

REVIEW ARTICLE

Prevalence of Common Methods of Suicide among Iranian Men; a Systematic Review

Soraya Moamer^{1,2}, Ghazal Hajinasrollah¹, Fereshteh Aliakbari¹, Abbas Ali Nasehi³, Keshvar samadaee Gelehkolaee^{4*}, Jalil Hosseini¹

1. Men's Health and Reproductive Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

2. Department of Biostatistics, Student Research Committee, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran.

3. Iran-Helal Institute of Applied Science and Technology, Tehran, Iran.

4. Sexual and Reproductive Health Research Center, Department of Reproductive Health and Midwifery, Faculty of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran.

Received: May 2023; Accepted: June 2023; Published online: July 2023

Abstract: **Introduction:** Suicide is one of the public health problems with a high rate worldwide. Sex is a risk factor for successful suicide, making it the seventh leading cause of death in men in the United States. Based on the increasing suicide rate in Iran, we aimed to investigate the common methods of suicide in Iranian men.

Methods: This study is a systematic review with subgroup analysis based on the prevalence of methods of suicide in Iranian men during 2009-2019. Specific keywords based on medical subject headings (MeSH) were searched in Iranian and international databases including PubMed, Scopus, Google Scholar, SID, and MagIran by designing a search strategy. Selected studies were reviewed using the study evaluation tool. For data analysis, STATA software version 14 was used. Also, heterogeneity studies by Q and I² statistics were assessed.

Results: In the first phase, 529 studies were extracted, and finally, data were extracted from 19 studies. Because of the heterogeneity of the studies, meta-analysis was not possible and the final results were extracted based on subgroup analysis. Drug abuse was the most common method of suicide and the use of firearms was the least prevalent among Iranian men.

Conclusions: Currently, the most common method of suicide in Iranian men is drug abuse. Therefore, it is recommended to design preventive interventions based on gender and take into account commonly available methods.

Keywords: Suicide; Iranian men; Prevalence

Cite this article as: Moamer S, Hajinasrollah G, Aliakbari F, Nasehi AA, samadaee Gelehkolaee K, Hosseini J. Prevalence of Common Methods of Suicide among Iranian Men; a Systematic Review. Mens Health J. 2023; 7(1): e2.

1. Introduction

Suicide is one of the major public health problems in the world. The worldwide suicide rate is estimated to be 11.4/per 100,000 people, killing more than 800,000 people annually. Women have more suicidal thoughts than men, but men have a higher suicide rate than women (1), according to the US Centers for Disease Control, it is the seventh leading

cause of death in men and the 14th leading cause of death in women. Suicide methods differ in men and women, with a standardized suicide rate of 21.42/per 100,000 American men and 5.94/per 100,000 women. Suicide methods are also completely different in men and women; in men the most common method is the use of firearms (52.3%) and in women mainly hanging and suffocation (32.94%) (2).

According to the latest disease burden report, in 2019, more than 162,000 years of life lost due to disability (DALY) are related to self-harm by men in Iran, which is equivalent to 1.54% (1.9-1.21) of total missing life years corresponding to disability due to all causes of death and is approximately 2.7 times the values for Iranian women (3). According to the latest local study, the years of life lost (YLL) of Iranian men due

*Corresponding Author: Keshvar Samadaee Gelehkolaee; Address: Sexual and Reproductive Health Research Center, Department of Reproductive Health and Midwifery, Faculty of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran. Email: K-samadaee@alumnus.tums.ac.ir, Tel: (+98)1133795573.



to suicide is estimated to be 34.52 per 1000 people, and hanging is known to be the most common cause of YLL. The report states that the annual growth rate of YLL due to suicide rate in Iran is 3.3% (4).

In Iran, about 5 out of every 100,000 people commit suicide, and having a mental health problem is considered the most important factor for suicide attempts (5). The latest systematic review and meta-analysis of suicide methods in Iranians is related to 2012, reporting that the most common method of suicide was self-immolation (13%), followed by the use of firearms (3%) and hanging (2%) (6). Given the high suicide rate of men compared to women, and the lack of an up-to-date review to determine the status of men in this area, we aimed to address this issue through a systematic review of studies during 2009-2019. Providing this information will help lay the groundwork for basic measures to prevent and control suicidal ideation in men.

2. Methods

To collect all the published articles on common methods of suicide attempts among Iranian men in the last 10 years, an electronic search of reputable global and Iranian databases including PubMed, Scopus, Google Scholar, SID, and MagIran was done by two independent researchers. Keywords used included suicide, "self-immolation", "self-burning", "methods", "completed", "attempt", "hanging" "drug", "poisoning", "overdose", "abuse", "men", "male", "Iran" in English and Persian sources, which were combined with "OR" and "AND". The articles found were screened by two independent researchers in terms of the inclusion and exclusion criteria. Inclusion criteria were reporting the relative frequency of suicides (whether attempted suicide or successful suicides) by gender or in Iranian men only, and were Persian or English. Articles that did not report frequency by gender and were published before 2012 and also, review articles were excluded from the study.

The screening was done in three stages: title, abstract, and full text by two researchers separately. At first, the articles were entered in reference management software (EndNote). Duplicate studies were excluded and titles and abstracts were studied. At this stage, the studies that met the inclusion criteria for the present study were selected, and the list of studies and the reasons for their selection were agreed upon in an online meeting between the two researchers. Then, a table was prepared to extract information about selected articles and the name of the first author, year of publication, place of study, sample size, age range of study participants, relative frequency of methods, type of population studied (general population, prisoners, the elderly, etc.) and other findings were included. In order to ensure the retrieval of all studies, the reference list of the final selected articles and review

articles was also investigated. The data extraction stage was done by two independent researchers. Any kind of disagreement between the two researchers was resolved by discussion in online meetings. Selected studies were also evaluated qualitatively using the Newcastle-Ottawa Scale (NOS) (6) quality assessment tool. Due to the excessive dispersion of the methods and populations studied in the selected articles, it was not possible to perform a meta-analysis, so we used the weighted average method and summarized the findings by giving a general summary based on the information in the table, and performed subgroup analysis based on common suicide methods. To analyze and combine the results of the studies, because of using the prevalence of the common method of suicide as the indicator, the standard error for each study was calculated by using a binomial distribution. For data analysis, STATA software version 14 was used. Heterogeneity studies were assessed using the Q statistics and Chi-square test at a significance level of 5% ($P < 0.05$). The I² statistics was also used to quantitatively evaluate heterogeneity.

3. Results

529 articles were listed in the initial electronic search. After checking for duplicate articles, 125 duplicate articles were discarded and 404 articles were screened by the researcher, of which 127 articles were considered relevant. Of these 127 articles, 46 were selected according to the inclusion criteria. After a careful review of these articles, finally, 21 articles were selected for analysis. Figure 1 shows the study selection process. The value of I² was 98%, indicating high heterogeneity between studies. Therefore, subgroup analysis was done according to the suicide method. The Beggr's and Egger's test were used to evaluating the publication bias of the literature. Publication bias was not observed according to the type of suicide (Table 3 and Fig 2).

156,593 people, most of whom were sampled from the general population 85.71%, were included in this meta-analysis. The source of data collection in most studies (57.14%) was the registry and the rest were hospital-based. Types of studies included in order of frequency were cross-sectional, descriptive, retrospective, and trend analysis (table 1).

All studies obtained the minimum quality for inclusion. According to the results of sub-group analysis, suicide due to drug abuse was the most common (34.6%) method of suicide (95% confidence interval: 34.4-34.8%) and suicide due to the use of firearms (95% confidence interval: 0.7-0.9%). had the lowest prevalence (0.8%, table 2).

4. Discussion

In this study, we examined the common methods of suicide in Iranian men over a 10-year period (2009-2019). The results

showed that the most common method of suicide attempt among Iranian men was drug use. Also, the lowest prevalence of suicide attempts among Iranian men was the use of firearms. According to a meta-analysis in 2012 (5), the most common method of suicide in Iran was self-immolation and hanging was the least common. While in the present study, the most common method was drug use and the least frequent was the use of firearms. This difference in the results is more related to the objectives of the study because in the mentioned study both sexes were considered while we only focused on Iranian men. Comparing the two studies, it can be estimated that sex is a determining factor in choosing the method of suicide.

According to the US Center for Disease Control, suicide methods are quite different in men and women, with men using firearms the most, and women mostly using methods such as hanging and suffocating. This is different from the results we obtained. This difference can be partly related to the culture of the countries. Carrying a firearm with a license is allowed in the United States, so it can be considered an available risk factor while carrying a firearm is not allowed in Iran and it is time-consuming and difficult to prepare for suicide, so this can justify the difference in the reported results of these two studies (2).

Researchers in 2020 reported that hanging was the most common method of suicide among elderly Iranian men. These findings are different from the findings of our study. Comparing the two methods, it can be concluded that age can also be a factor in the difference in the prevalence of common methods of suicide. Considering the special physical and psychological conditions specific to old age, in choosing the suicide method, the convenience and availability of the method are also involved in the higher probability of death (7).

Another study reported self-immolation as the most common method in Iranian men, and these findings are different from our findings, which found drug use as the most common method of suicide in Iranian men. It seems that the passage of time is effective in the attitude of choosing the method of suicide attempt and also the difference in the methodology of examining the evidence can be another reason for the different results of the two studies (8).

Consistent with the results of the present review, studies with different methodologies in Iran reported drug use as the most common method of suicide in Iranian men (9-11). A systematic review in 2018 examined the social and demographic variables most associated with suicidal behavior and suicide practices in Europe and the United States. This study reported hanging as the most common method of suicide in men (12). A 2011 study in Korea also reported that the most common method was hanging for both sexes. This difference may be attributed to the sex and age composition in the study

(13) because studies reported the mentioned factors as a risk factor for suicide and the choice of method to attempt it (11, 13).

Lack of access to all articles and also lack of access to gray texts were the limitations of this study. On the other hand, the lack of accurate reporting of results, quality and usable reporting of some articles, and heterogeneity of studies did not make meta-analysis possible, so the results were analyzed by subgroups.

5. Conclusion

The most common method for suicide in Iran based on studies until 2020 was drug abuse. Therefore, considering the difference in the results of the suicide method with a previous meta-analysis, it is recommended to extract the reason and motive for the change in the suicide attempt by designing qualitative and mixed-methods studies to intervene in a timely manner.

6. Appendix

6.1. Acknowledgment

This systematic review was part of a project entitled: "Delineation of Men's Health Status in Iran during 2009-2019" (code: IR.SBMU.RETECH.REC.1399.665) which has been supervised by the Men's Health & Reproductive Health Research Center (MHRHRC). The authors would like to forward their gratitude to the MHRHRC for their sincere collaboration.

6.2. Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

6.3. Funding support

None.

6.4. Author's contributions

Conceptualization: Jalil Hosseini, Ehsan Shojaeefar; Analysis: Soraya Moamer; Writing –original draft: Ghazal Hajinasrollah, Fereshteh Aliakbari; Writing – review and editing: Keshvar Samadaee Gelehkolaei.

6.5. Transparency statement

The corresponding author Abbas Ali Nasehi affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that there is no discrepancies from the study.



References

1. Izadi N, Mirtorabi SD, Najafi F, Nazparvar B, Nazari Kangavari H, Hashemi Nazari SS. Trend of years of life lost due to suicide in Iran (2006–2015). *International journal of public health*. 2018;63(8):993–1000.
2. National Center for Injury Prevention and Control C. Web-based injury statistics query and reporting system (WISQARS) Centers for Disease Control and Prevention (CDC); 2018 [Available from: <http://www.cdc.gov/injury/wisqars/index.html>].
3. IHME. global burden of disease institute of health metrics and evaluation 2019 [Available from: <https://vizhub.healthdata.org/gbd-compare/>].
4. Kiadaliri AA, Saadat S, Shahnnavazi H, Haghparast-Bidgoli H. Overall, gender and social inequalities in suicide mortality in Iran, 2006–2010: a time trend province-level study. *BMJ open*. 2014;4(8):e005227.
5. Nazarzadeh M, Bidel Z, Sayehmiri K. Estimate the prevalence of physical methods used in attempted suicides in Iran: A systematic review and meta-analysis. *Irtiqa Imini Pishgiri Masdumiyat* [Internet]. 2013Mar.11 [cited 2022May21];1(1):44–2. Available from: <https://journals.sbm.ac.ir/spip/article/view/4135>.
6. Lo CK-L, Mertz D, Loeb M. Newcastle-Ottawa Scale: comparing reviewers' to authors' assessments. *BMC medical research methodology*. 2014;14(1):1–5.
7. Razai D, Ghadirzadeh MR, Mahdavi SA, Hasani J, Nazari SSH. The suicide rate in the elderly population of Iran between 2008 and 2014. *Journal of Research in Health Sciences*. 2020;20(1):e00471.
8. Azizpour Y, Sayehmiri K, Asadollahi K, Kaikhavani S, Bagheri M. Epidemiological study of suicide by physical methods between 1993 and 2013 in Ilam province, Iran. *BMC psychiatry*. 2017;17(1):1–10.
9. Veisani Y, Delpisheh A, Sayehmiri K, Moradi G, Hasanzadeh J. Suicide attempts in Ilam Province, West of Iran, 2010–2014: a time trend study. *Journal of research in health sciences*. 2016;16(2):64.
10. Afghah S, Aghahasani M, Noori-Khajavi M, Tavakoli E. Survey of suicide attempts in Sari. *Iranian journal of psychiatry*. 2014;9(2):89.
11. Momeninejad M, Sharifi B, Ghaffarian Shirazi H, Hashemi N, Ghafarian Shirazi Y, Gohargani M. Epidemiological study of attempting suicide and the associating factors in Boyer-Ahmad County, IR IRAN, (2008–2009). *Life Science Journal*. 2013;10(7s):1097–101.
12. Cano-Montalbán I, Quevedo-Blasco R. Sociodemographic variables most associated with suicidal behaviour and suicide methods in Europe and America. A systematic review. 2018.
13. Im J-S, Choi SH, Hong D, Seo HJ, Park S, Hong JP. Proximal risk factors and suicide methods among suicide completers from national suicide mortality data 2004–2006 in Korea. *Comprehensive psychiatry*. 2011;52(3):231–7.
14. Shojaei A, Moradi S, Alaeddini F, Khodadoost M, Barzegar A, Khademi A. Association between suicide method, and gender, age, and education level in Iran over 2006–2010. *Asia-Pacific Psychiatry*. 2014;6(1):18–22.
15. Saberi-Zafaghbandi MB, Hajebe A, Eskandarieh S, Ahmadzad Asl M. Epidemiology of suicide and attempted suicide derived from the health system database in the Islamic Republic of Iran: 2001–2007. *EMHJ-Eastern Mediterranean Health Journal*, 18 (8), 836–841, 2012. 2012.
16. Pajoumand A, Talaie H, Mahdaveinejad A, Birang S, Zarei M, Mehregan FE, et al. Suicide epidemiology and characteristics among young Iranians at poison ward, Loghman-Hakim Hospital (1997–2007). *Archives of Iranian medicine*. 2012;15(4):0–.
17. Khadem Rezaian M, Jarahi L, Moharreri F, Afshari R, Motamedalshariati S, Okhravi N, et al. Epidemiology of suicide attempts in Khorasan Razavi province, 2014–2015. *Iranian journal of epidemiology*. 2017;13(2):128–35.
18. Hajebe A, Ahmadzad-Asl M, Davoudi F, Ghayyomi R. Trend of suicide in Iran during 2009 to 2012: Epidemiological evidences from national suicide registration. *Iranian Journal of Psychiatry and Behavioral Sciences*. 2016;10(4).
19. Hassanipour S, Kazemi H, Ghayour A-R, Kazemi-Najafabadi A, Nikbakht H-A, Ghaem H. Epidemiological trend of suicide in center of Iran from 2012 to 2016. *Clinical epidemiology and global health*. 2019;7(4):559–63.
20. Kangavari HN, Shojaei A, Nazari SSH. Suicide mortality trends in four provinces of Iran with the highest mortality, from 2006–2016. *Journal of Research in Health Sciences*. 2017;17(2):382.
21. Gorgi Z, SheikhFathollahi M, Askarizadeh M, Rezaeian M. Epidemiology of suicide and attempted suicide in the Larestan and Gerash during 2008 to 2012. *Journal of Rafsanjan University of Medical Sciences*. 2014;13(7):597–608.
22. Rostami M, Jalilian A, Rezaei-Zangeneh R, Jamshidi T, Rezaeian M. Suicide pattern in Kermanshah province, west of Iran: March 2012–March 2013. *Middle East Journal of Family Medicine*. 2016;14(8):38–48.
23. Hashemian A, Najafi F, Jouybary T, Nazar ZM. Trend of suicide in Kermanshah during 11 years (2004 to 2014), Iran. *Journal of Medical and Biomedical Sciences*. 2017;6(2):17–24.
24. Zeinalzadeh AH, Saiyarsarai S, Jafari-Khounigh A, Soares JJ. Incidence of suicide in East Azerbaijan Province, Iran. *Social Determinants of Health*. 2016;2(2):61–9.
25. Mohammadi Z, Arghavani M, Solimani N, Akhlaghi M,

- Mousavi Z. Epidemiological study of suicide in Asadabad city in 2011-2017: a descriptive study. *Journal of Rafsanjan University of Medical Sciences*. 2020;19(3):235-50.
26. Rezaeian M, Reza SG, Reza FM, Moazam N. Recognition of some of the risk factors for suicide and attempted suicide within Ilam province and their direction of function. *Journal of health system research*. 2010;6(1):86-93.
27. Qari A, Yazdekhashti F, Masudi S. The epidemiology of suicide and related factors in the city of Lordegan from 2001 to 2011. *journal of shahrekord university of medical sciences*. 2014;15(6).
28. Zarenezhad M, Gorgi Z, Sheikh Fathollahi M, Gholamzadeh S, Ghadipasha M, Rezaeian M. Epidemiological Survey of Suicide in Fars Province in the south of Iran during 2003 to 2011. *Journal of Rafsanjan University of Medical Sciences*. 2015;13(12):1129-40.



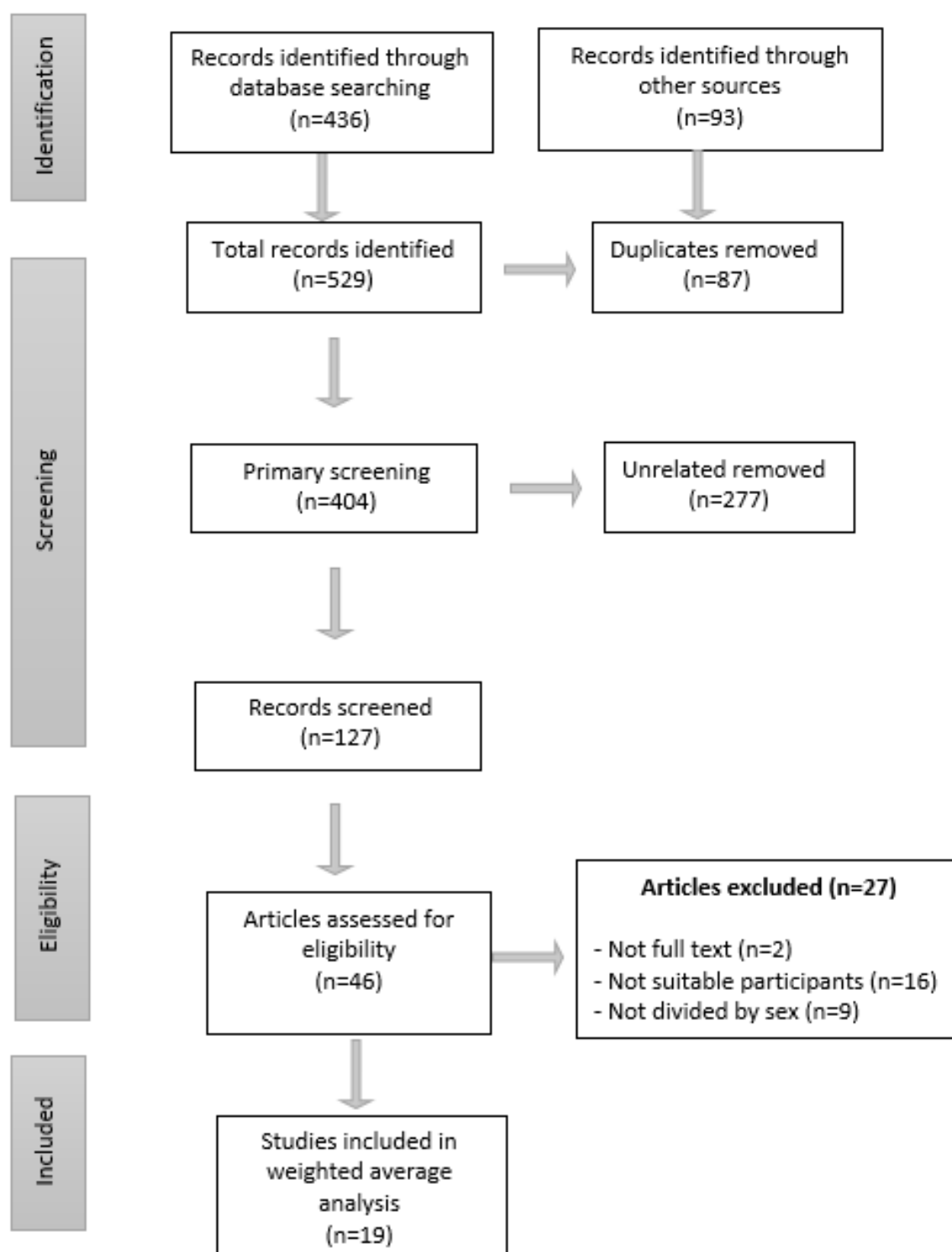


Figure 1: PRISMA flow chart of selection process.

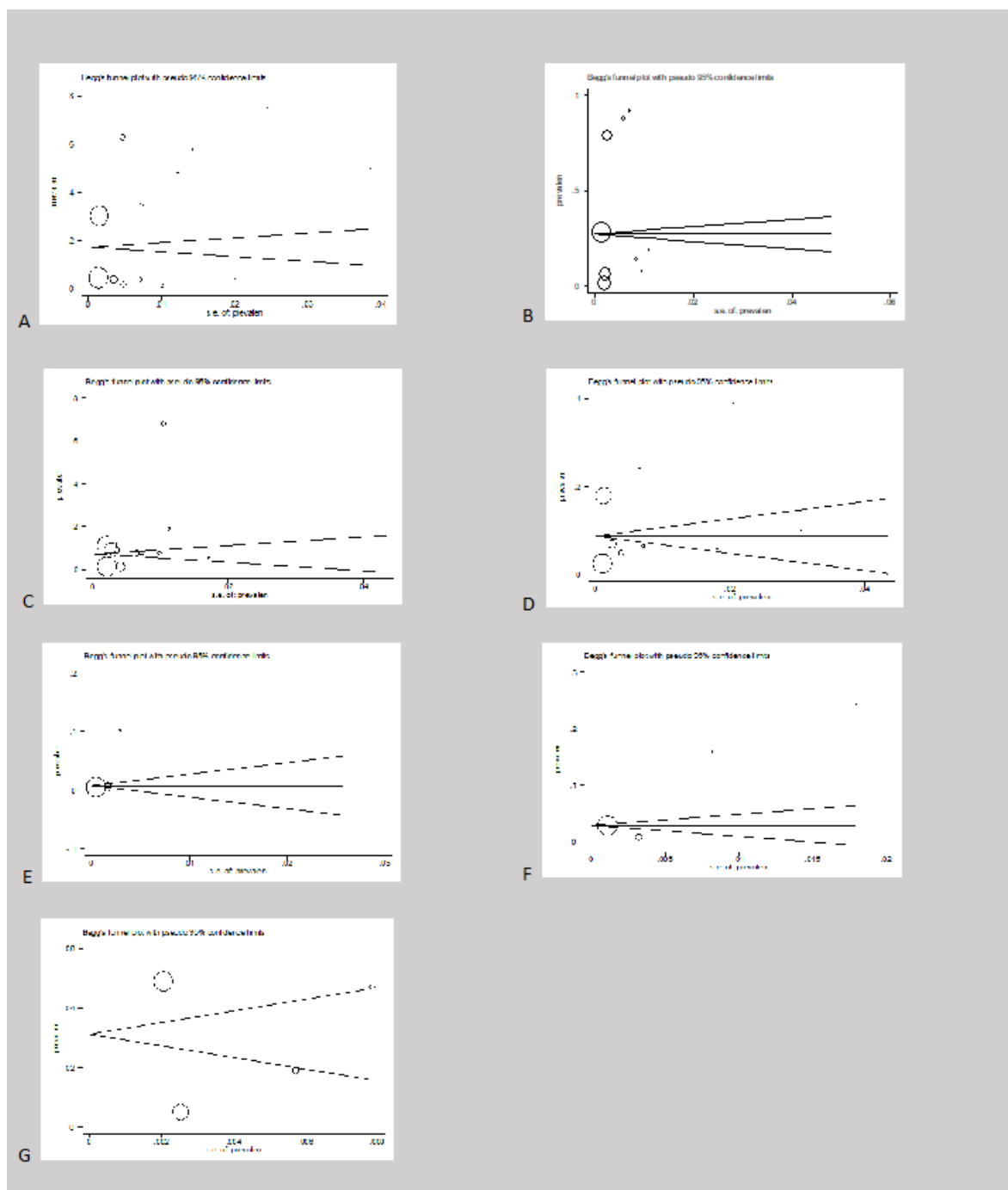


Figure 2: Begg's funnel plot of publication bias test by type of suicide. (A) Hanging; (B) Drug abuse; (C) poisoning; (D) Self-immolation; (E) Firearm; (F) Cutting; (G) Un-known.

Table 1: Description of included studies on methods of suicide in Iranian men

First author, year	status of suicide	Source of Data	Sample size	Study place	Type of the study	Participants	Reported methods of suicide (%)						
							Hanging	Drug abuse or Overdose	poison-ing	Self-immolation	Firearm	Cutting	Un-known
Rezai et al. 2020 (7)	Completed	Registry. forensic medicine	1217	Iran	Cross-sectional	Elderly	57.9		19.1	6.5			
Azizpour et al. 2017 (8)	Attempt	Registry	571	Ilam	Retrospective	General population	26.1			38.9	8.8	24.3	1.9
Nazarzadeh et al. 2016 (5)	Attempted, completed	Registry		732	Ilam	Retrospective	General population	3.9	75.5	7.7			
Veisani, et al. 2016 (9)	Attempted, completed	Registry	3157	Ilam	Cross-sectional	General population	3.9	87.6	1.3	4.9	0.9		
Shojaei, et al. 2014 (14)	Completed	Registry forensic medicine		11091	Iran	Cross-sectional	General population	62.9	6.0	9.1	7.0	10.1	
Afghah, et al. 2014 (10)	Attempted, completed	Hospital	98	Sari	Cross-sectional	General population	4.1	34.7	24.5	24.5			
Saberi-Zafaghbandi, et al. 2012 (15)	NA	41 medical universities	23652	Iran	Cross-sectional	Medical student	4.5	78.8	11	2.5	0.5	2.8	
Pajoumand, et al. 2012 (16)	NA	Hospital (poison ward)	1451	Tehran	Cross-sectional	8-16 years			91.9	8.1			
Khadem Rezaiyan, et al. 2017 (17)	NA	Hospital	2018	Khorasan	Cross-sectional	General population			68			16	
Hajebi, et al. 2016 (18)	Attempted, completed	Registry	99483	Iran	Trend analysis	General population	30.3	28.1		17.9			
Hassanipour, et al. 2019 (19)	Attempted	Hospital	780	Najaf abad (Isfahan)	Cross-sectional	General population	1.8	30	1.3	0.2	0.8	0.5	
Kangavari, et al. 2017 (20)	Registry	forensic medicine	4259	West of Iran	Trend analysis	General population	35.3			23.9			
Gorgi, et al. 2014 (21)	Attempted, completed	Hospital and forensic medicine	312	Lar(Fars)	Cross-sectional	General population	75						
Rostami, et al. 2016 (22)	NA	Registry forensic medicine	168	Kermanshah	Cross-sectional	General population	50	22.4	5.2	5.8	12.6		
Momeninejad et al. 2013 (11)	Attempted	Hospital	97	Yasuj	Descriptive	General population	1	88		10			
Hashemian, et al. 2017 (23)	Completed	Registry forensic medicine	1681	Kermanshah	Cross-sectional	General Population	48.1	13.9	7.6	10.5	16.7		

Table 1: Description of included studies on methods of suicide in Iranian men

First author, year	status of suicide	Source of Data	Sample size	Study place	Type of the study	Participants	Reported methods of suicide (%)						
							Hanging	Drug abuse or Overdose	poisoning	Self-immolation	Firearm	Cutting	Un-known
Zeinalzadeh 2016 (24)	Attempted, completed	Registry	3768	Tabriz	Descriptive	General Population	5.6	84.2	3.5				
Mohamadi et al 2020 (25)	Attempted, completed	Hospital	804	Asadabad (Hamedan)	Descriptive	General Population	10.3	4.65	13.1			3.0	2.8
Rezaeian et al 2010 (26)	Completed	Registry forensic medicine	88	Ilam	Cross-sectional	General Population	26.4	1.9	15.1	26.4	28.3		
Qari et al 2014 (27)	Attempted, completed	Hospital		233	Lordegan (Shahrekord)	Descriptive	General Population	41.5	43.9				
Zarenezhad et al 2014 (28)	Completed	Registry forensic medicine	934	Fars	Descriptive	General Population	50.5						

Table 2: Subgroup analysis based on methods of suicides

methods of suicides	Prevalence	95% confidence interval		I-squared ¹
		upper	lower	
Hanging	0.172	0.170	0.174	100.0%*
Drug abuse	0.346	0.344	0.348	100.0%*
poisoning	0.073	0.070	0.075	99.8%*
Self-immolation	0.087	0.086	0.089	99.9%*
Firearm	0.008	0.007	0.009	99.6%*
Cutting	0.029	0.027	0.031	99.3%*
Un-known	0.031	0.028	0.034	99.4%*

¹ Statistical test for heterogeneity. * P-value < 0.001

Table 3: Egger's and Egger's test to the publication bias of the literature

Type of suicide	P-value for Begg's test	P-value for Egger's test
Hanging	0.35	0.49
Drug abuse	0.93	0.38
poisoning	0.58	0.25
Self-immolation	0.24	0.67
Firearm	0.17	0.096
Cutting	0.28	0.49
Un-known	0.90	0.85

