaration of Helsinki and was approved by the ethical review committee of Isfahan University of Medical Sciences (IR.MUI.MED.REC.1398.467).

Data collection and variables definition

Data were extracted from medical records using a structured data extraction form developed by the research team prior to data collection, and extraction was performed by trained researchers to ensure accuracy and consistency. The form captured demographic characteristics including gender, age, marital status, and level of education; toxicological characteristics including method of poisoning, place of poisoning, and type of poisoning; clinical history and outcomes including intubation, mortality, and recovery; and past history variables including history of self-poisoning, number of previous self-poisoning attempts, addiction to opioids, stimulants, alcohol, cigarettes or other substances, history of psychiatric disorder, family history of suicide, history of non-suicidal self-harm, and criminal record.

Deliberate self-poisoning was defined according to the criteria described by Bancroft et al. (1977) and Carter et al. as (2005) the deliberate ingestion of more than the

prescribed amount of medicinal substances, or ingestion of substances never intended for human consumption, irrespective of whether harm was intended.

Based on the history of previous self-poisoning, which was ascertained through a combination of patient self-report during standardized psychiatric evaluation, review of previous medical records when available, and information provided by family members or companions, eligible patients were classified into two groups: 1.first-time self-poisoners, defined as those with no previous history of self-poisoning, and 2. repeated self-poisoners, defined as those with one or more documented previous self-poisoning attempts. The history of psychiatric disease was defined based on patient or companion reports of previous psychiatric disorders (such as depression, bipolar disorder, anxiety disorder, schizophrenia, or other DSM-5-diagnosed psychiatric disorders), regardless of their severity.

Type of poisoning was classified into seven categories: 1) drugs, encompassing all types of pharmaceutical agents whether taken alone or in combination; 2) opioids including opium, methadone, tramadol, buprenorphine, heroin, pethidine, morphine and multiple opioid poisoning; 3) pesticides including insecticides, herbicides, fungicides and rodenticides; 4) alcohol; 5) stimulants; 6) multiple substances involving poisoning with two or more substances from the other six specified groups; and 7) others including other types of poisoning.

Standardized clinical assessment protocol and missing data

At our center, all patients presenting with deliberate self-poisoning undergo a mandatory and standardized clinical evaluation protocol, which ensures systematic data collection for critical variables, particularly past suicidal behavior. This protocol includes comprehensive medical assessment by emergency medicine physicians and clinical toxicologists upon admission, followed by psychiatric consultation for all self-harm patients by trained psychiatrists conducted as part of routine clinical practice. This psychiatric assessment mandatorily includes detailed questioning about past history of self-harm and suicide attempts, as this information is essential for risk stratification and clinical management, with all findings systematically documented in the medical records as part of standard clinical care. This standardized approach ensures that data on past behavior, including the classification of first-time versus repeated attempts, are collected consistently for all patients, minimizing information bias and ensuring completeness of these critical variable. For the primary variable of interest history of previous self-poisoning the proportion of missing data was negligible, less than two percent, attributable to the mandatory nature of psychiatric assessment documentation in self-harm cases at our center and the multi-source approach to ascertaining this information. For other variables, missing data ranged from 0 to 5%, and given this low proportion of missingness, no imputation methods were applied; pairwise deletion was employed in the statistical analyses. As these techniques are unlikely to substantially alter results when missing data are minimal and assumed to be missing at random.

Statistical analysis

Data analyses were conducted using the Statistical Package for the Social Sciences (SPSS) software for Windows version 26 (IBM Corp. Released 2019. Armonk, NY: IBM Corp).

Numerical variables were presented as mean and standard deviation or median and interquartile range based on their distribution, which was assessed using the Kolmogorov–Smirnov test and visual inspection of histograms, while categorical variables were expressed as frequency and percentage. For between-group comparisons, the independent t-test was employed for normally distributed continuous variables, and the Mann–Whitney U test was used for non-normally distributed variables; categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. Univariate logistic regression analysis was first performed to examine the association of each potential risk factor with repeated self-poisoning. Given the exploratory nature of the study, all variables with a p-value < 0.05 in bivariate t-test or chi-square test analyses were considered for inclusion in the univariate and multivariable logistic regression model for quantifying the associations of potential predictors with dependent variable and the results were presented as odds ratios (OR) with corresponding 95% confidence intervals. Using multiple logistic regression enabled us to evaluate how strongly each predictor variable was associated with the response, while simultaneously adjusting for the other predictors in the model. The Hosmer–Lemeshow goodness-of-fit test was used to assess the adequacy of the final multivariable model. All analyses were based on complete-case analysis, with missing data excluded on a variable-wise basis. The proportion of missing data for variables included in the regression models was less than 5%, which is below the threshold typically considered problematic for bias; for the primary outcome variable (history of previous self-poisoning), missing data were negligible (<2%) due to the mandatory nature of psychiatric assessment documentation in self-harm cases at our center. In all statistical evaluations, two-tailed p-values less than 0.05 were considered statistically significant; however, given the exploratory nature of the study and the modest sample size, confidence intervals were emphasized over p-values in interpreting the precision and clinical relevance of the findings.

Results

During this five-year period, a total of 4256 patients with actue self-poisoning were included in our study (Figure 1). Among those, 936 (21.99%) patients had a history of a previous self-poisoning. The mean (SD) number of self-poisonings was 1.86 (1.74). Three hundred and seventy- five individuals presented on one occasion, 146 on two, 57 on three, 23 on four, 9 on six and 5 each on 5, 7 and 8, 4 on 10 and 1 each on 9, 12, 15 and 20 occasions.

The mean (SD) age of the study population was 33.31 (11.54). The majority (56.3%) were females. Oral ingestion was the main route of exposure (98.0%).

Table 1 presents the demographics, toxicological characteristics and past history of patients with repeated self-poisoning behavior in comparison with patients who attempts suicide for the first time. Females comprised a higher proportion of the repeated self-poisoning group (61.2% vs 54.5%, $p < 0.001$). There was a significant difference between the two groups in terms of the type of poisoning ($p = 0.001$). Drugs accounted for the most common cause of acute poisoning in patients with repeated self-poisoning followed by opioids, multiple substances and poisons. In patients with first-time self-poisoning, drugs were also responsible for the most common cause followed by opioids, poison and multiple substances.

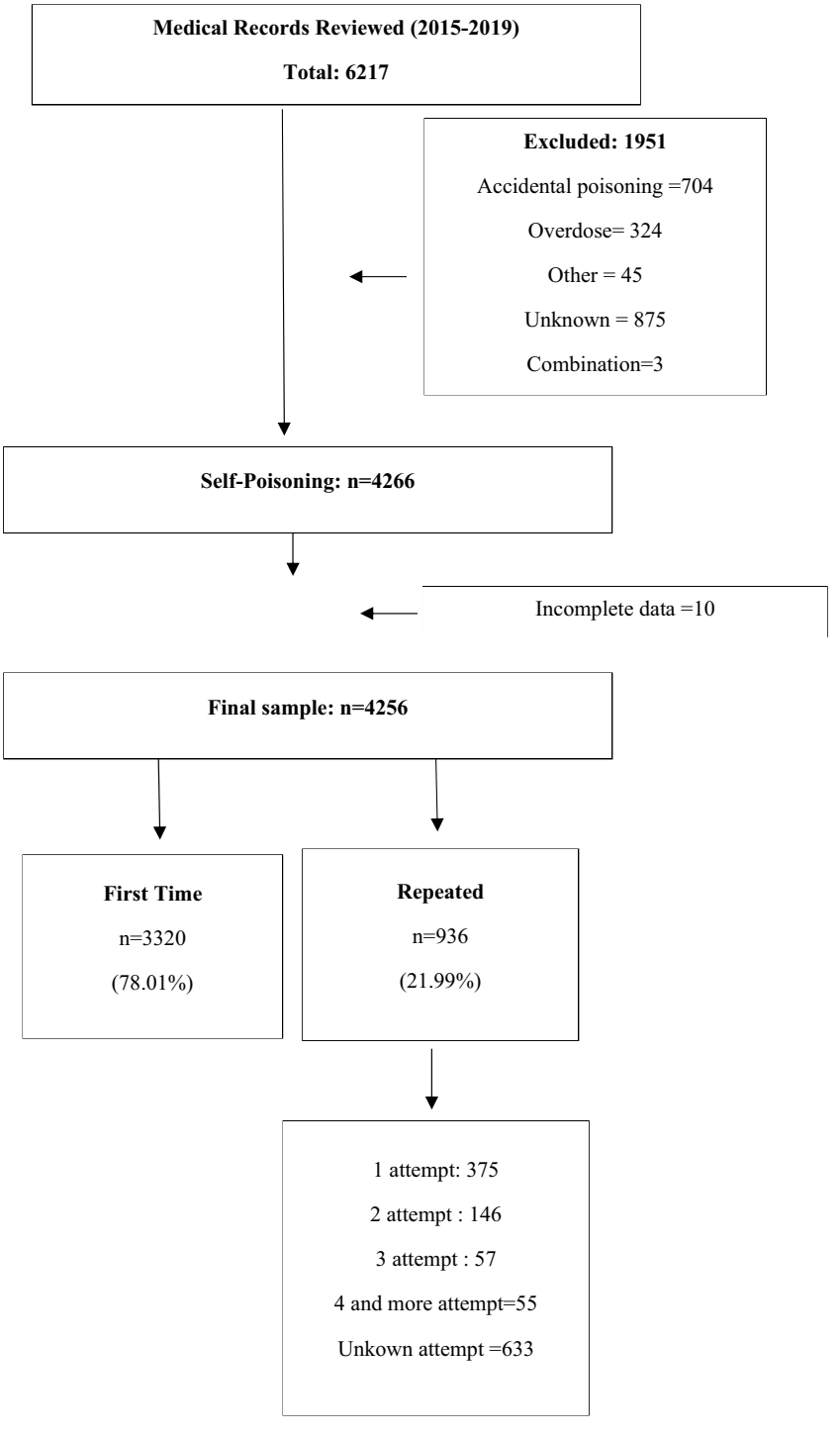


Figure 1. Flow chart.

Table 1. Demographics, toxicological characteristics and past history of patients with repeated self-poisoning in comparison with patients who attempts self-poisoning for the first time.

Variables	Category	Total	Suicidal attempt		*p*-value
			Repeated self-poisoning attempt	First time self-poisoning attempt	
		N = 4256	*N* = 936	*N* = 3320	
Age			33.14 ± 9.93	33.02 ± 11.63	0.76
Gender	Female	1912 (56.3%)	573 (61.2%)	1339 (54.5%)	<0.001
	Male	1482 (43.7%)	363 (38.8%)	1119 (45.5%)	
Marital Status	Married	1849 (54.5%)	499 (53.3%)	1350 (54.9%)	0.40
	Single	1545 (45.5%)	437 (46.7%)	1108 (45.1%)	
Education Level	Illiterate	18 (0.5%)	4 (0.4%)	14 (0.6%)	0.47
	Secondary	75 (2.2%)	20 (2.1%)	55 (2.2%)	
	Diploma	108 (3.2%)	22 (2.4%)	86 (3.5%)	
	Higher Secondary	14 (0.4%)	2 (0.2%)	12 (0.5%)	
	Bachelor's and above	24 (0.7%)	7 (0.7%)	17 (0.7%)	
	Unknown	3155 (93.0%)	881 (94.1%)	2274 (92.5%)	
Route of exposure	Oral	3313 (98.0%)	915 (98.2%)	2398 (97.9%)	0.47
	Inhalation	25 (0.7%)	4 (0.4%)	21 (0.9%)	
	Injection	10 (0.3%)	2 (0.2%)	8 (0.3%)	
	Unknown	33 (1.0%)	11 (1.2%)	22 (0.9%)	
Type of poisoning	Drug	2352 (69.3%)	666 (71.2%)	1686 (68.6%)	<0.001
	Opioids	359 (10.6%)	89 (9.5%)	270 (11.0%)	
	Pesticides	307 (9.0%)	67 (7.2%)	240 (9.8%)	
	Multiple substances	237 (7.0%)	4 (0.4%)	151 (6.1%)	
	Alcohol	39 (1.1%)	35 (1.4%)	35 (1.4%)	
	Stimulant	42 (1.2%)	9 (1.0%)	33 (1.3%)	
	Others	58 (1.7%)	15 (1.6%)	43 (1.7%)	
Location of poisoning	Home	2594 (76.4%)	713 (76.2%)	1881 (76.5%)	0.97
	Workplace	91 (2.7%)	27 (2.9%)	64 (2.6%)	
	Other	210 (6.2%)	59 (6.3%)	151 (6.1%)	
	Unknown	499 (14.7%)	137 (14.6%)	362 (14.7%)	
Addiction history	Yes	944 (28.5%)	293 (32.7%)	651 (27.0%)	0.001
	No	2367 (71.5%)	604 (67.3%)	1763 (73.0%)	
Psychiatric disease history	Yes	830 (26.2%)	426 (50.5%)	404 (17.4%)	<0.001
	No	2338 (73.8%)	417 (49.5%)	1921 (82.6%)	
Self-harm history	Yes	318 (13.2%)	209 (32.1%)	109 (6.2%)	<0.001
	No	2097 (86.8%)	443 (67.9%)	1654 (93.8%)	

(*Continued*)

Table 1. (Continued).

Variables	Category	Total	Suicidal attempt		*p*-value
			Repeated self-poisoning attempt	First time self-poisoning attempt	
		N = 4256	*N* = 936	*N* = 3320	
Past medical mistory	Yes	912 (33.6%)	292 (39.3%)	620 (31.4%)	<0.001
	No	1803 (66.4%)	451 (60.7%)	1352 (68.6%)	
Criminal record history	Yes	147 (5.0%)	55 (7.4%)	92 (4.2%)	0.001
	No	2798 (95.0%)	689 (92.6%)	2109 (95.8%)	
Suicide family history	Yes	213 (7.2%)	97 (12.5%)	116 (5.3%)	<0.001
	No	2732 (92.8%)	676 (87.5%)	2056 (94.7%)	

The results are presented as number (percent) per variable or mean ± SD (minimum-maximum) where applicable. Categorical variables were compared between groups with Fisher's exact or Chi-square tests where appropriate and continuous variables were compared with independent samples T-test. The *p* value less than 0.05 were considered as statistically significant.

People who repeated self-poisoning reported a greater proportion of addiction history (32.7% vs 27.0%), psychiatric disease history (50.5% vs 17.4%), suicide family history (12.5% vs 5.3%), self-harm history (32.1% vs 6.2%), past medical history (39.3% vs 31.4%) and criminal records (7.4% vs 4.2%) (all $p < 0.05$). No significant difference was observed between patients with repetitive and first-time self-poisoning in terms of age, marital status, educational level and location of poisoning.

Table 2 presents the findings from physical examinations upon admission and clinical outcomes among patients with and without a history of previous self-poisoning. There were a significant differences between the two groups in terms of CNS examination ($p < 0.001$). Patients with repeated self-poisoning had a higher proportion of altered mental status compared to first-time attempters.

Patients with repeated self-poisoning were significantly more likely to show physical signs of self-harm upon examination (24.3% vs. 8.7%, $p < 0.001$). Administration of activated charcoal was significantly higher among repeated attempters (85.7%) compared to first-time attempters (81.4%) ($p = 0.003$). There was no significant difference in the time interval from ingestion to presentation between first-time and multiple self-poisoners ($p > 0.05$). Twenty-two patients died by suicide with self-poisoning with ten having made repeated self-poisoning attempts and twelve attempting suicide for the first time. Of these patients, nine were female and thirteen were male. Half of the deaths were caused by pesticides ($N = 11$).

Logistic regression analysis was carried out on all significant variables in univariable analysis (Table 3). Female sex, past medical history, suicide family history and history of psychiatric disease, self-harm, addiction and criminal record were independently significantly associated with repeated self-poisoning. However, after conducting multivariable logistic regression, gender (OR: 1.44, 95%CI (1.08–1.92); $p = 0.013$), psychiatric disease history (OR: 3.85, 95%CI (2.95–5.01); $p <$

Table 2. Physical examination upon admission and outcome of patients with repeated self-poisoning attempt in comparison with patients who attempts self-poisoning for the first time.

Variables	Variable Category	Patients with no self-poisoning history	Patients with self-poisoning history	Total	p value
CNS examination	Alert	1471 (62.2%)	465 (50.8%)	1936 (59.0%)	<0.001
	Confusion	53 (2.2%)	10 (1.1%)	63 (1.9%)	
	Lethargy-obtundation	747 (31.6%)	393 (43.0%)	1140 (34.7%)	
	Stupor	59 (2.5%)	30 (3.3%)	89 (2.7%)	
	Coma	36 (1.5%)	17 (1.9%)	53 (1.6%)	
Pupil reflex	Yes	1359 (93.3%)	514 (95.4%)	1873 (93.9%)	0.09
	No	97 (6.7%)	25 (4.6%)	122 (6.1%)	
Pupil_size	Normal	1642 (70.6%)	595 (67.6%)	2237 (69.8%)	0.08
	Mydriasis	333 (14.3%)	124 (14.1%)	457 (14.3%)	
	Miosis	351 (15.1%)	161 (18.3%)	512 (16.0%)	
Heart sound	Normal	1538 (80.4%)	562 (81.1%)	2100 (80.6%)	0.67
	Abnormal	376 (19.6%)	131 (18.9%)	507 (19.4%)	
Lung sound	Normal	2143 (98.4%)	778 (97.4%)	2921 (98.2%)	0.06
	Abnormal	34 (1.6%)	21 (2.6%)	55 (1.8%)	
Abdominal examination	Normal	1935 (99.0%)	688 (98.1%)	2623 (98.8%)	0.09
	Abnormal	20 (1.0%)	13 (1.9%)	33 (1.2%)	
Body sign of self-harm	Yes	95 (8.7%)	95 (24.3%)	190 (12.8%)	<0.001
	No	999 (91.3%)	296 (75.7%)	1295 (87.2%)	
Body sign of injection	Yes	23 (2.3%)	11 (3.3%)	34 (2.5%)	0.32
	No	989 (97.7%)	326 (96.7%)	1315 (97.5%)	
Intubation	Yes	243 (10.1%)	104 (11.3%)	347 (10.4%)	0.30
	No	2173 (89.9%)	818 (88.7%)	2991 (89.6%)	
activatedcharcoal	Yes	1989 (81.4%)	794 (85.7%)	2783 (82.6%)	0.003
	No	454 (18.6%)	132 (14.3%)	586 (17.4%)	
Time to presentation	N (Mean rank)	1776 (1227.21)	683 (1237.25)		0.75
Intubation	Yes	243 (10.1%)	347 (10.4%)	104 (11.3%)	0.30
	No	2173 (89.9%)	2991 (89.6%)	818 (88.7%)	
outcome	Recovery	2403 (99.5%)	919 (98.9%)	3322 (99.3%)	0.063
	Death	12 (0.5%)	10 (1.1%)	22 (0.7%)	

The results are presented as number (percent) per variable. Categorical variables were compared between groups with Fisher's exact or Chi-square tests where appropriate. The p value less than 0.05 were considered statistically significant.

0.001), self-harm history (OR: 5.35, 95%CI (3.70–7.77); $p < 0.001$) and suicide family history (OR: 2.17, 95%CI (1.41–3.32); $p < 0.001$) remained significant (Table 3).

Table 3. Univariate and multivariable logistic regression analysis for evaluating determinants of repeated suicide attempts with self-poisoning in comparison with first-time suicide attempters with self-poisoning.

Variables		Univariate logistic model		Multivariable logistic model	
		OR (95% CI)	P-value	OR (95% CI)	P-value
Gender	Female	1.32 (1.13–1.54)	<0.001	1.44 (1.08–1.92)	0.013
	Male	1	–	1	–
Type of poisoning	Drugs	1.13 (0.63–2.05)	0.68	–	–
	Opioids	0.95 (0.50–1.78)	0.86		
	Pesticide	0.80 (0.42–1.53)	0.50		
	Multiple substance	1.63 (0.86–3.11)	0.14		
	Alcohol	0.33 (0.10–1.08)	0.066		
	Stimulant	0.78 (0.31–2.01)	0.61		
	Other	1	–		
Past medical history	Yes	1.41 (1.19–1.68)	<0.001	1.19 (0.92–1.54)	0.19
	No	1			
Psychiatric disease history	Yes	4.86 (4.09–5.77)	0.001	3.85 (2.95–5.01)	<0.001
	No	1			
Self-harm history	Yes	7.16 (5.55–9.23)	<0.001	5.35 (3.70–7.77)	<0.001
	No	1			
Suicide family history	Yes	2.54 (1.92–3.38)	<0.001	2.17 (1.41–3.32)	<0.001
	No	1			
Addiction history	Yes	1.32 (1.11–1.55)	0.001	0.97 (0.70–1.33)	0.83
	No	1			
Criminal record history	Yes	1.83 (1.30–2.58)	0.001	0.92 (0.51–1.65)	0.77
	No	1			

Odd ratio(OR); Confedence Interval (CI).

Discussion

Suicide remains a significant public health challenge and ranks among the leading external causes of death worldwide. This cross-sectional study of 4,256 patients with self-poisoning at a referral poisoning center revealed that 21.99% ($n = 936$) had a history of previous suicide attempts. Multivariable logistic regression analysis identified four independent predictors of repeated self-poisoning : history of self-harm, psychiatric disease history, family history of suicide, and female sex. These findings align with established literature on suicide risk factors and provide quantitative evidence from a Middle Eastern population, where such data remain limited. The identification of these predictors has important implications for targeted screening and intervention strategies in clinical toxicology settings.

Female patients constituted a significantly higher proportion of the repeated self-poisoning group (61.2%) compared to first-time attempters (54.5%,), with female gender emerging as an independent predictor in multivariable analysis. This finding is consistent with previous research demonstrating that females face approximately 2.2 times higher risk for repeated self-poisoning compared to males (Oh et al., 2011). This aligns with what is often referred to as the gender paradox in suicidology (Berardelli et al., 2022), wherein females demonstrate higher rates of self-poisonings and ideation, while males exhibit higher rates of suicide completion (Berardelli et al., 2022; Henderson et al., 2005; Turecki & Brent, 2016). Prior studies have shown that women more frequently choose self-poisoning as a method, whereas men tend to choose more violent and lethal means, such as firearms or jumping from height (Callanan & Davis, 2012; Monnin et al., 2012; Park, 2015;

Tsirigotis et al., 2011). This behavioral trend is often attributed to differences in suicide intent, societal roles, and accessibility of methods (Berardelli et al., 2022; Canetto & Sakinofsky, 1998).

One of the associations identified in our study was between repeated self-poisoning and psychiatric history. More than half of the repeat attempters had a diagnosed psychiatric disorder, compared to only 17.4% in the first-time attempter group. This is consistent with the existing literature indicating that psychiatric disorders are associated with an increased risk of suicidal (Bertolote et al., 2004).

A wide range of psychiatric disorders, such as bipolar disorder, major depressive disorder, schizophrenia, anxiety disorders, and alcohol or substance use disorders, are associated with an elevated risk of suicide (Esang & Ahmed, 2018; Nordentoft et al., 2011; Rizk et al., 2021). As evident in our study, univariable analysis showed that patients with a history of substance abuse (including opioids, alcohol, and stimulants) were more likely to have repeated self-poisoning. This may be attributed to the fact that both acute and long-term substance misuse can impair cognitive function, reduce impulse control, and disrupt neurochemical regulation, thereby facilitating suicidal behavior (Pompili et al., 2010). Nonetheless, the lack of a significant association between addiction and repeated self-poisoning in our multivariable analysis suggests that this relationship may be mediated by other factors.

A positive family history of suicide among first-degree relatives was associated with more than a twofold increase in the likelihood of repeated self-poisoning attempts. This finding is consistent with previous research, which has identified familial suicide history as a well-established risk factor contributing to vulnerability toward suicidal behavior.

The history of self-harm was also associated with increased odds of repeated self-poisoning. A significantly higher proportion of repeated self-poisoners (32.1%) reported engaging in self-harming behaviors compared to first-time attempters. A history of self-harm increases the risk of all cause mortality especially suicide (Bjornaas et al., 2009; Chen et al., 2011; Hawton et al., 2006). A meta-analysis estimated that within one year of a self-harm episode, the pooled rates of fatal and non-fatal repetition are approximately 1.3% and 17.0%, respectively (Liu et al., 2020).

Approximately 22% of our patients with intentional poisoning had a history of previous self-poisoning. Comparing this percentage with existing literature is difficult due to variations in study populations, study designs, and definitions of repeated self-poisoning. Pushpakumara et al. reported that less than 10% of participants self-reported a lifetime history of deliberate self-poisoning in their prospective cohort study conducted in Sri Lanka (Pushpakumara et al., 2019). In a cross-sectional study conducted in South Korea, Kyoung Ho Choi reported that 35.1% of patients were multiple attempters (Choi et al., 2013). A retrospective review of medical records reported a 21% prevalence of repeated self-poisoning (Oh et al., 2011). Regardless of methodological variations our data reinforce the need for targeted interventions in high-risk groups.

This study has several important limitations that should be considered when interpreting the findings. First, the cross-sectional and retrospective design precludes any inference of causal relationships between identified factors and self-harm repetition. Associations observed in this study should therefore be interpreted as correlational rather than predictive, and it cannot be determined whether the identified characteristics precede or result from repeated self-harm behavior.

Second, this was a single-center study conducted at a tertiary referral poisoning center, which may limit the generalizability of the findings. Patients presenting to a specialized referral center are likely to represent more severe or complex cases of self-harm via self-poisoning, potentially leading to an overrepresentation of individuals with psychiatric comorbidity or prior self-harm. As a result, prevalence estimates and effect sizes may not be directly applicable to community settings or non-referral hospitals. In addition, we did not provide severity scores for all patients who were admitted.

Third, key variables including history of prior self-harm, psychiatric disorders, substance use, and family history of suicide were based on self-report and routine clinical documentation rather than structured diagnostic assessments. Variations in the completeness of these records or in how clinicians elicited and recorded past behavior may have resulted in underreporting or missing data. In a low- and middle-income countries context, social stigma, legal concerns, and cultural factors may contribute to underreporting or misclassification of these variables or missing data. This limitation may have resulted in nondifferential misclassification, potentially attenuating or, in some cases, inflating observed associations.

Fourth, suicidal intent was not formally assessed, and classification was based on deliberate self-poisoning recorded in medical notes. Consequently, the findings should be interpreted within a self-harm framework rather than as definitive indicators of suicidal behavior. This limitation restricts conclusions regarding intent, lethality, or escalation of suicidal behavior over time.

Finally, although we identified factors associated with a history of repeated self-harm, the study design does not allow examination of temporal patterns, frequency, or trajectories of repetition. Therefore, the results should not be interpreted as describing patterns of repetition or predicting future self-harm, but rather as identifying characteristics that distinguish patients with and without a self-reported history of prior self-harm at the time of presentation.

Conclusion

In this hospital-based sample of patients, it was found that female patients, having a history of psychiatric disease, self-harm and a family history of self-poisoning were predictors of repeated self-poisoning. Interventions aimed at reducing recurrence rates for self poisoning should be focus on these specific factors. In Iran, seeking help after self-harm is often delayed, and the disclosure of intent may be influenced by stigma and legal or familial concerns. These contextual factors complicate both the assessment of suicidal intent and the interpretation of clinical data from routine hospital records. However, self-poisoning cases occurring in the community may be underrepresented, and gender differences may reflect variations in help-seeking behavior or reporting rather than actual differences in recurrence risk.

Author contributions

CRediT: **Rokhsareh Meamar:** Conceptualization, Project administration, Funding acquisition, Data curation, Supervision, Writing- Reviewing and Editing; **Nastaran Eizadi-Mood:** Writing-Reviewing and Editing, Data curation; **Awat Feizi:** Methodology, Software, Data Curation,

Validation, Writing- Reviewing and Editing; **Gholamali Dorooshi:** Conceptualization, Project administration, Data curation, Resources, Supervision. Visualization, Writing- Reviewing and Editing; **Hussein Al-Hajj Ahmed:** Data collection, Data gathering, Investigation

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Consent for publication

All authors approved the final version of the manuscript.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Ethics approval and consent to participate

This research has been performed in accordance with the Declaration of Helsinki and has been approved by the ethics committee of Isfahan University of Medical Sciences (Ethics code: IR.MUI.MED.REC.1398.467).

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