Original Article

A Forensic Epidemiological Investigation of the Characteristics of Completed Suicides in Isfahan Province, Iran

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Abstract

Background: Suicide is a worldwide public health problem with over a million deaths each year. Overall, the suicide rates among Muslim countries is reported at as low, however, there is growing evidence that it is increasing. Suicide is one of the greatest sins in Islam and is strictly forbidden. Therefore, data on the national incidence and prevalence of suicide in Muslim countries may be under-reported.

Objectives: The current study aimed at describing the frequency and pattern of deaths due to suicide based on medicolegal autopsy records.

Methods: In the current retrospective study, data were collected on all suicide deaths underwent a medicolegal forensic investigation from 01 January, 2013, to 31 December, 2015, in the Isfahan province, Iran.

Results: During the study period 576 suicides were identified. Hanging was the most frequent method comprising 335 cases, followed by poisoning and burning with 98 and 87 cases, respectively. Males hanged themselves (68.79%), while females used burning (41.2%). Among the victims, 307 were married and 261 were unmarried. Death due to burning was 3.3 times more frequent among the married cases compared with that of the single ones (P < 0.001). Education status did not significantly contribute to explain differences in the methods of suicide (P value = 0.123).

Discussion: The current study results showed that self-burning was a method mostly used by housewives. Due to the heavy influence of Islam on this region, there was a high probability that the true number of suicides is significantly underreported and more detailed investigations are required.

Keywords: Cause of deaths, Epidemiology, Forensic Epidemiology, Forensic Medicine, Suicide

1. Background

Suicide is a significant public health challenge faced by every country worldwide. Suicide is a manner of death defined as the result of self-inflicted act committed to end life voluntarily and intentionally (1). Suicide results from an interaction between demographics, social, and cultural factors (2). Suicide is the second leading cause of unnatural deaths in adolescents aged 10 - 19 years. Unnatural death has external causes such as intentional or unintentional injury (3).

Worldwide, approximately 1.4% of all deaths are caused by suicides, and in 2012 it was the 15th leading cause of death throughout the world (4, 5). Globally, over 1 million people die every year due to suicide. While suicide occurs throughout ones lifespan, individuals in the age range of 15

- 29 years are at the highest risk of committing suicide and it represented the second leading cause of death within the mentioned age range worldwide in 2012 (6).

In the Eastern Mediterranean region, about 36,000 people die each year from suicide (6, 7). Suicide rates are low in most of the Islamic countries, however, recent evidence indicated that it is increasing (2). The population of Iran is about 76,424,000. On average, 441,000 people die (5.9/1000) in Iran each year of which 398,000 (5.3/1000) die from natural causes, and about 43,000 (6/10,000) die from unnatural causes of which 3650 (5/100,000) are due to commitment to suicide (7). Overall, the suicide rate in Iran is 5.3/100,000 with the rate of 7.0 for males and 3.6 for females (4). Suicide in Iran appears to follow a seasonal pattern with higher rates during summer (2). Suicide can

be caused by a number of biological, psychological, family, socioeconomic, political, and religious complex factors (2). Common causes of suicide include family conflicts, marital problems, economic constraints, and educational failure. Hanging (50.7%) is the most frequent mechanism of death. Poisoning and self-burning accounted for 19.6% and 16.5% of the deaths, respectively. In terms of employment among the cases committing suicide, 24.5% are self-employed or housewife, 23.3% unemployed, 15.1% worker, 10% student, and 4.7% are the military members (8). However, it is highly probable that the true number of suicides is underreported in local and national data. The main reason for it is that it is a great sin in Islam to commit suicide (9). The stigma of suicide due to religious context of Iranian society and the consequences of legal problems (burying deceased) should be understood since it may lead to a serious underreporting of suicides in the Islamic Republic of Iran (10). In addition, the act of suicide affects the committed individual and it also influences the victims' family and friends.

Suicide is a tragic event and its impact on families, friends, and communities is far-reaching and devastating, even many years after the death of the person. Unfortunately, the act of suicide fails to be prioritized as an important public health problem. Despite abundant research and knowledge about risk factors and methods of prevention, the act of suicide has a strong stigma and shame surrounding it. This attitude is rooted in the context of social and religious beliefs; therefore, people do not seek treatment and remain forlorn and helpless. In addition, if they do seek help or treatment, the current health care systems are incapable of providing efficient and timely services (4).

In Iran, similar to many developing countries, key data sources such as medicolegal report, medical examiner report, and death certificates are not yet linked (11). Additionally, suicide is strictly forbidden and people look at it as a shame and blame, especially among religious people (9, 12). Therefore, data on the national incidence and prevalence of suicide are underreported. There are other reasons including restrictions on registration policy and practice, uncertainty of the circumstances and situations surrounding a death, family's antipathy and unwillingness for suicide label, and stigma (13).

2. Objectives

The current study aimed at describing the frequency and pattern of deaths due to commitment to suicide during a 3-year period from 2013 to 2015 based on medicolegal autopsy records of unnatural death investigated by the legal medicine center of Isfahan, Iran.

3. Materials and Methods

In the current retrospective study, information on all unnatural deaths examined at the Legal Medicine Center of Isfahan province, from 01 January, 2013 to 31 December, 2015 was collected. The medicolegal reports were reviewed and all cases with the manner of death listed as suicide were used in the current study. During this period, 6044 forensic postmortem examinations were performed and 576 (423 males and 153 females) deaths were due to suicide. The legal medicine center of Isfahan serves 26 townships with a population of about 5,000,000. All violent deaths and those of unknown cause of death occurring within the Isfahan province underwent a forensic investigation and forensic examination. Once the cause of death is undetermined or assumed to be unnatural, an inquest takes place.

For each suicide case data were collected including gender, age, race, cause of death, method of suicide, geographical location, nationality, history of commitment to suicide, marital status, level of education, and job status.

The methods of suicides were categorized into hanging, burning, poisoning, using firearm, stabbing, jumping from height, strangulation, and drowning groups. Age was grouped into the following age ranges: 10 - 14, 15 - 29, 30 - 34, 45 - 59, and > 60 years. Level of education, a metric variable, was entered as a covariate in the model. Gender, marital status, occupational status, and nationality were treated as nonmetric variables. Although it is customary to combine suicide rates of males and females in suicidology literature, the current forensic epidemiological practice presented suicide rates based on age and gender, particularly because important differences across gender or age groups existed (14). Since the number of cases with missing data was so small, it cannot produce a missing data process that is disruptive to the analysis. The missing data analyses were excluded. The data set had 576 cases and 8 independent variables for a ratio of 72:1, well in excess of the requirement of 15 - 20 cases per independent variable. There was no evidence at this point in the analysis to add interaction or moderator variables. Therefore, the relationship between the methods of suicide and some demographic variables was examined using the multinomial logistic regression and descriptive analysis (13) with SPSS version 20.

4. Results

The retrospective analysis of deaths investigated at the legal medicine center of Isfahan from 2013 to 2015 identified a total of 6044 unnatural deaths that underwent a postmortem forensic examination. Among the 6044 deaths, 576 cases were due to suicide of which 423 (73.4%)

cases were male and 153 (26.6%) female. Only 8 of the 576 cases had missing data and were excluded from the analysis. Table 1 presents the 3 leading causes of death based on age groups and gender. Overall in the current study, males mostly committed to suicide by hanging (68.79%), whereas females used burning (41.2%). Table 2 presents methods of suicide based on gender and age group. Generally, 101 (17.5%) cases were under 19 years old. Most of the victims, 262 (45.5%) cases, were 15 - 29 years old followed by 181 (31.4%) cases in the age range of 30 - 44 years (Table 3). The most vulnerable age group included males in the age range of 15 - 29 years followed by the ones in the age range of 30 - 34 years (Figure 1).
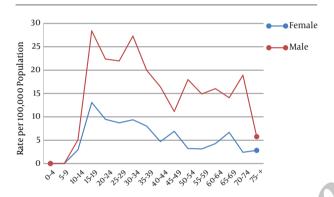

Figure 1. Cumulative Suicide Incidence Rates Based on Age and Gender, Isfahan Province, 2013 - 2015

Male outnumbered females in all age groups, except in suicides committed by burning, strangulation, and drowning (Table 2). Overall, suicides were 2.8 times higher among males than females; 78 (13.5%) males had a history of commitment to suicide and this ratio among females was double.

Among the methods of suicide, hanging was the most frequent method comprising 335 (58.2%) deaths followed by poisoning and burning with 98 (17.0%) and 87 (15.1%) deaths, respectively. The marital status was known in 568 (98.6%) cases with 307 (53.3%) married, 261 (45.3%) single, and unknown in 8 (1.4%) of the cases. Marital status based on age group for the top 5 methods of suicide is shown in Table 3.

Death due to burning and using firearms among married individuals was 3.3 (P < 0.001) and 0.34 (P value = 0.02) times higher than that of the single ones. Death due to burning, using firearm, and hanging in females was approximately 5 (P < 0.001), 0.06 (P value = 0.008), and 0.28 (P < 0.001) times higher than that of males. The odds ratio for suicide in the housewives was 7.5 (P value = 0.018) times higher than that of other jobs (Table 4). Education status did not significantly contributed to explain differences in

methods of suicide (P value = 0.123).

5. Discussion

In Iran, the suicide death rate was reported approximately 5 suicide deaths per 100,000 in 2012; hence, every day approximately 11 Iranians die from suicide (8), but a systematic review showed that the prevalence of suicide was 9.4 in 100,000 (15). In the current study, the overall suicide death rate in Isfahan province was approximately 4.2 suicide deaths per 100,000 (13.34 death per 100,000 population aged over 14 years).

The most frequent association between the commitment to suicide and sociodemographic status was observed in the following variables male, 17 - 39 years old, being a housewife, self-employment, unemployed, workers, or students. There were substantial gender and social disparities in the distribution of suicide mortality across the country and it was higher in the provinces with lower social status (16).

According to the world health organization (WHO), the median suicide rates (4.9 per 100,000 population) in the Eastern Mediterranean region countries are generally lower than those of other WHO covered regions and countries of the world (6.55 per 100,000 population). However, there is evidence that the suicide rate is relatively high in this region, especially among young individuals aged 15 - 29 years. Despite the underreporting of suicide in the countries where it is illegal, sin, and taboo, even in countries with several religious orientations, suicide rates seem to be lower among Muslims than the followers of other religions (9).

It is widely known that official statistics hide the real magnitude of suicide (13). This is partly due to sociocultural taboos, religious prohibitions, and unpleasant atmosphere of suicide and also by weakness of registration and inefficiency of health information system in such countries. These factors lead to a lack of access to accurate information, a proper understanding of the extent of the problem, and the inability to determine the groups that are at greatest risk for suicide.

Suicide represents a serious challenge to the local health care system. The challenge is to identify the individuals at risk and treat the ones affected by the suicide.

Suicide indirectly affects various aspects of the health of others and society as a whole. The families, friends, and acquaintances of people that commit suicide often experience depression, shock, guilt, anger, and disappointment.

Suicide is the second leading cause of death among adolescents 10 - 19 years in Isfahan province, Iran. Although great progress in the epidemiological patterns is made to prevent infectious diseases, the exposure of adolescents to

Table 1. The Three Leading Methods of Suicide Based on Age and Gender[a]

Rank	Age Group, y									
	10 - 14		15 - 29		30 - 44		45 - 59		≥ 60	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
1	Hanging 9 (1.56)	Burning 2 (0.35)	Hanging 122 (29.39)	Burning 30 (19.60)	Hanging 95 (22.89)	Burning 19 (12.41)	Hanging 40 (9.63)	Burning 10 (6.53)	Hanging 20 (4.81)	Hanging 4 (2.61)
2	-	-	Poisoning 28 (6.74)	Hanging 23 (15.03)	Poisoning 24 (5.78)	Hanging 2 (1.30)	Poisoning 7(1.68)	Hanging 5 (3.26)	Burning 4 (0.96)	Poisoning 3 (1.96)
3	-	-	Firearm 18 (4.33)	Poisoning 17 (11.11)	Firearm 9 (2.16)	Poisoning 11 (7.18)	Burning 4(0.96)	-	-	-

[a]Values are expressed as No. (%).

Table 2. Methods of Suicide Based on Gender and Age[a]

Method of Suicide	Gender	Age Group, y					Total
		10 - 14	15 - 29	30 - 34	45 - 59	≥ 60	
Burning	Male	0 (0.0)	13 (2.2)	3 (0.5)	4 (0.7)	4 (0.7)	24 (4.2)
	Female	2 (0.3)	30 (5.1)	19 (3.2)	10 (1.7)	2 (0.3)	63 (11.1)
	Total	2	43	22	14	6	87
Stabbing	Male	0 (0.0)	1 (0.2)	3 (0.5)	2 (0.3)	1 (0.2)	7 (1.2)
	Female	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	0	1	3	2	1	7
Firearm	Male	0 (0.0)	18 (3.1)	9 (1.5)	0 (0.0)	1 (0.2)	28 (4.9)
	Female	0 (0.0)	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)
	Total	0	19	9	0	1	29
Hanging	Male	9 (1.5)	122 (20.8)	95(16.2)	40 (6.8)	20 (3.5)	286 (50.4)
	Female	0 (0.0)	23 (3.9)	12 (2.0)	5 (0.9)	4 (0.7)	44 (7.7)
	Total	9	145	107	45	24	330
Strangulation	Male	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.0)	1 (0.2)
	Female	1 (0.2)	1 (0.2)	1 (0.2)	0 (0.0)	0 (0.0)	3 (0.5)
	Total	1	1	1	1	0	4
Poisoning	Male	0 (0.0)	28 (4.8)	24 (4.2)	7 (1.2)	3 (0.5)	62 (10.9)
	Female	2 (0.3)	17 (2.9)	11 (1.9)	1 (0.2)	3 (0.5)	34 (6.0)
	Total	2	45	35	8	6	96
Jumping from height	Male	0 (0.0)	3 (0.5)	2 (0.3)	1 (0.2)	1 (0.2)	7 (1.2)
	Female	0 (0.0)	3(0.5)	2 (0.3)	1 (0.2)	0 (0.0)	6 (1.1)
	Total	0	6	4	2	1	13
Drowning	Male	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Female	0 (0.0)	2 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.4)
	Total	0	2	0	0	0	2
Total		14 (2.4)	262 (44.7)	181 (31.8)	72 (12.7)	39 (6.9)	568 (100.0)

[a]Values are expressed as No. (%).

the risks of suicide appears to be increasing and seems to continue in the future. Therefore, it is necessary to study the risk factors, preventive measures, and plans to reduce

suicide and other violent behaviors in adolescents (3).

Suicide is one of the health priorities designated as part of WHO mental health gap action programme (mh-

Table 3. Major Methods of Suicide Based on Age and Marital Status[a]

Method of Suicide	Marital Status	Ag, y					
		10 - 14	15 - 29	30 - 44	45 - 9	≥ 60	Total
Burning	Married	0 (0.0)	27 (4.8)	20 (3.5)	14 (2.5)	6 (1.1)	67 (3.0)
	Single	2 (0.4)	16 (2.8)	2 (0.4)	0 (0.0)	0 (0.0)	20 (3.5)
	Total	2	43	22	14	6	87
Hanging	Married	0 (0.0)	39 (6.9)	70 (12.3)	40 (7.0)	22 (3.9)	171 (30.1)
	Single	9 (1.6)	105 (18.5)	36 (6.3)	5 (0.9)	2 (0.4)	157 (27.6)
	Total	9	144	103	45	24	328
Firearm	Married	0 (0.0)	1 (0.2)	6 (1.1)	0 (0.0)	1 (0.2)	8 (1.4)
	Single	0 (0.0)	18 (3.2)	3 (0.5)	0 (0.0)	0 (0.0)	21 (3.7)
	Total	0	19	9	0	1	29
Poisoning	Married	0 (0.0)	14 (2.5)	21 (3.7)	8 (1.4)	6 (1.1)	49 (8.6)
	Single	1 (0.2)	31 (5.5)	14 (2.5)	0 (0.0)	0 (0.0)	46 (8.1)
	Total	1	45	35	8	6	97
Others	Married	0 (0.0)	3 (0.5)	2 (0.4)	5 (0.9)	0 (0.0)	10 (1.8)
	Single	1 (0.2)	6 (1.1)	6 (1.1)	5 (0.9)	1 (0.2)	19 (3.3)
	Total	1	9	8	10	1	29
Total		13 (2.3)	260 (45.8)	180 (31.7)	77 (13.6)	38 (6.69)	568 (100.0)

[a] Values are expressed as No. (%).

Table 4. Relationship of Suicide Methods Based on Gender, Job, and Marital Status

Suicide Method[a]	Risk Factor	B	Std. Error	Wald	df	P Value	OR	95% Confidence Interval for OR	
								Lower Bound	Upper Bound
Burning	[Gender = female/male]	1.598	0.320	24.882	1	0.001	4.941	2.638	9.256
	[Job = housewife]	2.024	0.818	1.810	1	0.018	7.565	1.422	40.252
	[Marital status = married/single]	1.197	0.331	13.62	1	0.001	3.310	1.730	6.336
Firearm	[Gender = female/male]	-2.735	1.039	6.928	1	0.008	0.065	0.008	0.497
	[Marital status = married/single]	-1.075	0.461	5.433	1	0.020	0.341	0.138	0.843
Hanging	[Gender = female/male]	-1.257	0.267	22.178	1	0.001	0.285	0.169	0.480

Abbreviation: OR, odds ratio.
[a] The reference category is: poisoning.

GAP) that recommends regional strategies to develop a precise reporting and registration system, promotion of primary health care services to manage neurological and psychological methods for early detection, and develop mental health services for early recognition and prevention, and special plans for high risk and vulnerable people such as the elderly, females and adolescents and limit access to methods of committing suicide (17).

The suicide method reflects the availability of the means by which the suicide is committed. This is some-times related to the profession of the suicide, but also the popularity in media, especially from information widely accessible through internet of which suicide methods can spread widely and rapidly (18). The current study results showed that self-burning is a method mostly used by housewives. Unfortunately, the impact of sociocultural, political, or religious factors on the choice of this painful and aggressive method is not clear; therefore, further researches in this area are still needed. The main limitation of the current study was the lack of psychological au-

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topsy. A psychological autopsy is the reconstruction of the events leading up to the death; ascertainment of the circumstances of the death, including suicidal intent; and an in-depth exploration of other significant risk factors for suicide. Prospective studies and psychological autopsy are recommended to obtain a deeper insight of suicidal behavior. Effective prevention is possible only by understanding the details of suicidal behaviors.

Acknowledgments

Footnotes

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