Original Article

Completed Suicide and Associated Risk Factors: A Six-Year Population Based Survey

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Abstract

Introduction: The investigations on suicide conducted within low- and middle-income countries are limited. This study evaluated the trend of suicide and its associated risk factors in the west of Iran.

Methods: This six-year population-based survey was conducted in Kermanshah Province, in 2012. The data on suicide was extracted from the suicide database of the Provincial Health Center, which was collected for six successive years. Multivariate logistic regression analysis was performed and odds ratio (OR) as well as its 95% confidence intervals (CI) was reported.

Results: During the study period, 13,810 attempted suicides occurred of which 1,564 (11.33%) were completed. The incidence rate of suicide has increased in recent years. Based on logistic regression analysis, OR estimate of completed suicide increased 1.46 (95% CI: 1.36, 1.56) fold for every 10-year increase in age. Moreover, OR estimate of completed suicide was 2.53 (95% CI: 1.94, 3.31) in men compared to women. Compared to married people, the OR estimate of completed suicide was 1.41 (95% CI: 1.15, 1.72) in single people, 1.92 (95% CI: 1.15, 3.23) in widowed people, and 1.97 (1.32, 2.95) in divorced people. The lower the educational level, the higher the risk of completed suicide. Compared to school/college students, the risk of completed suicide was higher among housewives, employed people or employees, and retirees. A majority of the suicides (90.05%) occurred at home. Taking medications was the most common way (69.13%) of a suicide attempt.

Conclusion: We indicated that associated factors with completed suicide vary in Iran compared to other developed and developing countries and that factors associated with attempted suicide are different from that of completed suicide.

Keywords: Assisted suicide, attempted suicide, incidence, Iran, risk factors

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Introduction

Suicide is an important health problem which receives an increasing attention worldwide.[1] The estimated global mortality of suicide is 14.5 deaths per 100,000 people per year, which equates to one million deaths per year.[2] It has been indicated that suicide rates vary substantially across countries, even within the same region with similar levels of development.[3] The burden of suicide is highest in low- and middle-income countries.[4] A population-based study which was conducted in Iran during 2006 to 2010 revealed that intentional self-harm was among the first eight major causes of premature death.[5]

There are numerous factors contributing to suicide, which is never the consequence of one single cause.[1] Men die much more than women by suicide. The suicide rate has decreased among elderly people in many countries, while has risen in young people. Rates also vary across different ethnic origins, employment status, and occupations.[1] Most people who die by suicide have psychiatric disorders.[1] Bipolar disorder is strongly associated with suicide ideation and suicide attempts.[6] Substance abuse, unmarried, low education, anxiety, psychotic, mental and personality disorders, as well as previous self-harm are the major risk factors of suicide.[1,7,8] In addition, suicide is associated with physical characteristics such as low body mass index and smoking.[1,9] Family history of suicidal behavior and marital disputes are also important.[1,10]

Most investigations on suicide have been conducted in western, high-income countries while it is unclear whether the incidence rate of suicide and associated risk factors identified in such countries can be generalized to low- and middle-income countries.[8] The present study was conducted on a large dataset collected during six successive years in Kermanshah Province, the west of Iran, as a developing country, in order to evaluate the incidence rate of suicide attempt and completed suicide as well as associated factors that increase the risk of death from suicide.

Materials and Methods

This six-year population-based survey was conducted in Kermanshah Province, the west of Iran, in 2012. The Research Committee of Hamadan University of Medical Sciences approved the study (N: 9107252601). The data on suicide was extracted from the suicide database of the Provincial Health Center (PHC), which is compatible with the International Classification of Diseases Revision 10 (ICD-10).[11] In the Islamic Republic of Iran, PHC is

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primarily responsible for collecting morbidity and mortality data including suicide reported from district health centers and hospitals throughout the province. The data on suicide was collected for six successive years from 21 March 2006 to 20 March 2011 (based on Iranian calendar time). In order to confirm a complete suicide, the data were compared with and adapted by information on suicide recoded by the Center of Province Forensic Medicine. In cases, where there was inconsistency between the two datasets, the judgment was based on forensic identification because forensic medicine is the only legal authority in the country that judge on unusual and suspicious deaths.

In order to estimate the annual incidence rate of suicide, the population of the province in 2006 to 2011 was considered as the denominator and the number of attempted and completed suicide was considered as the numerator. The suicide rate was reported per 100,000. The data on population of the province was extracted from the statistics released by the Statistical Center of Iran based on the last Population and Housing Census in 2006 and the subsequent estimates for the following years till 2011.

The effects of several factors on suicide were investigated, including: date of suicide (year and month), location of suicide, gender, age, marital status, educational level, occupational status, as well as way of suicide, reason of suicide, and the death from suicide. Multiple logistic regression analysis was used for measuring the association between the risk factors of interest and suicide. All analyses were performed at 0.05 significant levels using the Stata version 11.2 (StataCorp, College Station, TX, USA).

Results

During the six-year study period, 13,810 attempted suicides occurred of which 1,564 (11.33%) were completed. The distribution of absolute number of suicides and the incidence rate of attempted and completed suicide is given in Table 1. The results show that incidence rates of attempted suicide have increased in recent years, although the incidence rates of completed suicide were not changed significantly. Furthermore, the frequency of suicide by age groups over the years is shown in Figure 1. This figure indicates that the number of suicides decreased from 2006 to 2008 and then increased in subsequent years, particularly in age groups of 10 – 19 and 20 – 29 years.

The characteristics of the study population are given in Table 2. Most of people who attempted suicide were women, 20 – 29 years old, single, intermediate educated, and jobless or housewife. Out of 13,810 subjects who attempted suicides, 8038 (58.2%) were female and 5772 (41.8%) were male. Nonetheless, OR estimate of completed suicide was 2.53 in males compared to females.

Most of the people who attempted suicide aged between 10 to 30 years, in particular among 20 – 29 years old subjects. However, the risk of completed suicide was higher among elderly people, therefore OR estimate of completed suicide was 1.46 (95% CI: 1.36, 1.56) for every 10-year increase in age.

A majority of people who attempted suicide were single. Nonetheless, the odds ratio of completed suicide was 1.41 (95% CI: 1.15, 1.72) in single people, 1.92 (95% CI: 1.15, 3.23) in widowed persons, and 1.97 (95% CI: 1.32, 2.95) in divorcees compared to married people.

A majority of the suicide attempts committed by people with the educational level of secondary or high school. However, risk of completed suicide had an inverse correlation with education level, therefore the OR estimate of completed suicide in illiterate people was 3.26 (95% CI: 2.09, 5.09) compared to subjects with academic education. In other words, the lower the educational level, the higher the risk of completed suicide.

Table 1. Incidence rate of suicide attempt and completed suicide per 100,000 and by year

		Suicide			Incidence rate of suicide per 100,000	
Year	Population	Attempted	Completed	Total	Attempted	Completed
2006	1,879,385	2080	245	2325	110.7	13.0
2007	1,892,553	1672	251	1923	088.3	13.3
2008	1,905,722	1379	304	1683	072.4	16.0
2009	1,918,890	2064	256	2320	107.6	13.3
2010	1,932,058	2515	240	2755	130.2	12.4
2011	1,945,227	2536	268	2804	130.4	13.8

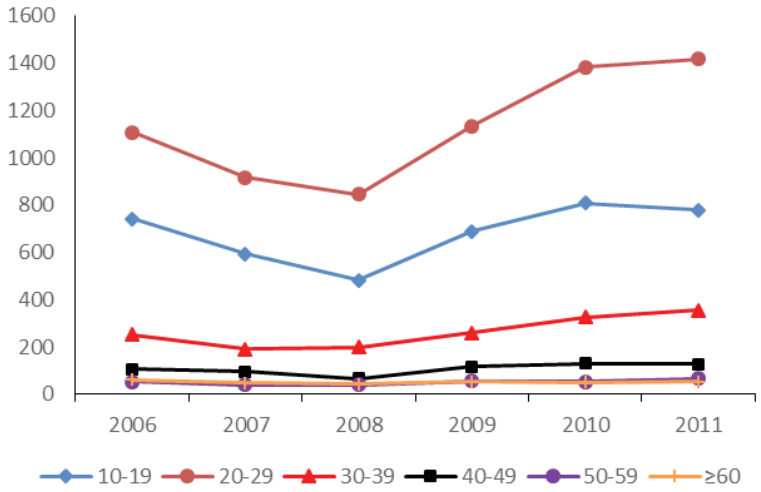

Figure 1. The frequency of suicide by age groups and years

Table 2. The characteristics of the study population and odds ratio (OR) estimates of completed suicide using bivariate and multivariate logistic regression analysis

Variables	Attempted N = 12,246[a]	Completed N = 1,564[a]	Unadjusted OR (95% CI)	*P*-value	Adjusted OR (95% CI)[b]	*P*- value
Gender						
Female	7,381	657	1.00	- - -	1.00	- - -
Male	4,865	907	2.09 (1.88, 2.33)	0.001	2.53 (1.94, 3.31)	0.001
Age group (year)						
10–19	3,858	237	1.00	- - -	1.00	- - -
20–29	6,163	646	1.71 (1.46, 1.99)	0.001	1.64 (1.30, 2.06)	0.001
30–39	1,276	307	3.92 (3.27, 4.69)	0.001	3.47 (2.60, 4.65)	0.001
40–49	498	144	4.71 (3.75, 5.91)	0.001	3.87 (2.71, 5.54)	0.001
50–59	217	90	6.75 (5.11, 8.92)	0.001	5.23 (3.36, 8.13)	0.001
60–69	79	48	9.89 (6.75, 14.49)	0.001	5.86 (3.21, 10.69)	0.001
70–79	50	51	16.60 (11.00, 25.06)	0.001	13.65 (7.46, 24.99)	0.001
≥ 80	44	32	11.84 (7.37, 19.02)	0.001	6.71 (3.14, 14.33)	0.001
Per 10 years increase in age	12,246	1,564	1.57 (1.52, 1.63)	0.001	1.46 (1.36, 1.56)	0.001
Marital status						
Married	4,745	685	1.00	- - -	1.00	- - -
Single	7,173	759	0.73 (0.66, 0.82)	0.001	1.41 (1.15, 1.72)	0.001
Widow	80	47	4.07 (2.81, 5.89)	0.001	1.92 (1.15, 3.23)	0.013
Divorced	243	58	1.65 (1.23, 2.23)	0.001	1.97 (1.32, 2.95)	0.001
Educational level						
Academic	860	54	1.00	- - -	1.00	
High	4,343	401	1.47 (1.10, 1.97)	0.010	1.45 (0.98, 2.14)	0.064
Secondary	3,606	401	1.77 (1.32, 2.38)	0.001	1.92 (1.29, 2.88)	0.001
Primary	1,762	357	3.23 (2.40, 4.35)	0.001	3.71 (2.45, 5.62)	0.001
Illiterate	1,058	328	4.94 (3.65, 6.68)	0.001	3.26 (2.09, 5.09)	0.001
Occupation						
School/College students	2,210	136	1.00	- - -	1.00	- - -
Housewives	4,721	548	1.89 (1.55, 2.29)	0.001	3.15 (2.23, 4.44)	0.001
Employed people/Employees	1,712	464	1.37 (1.11, 1.70)	0.004	2.58 (1.83, 3.62)	0.001
Retirees	30	25	4.40 (3.60, 5.39)	0.001	5.08 (2.43, 10.65)	0.001
Unemployed people	3,094	261	13.54 (7.75, 23.67)	0.001	1.08 (0.78, 1.51)	0.631
Military people	205	67	5.31 (3.83, 7.36)	0.001	1.62 (0.99, 2.66)	0.057
Others[c]	39	43	17.92 (11.23, 28.57)	0.001	7.46 (3.67, 15.17)	0.001
Reason of suicide						
Conflict with family/relatives	6,665	155	1.00	- - -	1.00	- - -
Poverty/Jobless	502	90	7.71 (5.85, 10.15)	0.001	6.68 (4.97, 8.99)	0.001
Substance abuse	642	156	10.45 (8.25, 13.24)	0.001	7.23 (5.57, 9.39)	0.001
Physical disease	255	35	5.90 (4.01, 8.70)	0.001	3.33 (2.16, 5.15)	0.001
Psychological disorders	2,349	201	3.68 (2.97, 4.56)	0.001	3.02 (2.41, 3.78)	0.001
Lovely relationship	406	11	1.17 (0.63, 2.17)	0.629	1.37 (0.72, 2.60)	0.339
Other reasons[e]	434	913	90.46 (74.36, 110.05)	0.001	121.65 (97.13, 152.36)	0.001

[a]Sum of subgroups are less than total number due to missing data; [b]OR adjusted for all variables mentioned in the table; [c]Others included prisoners, servant, beggar, or unknown; [d]Others included garden, road, mountain, dormitory, cemetery, etc; [e]Others included loneliness, infertility, disappointment, economic failure, or unknown.

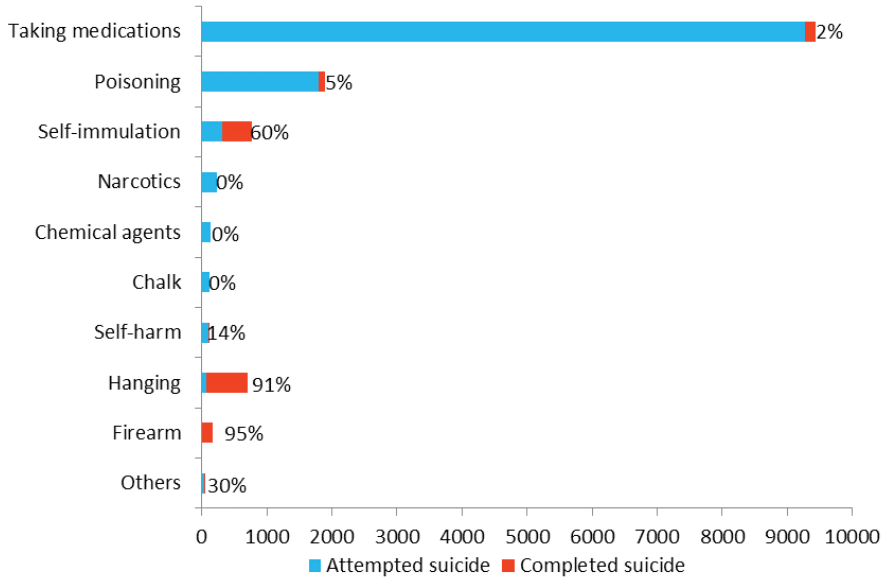

Figure 2. The ways of suicide (percentages show the proportion of completed suicide to attempted suicide, i.e. death rate)

In terms of occupational status, a majority of the study population comprised of college/school students, housewives, and employees. However, the risk of completed suicide was higher among housewives, employed people or employees, and retirees compared to school/college students.

Motivation and reasons of suicides were complex. A majority of people who had attempted suicide mentioned a history of conflict with family members, relatives, or colleagues. The second most common motivation of suicide was psychological disorders. However, the risk of completed suicide due to other reasons was much higher than suicide due to conflict with family members or relatives. Poverty and jobless increased the risk of completed suicide 6.98 fold, substance abuse 7.23 fold, physical diseases 3.33 fold, and psychological disorders 3.02 fold compared to those who had conflicts with their family members or relatives or colleagues. Furthermore, the OR estimate of completed suicide due to other reasons such as loneliness, infertility, disappointment, and economic failure was 121.65 (95% CI: 97.13, 152.36) compared to suicide due to conflict with family members or relatives.

About 90.05% (11,914) of the suicide cases occurred at home, 2.20% (291) at workplace, and 7.75% (1025) in other places such as garden, road, mountain, dormitory, cemetery, and etc.

The ways of attempting suicide and the proportion of completed suicide from each way are given in Figure 2. The results show that taking medications was the most common (69.13%) way of suicide attempt. Nonetheless, only 2% of those who had attempted suicide by taking medications had eventually died. On the other hand, only a minority of people attempted suicide through dangerous ways such as firearm, hanging, or self-immolation. However, most of them had died. In other words, 95% of those who used a firearm, and 91% of those who hanged themselves and 60% of those who immolated themselves had died.

Discussion

The individual and environmental factors contribute to suicide[1] vary substantially across countries and regions.[8] We showed that rates of attempted suicide are different from the rates of completed suicide so that rate of attempted suicide may be higher in one group while the rate of completed suicide may be higher in another group. For example, most of the people who attempted suicide were women, whereas the rate of completed suicide was much higher in men. The rate of suicide varies in men and women across different countries and regions. In developed countries, the male-to-female ratio for suicide is between two and four to one[2] while in Asian countries, male-to-female ratios of suicides are much lower,[12] even in China more women than men die by suicide.[13] Studies which were conducted in other parts of Iran were consistent with the result of our study.[10,14] The male-to-female OR estimate of completed suicide was reported 2.27 (95% CI: 1.63, 3.14) by Amiri, et al.[10] and 2.34 (95% CI 1.45 to 3.79) by Kiadaliri, et al.[14] In addition, Shojaei, et al.[15] reported that the proportion of completed suicides was much higher in men than in women (70.4% in men versus 29.6% in women). Indeed, women are mostly suicidal gestures, but do not really want to kill themselves, while men are more serious to kill themselves when attempting suicide.

Age is another important factor associated with suicide. A majority of the people who attempted suicide were younger than 39 years, whereas the ratio of completed suicide increased with age. A study conducted in another part of Iran is consistent with our findings. Amiri, et al.[10] indicated that for every 10-year increase in age, the risk of completed suicide increases 1.48 (95% CI: 1.39, 1.59) fold. That means elderly people are more serious to kill themselves than young people. In addition, the results of similar studies conducted in other countries confirmed this finding and indicated that the completed suicide rate was higher in elderly people.[1] However, suicide rates vary across countries and even within countries. A study, which was conducted in Iran showed that a substantial disparity presents in the distribution of suicide mortality across the provinces.[14] Some investigations have shown an increasing trend of suicide in young people[16] and decreasing trend in elderly people[17] while recent evidence has shown that suicide rates in young people, particularly in men, have decreased in some developed countries.[18] In the present study, we indicated that the overall incidence rate of suicide has increased in recent years particularly in young people.

We showed that a majority of the study population comprised of housewives. The reason is that a most of middle aged and old women in Iran are housewives. Therefore, it seems reasonable that a major part of the women who attempted suicide are housewives. This finding is consistent with another study conducted in the west of Iran.[10]

According to our results, various ways were used for attempting suicide. Taking medications was the most common way used mostly by women and young people. Similar results were seen in the previous studies conducted in other parts of Iran.[10,19] Shojaei, et al. showed that younger individuals more frequently select a highly violent way, such as firearms while older persons more often use hanging and poisoning. They concluded that gender, age, and educational level are variables that have an effect on adopting different suicide ways.[15] However, selecting suicide tools depends on the socioeconomic determinants and the accessibility of the suicide tools.[20,21]

There is a general consensus that suicide rates are usually underreported.[22,23] We used data on suicide recorded in Province Health Center. The quality and accuracy of the data depends primarily on the quality of the recorded data. We compared the data on completed suicide with the data available in the forensic medical center to verify the quality of the data and reduce information bias. However, we were unable to verify the data on attempted suicide, because the data were not recorded in the forensic medical center. This issue may raise the possibility of the information bias and might have lead led to underestimation of the attempted suicide rate. Another limitation of this study was that, unintentional death due to substance overdose among addicts might sometimes be considered and recorded as suicide. This might lead to measurement bias.

Despite its limitations, an important strength of this study was that the data on attempted and completed suicide as well as the associated risk factors were analyzed and assessed separately. Another major advantage of this study was that crude and adjusted correlations between completed suicide and various risk factors that were investigated and reported.

We concluded that factors associated with completed suicide vary in Iran compared to other developed and developing countries. Furthermore, we indicated that factors associated with attempted suicide were different from that of completed suicide. These findings may have implications for health policy making and planning prevention program to reduce suicide rate and its associated risk factors.

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Conflict of interest statement

The authors declare that they have no conflicts of interest in this work.

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