

Research Article

Suicide mortality trends by age, gender and method in Turkey, 2002–2015

Saniye Göktaş^a, Selma Metintaş^b

^a Araş. Gör. Dr., Eskisehir Osmangazi Uni., Medical Faculty Dept. of Public Health, Meselik, Eskisehir, Turkey

^b Prof. Dr., Eskisehir Osmangazi Uni., Medical Faculty Dept. of Public Health, Meselik, Eskisehir, Turkey

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Abstract

Objective: The aim of this study was to evaluate the change in the gender, age and method-specific suicide rates in Turkey between 2002-2015. **Method:** Gender, age and method-specific suicide rates were calculated during the study period with the data obtained from the Turkish Statistical Institute and Joinpoint regression analysis was used to test the change of these rates within the observed time period. **Results:** Of a total of 40,281 suicides recorded during the study period, 27,407 consisted of males (68%) and 12,874 consisted of females (32%). The suicide rate was higher in females than males only in the group under 15 years of age, whereas it was higher in males than females in all other age groups. Male suicides showed an increasing trend in the time interval studied for the age groups under 15, 25-44, 65 and above. The most commonly used suicide method was hanging in all age groups. It was noteworthy that suicides committed by firearms also increased in the group under 15 years of age. **Conclusion:** Trend in suicidal behavior over the years should be closely monitored. Preventive measures to curb increasing trends of suicide are urgently needed.

Key words: Suicide rate, trends of suicide, methods of suicide, time series analysis

Corresponding Author: Saniye Göktaş, Eskisehir Osmangazi University, Medical Faculty Department of Public Health, Meselik, Eskisehir 26480, E-mail: doktorsaniye@gmail.com Tel institution: 0090-222-239 29 79 / 4515 (ext.) Tel mobil: 0090-553-0785268

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Türkiye'deki intiharların yaşa, cinsiyete ve yönteme göre değişim trendi, 2002-2015

Özet

Amaç: Çalışmada, Türkiye'de, 2002-2015 zaman aralığında, yaşa, cinsiyete ve yönteme özel intihar hızlarında meydana gelen değişimin değerlendirilmesi amaçlandı. **Yöntem:** Türkiye İstatistik Kurumu'ndan elde edilen verilerle, çalışma periyodunda yaşa, cinsiyete ve yönteme özel intihar hızları hesaplandı ve bu hızların incelenen zaman trendinde gösterdiği değişimin incelenmesinde Joinpoint regresyon analizi kullanıldı. **Bulgular:** İncelenen zaman trendinde kaydedilen 40,281 intiharın 27,407'si erkek (%68), 12,874'ü kadın (%32) idi. İntihar hızı sadece 15 yaşın altında olan grupta kadınlarda erkeklere göre daha yüksek iken, diğer yaş gruplarında erkeklerde daha yüksekti. İncelenen zaman trendinde, erkeklerde intihar hızı 15 yaşın altında, 25-44, 65 yaş ve üzerindeki yaş gruplarında anlamlı bir artış trendi gösterdi. Tüm yaş gruplarında en çok tercih edilen intihar yöntemi ası idi. Ateşli silah kullanımıyla gerçekleşen intiharların, 15 yaşın altında olan grupta artış trendi göstermesi dikkat çekiciydi. **Sonuç:** İntihar davranışının, yıllar içinde gösterdiği değişim trendi daha yakından izlenmelidir. Artan intihar hızlarının önüne geçebilmek için, acilen önleyici tedbirlerin alınmasına ihtiyaç vardır.

Anahtar kelimeler: İntihar hızı, intihar trendi, intihar yöntemleri, zaman seri analizi

Introduction

The World Health Organization (WHO) defines suicide as 'the act of deliberately killing oneself' and suicide is one of leading cause of preventable deaths¹⁻³. Due to suicide, which is a major public health problem, approximately one million people lose their lives every year, and in 2015, the global age-standardized suicide rate was 10.7 per 100,000.^{2,4-6}

Recording of suicides is a complex, multi-stage procedure that involves medical and legal concerns and can vary from country to country. It is possible that a wide range of change in the estimated rates of suicide reported for different countries and regions is a result of different reporting and recording practices. In 60 countries with a good vital recording system, there is a 32-fold difference (from 0.89 to 28.85 per 100,000) among the national age-standardized suicide rates in 2012.²

The distribution of suicide rates shows significant differences between countries as well as by gender and age groups⁷. In many countries, suicide rates are higher in males than in females, but in certain Asian countries, the situation is exactly the opposite⁴. The age group with the highest suicide rates in many countries is 65 years and above for both genders, while the age group with the lowest rates is the age group under 15 years, and suicide is the second cause of death in young people aged 15-29 years worldwide.^{2,5,7}

It is known that suicide rates are influenced by the change of social, economic, cultural and psychological factors, as well as the change in the use and popularity of lethal suicide methods. Sound experimental evidence has shown that restricting access to lethal means in the environment is an important suicide prevention method. Since the results of time series analyses in various countries show that the frequency of use of suicide methods can change over time, the

monitoring of suicide methods gains importance.⁵

Detailed analyses of specific sites should be carried out with an epidemiological perspective to better predict specific tendencies of regions for suicide.⁶ It has been reported that the suicide rates in Turkey may show significant changes over time according to age, gender and methods.⁸ Turkey is a country located in the middle of the east and west in terms of social, economic, psychological and cultural aspects, and carries the characteristics of both the developed and the developing countries at the same time. Therefore, it is important to closely monitor trends of suicide rates in Turkey in terms of contributing to both national and international suicide epidemiology.

In this context, the study aims to evaluate the change occurring in the gender, age and method-specific suicide rates in Turkey between 2002 and 2015.

Material and Method

Ethical permission was obtained from the Ethics Committee of Eskisehir Osmangazi University, Institute of Education, to carry out the study.

Study data were taken from suicide and population statistics published by TURKSTAT for 2002-2015. TURKSTAT has started to compile the information on the cases of suicides resulting in death, which are obtained from the records of General Directorate of Security and General Directorate of Gendarmerie, from all the settlements since 1962 and to publish the same as a separate publication since 1974⁹. TURKSTAT permits the use of data published at its official site. TURKSTAT publishes the suicide data on its official site, including some of its own variables. TURKSTAT permits the use of the data it shares. By using these data, gender, age (age groups of under 15 years, 15-24, 25-44, 45-64, 65 years and older) and method-specific (hanging, firearms, jumping

Results

from heights and chemical poisoning which are classified as other methods jumping to the water, self-burning, using a cutting tool, gas poisoning, jumping in front of a train or other motor vehicle) suicide rates were calculated. Gender and age-specific standardized suicide rates and 95% Confidence Intervals (CI) were calculated by taking into consideration the 2002 standard population of the WHO¹⁰. Suicide rates were expressed as rates per 100,000 persons.

The Joinpoint Regression Program (Version 4.5.0.1) was used to test the change of suicide rates according to gender, age and method in the study period. This program was originally used to analyze cancer mortality changes in time trends, and later started to be widely used in areas such as cardiology and psychiatry. The advantage of this program is that it can model the changes of an event over time⁵. The most appropriate point where trend in suicide rate (decrease or increase) has occurred was determined. Annual Percent Change (APC) and corresponding 95% CI of suicide rates for each trend were calculated with the Generalized Linear Model based on the Poisson distribution¹¹. There are multiple APC values from cells that exhibit more than one change (increase or decrease) trend. Joinpoint regression analysis was performed on age-corrected rates for gender, age and method separately.

Data analysis

IBM SPSS (version 15.0) Statistical Package Program was used for other analyses. The differences in suicides according to gender, age and method were analyzed by chi-square test. Statistical significance level was accepted as $p < 0.05$.

Of the 40,281 suicides recorded during the study period (2002-2015), 27,407 consisted of males (68%) and 12,874 consisted of females (32%).

Male/female suicide ratio (number of male suicide/number of female suicide rate) was 1.53 in 2002, 2.66 in 2015 and 2.13 for the whole period. The suicide rate was higher in females only in the group under 15 years of age, whereas it was higher in males in all other age groups. The age group in which the highest number of suicides took place within the observed time period was 25-44 years for males (38%) and 15-24 years for females (37%). Crude and standardized suicide rates in 2002, 2015 and for the period of 2002-2015 are given in Table 1.

The distribution of suicide methods preferred by males and females showed a significant difference ($\chi^2 = 2195.995$; $df = 3$; $p < 0.001$). In males, the two methods which were most preferred in all age groups were hanging and the use of firearms, whereas the order of methods of suicide showed a

significant difference in each age group ($\chi^2 = 149.385$; $df = 12$; $p < 0.001$, "others" row and "total" column were not included in the chi-square test). In addition, one out of two suicides in males was committed by hanging and one out of three with firearms. Hanging was the most used method for females in all age groups also, while the order of other methods in between showed a significantly different course in each age group ($\chi^2 = 1104.031$; $df = 12$; $p < 0.001$, "others" row and "total" column were not included in the chi-square test). In each age group, the preference of the suicide method showed a significant difference by age (<15 ages: $\chi^2 = 64.167$; $df = 3$; $p < 0.001$, 15-24 ages: $\chi^2 = 690798$; $df = 3$; $p < 0.001$; 25-44 ages: $\chi^2 = 942.999$; $df = 3$; $p < 0.001$, 45-64 ages: $\chi^2 = 566.335$; $df = 3$; $p < 0.001$, ≥ 65 ages: $\chi^2 = 329.726$; $df = 3$; $p < 0.001$, "others" row and "total" column were not included in the chi-square test).

The distribution of suicide methods in Turkey by age group and gender between 2002-2015 is given in Table 2.

Table 1. Crude and standardized suicide rates in Turkey, in 2002, 2015 for the period of 2002-2015

| | Male (per 100,000) (95% CI) | Female (per 100,000) (95% CI) | Total (per 100,000) (95% CI) |
|--------------------------|-----------------------------------|-------------------------------------|------------------------------------|
| 2002 | | | |
| Crude rate | 4.28 (4.17-4.39) | 2.77 (2.68-2.86) | 3.52 (3.45-3.59) |
| Standardized rate | 4.49 (4.37-4.61) | 2.69 (2.60-2.78) | 3.54 (3.47-3.61) |
| 2015 | | | |
| Crude rate | 5.91 (5.79-6.03) | 2.23 (2.15-2.31) | 4.08 (4.01-4.15) |
| Standardized rate | 5.81 (5.69-5.93) | 2.19 (2.12-2.26) | 3.98 (3.91-4.06) |
| 2002-2015 period | | | |
| Crude rate | 5.39 (5.32-5.82) | 2.59 (2.19-2.50) | 3.98 (3.83-4.12) |
| Standardized rate | 5.37 (5.13-5.61) | 2.46 (2.31-2.63) | 3.88 (3.74-4.08) |

Table 2. Distribution of suicide methods in Turkey by age group and gender, 2002-2015

| | <15 n (%) | 15-24 n (%) | 25-44 n (%) | 45-64 n (%) | >65 n (%) | Total n (%) |
|------------------|--------------|----------------|----------------|----------------|---------------|----------------|
| MALE | | | | | | |
| Hanging | 370 (66) | 2544 (46) | 4913 (48) | 3012 (49) | 1525 (49) | 12364 (49) |
| Firearms | 136 (24) | 1803 (33) | 3212 (31) | 1834 (30) | 830 (26) | 7979 (31) |
| Poisoning | 21 (4) | 426 (8) | 691 (7) | 435 (7) | 229 (7) | 1802 (7) |
| Jumping | 22 (4) | 423 (8) | 826 (8) | 506 (8) | 368 (12) | 1913 (8) |
| Others | 12 (2) | 303 (5) | 595 (6) | 317 (6) | 186 (6) | 1413 (5) |
| Total | 561 (100) | 5499 (100) | 10237 (100) | 6104 (100) | 3138 (100) | 25471 (100) |
| FEMALE | | | | | | |
| Hanging | 311 (48) | 1631 (35) | 1909 (48) | 1170 (62) | 856 (61) | 5899 (47) |
| Firearms | 181 (28) | 1094 (24) | 509 (13) | 79 (5) | 54 (4) | 1917 (15) |
| Poisoning | 91 (14) | 1167 (25) | 768 (19) | 197 (10) | 169 (12) | 2392 (19) |
| Jumping | 57 (9) | 577 (13) | 586 (15) | 311 (16) | 242 (17) | 1773 (14) |
| Others | 7 (1) | 130 (3) | 195 (5) | 126 (7) | 77 (6) | 535 (5) |
| Total | 647 (100) | 4599 (100) | 3967 (100) | 1883 (100) | 1398 (100) | 12516 (100) |

In the period examined, male suicide rates were found to show an increasing trend in the <15, 15-24, 45-64 age groups and in total. However, there was an increasing trend in the period of 2002-2009, while there was no significant change in the period of 2009-2015 in the > 65 age group. Trend in Suicide Rates in Turkey by Age Groups for Males, 2002-2015 given at Graph 1.

In the period examined, female suicide rates were found to show a decreasing trend in the 15-24, 25-44, 45-64 age groups and in total. Trend in Suicide Rates in Turkey by Age Groups for Females, 2002-2015 given at Graph 2.

Suicide rates showed a 2.3% increase trend in males and a 3.1% decrease trend in females between 2002 and 2015. Suicide rates showed an increasing trend in all age groups

except for the age group of 65 and over for males. Suicide rates in the age group of 65 and over for males showed an increasing trend in the period of 2002-2009. A significant decreasing trend was observed in the age groups of 15-24, 25-44 and 45-64 for females (Table 3).

Hanging and jumping from heights showed an increasing trend for males between 2002-2015, whereas the use of firearms showed an increasing trend between 2004-2015. In males, hanging showed an increasing trend in 15-24, 25-44, 45-64 age groups within the observed time trend. While the use of firearms in males showed an increasing trend between 2002-2015 in all age groups except for those aged 65 and over, it showed an increasing trend until 2004 (Table 3).

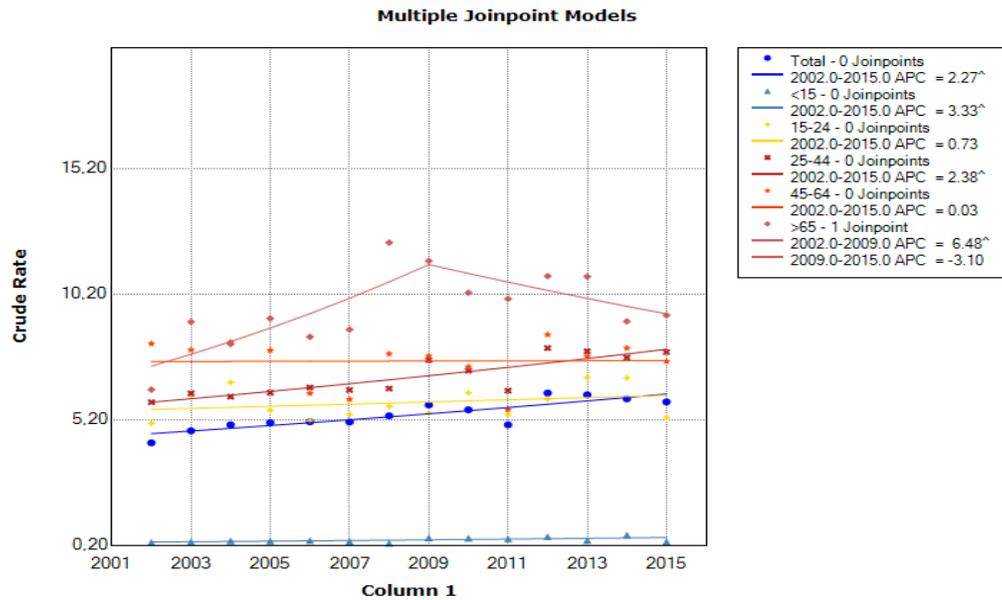


Figure 1. Trend in suicide rates in Turkey by age groups for males, 2002-2015

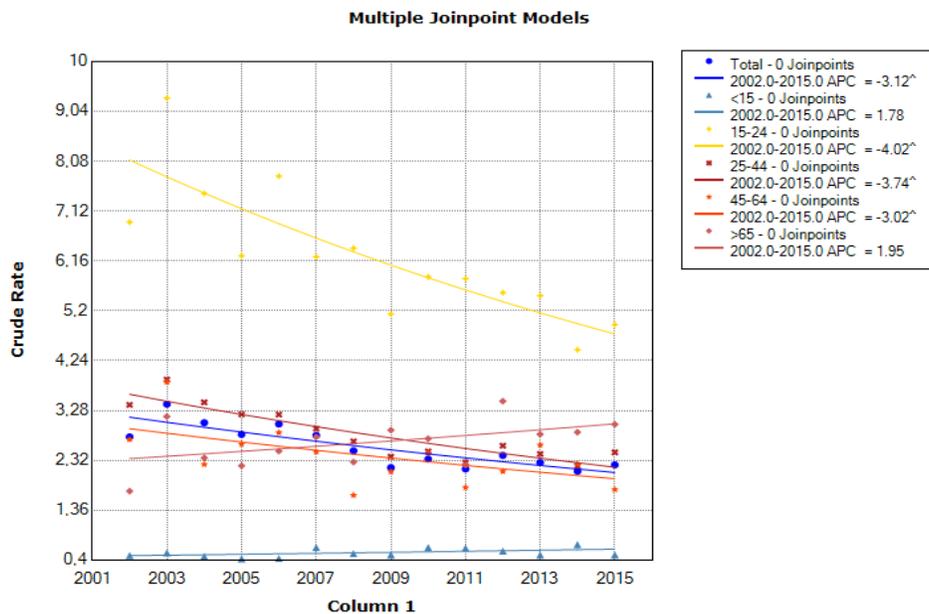


Figure 2. Trend in suicide rates in Turkey by age groups for females, 2002-2015

Table 3. Trend in Suicide Methods in Turkey by Age Groups for Males and Females, 2002-2015

| MALE | | | | | | |
|------------------|------------------------|---------------------------------------|--------------------------------------|--------------------------|---------------------------------------|--------------------------------------|
| | <15 APC (95% CI) | 15-24 APC (95% CI) | 25-44 APC (95% CI) | 45-64 APC (95% CI) | >65 APC (95% CI) | Total APC (95% CI) |
| Hanging | 1.9 (-1.5 to 5.5) | 2.2* (0.9 to 3.5) | 2.4* (1.0 to 3.8) | 2.1* (0.6 to 3.7) | 2002-2004 77.8 (-15.0 to 271.7) | 2.3* (1.2 to 3.5) |
| | | | | | 2004-2015 -4.7* (-7.8 to -1.5) | |
| Firearms | 7.4* (2.3 to 12.9) | 2.6* (0.2 to 5.1) | 23.7* (1.4 to 50.9) | 3.4* (1.3 to 5.4) | 2002-2004 43.1* (6.0 to 93.2) | 2002-2004 20.8 (-5.7 to 54.8) |
| | | | | | 2004-2015 -4.5* (-7.6 to -1.3) | 2004-2015 2.2* (0.9 to 3.5) |
| Jumping | ** | 1.8 (-0.9 to 4.7) | 2002-2013 0.2 (-2.6 ile 3.2) | 1.0 (-2.0 to 4.1) | -0.2 (-3.3 to 2.9) | 4.1* (2.4 to 5.8) |
| | | | 2013-2015 27.2 (-11.1 to 81.9) | | | |
| Poisoning | ** | 2002-2008 -5.1 (-13.0 to 3.4) | -6.7* (-9.6 to -3.7) | -3.1* (-5.8 to -0.2) | -4.5* (-8.5 to -0.4) | 2002-2007 -4.1 (-9.8 to 2.0) |
| | | 2008-2011 -31.9 (-68.8 to 48.9) | | | | 2007-2011 -13.7 (-26.6 to 1.5) |
| | | 2011-2015 27.1 (-0.6 to 62.5) | | | | 2011-2015 8.5 (-2.6 to 21.0) |
| Others | ** | 2002-2006 -16.9 (-34.4 to 5.2) | -0.7 (-2.9 to 1.7) | -2.5 (-5.0 to 0.1) | -3.0 (-7.4 to 1.7) | 2.3* (1.2 to 3.5) |
| | | 2006-2015 12.6* (5.6 to 20.0) | | | | |
| Total | 3.3* (0.5 to 6.2) | 2.1* (0.4 to 3.9) | 2.1* (1.4 to 2.9) | 1.8* (0.4 to 3.2) | 6.5* (1.3 to 11.9) (2002-2009) | 2.3* (1.4 to 3.1) |
| | | | | | -3.1 (-8.1 to 2.2) (2009-2015) | |

*p<0.05; ** The Joinpoint program could not perform because it is less than 1.

Table 3 (Devam). Trend in Suicide Methods in Turkey by Age Groups for Males and Females, 2002-2015

| FEMALE | | | | | | |
|------------------|--------------------------|---|--|--------------------------|--|------------------------------------|
| | <15 APC (95% CI) | 15-24 APC (95% CI) | 25-44 APC (95% CI) | 45-64 APC (95% CI) | >65 APC (95% CI) | Total APC (95% CI) |
| Hanging | 1.5 (-1.6 to 4.7) | -2.0* (-3.5 to -0.4) | -0.7 (-1.7 to 0.3) | -1.6 (-3.7 to 0.5) | 2002-2004 39.2 (-20.4 to 143.4) | -0.9 (-1.9 to 0.1) |
| | | | | | 2004-2015 -3.1* (-5.9 to -0.2) | |
| Firearms | 3.7* (0.2 to 7.4) | -0.9 (-3.4 to 1.6) | 19.8* (6.3 to 35.1) | -2.4* (-3.9 to -0.9) | -3.8 (-10.2 to 3.1) | -1.2 (-2.8 to 0.4) |
| Poisoning | -9.8* (-15.5 to -3.7) | -16.4* (-20.3 to -12.2) | 2002-2007 -4.4 (-12.8 to 4.7) | -5.8 (-11.5 to 0.2) | 2002-2006 55.7* (11.2 to 117.9) | -13.8* (-17.7 to -9.7) |
| | | | 2007-2011 -32.9* (-50.0 to -9.8) | | 2006-2009 -44.3 (-75.5 to 26.8) | |
| | | | 2011-2015 13.7 (-10.8 to 45.0) | | 2009-2015 3.2 (-15.5 to 26.0) | |
| Jumping | ** | 2002-2007 -14.8* (-19.0 to -10.3) | 2.9* (0.4 to 5.5) | 0.2 (-3.1 to 3.6) | 0.8 (-2.9 to 4.6) | 2002-2008 -4.5 (-8.8 to 0.0) |
| | | 2007-2013 13.5* (7.8 to 19.4) | | | | 2008-2015 7.2* (3.9 to 10.6) |
| | | 2013-2015 -6.9 (-23.6 to 13.4) | | | | |
| Others | ** | -14.0* (-20.3 to -7.2) | -6.3* (-10.6 to -1.8) | -4.4* (-8.4 to -0.2) | 2002-2007 24.3 (-0.0 to 54.5) | -7.4* (-11.1 to -3.6) |
| | | | | | 2007-2010 -47.6 (-88.3 to 134.1) | |
| | | | | | 2010-2015 13.4 (-15.5 to 52.2) | |
| Total | 1.8 (-0.3 to 3.9) | -5.1* (-6.6 to -3.6) | -2.6* (-3.6 to -1.6) | -1.8* (-3.4 to -0.1) | 1.9 (-0.3 to 4.2) | -3.1* (-4.2 to -2.0) |

*p<0.05; ** The Joinpoint program could not perform because it is less than 1.

Within the examined time period, of the female suicide methods, jumping from heights showed an increasing trend between 2008-2015. Hanging in females showed a decreasing trend between 2002-2015 in the 15-24 age group, and between 2004-2015 in the group aged 65 and over. The use of firearms in females showed an increasing trend in the 15 and less age group, as well as the age group of 25-44. Jumping from heights in females showed an increasing trend between 2002-2015 in the 25-44 age group, and between 2007-2013 in the 15-24 age group, a decreasing trend was observed in the time interval of 2002-2007 for the 15-24 age group. Age group and method-specific trend of suicides for males and females within the 2002-2015 is given in Table 3.

Discussion

In the world, the age-standardized suicide rate in 2015 is 10.7 per 100,000. Respectively, total, male, and female age-standardized suicide rates were reported as 12.6, 19.5, and 5.8 per 100,000 in America; 12.3, 19.0, and 5.9 in France; 16.1, 23.4, and 9.1 in Belgium; 3.9, 5.5, and 2.2 in Saudi Arabia; 3.6, 4.2, and 2.9 in Iran and 3.1, 5.3, and 1.1 in Azerbaijan in 2015.⁶ In Turkey, total, male, and female age-standardized suicide rate for 2015 was found in the study as 3.98, 5.81, and 2.19 per 100,000 respectively. According to another study examining the suicides between 1990-2000 in Turkey, the suicide crude rate in the total population was 2.02 per 100,000 in 1990 and 3.19 in 2000.¹² According to WHO data, total, male, and female age-standardized suicide rates for 2015 were 7.5, 11.3, and 3.3 per 100,000 in Turkey respectively.⁶

Examining all these results, it is seen that the suicide rate is higher in males than in females and suicide rates in Turkey are lower compared to western countries and similar to those of Muslim countries. According to WHO, religious and spiritual beliefs protect people from the risk of suicide. Islam forbids suicidal behavior. In addition, each Islamic nation has

its own ethnic mix and variation in the sects and practices of Islam.¹³ However, suicidal behaviors are complex; there are multiple contributing and protecting factors for suicide.² It is striking that there is a significant difference between WHO and Turkey reports of suicide. This difference may be due to differences in suicide data sources of WHO and Turkey. In Turkey, only suicide data can be obtained from Turkstat. If we could reach the suicide data used by WHO, we could compare the differences between the two sources more.

Gender differences related to suicides are still not fully explained.¹⁴ There are studies indicating that males have a higher risk of suicide than females.^{14,15} The high rate of suicide in males may be related to alcohol abuse, the use of lethal methods and a higher tendency of violence compared to females. The low rate of suicide in females may be related to the fact that females apply for health services, in particular the psychiatric services, earlier and more often than males.

In the observed time period, the suicides were most frequently observed in the age group of 25-44 in males and 15-24 in females. In similar studies performed, the age group in which the suicides were most frequently observed was 45-64 for males in Japan and the age group of 65 and up for Italy, whereas for females the suicides were most frequently observed in 65 and over age group in both countries.^{5,16} According to a study conducted in Egypt, the most prevalent age range of suicides was reported as 20-30 years of age.¹⁷

Suicide rates showed an increasing trend in males and a decreasing trend in females between 2002 and 2015. In a study carried out in Norway and examined the suicides between 1969-2012, it was reported that there was no significant change in males and females.¹⁸ In the study examining the 1990-2011 time trend in Japan, an increasing trend were observed for males whereas no changes were observed for females.⁵

Male suicide rates showed an increasing trend in all age groups except for the age group of 65 and over. In a time series analysis performed in Japan, suicide rates have been reported to show an increasing trend at the age groups of 15-24, 25-44 and 65 years and over in males, and at the age group of 15-24, 25-44 for females.⁵

One of the remarkable points of the study is that the suicide rates in the elderly are lower than the younger groups in Turkey, when compared to other countries.^{5,16} Elderliness is perhaps the most difficult part of human life in terms of social, economic and psychological aspects. The fact that the social viewpoint of the elderly and the family structure in Turkey is suitable to live together with the elderly protects the elderly from loneliness and many other psychological difficulties may be among the reasons for this difference. However, the increasing trend of suicide within the age group of 65 and over in recent years might be an indicator of changing social dynamics in the percent of nuclear families, working women, elderly living alone or in a nursing home.

It is one of the important results of the study that suicides in young age groups, who are most active in terms of vocational and social aspects in Turkey, are observed more than other age groups. Turkey is a developing country and suicide causes such as education, unemployment, substance abuse and family conflicts affect the young in particular. In addition, the presence of psychiatric disorders, which constitute a large proportion of suicide causes in young people, should not be overlooked¹⁹.

About half of the suicides (48%) in Turkey between the years 2002-2015 were carried out by hanging, and hanging continues to be the most common method of suicide with 1305 suicides per year. In suicide trend analyses performed in Germany, Taiwan (China), Japan, Norway, Italy and Sao Paulo (Brazil), the most frequently preferred method for males was hanging and it is the most frequently preferred method for females

as well, except for Italy (where the most frequent method is jumping from heights) and Sao Paulo (where the most frequent method is chemical poisoning).^{5, 16, 18, 20-22}

Hanging was the most preferred method in males and females in all age groups in Turkey. In the suicide time series analyses performed in Germany, Japan and Italy, it was reported that the most frequently preferred method in males and females was hanging also in all age groups.^{5, 16, 22}

For males, hanging and jumping at heights showed an increasing trend between 2002-2015, use of firearms between 2004-2015, and for females, jumping from heights showed an increasing trend between 2008-2015. Suicide time series analyses done in Japan, Norway and Brazil also reported an increase in the use of hanging method in males, while the Norwegian study reported a decrease in the use of the method of jumping from heights in females.^{5, 18, 21}

Within the observed time period, hanging showed an increasing trend in the age groups of 15-24, 25-44, 45-64 for males. A declining trend was shown in the 15-24 age group between 2002-2015 and the age group of 65 and over between 2004-2015 for females. This increase in suicides by hanging was in line with increases in Japan, Italy, England and other countries.^{5, 16, 23, 24} Hanging, in which asphyxiation occurs within a few minutes and rescue procedures are generally ineffective (estimated rate of death is 70%), is the most commonly preferred and oldest method of suicide in the World.^{16, 24}

The use of firearms showed an increasing trend in males aged 65 and over between 2002-2004 and in all other age groups between 2002-2015. Whereas in females, it showed an increasing trend in the age groups of 15 and lower as well as the age group of 25-44, and a decreasing trend in the age group of 45-64 between 2002-2015. In the study in Italy, the use of firearms showed a decreasing trend in the age group of 25-44 and 45-64 for males and 25-44 for females¹⁶. In Turkey, it is required to be at least 18 years old

in order to be able to obtain a firearm license²⁵. As they are not in the age to obtain a license, it may be considered that this increase in suicides with firearms in those aged 15 and less may be related to the inadequacy of parental supervision and control measures regarding the access to weapons in their homes or surroundings. Firearms at home bring a risk of death by firearms to those living in the house. Unloading the gun and keeping it locked in a place and storing the explosive material locked in a place other than the gun is associated with a decrease in suicides committed by firearms.²⁶ In order to reduce suicides by firearms in this age group, the number of guns that can be accessed must be lowered by introducing more restrictive criteria while providing a gun license. More importantly, parents provided with weapons must be instructed to keep guns under strict control and even remove guns from the house where an adolescent who has experienced a suicide attempt lives.

Jumping from heights did not show any significant change in all age groups in males, whereas in females, there was an increasing trend in the age group of 25-44 between 2002-2015 and the age group of 15-24 years between 2007-2013. There are regional and international differences in the trend of suicides by jumping. The increase in suicides by jumping from heights in females, though not in males, may be related to committing suicide by jumping down from popular places becoming widespread, the increase in resorting to this method in hospital or house environment for those with psychiatric disorders as a result of increasing restriction of access to many methods, and the construction of high buildings without safety measures.²⁷ At the very least, necessary environment-specific precautions should be taken in order to avoid attempts in places where suicide attempts have already occurred.

During the period investigated, suicide rates showed significant changes according to age, gender and method. One of the important results of the study is the increase in suicide

rates in males and young age groups. Suicides committed by hanging, firearms and by jumping from heights in males and committed by jumping from heights in females showed an increase. The increase of hanging in all age groups and the firearm suicides in the group under 15 years of age was remarkable. The change in suicidal behavior over the years should be closely monitored by related scientific and vocational branches. Prevention of suicide should be one of the primary goals of public health activities. As a result, it has been concluded that there is a need to carry out further investigations on suicide and to develop age- and method-specific emergency response programs in all age groups to decrease suicides.

References

1. Rao D, Namaratha P, Rao T, Raman R. South Indian Study On Themes of Suicide Notes & Prevention. *Eur Psychiatry* 2015;30:966.
2. Suicide WP. A global imperative. World Health Organization 2014.
3. MacIsaac MB, Bugeja L, Weiland T, Dwyer J, Selvakumar K, Jelinek GA. Prevalence and characteristics of interpersonal violence in people dying from suicide in Victoria, Australia. *Asia Pac J Public Health* 2017;1010539517743615.
4. Detels R, Gulliford M, Karim QA. Oxford textbook of global public health: Oxford University Press, USA 2015.
5. Yoshioka E, Hanley S, Kawanishi Y, Saijo Y. Time trends in method-specific suicide rates in Japan, 1990–2011. *Epidemiol Psych Sci* 2016;25(01):58-68.
6. World Health Organization. Suicide rates. Available at: http://www.who.int/gho/mental_health/suicide_rates/en/ Accessed May 1, 2017.
7. Metintaş S. Public Health Perspective in Suicides. *Turkiye klinikleri J Pub Health-special topic* 2016;2(1):55-64.

8. Oner S, Yenilmez C, Ozdamar K. Sex-related differences in methods of and reasons for suicide in Turkey between 1990 and 2010. *J Int Med Res* 2015;43(4):483-93.
9. Turkish Statistical Institute. Vital statistics Available at: http://www.turkstat.gov.tr/PreTablo.do?alt_id=1060 Accessed May 5, 2017.
10. National Cancer Institute. Standard population data, World (WHO 2000-2025) Standard Available at: <https://seer.cancer.gov/stdpopulations/world.who.html> Accessed July 13, 2017.
11. National Cancer Institute. Joinpoint trend analysis software. Available at: <https://surveillance.cancer.gov/joinpoint/> Accessed July 14, 2017.
12. Oner S, Yenilmez C, Ayranci U, Gunay Y, Ozdamar K. Sexual differences in the completed suicides in Turkey. *Eur Psychiatry* 2007;22(4):223-8.
13. Lester D. Suicide and islam. *Arch Suicide Res* 2006;10(1):77-97.
14. Clarke CS, Bannon F, Denihan A. Suicide and religiosity—Masaryk's theory revisited. *Soc Psychiatry Psychiatr Epidemiol* 2003;38(9):502-6.
15. Chon DS. National religious affiliation and integrated model of homicide and suicide. *Homicide Stud* 2017;21(1):39-58.
16. Vichi M, Masocco M, Pompili M, Lester D, Tatarelli R, Vanacore N. Suicide mortality in Italy from 1980 to 2002. *Psychiatry Res* 2010;175(1):89-97.
17. Moneim WMA, Yassa HA, George SM. Suicide rate: trends and implications in upper Egypt. *Egypt J Forensic Sci* 2011;1(1):48-52.
18. Puzo Q, Qin P, Mehlum L. Long-term trends of suicide by choice of method in Norway: a joinpoint regression analysis of data from 1969 to 2012. *BMC Public Health* 2016;16(1):255.
19. Siyez DM. Attempts Of Committing Suicide In The Period Of Puberty: A Review. *Kastamonu Edu J* 2006;14(2):413-20.
20. Lin J-J, Lu T-H. Suicide mortality trends by sex, age and method in Taiwan, 1971–2005. *BMC Public Health* 2008;8(1):6.
21. Bando DH, Brunoni AR, Fernandes TG, Benseñor IM, Lotufo PA. Suicide rates and trends in São Paulo, Brazil, according to gender, age and demographic aspects: a joinpoint regression analysis. *Braz J Psychiatry* 2012;34(3):286-93.
22. Baumert J, Erazo N, Ruf E, Ladwig K-H. Time trends in suicide mortality vary in choice of methods. *Soc Psychiatry Psychiatr Epidemiol* 2008;43(11):913.
23. Starkuviene S, Kalediene R, Petrauskiene J. Epidemic of suicide by hanging in Lithuania: does socio-demographic status matter? *Public health* 2006;120(8):769-75.
24. Gunnell D, Bennewith O, Hawton K, Simkin S, Kapur N. The epidemiology and prevention of suicide by hanging: a systematic review. *Int J Epidemiol* 2005;34(2):433-42.
25. The Republic of Turkey. Law on gun and other knitting tools and knaps. Available at: <http://www.mevzuat.gov.tr/MevzuatMetin/1.3.6136.pdf> Accessed July 1, 2017.
26. Grossman DC, Mueller BA, Riedy C, Dowd MD, Villaveces A, Prodzinski J, et al. Gun storage practices and risk of youth suicide and unintentional firearm injuries. *Jama* 2005;293(6):707-14.
27. Gunnell D, Nowers M. Suicide by jumping. *Acta Psychiatr Scand* 1997;96(1):1-6.