Prevalence of Ideation, Attempt and Completed Suicide in Iranian Substance Abusers: A Scoping Review and Meta-Analysis

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Abstract

Context: Suicide is a serious public health issue that is more prevalent among substance abusers.

Objectives: This scoping review aims to examine the prevalence of suicide attempts and completed suicides in this target population.

Data Sources: A systematic search was conducted without language or time restrictions in electronic databases including PubMed, Scopus, and Web of Sciences and Google Scholar using medical subject headings (MeSH) keywords. The primary outcome was the overall prevalence of suicide, while secondary outcomes included the prevalence of suicide attempts, suicidal ideation, and completed suicides among the target population.

Study Selection: All observational studies (including cohort, case-control, and cross-sectional studies) were included. Two independent reviewers performed the selection of relevant studies throughout all stages of the study selection process, including screening, full-text review, and quality assessment using a modified version of the Department of Health & Human Services tool.

Data Extraction: Data extraction was carried out using Excel, and data analysis was performed using Stata version 17. Ultimately, 13 studies were included in the systematic review and meta-analysis process.

Results: The findings revealed that personal and family history of suicide attempts, as well as psychological disorders, significantly increased the odds of mortality. Furthermore, the synthesis of studies indicated that the overall prevalence of suicide (including completed suicides, suicidal ideation, and suicide attempts) among this population was: ES [95% confidence interval] = 0.42 [0.31 to 0.52]. In the subgroup analysis, the results showed: The prevalence of completed suicides: ES [95% confidence interval] = 0.59 [0.52 to 0.66]. The prevalence of suicidal ideation: ES [95% confidence interval] = 0.29 [0.26 to 0.31]. The prevalence of suicide attempts: ES [95% confidence interval] = 0.29 [-0.17 to 0.76].

Conclusions: The results of this study demonstrate a high prevalence of both completed suicides and suicide attempts among individuals with substance abuse issues. To reduce the incidence of these behaviors, governments should design programs aimed at decreasing the rates of Poisoning and mortality in this population.

Keywords: Substance Abuse, Suicide, Scoping Review

1. Context

Suicide is a serious public health problem. Suicide occurs throughout the lifespan and was the fourth leading cause of death among 15 - 29-year-olds globally in 2019 (1). Suicide is defined as self-inflicted death, accompanied by explicit or implicit evidence indicating the individual's intent to die (2). This item, categorized in the ICD-10 under the range of external cause codes X60 - X84 (3), is also referred to as completed suicide. It involves the act of taking one's own life (2). Additionally, Suicidal Ideation refers to thoughts about death, varying in severity depending on the presence of a specific suicide plan and the degree of intent (4). Suicide is defined as self-inflicted death, accompanied by explicit or implicit evidence indicating the individual's intent to die (2). This item, categorized in the ICD-10 under the range of external cause codes X60 - X84 (3), is

also referred to as completed suicide. It involves the act of taking one's own life (2). Additionally, Suicidal Ideation refers to thoughts about death, varying in severity depending on the presence of a specific suicide plan and the degree of intent (4). Suicide is defined as self-inflicted death, accompanied by explicit or implicit evidence indicating the individual's intent to die (2). This item, categorized in the ICD-10 under the range of external cause codes X60 - X84 (3), is also referred to as completed suicide. It involves the act of taking one's own life (2). Additionally, Suicidal Ideation refers to thoughts about death, varying in severity depending on the presence of a specific suicide plan and the degree of intent (4). Globally, 77% of suicides occur in low- and middle-income countries (5). In Iran, suicide represents a serious issue that requires further investigation and awareness. According to statistics published by the World Health Organization, the suicide rate in Iran has increased in recent years. Various factors may contribute to the rise in suicide rates in Iran, including social pressures, economic problems, mental illnesses, and limited access to health and psychological services (5). Recent evidence suggests an increase in the number of individuals attempting suicide and engaging in deliberate self-harm (DSH) behaviors, both with and without suicidal intent, due to the use of alcohol, narcotics, and stimulants (6). Moreover, studies have reported that the suicide rate among heroin users is 14 times higher than that of their counterparts (7). Globally, 77% of suicides occur in low- and middle-income countries (5). In Iran, suicide represents a serious issue that requires further investigation and awareness. According to statistics published by the World Health Organization, the suicide rate in Iran has increased in recent years. Various factors may contribute to the rise in suicide rates in Iran, including social pressures, economic problems, mental illnesses, and limited access to health and psychological services (5). Recent evidence suggests an increase in the number of individuals attempting suicide and engaging in DSH behaviors, both with and without suicidal intent, due to the use of alcohol, narcotics, and stimulants (6). Moreover, studies have reported that the suicide rate among heroin users is 14 times higher than that of their counterparts (7).

However, there is a lack of comprehensive and centralized statistics, as well as insufficient research in this field within the country. This issue has significant clinical implications for patient treatment and indicators of suicide-related harm in addiction. In one study, statistics on deaths due to substance abuse (according to ICD-10 classifications related to the nature of substance poisoning) were identified with specific codes for Methadone Poisoning (T40.3), Opium (T40.0), Alcohol (T51.9), Amphetamines (T43.6), Pills (T50.9), and Sedatives (T42.4) (8). The recent upward trend in statistics regarding drug overdose-related suicides underscores the importance of suicide risk assessment in patients receiving opioids. This is particularly crucial as most of these individuals intentionally consume substances with suicidal intent. Identifying risk factors for this behavior could help reduce the loss of young workforce in countries and decrease the disease burden associated with suicide (9).

2. Data Sources

We conducted a systematic search in accordance with the PRISMA checklist guidelines, utilizing electronic databases including PubMed, Scopus, Web of Sciences, and Google Scholar. The search aimed to identify studies examining the prevalence of suicide risk among substance abusers. Our search strategy was developed using a combination of medical subject headings (MeSH) terms from the PubMed database, as follows: "Prevalence AND Suicide OR Suicide Attempted OR Suicide Completed OR Suicide Ideation OR Reattempts Completed Suicide AND Substance Use OR Drug Users AND Iran AND Filters: From 2010/1/1 - 2024/11/1." For each electronic database, a tailored search strategy was adopted. We utilized the patients, outcome, location, indicator, and study design (POLIS) model for study selection (Table 1). This model is one of the most widely used frameworks for formulating observational studies in relation to evidence synthesis. It ensures that the relevant components of the research question are well-defined.

2.2. Inclusion and Exclusion Criteria

The inclusion criteria encompassed any studies examining suicide (including Suicidal Ideation, suicide attempts, or completed suicides) among the Iranian

Table 1. The Patients, Outcome, Location, Indicator and Study Design

POLIS Criteria	Patients	Outcome	Location	Indicator	Study Design
Description	Drug substance abuser	Attempted suicide, suicide ideation, completed suicide	Iran	Prevalence of suicide or attempted suicide or suicide ideation	Observational study (cross sectional, case control, cohort)

Abbreviation: POLIS, patients, outcome, location, indicator, and study design.

substance-abusing population. Studies published in languages other than Persian were included if they could be easily translated into English using a web-based translation program. Otherwise, these studies were excluded. Both retrospective and prospective observational studies, including cross-sectional, cohort, and case-control designs, were included in this review. Case studies (including case reports or case series) were excluded.

2.3. Primary and Secondary Outcomes in the Study of Suicide Prevalence Among Substance Abusers

The primary outcome of interest for this study was the examination of the overall prevalence of suicide. Secondary outcomes included suicidal ideation, potentially harmful behavior with intent to die, and completed suicide (9).

2.4. Study Selection and Data Extraction

The selection of relevant studies was independently conducted by two reviewers throughout all stages of the study selection process, including screening, full-text review, and quality assessment. Any disagreements at each stage of the review were resolved through consultation with a third independent arbiter. A data extraction form and quality assessment tool were designed in Excel. The variables included were: (1) First author's name, (2) publication year, (3) research location, (4) study type, (5) sample size, (6) mean age, (7) target population, (8) type of suicidal behavior (ideation, attempt, completed suicide), (9) prevalence, (10) conclusion This systematic approach ensured a comprehensive and unbiased collection of data from the selected studies, facilitating a thorough analysis of the prevalence of suicide risk among substance abusers.

2.5. Quality Assessment of Studies

To implement this section, two independent evaluators utilized a modified version of the Department of Health & Human Services tool for cohort, observational, and case-control studies (10). This tool comprises 14 questions designed to assess the risk of bias.

2.6. Data Synthesis

A narrative synthesis of data from studies addressing the prevalence of suicide in the Iranian addicted population was conducted using meta-analysis techniques with the meta-prop command in STATA version 17. Results were reported with 95% confidence intervals. The I-squared test was used to identify heterogeneity between studies. Interpretation of I-squared values was as follows: $I^2 < 25\%$: No heterogeneity $I^2 = 25 - 50\%$: Moderate heterogeneity $I^2 > 50\%$: Substantial heterogeneity (10). This approach allowed for a comprehensive analysis of the available data, taking into account potential variations between studies and providing a robust assessment of the prevalence of suicide among substance abusers in Iran.

3. Results

3.1. Characteristics of Included Studies

From the total number of relevant articles systematically reviewed, the characteristics of 11 articles were included in the study (11-21). Given that the nature of this study was a scoping review, which does not include the precise stages of searching, selection, and data analysis typically found in systematic reviews, and instead focuses more on key themes and research gaps, we did not report a PRISMA flow diagram in this study. The characteristics of the studies included in this article are reported in Table 2. This scoping review approach allowed for a broader exploration of the literature on suicide prevalence among substance abusers in Iran,

Table 3. Quality Assessment of Included Studies for Risk of Bias Evaluation

First Author, Year	Was the Research Question or Objective in This Paper Articulated Clearly?	Was the Study Population Explicitly Defined and Described?	Was the Participation Rate Among Eligible Individuals at Least 50%?	Were All the Participants Chosen or Recruited from the Same or Comparable Populations (Including the Same Time Period)?	Was There a Justification for the Sample Size Provided?	Was the Timeframe Adequate to Reasonably Expect an Association Between the Exposure and the Outcome, If Such an Association Existed?	Assessment and Measurement of Exposure Type	Were the Results Validated with Accurate Methods?	Statistical Analysis (Control of Logistic Regression Confounding Variable)	Result of Publication Bias [a]
Naghizadeh, 2022 (11)	1	1	1	1	1	1	1	1	1	High quality of assessment
Mirahmadizadeh, 2020 (12)	1	1	1	1	1	1	1	1	1	High quality of assessment
Manouchehri, 2022 (13)	1	1	1	1	1	1	0	0	1	High quality of assessment
Ghoreishi, 2017 (14)	1	1	0	1	0	1	1	0	0	Moderate quality of assessment
Balvardi, 2021 (15)	1	1	1	1	1	1	0	0	1	High quality of assessment
Lalehzari, 2023 (16)	1	1	1	1	1	1	1	1	1	High quality of assessment
Kordrostami, 2017 (17)	1	1	1	1	1	0	0	0	1	Moderate quality of assessment
Shahbazi, 2018 (18)	1	1	1	1	1	1	0	0	1	High quality of assessment
Hajebi, 2016 (19)	1	1	1	1	1	1	0	0	1	High quality of assessment
Ghaderi, 2020 (20)	1	1	1	1	1	1	1	1	1	High quality of assessment
Zarghami, 2022 (21)	1	1	1	1	1	1	1	1	1	High quality of assessment

[a] 0 - 3, low quality, 4 - 7; moderate quality; 8 - 10, high quality.

highlighting key findings and areas requiring further research. While not as structured as a systematic review, this method provides valuable insights into the current state of knowledge on this critical public health issue (Table 2).

3.2. Quality Assessment

Approximately 82% of the studies had a low risk of bias, while 18% had a moderate risk of bias. There were no studies with a high risk of bias. The primary weakness in most studies was the lack of reference to result validation through precise methods and measurement of exposure type in the analysis of results, which was the main factor affecting the quality of the evaluated studies (Table 3).

3.3. Meta-Analysis Report

The primary outcome of interest for this study was the overall prevalence of suicide. Due to high heterogeneity, subgroup analysis was conducted based on the quality assessment of studies and the prevalence of specific suicide-related behaviors, including Suicidal Ideation, potentially self-injurious behavior with intent to die, and completed suicide (9). Eleven studies were included in the meta-analysis to examine these

outcomes in the target population. This model was calculated using the random-effects method. Table 4 presents the results of the meta-analysis for the primary outcome and subgroup analysis. As observed in the table, the incidence rate of completed suicide among Iranian substance abusers is 59%, while the incidence rates of Suicidal Ideation and suicide attempts are approximately 29%. The rate of completed suicide is observed to be about twice that of suicide attempts and Suicidal Ideation in this population (Table 4).

3.4. Publication Bias

To assess publication bias for this outcome, we employed the Begg test. This test evaluates the influence of small studies on the overall results. The analysis yielded a P-value of 0.51, which is not statistically significant. This finding suggests the absence of substantial publication bias in our meta-analysis. The detailed results of the Begg test are as follows: Adjusted Kendall's Score (P-Q) = 13, standard deviation = 18.27, z-score = 0.71, and probability > |z| = 0.477. These statistics further support the conclusion that publication bias is unlikely to have significantly impacted our results.

4. Conclusions

Table 4. Prevalence of Drug Related Suicide and Sub-group Analysis

Variables	Number of Studies	Overall, I-squared (%)	z	P-Value	ES (95% CI)
Total result					
Prevalence of suicide	14	100	7085	0.000	0.42 (0.31 to 0.52)
Subgroup analysis according to "quality assessment"					
High quality	12	100	6.5	0.000	0.39 (0.28 to 0.51)
Moderate quality	2	100	2304.61	0.000	1 (1-1)
Subgroup analysis according to "type of suicide"					
Suicidal ideation	2	0	24.3	0.000	0.29 (0.29 to 0.31)
Suicide attempts	6	100	1.24	0.22	0.29 (-0.17 to 0.76)
Completed suicide	6	100	16.71	0.000	0.59 (0.52 to 0.66)

In this study, we reported the prevalence of suicide attempts and completed suicides among the Iranian substance-abusing population. Our findings revealed that the prevalence of completed suicides was higher than the incidence of suicide attempts and Suicidal Ideation in this population. The included articles were evaluated for publication bias risk, and the results of this assessment were reported. This comprehensive analysis provides valuable insights into the suicide-related behaviors among substance abusers in Iran, highlighting the need for targeted interventions and further research in this critical area of public health. The results of the present study clearly highlight the significant prevalence of Suicidal Ideation and suicide attempts among the population of substance abusers. The findings indicate that the rate of suicide attempts is approximately twice that of Suicidal Ideation and unsuccessful suicide attempts within this target group. Both suicide attempts and Suicidal Ideation are identified as the primary predictors of future successful suicide behavior among individuals with substance use disorders. This underscores the critical need for targeted preventive measures and interventions to address these alarming trends in this vulnerable population (22). There are numerous important parameters for determining the cause of death in forensic medicine, including autopsy reports, toxicological findings, police information, and the circumstances surrounding the death (23). Among the primary risk factors for suicide attempts among substance abusers are genetics, the presence of psychotic disorders, a family history of suicide attempts, the duration of substance use,

intravenous heroin use, and the individual's personality structure (24). These individuals should be assessed for psychological risk factors, particularly depression and impulsivity (25, 26). Substance abuse is a significant risk factor for self-harm or self-injury. According to the National Alliance on Mental Illness, alcohol consumption or drug use during self-harming behaviors increases the likelihood of more severe injuries (27). Additionally, regular assessments of clients for the presence of intentional and common self-harming behaviors, such as cutting, burning, and self-mutilation, can aid in the timely identification of individuals at risk for self-harm within this population (28). Women are less likely than men to commit suicide, but they tend to make more attempts, as suicidal thoughts are more prevalent among women throughout their lives. Currently, the most common method of suicide among Iranian men is substance abuse. Therefore, gender serves as a determining factor in the choice of method for suicide attempts. The government should implement programs to significantly contribute to reducing the incidence of overdoses and fatalities among this population (29, 30). Limitations of the Study: Most studies did not specify the type of suicide attempts or their frequency within the target population. This limitation hindered our ability to conduct sub-group analysis.

This study highlights the alarming prevalence of suicide attempts and completed suicides among the Iranian substance-abusing population, revealing that completed suicides are more common than suicide attempts and suicidal ideation. The findings underscore

the need for targeted interventions, particularly considering risk factors such as genetic predispositions, psychotic disorders, and patterns of substance use. Regular psychological assessments focusing on depression and impulsivity are crucial for early identification and intervention. Additionally, implementing harm reduction strategies, such as providing access to Naloxone, is essential to reducing overdose incidents and fatalities. Overall, this research emphasizes the importance of coordinated efforts among healthcare providers, families, and policymakers to address the mental health challenges faced by this vulnerable group.

Footnotes

Authors' Contribution: Study concept and design: F. H. and H. Gh.; Acquisition of data: Z. M.; Analysis and interpretation of data: Z. M.; Drafting of the manuscript: F. H. and H. Gh.; Critical revision of the manuscript for important intellectual content: Z. R.; Statistical analysis: A. S., M. S., and M. Sh.; Administrative, technical, and material support: All authors; Study Supervision: F. H. and H. Gh.

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Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to the possibility that some parts of the data may need to be changed during the judging process.

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Table 2. Characteristics of Studies Included in the Article

First Author, Year	Place	Design of Study	Sample Size	Mean Age	Type of Drug Use	Type of Suicide	Frequency (n)	Quality Assessment	Key Finding
Aghazadeh, 2022 (11)	-	Cross sectional	689		Drug and methadone	Suicidal ideation	218	High quality of assessment	Suicidal ideation is observed in one-third of individuals seeking help at addiction treatment centers in Iran. Key factors contributing to suicidal thoughts include depression and overall poor health
Aghazadeh, 2022 (11)	-	Cross sectional	689	-	Drug and methadone	Suicide attempts	151	-	-
Mirahmadizadeh, 2020 (12)	Fars	Cross sectional	28552			Suicide attempts	253	High quality of assessment	Most participants reported using medication overdose as their method of suicide. A personal and family history of suicide attempts, along with psychological disorders, significantly heightened the risk of mortality.
Manouchehri, 2022 (13)	Babol	Retrospective cohort study	3096	45.53 ± 13.35	-	Suicide attempts	354	High quality of assessment	The use of multiple drugs in suicide attempts was linked to a higher relative risk ratio for attempting suicide.
Ghoreishi, 2017 (14)	Iran	Cross sectional	2306	36.07 ± 12.61	Alcohol and illicit drug abuse	Died cases from opioid or psychotropic abuse	2306	Moderate quality of assessment	The mortality rate due to opiate and psychotropic substance abuse across the entire country was 38.22 per 1,000,000 population. The most frequent location of death was at home or in another private residence. Some individuals who died from drug abuse had a history of overdose, suicide attempts, psychiatric hospitalizations, incarceration, and family substance abuse.
Balvardi, 2021 (15)	Sirjan	Cross sectional	768	25.1 ± 8.6	Alcohol, opiom, methadone	Completed suicide and suicide attempts	74	High quality of assessment	Self-poisoning (i.e., drug intoxication) was the most prevalent method of suicide attempts. The rate of suicides resulting in death was 3.7 per 100,000 individuals, with higher rates noted among men, younger individuals, those who were single, urban residents, and individuals with high school diplomas.
Lalehzari, 2023 (16)	Bandar abbas	Descriptive-cross-sectional retrospective study	193	29.87 ± 8.37	Drug, stimulant, and alcohol abuse	Suicide attempts	38	High quality of assessment	The findings indicated that the prevalence of alcohol and drug abuse, as well as the simultaneous use of drugs and stimulants, was significantly greater in men than in women. While the average age of patients using stimulants was notably higher, there was no significant difference among the groups using

First Author, Year	Place	Design of Study	Sample Size	Mean Age	Type of Drug Use	Type of Suicide	Frequency (n)	Quality Assessment	Key Finding
									drugs, alcohol, and tobacco.
Kordrostami, 2017 (17)	Tehran	Cross-sectional analytical retrospective study	674	32.61 ± 13.7	Opioids, methamphetamine, benzodiazepines, tricyclic antidepressants	Completed suicide	93	Moderate quality of assessment	Self-poisoning as a method of suicide was most prevalent among the young male population in Tehran, Iran. It appears that unrestricted access to means of suicide, such as drugs and poisons, should be limited by national and health authorities.
Shahbazi, 2018 (18)	Iran	Cross sectional	15304	36.61 ± 12.60	Illicit drugs overdose	Completed suicide	15304	High quality of assessment	The results indicated that deaths resulting from substance misuse have risen over the course of the study period, with this upward trend noted in both women and men.
Hajebi, 2016 (19)	Iran	Cross sectional	252911	-	Illicit drugs overdose	Completed suicide	71067	High quality of assessment	In this target group, medication overdose was the preferred method for attempting suicide among 84% of subjects, making it the second most common cause of suicide deaths after hanging.
Hajebi, 2016 (19)	Iran	Cross sectional	252911	-	Illicit drugs overdose	Suicide attempts	212445	-	-
Ghaderi, 2020 (20)	Iran	Cross-sectional comparative study	787	34.3 ± 9.2	Illicit drugs use	Suicide attempts	303	High quality of assessment	Women who abuse drugs are at a higher risk of experiencing suicidal ideation and attempting suicide compared to their non-drug-using peers.
Ghaderi, 2020 (20)	Iran	Cross-sectional comparative study	787	34.3 ± 9.2	Illicit drugs use	Suicidal ideation	206	High quality of assessment	-
Zarghami, 2022 (21)	Iran	Cross sectional	6810	39.2 ± 17	Illicit drugs use	Completed suicide	6810	High quality of assessment	The average age of those who died was 39.2 ± 17.0 years, with the majority being men. The central regions of Iran, followed by the western regions, recorded the highest number of deaths related to opioid poisoning.