

ORIGINAL ARTICLE

Trend of Suicide in Kermanshah during 11 years (2004 to 2014), Iran

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Suicide is one of the most important health problems which has dedicated a significant part of the energy and health care costs to itself. The present study carried out to investigate trend of suicide in Kermanshah province during 2004-2014. This is an analytical (cross sectional) study in which all cases died by suicide and documented in forensics of Kermanshah during 2004 – 2014 were investigated. For evaluating the trend for suicide, Poisson regression model was used and to calculate suicide rate, census data from 2006 and 2011 as well as Organization for Civil Registration were obtained. During the 11 years of study, 2799 people died in Kermanshah province by suicide; among which 1681 (60.1%) were men and 1118 (39.9%) were women. The average annual mortality rate was 15.77 per 100,000; that is, 12.81 women and 18.62 men per every 100,000 populations. The highest number of deaths caused by suicide was witnessed among the age group 20-24 by 24.91 per 100,000. The most common method of suicide death was self-immolation among women with 47.8% and hanging in men with 48.1%. Over these years, suicide by hanging was rising with almost constant rate; however, self-immolation was rising until the end of 2008 that it started to decrease. Although the deaths by suicide in west of Iran is lower compared to other countries; it is higher in this region than other parts of the country. Considering the suicide trend and young population of Iran, the overall rate of deaths by suicide will substantially increase in Iran in case no plan and appropriate strategy are provided.

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INTRODUCTION

In recent decades, suicide and its related issues have led to major problems in the field of public health (Mann *et al.*, 2006; Najafi *et al.*, 2014). Suicide is defined as voluntary action of hurting oneself to death. In most parts of the world, suicide is seen as an important health problem (Heok, 2012).

The World Health Organization has regarded suicide as one of the world's leading cause of death (Krug *et al.*, 2002; Bertolote and Fleischmann, 2015). Every year about 800,000 to one million people die by suicide (Värnik, 2012; Marshall *et al.*, 2016). Also, during the past 45 years, suicide rates have increased by 60% worldwide (Bairami *et al.*, 2015). Studies have shown that the official rate of suicide among the

world countries is obviously variable. This rate has fluctuated between 1 and 45 per 100,000 populations. In the United States of America, suicide deaths are about 12 per 100,000 populations and in countries such as Scandinavia, Switzerland, Germany, Japan, Austria and Eastern Europe, which are called suicide belt, it is about 25 per 100,000 population (Sadock and Sadock, 2009).

In Iran, especially among adolescents and young people, this phenomenon has an upward trend (Najafi *et al.*, 2012; Najafi *et al.*, 2013b; Rostami *et al.*, 2016). Planning to reduce suicide is one of the governments' goals to protect and promote public health (Hatami *et al.*, 2008; Moradinazar *et al.*, 2016; Naghshvarian *et al.*, 2016). Since suicide is a complex phenomenon that occurs based on individual interaction with different risk factors (Oliver and Hetzel, 1972; Qin *et al.*, 2003), preventing it requires careful planning. Indeed, suicide patterns in different age and sex groups vary depending on geo-

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graphical areas and even in a specific geographical area, this difference can also vary among people with different age and sex (Wasserman *et al.*, 1998; Gunnell, 2000; Krug *et al.*, 2002; Qin *et al.*, 2003; Rezaeian *et al.*, 2005).

Therefore, planning for a certain country or region, with distinct culture and socio-economic status cannot be helpful for another region (Charlton *et al.*, 1992; Rezaeian *et al.*, 2004). As desire to commit suicide is associated with different social, cultural and economic consequences, it is regarded as one of the most important problems of modern societies that every year imposes a large financial burden on the society by involving health and psychiatry systems. Accurate understanding of pattern of suicide required broad studies. The present study was carried out to investigate death rate and trend of suicide in Kermanshah province.

MATERIAL AND METHODS

Study design

This is a descriptive-analytical (cross sectional) study carried out in forensics of Kermanshah. Participants were assured that their names would not be mentioned and the results of interviews would remain confidential. This research was conducted by permission and confirmation of the Department of Research and Ethics Committee of Kermanshah University of Medical Sciences (Code KUMS.REC.1395.65).

Study site

Kermanshah Province, with nearly two million populations, is located as the west end of Iran and shares a border with Iraq. To study suicides during the 11-year period (2004 to 2014), all occurred death suicides in Kermanshah were investigated.

Data collection

Data were obtained from the province forensics using provided checklists. For evaluating some of the important factors in suicide, such as drug abuse, cause and motivation for suicide, and history of physical and mental diseases, the researchers used assistance of trained experts of the organization, interviewed with friends, relatives and other people

who had close contact with the deceased and reviewed their medical cases and records. Given the suffering incurred for the loss of their loved ones, interviews were carried out so that sensitive issues that will disturb deceased family were eliminated from questioning.

Given that a person may have several reasons for suicide attempt at the same time, the most intense cause or motive that had most probably incited him/her to commit suicide was considered as the suicide motive. Since all death suicides occurred to +10 years old people, all the measures are calculated for individuals with +10 years of age.

To calculate specific rates of suicide, average population of the province was obtained from censuses data of 2006 and 2011 and to estimate changes during the years when no census is taken, data records of Organization for Civil Registration and Information were employed (SCo). Also, to calculate standard measures adjusted by the direct method, the world standard based population was used (Ahmad *et al.*, 2001).

Statistical analysis

Data were analyzed using Microsoft Excel and SPSS (version 19). In order to compare proportions and averages chi-square test and T-test were performed. Poisson regression was used to investigate the results' significance over the time period.

RESULT

During 2004 to 2014, 2,799 people died in Kermanshah by suicide; among which 1,681 (60.1%) were men and 1,118 (39.9%) were women. The population mean age (\pm SD) was 15.6 ± 32.36 years; the averages of age range of men and women were 33.8 ± 15.9 and 30.2 ± 14.7 respectively. The difference was statistically significant ($p < 0.001$).

During these 11 years, the average annual mortality rate was 15.77 per 100,000; that is, 12.81 women and 18.62 men per every 100,000 populations. The highest number of deaths caused by suicide was witnessed among the age group 20-24 followed by 25-34. The difference in suicide rates of different

Table 1: Annual suicide deaths by age and sex during 2004 to 2014 in Kermanshah

Age groups (Years)	Men		Women		Total	
	n(%)	Rate	n(%)	Rate	n(%)	Rate
10-14	22(1.3)	2.03	28(2.5)	2.73	50(1.8)	2.37
15-19	171(10.2)	12.04	205(18.3)	15.25	376(13.3)	13.6
20-24	402(23.9)	28.74	270(24.2)	20.79	672(24.0)	24.91
25-34	501(29.8)	28.27	316(28.3)	17.99	817(29.2)	23.16
35-44	236(14.0)	17.79	133(11.9)	10	369(13.2)	13.89
45-54	155(9.2)	16.39	75(6.8)	7.94	230(8.3)	12.17
54 ≤	194(11.6)	17.99	91(8.0)	8.87	285(10.2)	13.54
Total	1681(100.0)	18.62	1118(100.0)	12.81	2799(100.0)	15.77
Age and sex Standardized Rate* (95% CI)	10.3 (8.73-11.87)		7.23 (5.86-8.60)		8.78 (7.17-10.39)	

*Data presented as number and percentages; * Rate per 100,000, Rates have been standardized with world standard population*

age groups is statistically significant ($p < 0.001$) (Table 1).

There was a significant relationship between methods to commit suicide and level of education so that higher education level was associated with lower incidence of self-immolation and higher tendency to poisoning and firearm suicide. Also, there was a significant relationship between suicide methods and

gender. Self-immolation and hanging were the most common methods of suicide deaths among women and men ($p < 0.001$). In general, hanging, intentional poisoning, and firearm with 39.8%, 25.4%, and 12.3% were the most common method of suicide, respectively (Table 2).

As described in Figure 1, during the studied period, rate of deaths caused by suicide had an upward

Table 2: Analysis of suicide by method and sex during 2004 to 2014 in Kermanshah

Method	Men		Women		Total	
	n(%)	Rate	n(%)	Rate	n(%)	Rate
Hanging	809(48.1)	8.77	304(27.2)	3.34	1113(39.8)	6.6
Self-immolation	177(10.5)	1.92	534(47.8)	5.85	711(25.4)	3.87
Drug abuse	233(13.9)	2.5	110(9.8)	1.2	343(12.3)	1.9
Chemical and Poisonous Material	127(7.6)	1.37	92(8.2)	1.01	219(7.8)	1.2
Weapon	281(16.7)	3.04	64(5.7)	0.7	345(12.3)	1.9
Others	54(3.2)	0.54	14(1.3)	0.15	68(2.4)	0.4
Total	1681(100.0)	18.21	1118(100.0)	12.3	2799(100.0)	15.3

*Data presented as number and percentages; * Rate per 100,000,*

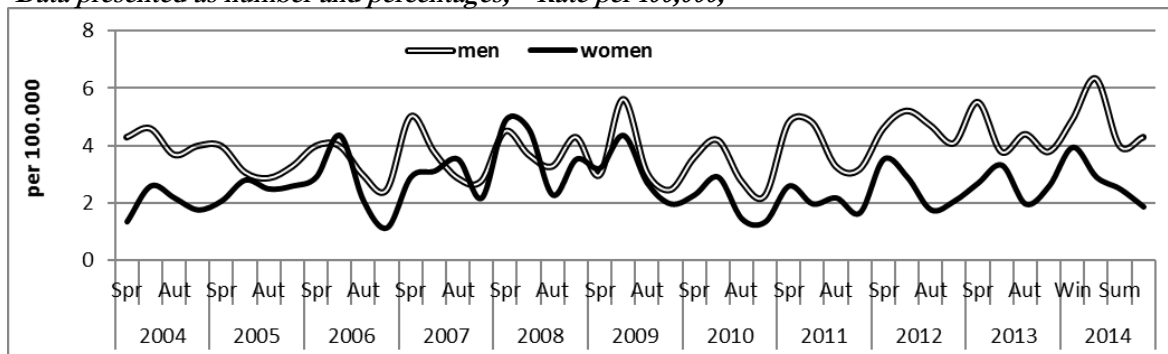


Figure 1: Suicide trend by season and sex during 2004 to 2014 in Kermanshah

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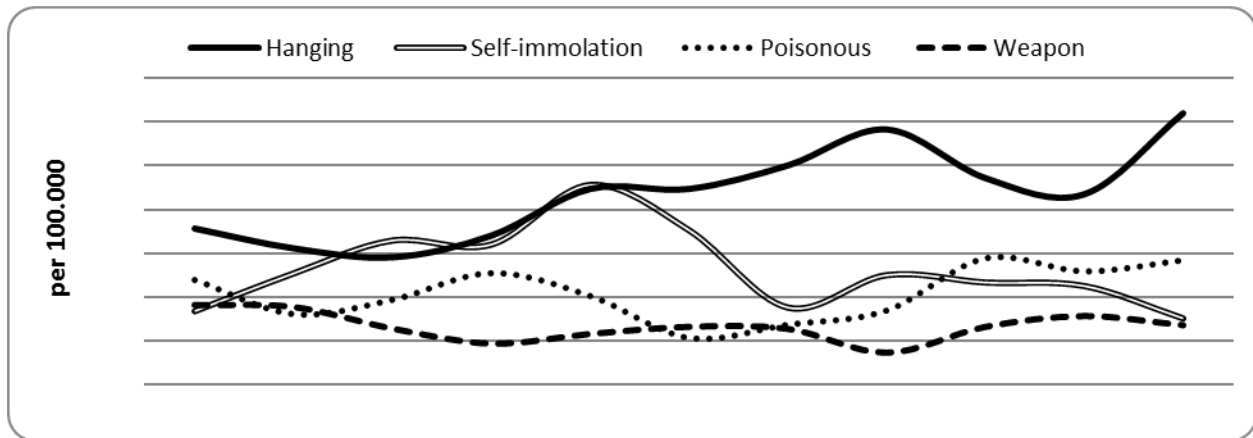


Figure 2: Suicide trend by method during 2004 to 2014 in Kermanshah

trend among men while it was downward among women; however, these ascending and descending trends were not statistically significant ($p > 0.5$). Evaluation of the trend of suicide indicated a seasonal trend where the highest rate of suicide occurred in spring and summer and the lowest rate occurred in autumn and winter ($p < 0.001$).

Methods of suicide during the study period showed different patterns. Suicide deaths caused by self-immolation was rising until the end of 2008, since then it is falling. Suicide deaths caused by hanging is rising with almost constant trend. In the meantime, other methods of suicide has had almost unchanged trend ($p > 0.001$) (Figure 2).

DISCUSSIONS

Results of studying the 11-year period suggest that Kermanshah is a province with higher rate of suicide than other provinces of Iran (Mami *et al.*, 2015). However, given that data source and data recording systems of each province are different and also considering the underestimation of suicides due to assuming suicide as an accident, denial of suicide by relatives of the deceased and other political, cultural and social issues that families and communities of the deceased are facing after his/her death, these findings should be analyzed with caution (Gunnell, 2000; Krug *et al.*, 2002; Hatami *et al.*, 2008; Pitman *et al.*, 2012).

Although death rate of suicide in Kermanshah is specifically lower than rest of the world (Najafi *et al.*,

2013a; Choi and Kim, 2015) when adjusted worldwide measures were used, the difference was largely reduced since Iran has a young population and that suicides occur mostly among young people and adolescents (Yip *et al.*, 2012; Bertolote and Fleischmann, 2015).

Methods of suicides among men and women were different. The most common method of suicide was self-immolation among women and hanging among men. In this regard, findings of the current research is consistent with similar studies conducted in Iran and other countries such as Pakistan, Australia, Denmark and Lithuania (and most countries of East Europe) (Bille-Brahe and Jessen, 1994; De Leo *et al.*, 2003; Starkuviene *et al.*, 2006; Hatami *et al.*, 2008; Khan *et al.*, 2008) but different from results of studies carried out in England (drugs), America (firearms), some parts of China (height jump) (Hawton *et al.*, 2007; Ajdacic-Gross *et al.*, 2008). Differences in suicide methods in different parts of the world can be attributed to cultural, social, and economic differences and access to common means of suicide.

Suicide methods vary among different age groups so that hanging was more common in people over 20 years of age while self-immolation was more common among people with less than 20 years old. These findings may be important for planners since they can reduce suicide attempts by providing strategic programs for different age groups. Higher rate of suicide in youth and adolescents is another im-

portant finding of this study which is consistent with that of similar researches carried out in Iran and other parts of the world (Mathers *et al.*, 2001; Pitman *et al.*, 2012).

Since Iran has one of the youngest populations in the world (Rastegar, 2016), the overall rate of suicide death in Iran will be reduced considerably by planning and providing appropriate strategies to mitigate this social problem. That, self-immolation had an upward trend until 2008 and followed by a downward trend since then, was the other significant finding of this research so that it may be regarded as the most important finding of this study. Indeed, entering urban gas to fueling network of the province and reduced oil consumption at homes and consequently reduced access to it, was the starting point of this downward trend. Also, during the studied period, TV and radio programs as well as other mass media tried to reduce self-immolation by promoting societies' culture and awareness. Although these programs have not been properly documented, reduced self-immolation rate and number may be partly attributed to this. It is worth noting that in this study, mortality rate was increasing in men and decreasing in women and since self-immolation is the most common method of suicide in women, (Chen *et al.*, 2012; Seghatoleslam *et al.*, 2012; Najafi *et al.*, 2013a; Najafi *et al.*, 2013b; Moradinazar *et al.*, 2016) this resulted in reduced suicide rate among women.

Although suicide is regarded as a social-psychological phenomenon, many studies have shown the impact of geophysical factors on suicide, as well. Scholars argue that changes in the earth's magnetic activity and solar radiation can affect suicide rate (Behroozi fard and Ghaleiha, 2007). Analysis of seasonal trend of suicide indicated that rate of suicide increases in spring and summer and decreases in autumn and winter which was consistent with results of similar studies (Behroozi fard and Ghaleiha, 2007; Pajoumand *et al.*, 2012; Moradinazar *et al.*, 2016).

The highest incidence of suicide occurred in people with diploma and illiterates. A study in Japan which indicated indirect relationship between education

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level and incidence of suicide (Najafi *et al.*, 2014; Kimura *et al.*, 2016) suggests that higher education level is associated with lower rate of suicide. Several factors, such as poverty and unemployment, may give rise to incidence of suicide among the illiterate and people with diploma due to the problems they are facing with in finding job opportunities (Agerbo *et al.*, 2001; Najafi *et al.*, 2012).

Due to the lack of professional ability, illiterates are face with difficulty in finding job opportunities and those with diploma cannot find their expected jobs, as well, due to lack of sufficient expertise or because they are not willing to work at low level jobs; that is why this group have trouble on this area. On the other hand, with increasing level of education, there would be a change in the method of suicide. Therefore, illiterates often use violent methods such as self-immolation and hanging with less probability of error while educated people are more prone to commit suicide by drug and weapon, which is also consistent with similar studies (Agerbo *et al.*, 2001; Najafi *et al.*, 2012; Kimura *et al.*, 2016; Ursano *et al.*, 2016).

CONCLUSION

According to current research findings, it can be inferred that rate of suicide in Kermanshah is higher than other provinces of Iran and steps should be taken to mitigate this problem by providing an integrated plan and intersectional coordination of responsible bodies.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

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