



# Effective Factors in Recurrent Deliberate Self-Poisoning Attempts

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## Abstract

**Background:** The most common suicide attempt (SA) is deliberate self-poisoning (DSP) in Iran. Although the proportion of fatal suicide by DSP is much lower compared to other methods, repeated suicide attempts (RSA) are very high.

**Objectives:** This study aimed at determining the effective factors on RSA among patients referred due to DSP in west of Iran.

**Methods:** All cases attempting DSP, who were referred to the only main poisoning treatment centre in the west of Iran, were assessed during year 2014. They were interviewed by psychologists in order to determine the number of SAs for each person individually, using data linkage. Data was analyzed by zero-truncated poisson regression.

**Results:** During year 2014, of 1790 cases committed with DSP, 64 (3.5%) died because of the severity of poisoning. Among non-fatal DSP attempters, 1069 (61.94%) attempted suicide for the first time and 334 (19.34%) for the second time. In the multivariate model, age was an important predictor of RSA, so that the risk of RSA in 26 to 35 year-old age group was lower than in the 18-year-old age group (IRR 0.3, 95 % CI, 0.2 to 0.4 P = 0.001). Also, SA history was the first risk factor for RSA, so that individuals with SA history had higher RSA than individuals without SA history (IRR 3.1, 95 % CI, 2.8 to 3.3, P = 0.001). After SA history, psychological disorders were the most important risk factor for RSA (IRR 2.7, 95 % CI, 2.1 to 3.6, P = 0.001).

**Conclusions:** Psychological disorders and SA history are the most important factors on RSA. Because of the high prevalence of psychological disorders in SA individuals than the normal population, it is necessary to present psychological and surveillance consultation to suicide attempters to decrease the number of SAs.

**Keywords:** Self-Poisoning, Suicide Attempt, Mental Disorders

## 1. Background

Suicide is a psychological problem currently growing due to increased complexity of interaction and relationships (1). In most countries, rates of mortality from suicide attempt (SA) are higher than those from accidents (2). Annually, one million people die from suicide while 10 to 20 times more people attempt suicide worldwide. In other words, one death per forty seconds due to suicide and one SA per three seconds around the world has been reported (3). According to the world health organization (WHO) report, rate of SA was 10 to 40 times higher than that of fatal suicide during the second half of this century, with an increase in SA rate among young people compared to the elderly (4).

Iran has one of the lowest rates of suicide (5.7 (for young people) and 3.1 (for the elderly) per 100,000), yet rates of SA have been increasing for the last 2 decades (2). In Iran, Deliberate Self-Poisoning (DSP) was the most common way of SA (5). The methods of SA are associated with social-cultural factors and availability of drugs to the peo-

ple of some areas (6). In the western part of Iran (Kermanshah), rates of DSP-based SA are higher than elsewhere (5).

Although the proportion of fatal DSP-based SA is much lower compared to other SA means, the rates of DSP based on repeated suicide attempts (RSA) are higher (3). Furthermore, DSP accounts of 85% to 95% of suicide-related hospital admissions. Over 1% of non-fatal SAs will be fatal when they are re-attempted in the following year (7). However, elimination of SA is not possible and trend of DSP in Iran has increased during the recent years, yet it can be reduced dramatically by an organized planning (8).

One way to reduce DSP is to prevent RSA; in the past decade, several studies have been conducted to describe what protective and risk factors are associated with RSA. Moreover, most information about suicide has been reported from western countries (9).

Limited knowledge on preventive factors and risk factors for DSP makes suicidal preventive measures the most challenging area in clinical practice (4). It has been reported that identifying people with attempted to suicide

and providing them with needed care, training and support services could be considerably effective in decreasing SA rates, hence fatal SAs (8).

## 2. Objectives

The present study aimed at investigating factors affecting RSA in order to help respective authorities make plans to lower SA rates and related mortalities.

## 3. Materials and Methods

### 3.1. Study Population

During this cross-sectional study, all individuals attempting DSP and referring to the only and main Kermanshah Poisoning Treatment Centre were assessed during year 2014. Having an approximate population of 1 million, Kermanshah city is the biggest western city of Iran and Kermanshah province has shared borders with Iraq. Imam Khomeini hospital, located in Kermanshah city, is the main poisoning treatment centre (PTC) in the western part of Iran, to which more than 90% of un/deliberately poisoned cases needing medical care and treatment are referred. To determine mortality rates, the researchers used data from both hospital and forensic records. The number of SAs for any person was determined individually by using data linkage.

### 3.2. Health Status Assessments

Having had stable conditions, people with attempted suicide and those under health care were interviewed by clinically trained interviewers, privately, giving their demographic information including age, gender, marital status, education level, employment status, and place of residence. Data at the time, number and outcomes of SAs, suicidal means, reasons and motivations, and psychological diseases (anxiety disorders, personality disorders, depression, traumas, and stresses and related schizophrenia and substance dependence) were collected on the basis of age. According to both the symptoms and impairment criteria, the diagnostic and statistical manual of mental disorders (DSM-V) was used being capable of identifying 29 different psychiatric disorders in order to evaluate and diagnose psychological diseases involved (10). Due to the high rate in the community, psychosis was excluded from the analysis. Participants were interviewed individually during one hour.

### 3.3. Statistical Analysis

The association between the number of SAs and independent variables was examined using zero-truncated Poisson regression. This type of regression was used to model count data for which value of zero cannot occur when there is no evidence of over dispersion. In this study, the researchers use residual deviance to perform a goodness of fit model. Residual deviance is the difference between the deviance of the current model and the maximum deviance of the ideal model, where the predicted values are identical to the observed. The youngest age of SA was 13. Age logarithm minus 13 was considered as an offset variable. Nearly 1% of data was missing, so it was excluded from the analysis. In addition, P-values of less than 0.05 were considered statistically significant.

### 3.4. Ethical Consideration

The present study was conducted on the basis of the Helsinki declaration. The DSP attempters were interviewed personally by a group of Imam Khomeini hospital psychologists. Also, the study and related methods were approved by the ethical committee of Kerman Medical Science University (IR. KMU. REC. 2015. 440).

## 4. Results

In 2014, 1790 individuals attempted DSP, of whom 797 (42.8%) were male. Also, among all DSP attempters, 64 (44 males and 20 females) (3.5%) died. Among non-fatal DSP attempters (id est. 1726 people), 1069 (61.94%) attempted for the first time, 334 (19.34%) for the second, 156 (9%) for the third, and 167 (9.8%) for the fourth time. The highest number of SA was 15. In addition, 834 (49.2%) of the study population had a family history of SA.

Clinical interview with DSP attempters indicated that prevalence of drug abuse and psychological disorders were 17.8% and 72.5%, respectively. This study indicated that RSA was significantly related to age, gender, education level, marital status, place of residence, drug abuse, and regretful feeling. Also, there was no significant association between RSA and family history of SA and medical diseases (Table 1).

Univariate analysis showed higher incidence rate ratio (IRR) of DSP re-attempts for males compared to females (IRR 1.5, 95% CI, 1.4 to 1.7  $P=0.001$ ), yet multivariate analysis showed no significant differences (IRR 1.1, 95% CI, 0.9 to 1.2  $P=0.8$ ).

In the multivariate model, age was an important predictor for RSA of DSP, so that the risk of RSA in 26- to 35-year-old age group was lower than in the 18-year-old age group (IRR 0.3, 95% CI, 0.2 to 0.4  $P=0.001$ ).

**Table 1.** Frequency (Relative Frequency) of Repeated Suicide Attempts in the Kermanshah Province, During Year 2014

Variable		Total No. (%)	Number of Attempted Self-Poisoning (%)				P Value
			1	2	3	4 ≥	
Gender	Male	723 (41.9)	413 (57.1)	150 (20.7)	71 (9.8)	89 (12.3)	< 0.001
	Female	1003 (58.1)	656 (66.4)	184 (18.3)	85 (8.5)	78 (7.8)	
Age group	≤ 18	366 (21.3)	250 (68.3)	66 (18.0)	26 (7.1)	24 (6.6)	0.013
	19 - 25	805 (46.8)	484 (60.1)	163 (20.2)	80 (9.9)	78 (9.7)	
	26 - 35	373 (21.7)	210 (56.3)	79 (21.2)	37 (9.9)	47 (12.6)	
	≥ 36	177 (10.3)	122 (68.9)	24 (13.6)	13 (7.3)	18 (10.2)	
Job	Unemployed	350 (20.3)	182 (52.0)	87 (24.9)	36 (10.3)	45 (12.9)	< 0.001
	Housekeeper	575 (33.3)	401 (69.7)	98 (17.0)	40 (10.1)	36 (8.2)	
	Employee	516 (30.0)	306 (59.3)	104 (20.1)	56 (10.9)	50 (9.7)	
	Student	284 (16.4)	194 (68.3)	55 (19.4)	24 (8.4)	11 (3.9)	
Years of education	≤ 5 years	283 (16.7)	210 (74.2)	41 (14.5)	15 (5.3)	17 (6.0)	< 0.001
	6 - 9 years	389 (22.9)	227 (58.4)	75 (19.3)	39 (10.0)	48 (12.3)	
	10 - 12 years	820 (57.7)	473 (57.7)	181 (22.1)	85 (10.4)	81 (9.9)	
	≥ 13 years	203 (12.8)	133 (56.5)	35 (17.2)	16 (7.9)	19 (9.4)	
Marital Status	Single	933 (54.1)	571 (61.2)	198 (21.2)	89 (9.5)	75 (8.0)	< 0.001
	Married	663 (38.4)	437 (65.9)	118 (17.8)	50 (7.5)	58 (8.7)	
	Divorced	130 (7.5)	61 (46.9)	18 (13.8)	17 (13.1)	34 (26.2)	
Place of residence	City	1457 (86.3)	889 (61.0)	283 (19.4)	138 (9.5)	147 (10.1)	0.07
	Village	238 (13.7)	164 (68.9)	43 (18.1)	16 (6.7)	15 (6.3)	
Substance abuse	Yes	305 (17.8)	133 (43.6)	73 (23.9)	33 (10.8)	66 (21.6)	< 0.001
	No	1411 (82.2)	927 (65.7)	260 (18.4)	123 (8.7)	101 (7.2)	
Family history of suicide	Yes	834 (49.2)	516 (61.4)	158 (18.9)	82 (9.8)	78 (9.4)	0.6
	No	861 (50.8)	541 (63.8)	173 (20.1)	73 (8.5)	74 (8.6)	
Chronic Pain	Yes	343 (19.9)	210 (61.2)	75 (21.9)	34 (9.9)	24 (7.0)	0.5
	No	1383 (80.1)	874 (63.2)	269 (19.4)	122 (8.8)	118 (8.5)	
Feeling Regretful	Yes	894 (52.0)	631 (70.6)	163 (18.2)	62 (6.9)	38 (4.2)	< 0.001
	No	823 (48.0)	446 (54.1)	179 (21.7)	94 (11.4)	104 (12.7)	
	No	448 (27.5)	345 (77.0)	72 (16.0)	15 (3.4)	16 (3.6)	
Psychological disorders	Schizophrenia spectrum and other psychotic	31 (1.9)	11 (35.5)	6 (19.3)	6 (19.3)	8 (25.9)	< 0.001
	Depressive	629 (38.6)	392 (62.3)	114 (18.1)	71 (11.3)	52 (8.3)	
	Personality disorders	89 (5.5)	13 (14.6)	28 (31.5)	20 (22.4)	28 (31.5)	
	Trauma and stress or related	290 (17.8)	207 (71.4)	53 (18.3)	22 (7.6)	8 (2.7)	
	Substance use and addiction	35 (2.1)	12 (34.3)	10 (28.6)	5 (14.3)	8 (22.8)	
	Other disorders	204 (6.6)	104 (51.0)	61 (30.0)	17 (8.3)	22 (10.7)	

Individuals with higher levels of education (10 to 12 years of education) showed values of such risk higher than individuals with lower levels of education (< 5 years education) (IRR 3.5, 95 % CI, 2.9 to 4.2  $P < 0.001$ ). The difference

was partially decreased after making multivariate adjustments (IRR 1.8, 95 % CI, 1.5 to 2.2  $P < 0.001$ ) (Table 2).

A history of SA was the top risk factor for RSA both in the univariate and multivariable models. After multivari-

ate adjustments, values of such a risk for people with SA history were higher than those without SA history (IRR 3.1, 95 % CI, 2.8 - 3.3  $P < 0.001$ ).

After SA history, psychological disorders were the most important risk factors for RSA. The highest value of IRR of RSA was observed for people with schizophrenia, followed by substance-induced disorders. Values of such a risk were higher for individuals with schizophrenia and other psychotic disorders than individuals without these disorders (IRR 2.7, 95 % CI, 2.1 - 3.6  $P < 0.001$ ).

## 5. Discussion

Repeated Suicide Attempts are a common problem among those attempting DSP, most cases of which are not recorded, hence not reported for reasons such as the lack of registration and referral to health care centers, SA denial for political and social-cultural considerations, and individual and social prohibitions. Individuals whose suicide attempt is not disclosed for any reason are at higher risk of RSA and fatal suicides due to not receiving social support services provided to disclosed attempters and their families.

### 5.1. Repetition and Mortality

Amongst current SA attempters, 1% reattempt fatal suicides in the following year and 10% in the second year and afterwards. Non-fatal SAs are widely thought to increase the risk of RSA due to the adverse effects they have on attempters themselves and their surroundings. Although protective measures are not very effective regarding RSA since they have already been accustomed to, taking service, support, and consulting measures is required with seriousness.

In the present study, 3.5% of SAs were fatal. The SA fatality rates varied depending on availability of different suicide means. This rate reported for DSP was 1% to 5% (11); for self-burning the rate was 50% to 80% (12, 13), for self-shooting 80% to 90% (11), for self-hanging 60% to 70%, and for self-jumping off heights 30% to 35% (14, 15).

### 5.2. Age and Gender

Although DSP rate varied among countries, SA rates were increased by 60% for the past 45 years throughout the world (16). The RSA rates were higher for females compared to males. Considering relevant literature, including the current study, it can be argued that RSA rates are higher for females than for males while the opposite is true for rates of fatal suicides (17). As shown by univariate analyses, males exhibited suicidal re-attempt IRR 1.5 times more than females. However, after multivariate adjustments, no

significant difference was observed between the 2 groups in terms of IRR. Different studies performed in different countries have obtained inconsistently different results. In Taiwan (18), Australia (19), and Brazil, studies reported rates of RSA risk for females as 1.2, 1.9, and 2.7 times higher than for males, respectively. However, no significantly different rates of RSA risk were found between females and males by studies conducted in Scotland (20) and England (21).

Aging was the most significant protective factor that decreased the rates of RSA. The highest and lowest values of SA IRR were observed for 18-year-old and over-36-year-old cases. In similar studies, SA rates decreased as age increased (22). Several studies indicated a significant reverse correlation between age and means of attempting suicide. Accordingly, younger individuals used slightly fatal means of suicide, such as poisoning, while older ones used highly fatal means, such as self-burning, self-hanging, and self-shooting (22, 23).

### 5.3. Job and Length of Education

The highest rates of SA were reported for unemployed cases. The IRR of SA was 30% lower for employed individuals than that of unemployed ones. Studied performed in the US (24), Ireland (25), and India (26) showed that values of SA risk or of risk of RSA by unemployed individuals were 2.12, 3.12, and 6.15 times higher than those by employed ones, respectively.

The highest rate of RSA was observed for those for whom the length of education was 10 to 12 years; suicidal re-attempt IRR was 3.5 times higher than that for those with 5 years of education. After multivariate adjustments, the risk was partially moderated for the former compared to the latter. Similar studies showed that individuals with lower levels of education used more violent means of suicide with higher fatality, including self-burning and self-hanging, and are less likely to attempt self-poisoning. In accordance with available literature and results of the present study, it can be argued that, as education levels rise, rates of RSA increase, yet SA fatality rates decrease (11).

### 5.4. Marital Status

In univariate analyses, divorced individuals were at lower risk of RSA than single cases. However, after conducting a multivariate analysis, divorced individuals exhibited RSA rates 1.2 times higher than others. In univariate analyses, married people exhibited risk of RSA 50% lower than single cases, yet such protective effect was relatively moderated after making multivariate adjustments.

This factor is most probably related to age (the mean age was higher for married individuals than for single cases). Similar studies indicated that married people were

at a lower risk of RSA and SA than single and divorced ones were, after making adjustments (24).

Risk of RSA was higher for people with a family history of SA than those without this history. In studies performed in England (27), Sweden (28), and the US (29), individuals with a family history of SA showed an odds ratio of SA of 2.1, 1.98, and 3.87 times higher than those without, respectively.

#### 5.5. Family History of Suicide and Previous Attempts

In the present study, 38% of the study population had a history of SA. In the US, 50.9% (30), in central Iran 70% (31), and in France 47.7% (32) of suicide attempters had SA history. After multivariate adjustments, higher RSA risk values were obtained for individuals with SA history compared to those with a lack of history. A similar study showed that history of SA was the most significant risk factor for RSA (30).

Regarding the contribution of SA history to suicidal re-attempts, it is recommended for respective authorities and professionals to consider such people as being at high risk and provide them with job and psychological support services in order to lower SA rates.

#### 5.6. Mental Disorders

Suicide is a major problem for public health and SA is an important index in relation to community psychological health. Prevalence of psychological disorders was nearly 72% for suicide attempters participating in this study. This figure was reported as 41.6% and 80% by similar studies performed in Taiwan (18) and the US, respectively (33). A systematic review on the Iranian population reported that 71.8% and 53.5% of suicide attempters had mood disorders and history of drug abuse, respectively (34). In univariate analysis, the most significant psychological disorder involved in RSA was personality disorders, followed by schizophrenia and substance-induced disorder. After conducting a multivariate analysis, all 3 disorders remained the most significant. Most studies showed that psychological disorders increased the risk of SA and RSA (18, 33).

A single SA adversely affects 6 individuals, psychologically and socioeconomically (3, 35). Ninety percent of fatal suicide attempters have psychological disorders that can be diagnosed. Mental disorders were reported for SA individuals at a rate of approximately 12.7 per 1000, 10 times higher than that of the general population (36). In this regard, prevention, treatment, and rehabilitation measures can be effective in reducing rates of SA and related mortality along with psychological disorders, by promoting mental health. This is possible by increasing public awareness and knowledge of such disorders and by increasing the

number of health care and psychoanalysis centers within the community.

#### 5.7. Conclusions

Repeated Suicide Attempts are very high in DSP, to which many factors contribute. The most important of such factors include unemployment, SA history, family history of SA, substance abuse, and psychological disorders. In addition, psychological disorders and history of SA are the most important factors on RSA. Given that most suicide attempts could be prevented and that a high percentage of attempters re-attempt to fatal suicides in the following year, it is suggested that medical and psychiatric supporting services should be provided to both individuals at high risk and their families. It is recommended for respective authorities to take steps necessary to implement training and consulting plans at schools, workplaces, households and health care centers since this can be effective in reducing rates of RSA and related mortalities.

#### 5.8. Strengths and Limitations

The most remarkable strength of the present study was the recruitment of all people attempting DSP, from whom, 90% of un/deliberately poisoned cases need medical care and treatment. Imam Khomani hospital is the only poisoning treatment center in Kermanshah province in Western Iran. To avoid bias, other methods of suicide, including self-burning, and self-hanging with high mortality rates, were excluded from the current study. In fact, DSP is the most common method of SA in Iran, having much more frequency of repetition. Moreover, necessary efforts were made to have psychologists from the poisoning ward to interview suicide attempters in order to optimize their cooperation and to increase the validity of diagnosis of psychology disorders. As with any other work on suicide, the present study also had limitations, such as missing data, lack of cooperation from attempters, and denial of SA.

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#### Footnotes

**Authors' Contribution:** Ali Akbar Haghdoost and Mehdi Moradinazar involved in planning and implementation of the study, data collection, and contribution in drafting of the manuscript. Farid Najafi and Mohammad Reza Baneshi involved in planning and implementation of the study, data collection, and contribution in drafting of



**Table 2.** Comparison of Crude and Adjusted Incidence Rate Ratios of RSA in Kermanshah Province, During Year 2014

Variable		Crude IRR	Adjusted IRR
Gender	Female	1	-
	Male	1.5 (1.4 - 1.7)	
Age group	≤ 18	1	1
	19 - 25	0.5 (0.4 - 0.5)	0.5 (0.5 - 0.6)
	26 - 35	0.2 (0.2 - 0.3)	0.3 (0.2 - 0.4)
	≥ 36	0.1 (0.1 - 0.2)	0.1 (0.1 - 0.2)
Job	Unemployed	1	1
	Housekeeper	0.4 (0.3 - 0.6)	0.8 (0.6 - 0.9)
	Employee	0.6 (0.5 - 0.7)	0.7 (0.7 - 0.8)
	Student	0.9 (0.7 - 1.1)	0.9 (0.7 - 1.1)
Length of education, y	≤ 5	1	1
	6 - 9	3.0 (2.5 - 3.8)	1.6 (1.3 - 2.5)
	10 - 12	3.5 (2.9 - 4.2)	1.8 (1.5 - 2.2)
Marital Status	≥ 13	2.4 (1.9 - 2.9)	1.6 (1.3 - 2.1)
	Single	1	1
	Married	0.5 (0.4 - 0.6)	1.0 (0.9 - 1.2)
Place of Residence	Divorced	0.6 (0.5 - 0.8)	1.2 (1.1 - 1.5)
	City	1	-
Substance abuse	Village	0.9 (0.6 - 1.1)	
	No	1	1
Family history of suicide	Yes	1.5 (1.3 - 1.6)	1.2 (1.1 - 1.4)
	No	1	1
Chronic pain	Yes	1.3 (1.1 - 1.4)	1.3 (1.1 - 1.4)
	No	1	-
Feeling regret	Yes	1	1
	No	1.3 (1.1 - 1.4)	1.5 (1.4 - 1.7)
Previous attempts	No	1	1
	Yes	3.2 (2.9 - 3.4)	3.1 (2.8 - 3.3)
Psychological Disorders	No	1	1
	Schizophrenia spectrum and other psychotic	2.3 (1.9 - 2.9)	2.7 (2.1 - 3.6)
	Depressive	1.4 (1.2 - 1.7)	1.4 (1.3 - 1.7)
	Schizophrenia	4.8 (4.0 - 5.8)	2.7 (2.2 - 3.4)
	Trauma and stress or related	1.2 (0.9 - 1.4)	1.0 (0.9 - 1.1)
	Substance use and addiction	2.3 (1.8 - 3.2)	2.5 (1.5 - 2.7)
	Other disorders	2.1 (1.7 - 2.5)	1.7 (1.4 - 2.1)

Abbreviation: IRR, incidence rate ratio.

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