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RESEARCH ARTICLE

Completed physician and medical student suicides in Turkiye (2006–2021): An explanatory internet-based study

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ABSTRACT

Objective: Among physicians, men are 1.41 times, and women are 2.27 times more likely to die by suicide than the general population. Physician suicide exhibits a double peak, with the highest incidence occurring in late middle age, and the second peak during the training years. There is a limited number of studies on physician suicides in Turkiye. This study aims to examine completed physician and medical student suicides and explore the associated socio-demographic, professional, and suicidological parameters over a 16-year period.

Method: The research involves an explanatory study of medical student and physician suicide deaths in Turkiye from 2006 to 2021, based on data from the Google database and online news sites. In the initial stage, specific keywords were used to search Google for news related to the topic. This process yielded 892 results, from which 133 relevant cases were identified. Subsequently, the study extended to searching 32 online national newspapers and 28 online news sites using the same keywords, leading to the discovery of an additional 33 cases. Furthermore, 32 cases were obtained from four widely used social media sites and seven health workers' news portal.

Results: The study evaluated 138 cases as definite/probable suicide deaths. The mean age of individuals was 38.64±12.80. Most of the subjects were specialists (39.9%). Drug intoxication (27.9%) was the most common method of suicide, followed by jumping from height (21.7%). Familial problems were cited most frequently (26.5%), followed by occupational/academic problems (22.1%). Regarding the specialties, anesthesiology (12.5%), gynecology and obstetrics (10.2%), and psychiatry (10.2%) had the highest occurrences among the suicide cases.

Conclusion: The study revealed that academic problems among medical students and marital discord among specialists emerged as the key reasons for suicide. These issues are preventable and warrant further investigation through focused research.

Keywords: Completed suicide, physician suicide, medical students, suicide method

INTRODUCTION

Every 45 seconds, one person dies from suicide, leading to 703,000 suicide-related deaths globally each year. Each suicide impacts approximately 135 individuals, who experience grief and acute stress responses, affecting about 108 million people annually (1). In the US, the age-adjusted suicide rate in 2020 was 13.48 per 100,000 individuals, with the highest rate observed among middle-aged white men (2).

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Studies have shown that younger age, fewer years of formal education, single relationship status, and the presence of mental disorders are significant risk factors for suicide (3,4).

Certain occupational groups also present a significant suicide risk. Physicians have higher suicide rates than the general population, even surpassing that of soldiers (5). In Sao Paulo, Brazil, suicides accounted for 1.7% of all causes of physician deaths between 2000 and 2009 (6). According to a US study based on the National Violent Death Reporting System records, 203 physicians died from suicide between 2003 and 2008. Meanwhile, a study conducted in mainland China reported 51 suicide-related physician deaths over eight years (7,8). Among physicians, men are 1.41 times more likely, and women are 2.27 times more likely to die by suicide than the general population (9). One recent meta-analysis revealed that both make and female physicians were at a higher risk of suicide than the general population, while another found only female physicians to be at a high risk (10,11).

Physician suicides show a double peak, with the highest incidence occurring in late middle age and the second peak during the residency and fellowship years (12). During these training years, factors such as intensive and stressful educational conditions, long working hours, the risk of medical errors, and difficulties balancing work and family responsibilities are associated with suicide. In late middle age, physical health problems and the loss of physician identity due to retirement contribute to the risk of suicide (13). Psychiatric disorders, interpersonal relationship problems, older age, and easier access to drugs are other significant risk factors (6,12,14,15). Furthermore, among the medical specialties, psychiatrists, anesthesiologists, and general practitioners have been most frequently associated with suicide (16,17). A meta-analysis revealed that firearms and intoxication were the most common methods of suicide in the US, Brazil, and South Africa, while intoxication was reported as the most common method in Europe, Australia, and New Zealand (11). Conversely, in a study on suicide-related deaths among medical students, residents, and physicians in India, hanging was identified as the most common suicide method across all groups (18).

Depression and substance abuse are the most common mental disorders among physicians (11). In one study with residents, the prevalence of depression was found to be 28.8% (19). A psychological autopsy study involving suicide and open verdict cases found a definite or probable psychiatric disorder in 86.2% of physicians (20). Physicians are less likely to seek mental health due to career concerns, cultural factors, and/or a predisposition toward self-reliance (21). This reluctance may lead to self-medication or alcohol and substance abuse (13). A retrospective study found more positive drug screenings for antipsychotic, benzodiazepine, and barbiturate class drugs in toxicological analysis in physicians than non-physicians, while no similar trend was seen for antidepressants (7). Substance abuse is most common in anesthesiologists, psychiatrists, and emergency medicine physicians (22).

Medical students also face a significant risk of suicide due to the unique challenges of their education. A recent systematic review comprising 13,244 medical students from 13 different countries found the prevalence of suicidal ideation to range from 1.8% to 53.6% (23). Studies have shown higher suicide rates in medical students compared to the general population (24,25). However, a study conducted in the US between 2006 and 2011 reported an average suicide rate among medical students of 2.3, lower than the mean suicide rate in the general population (26). The most common factors associated with suicidality in medical students included depressive symptoms, a previous diagnosis of a psychiatric disorder, financial difficulties, substance abuse, and feeling neglected by parents (23). In a study involving medical students, 64.2% of participants scored above the cut-off point on a depression screening scale (27). Furthermore, academic stress is a key factor that mediates suicide in medical students. An Indian study investigating suicide-related deaths among medical students between 2010 and 2014 found that stress due to poor academic performance was a factor in 56% of cases (28). The incidence of depression was reported to increase fourfold during medical internships, especially within the first four months of the year (29). Another study suggested that the first three years are a particularly vulnerable period for suicidality in medical students (26).

In Turkiye, the Turkish Statistical Institute (TurkStat) has been collecting information on death events since 1957. Until 2008, the data was collected using the "Death Statistics Form" sent to the institute by health directorates. From 2009 onwards, deaths occurring in health institutions are recorded in the "Death Notification System" and reported to the district population directorate within ten days. Deaths happening outside health institutions are reported by individuals authorized to issue a burial license (family doctors, village headmen, etc.). All death events are subsequently recorded in the Central Population

Management System database (30). However, this database does not categorize causes of death by occupational groups, making it impossible to access parameters such as medical specialty, academic degree, type of workplace, signs of suicide, and previous treatment history. Consequently, the media can serve as a suitable alternative for overcoming these limitations. There is generally high media interest in suicide news, which often results in inappropriate sharing of personal information about the deceased (31). Media information can be used as a resource for suicide research, and studies using media data have been increasing in recent years (18,32,33). However, it cannot be claimed that these data accurately reflect the reality of physician suicides.

In Turkiye, there have only been two studies on physician suicides to date. One study conducted on physician suicides relied on news data and excluded information on medical students (34). Moreover, it did not clearly specify which cases of suicide (completed suicide or suicide attempts) were included in the study. The other study was similarly internet-based, examining completed suicides of physicians and medical students over an 11-year period (35). This study was limited to the Google search engine and ten major national newspaper sites, with dubious deaths not examined in detail.

In this study, we aim to conduct exploratory research on both medical student and physician suicide deaths in Turkiye, using data from the Google database and online news sites. In order to reach a larger sample in the study, we also screened suspicious physician deaths and included cases with a high probability of suicide. Studies have shown that most suspicious deaths are related to suicide, and leading to a trend in epidemiological studies to include these data in suicide statistics (36,37).

METHOD

Procedure

The current study is an exploratory study based on retrospective news content analysis. Internet usage in Turkiye began in the early 2000s, with most of the current internet sites emerging in 2005 (38). Therefore, medical student and physician suicides resulting in death since 2006 were included in the study. Reports of suicide deaths from 1 January 2006 to 31 December 2021 among medical students and physicians available on leading online news portals and other publicly available sites were selected as the primary sources of data collection. News published only in Turkish was selected for this study. Ethical approval is not required, as publicly disclosed data available from published or online news sources was used.

A list of all leading online news portals (supplementary digital Appendix 1) in the Turkish language was prepared and thoroughly searched. The screening part of the study was carried out in three stages. In the first stage, news about physician and medical student deaths was obtained by making the necessary adjustments in the Google search engine and using keywords such as "the physician committed suicide", "the physician shot himself", "the physician was found dead", "the physician hanged himself", "the physician died by jumping", "the physician killed himself", "the medical student committed suicide", and "the professor committed suicide". This stage was completed between 10-20 February 2022, yielding 892 results, out of which 133 were related to suicide or suspicious deaths. In the second stage, 32 online national newspaper sites and 28 online news sites were searched using the same keywords in the search tab, and 33 additionaly cases were identified. In the third stage, 32 cases were found by using the same keywords to search four widely used social media sites and seven health workers' news portals. Repeated cases were excluded during each stage, resulting in a total of 198 cases. The screening part of the study is shown in supplementary digital Appendix 2.

From the data obtained, each case was evaluated separately by two psychiatrists, and cases with differing opinions were discussed again. As a result, 34 cases were excluded from the study due to the low probability of suicide or a higher association with natural death. By considering variables such as the presence of witnesses, the findings at the death scene, statements from relatives and individuals who knew the deceased, official statements, autopsy, and pre-autopsy results, the remaining cases were divided into two groups: probable/definite suicide or undetermined death. 138 cases were evaluated as definite/probable suicide deaths and 26 cases as undetermined deaths.

A thorough content analysis of each suicide report was conducted. Information from each report was collected based on several parameters, including socio-demographic variables such as age, gender, marital status, and living environment; professional variables like medical specialty, academic degree, and type of workplace; and suicidological variables such as the place, time, and method for suicide, suicide

warning signs or complicated suicide patterns like homicide with suicide or suicide pact, etc. Additional information, such as psychiatric treatment history, previous suicide attempts, and alcohol or substance use was also collected based on the psychiatric history obtained from the news content. Possible stressors that could trigger suicide, such as occupational/academic, familial, and financial problems, were identified. Suicide signs were subdivided into categories such as suicide notes, social media posts about suicide, messages or emails suggesting suicide, and recent conversations implying suicidal intentions. When there were conflicting data about a case across different sources, all data were preserved if more than one option could be included for the variable. However, when only one option was expected for the variable, data from the most sources or most likely sources were preserved.

Statistics

IBM Statistical Package for the Social Sciences (SPSS) for Windows, Version 22.0. released in 2013. (IBM Corp, Armonk, NY) was used for statistical analysis. Descriptive statistics were presented as mean±standard deviation, frequency distribution, and percentages. The normal distribution of variables was examined visually (using histogram and probability plots) and analytically (using the Kolmogorov-Smirnov/Shapiro-Wilk test).

To compare the undetermined death and definite/probable suicide death groups, nonparametric tests were used in the analysis of the data, since some dependent continuous variables (such as age) did not show a normal distribution and the number of people in the undetermined group was less than 30. The Chi-square test was used to evaluate categorical variables, and the Mann-Whitney U test was used to compare continuous variables. Differences with a two-tailed p-value of less than 0.05 were considered statistically significant, and the Bonferroni correction was used for multiple comparisons.

RESULTS

There were 138 cases in the definite/probable suicide death group, with a mean age of 38.64±12.80. The majority of individuals were male (71.7%) and employed in government-owned institutions (74.6%). Among the individuals, 39.9% were single, 32.6% were married, and 15.9% were divorced. The marital status of 11.6% of the cases was not specified. While 47.1% of the individuals lived with their families, 30.4% lived alone. Most of the individuals were specialists (39.9%). The rest were general practitioners (18.8%), students (16.7%), residents (13%), and academicians (10.9%). The academic degree of one case was not specified. While 59.4% of the cases were found dead at home, 20.3% were found dead at work.

In the undetermined death group, there were 26 cases with a mean age of 43.27±12.36. Most of the individuals were male (73.1%), lived alone (53.8%), and worked in government-owned institutions (50%). Among the individuals, 26.9% were single, 23.1% were divorced, and 15.4% were married. The marital status of 34.6% of the cases was not specified. General practitioners and specialists constituted 57.7% (15) and 34.6% (9) of the group, respectively. Additionally, there was one academician (3.8%) and one student (3.8%) among the cases. Excluding students and general practitioners, the most common specialty was psychiatry (50%). While 73.1% of the cases were found dead at home, only two individuals were found dead at work. Detailed socio-demographic information about the undetermined and definite/probable suicide deaths is shown in Table 1.

The groups of undetermined and suicide deaths were compared by excluding unspecified variables. There was no significant difference between the groups in terms of age (U=1393, p=0.07), gender (χ^2=0.001, p=0.98), and marital status (χ^2=3.013, p=0.22). However, there was a significant difference between the groups concerning the institution where the individuals worked (χ^2=6.418, p=0.04). After the post-hoc analysis, only the difference between government-owned versus private institutions remained significant (χ^2=5.269, p=0.048).

137 definite/probable suicide deaths were evaluated according to individuals' academic degrees. The male gender predominated in all subgroups. As expected, the mean age in the student and resident groups was lower than the others, with the highest mean age in the academician group (50.93±13.04). Although the mean age of general practitioners and specialists was similar, most practitioners were single (34.6%) or divorced (30.8%), and most specialists were married (41.8%). The year of medical education was not stated in three of the 23 students. Of the remainder, 30% were in the fourth year, and 25% were in the sixth year. In all subgroups, individuals primarily lived with their families, although the rate of living alone (40%) was close to that of living with families (41.8%) among specialists. In all subgroups,

Table 1: Sociodemographic variables of death groups

	Suicide deaths		Undetermined deaths	
	n	%	n	%
Gender				
Male	99	71.7	19	73.1
Female	37	26.8	7	26.9
Unspecified	2	1.4	0	0
Marital status				
Single	55	39.9	7	26.9
Married	45	32.6	4	15.4
Divorced	22	15.9	6	23.1
Unspecified	16	11.6	9	34.6
Living environments				
Alone	42	30.4	14	53.8
With family	65	47.1	7	26.9
Others	8	5.7	0	0
Unspecified	23	16.7	5	19.2
Institution				
Government	103	74.6	13	50
Private	24	17.4	9	34.6
Retired/not working	11	8	4	15.4
Academic degree				
General practitioner	26	18.8	15	57.7
Specialist	55	39.9	9	34.6
Academician	15	10.9	1	3.8
Student	23	16.7	1	3.8
Resident	18	13	0	0
Unspecified	1	0.7	0	0
Death time				
Night	50	36.2	6	23.1
Daytime	48	34.8	2	7.7
Unknown	23	16.7	15	57.7
Unspecified	17	12.3	3	11.5
Death place				
Home	82	59.4	19	73.1
Workplace	28	20.3	2	7.7
Hotel/hostels	2	1.4	2	7.7
Outdoor environments	12	8.7	1	3.8
Others	11	7.9	1	3.8
Unspecified	3	2.2	1	3.8
	Mean	**SD**	**Mean**	**SD**
Age	38.64	12.80	43.27	12.36

SD: Standard deviation.

individuals primarily worked in government-owned institutions, with the highest rate of employment in private institutions among specialists (29.1%). In total, among 137 cases, 19% were reported to have a history of receiving psychiatric treatment, with the highest rate among specialists (25.5%). Four specialists, three general practitioners, and two academicians and students each had a previous suicide attempt. Alcohol or substance abuse was reported in 4.4% (n=6) of the cases, with five specialists and one academician among these. Except for the academician group, deaths most frequently occurred at home across all subgroups. For academicians, deaths most frequently occurred at workplaces (46.7%). Table 2 presents detailed information about the sociodemographic variables of suicide deaths.

Of the 129 cases with specified suicide methods, 27.9% died from drug intoxication and 21.7% from jumping from a height. Death by hanging was most common in the student group; residents, specialists, and academicians died more frequently from drug intoxication. Conversely, general practitioners died most often from firearms (26.9%) or drug intoxication (26.9%). 67.4% of the cases employed violent methods for suicide. A comparison of all subgroups regarding the violence of the suicide method revealed no significant difference (χ^2=9.307, p=0.054). Table 3 provides comprehensive information about suicide methods.

Suicide signs were specified in only 21.7% of the cases, with suicide notes being the most common sign (66.7%). While no suicide pact was detected, two cases involved the individual also killing a family member. Potential stressors that may have contributed to the suicide were identified in 68 cases. The most frequently reported stressors were familial problems (26.5%), followed by occupational/academic problems (22.1%). Table 4 provides more information on other possible stressors.

Of the 88 suicide cases excluding general practitioners and students, the most common specialties were anesthesiology (12.5%), psychiatry (10.2%), gynecology and obstetrics (10.2%), and cardiovascular surgery (9.1%), respectively. Most specialists were in anesthesiology, gynecology and obstetrics, and psychiatry, whereas most residents were working in emergency service and cardiovascular surgery. Cardiovascular surgery was the most common specialty among academicians. Supplementary digital Appendix 3 shows the distribution of individuals by medical specialty.

Table 2: Sociodemographic variables of definite/probable suicide deaths

	Student n=23 (%)	Resident n=18 (%)	Practitioner n=26 (%)	Specialist n=55 (%)	Academician n=15 (%)	Total n=137 (%)
Gender						
Male	15 (65.2)	12 (66.7)	20 (76.9)	40 (72.7)	11 (73.3)	98 (71.5)
Female	8 (34.8)	6 (33.3)	5 (19.2)	14 (25.5)	4 (26.7)	37 (27)
Unspecified	0	0	1 (3.8)	1 (1.8)	0	2 (1.5)
Marital status						
Single			9 (34.6)	8 (14.5)	3 (20)	55 (40.1)
Married	0	5 (27.8)	5 (19.2)	23 (41.8)	11 (73.3)	44 (32.1)
Divorced	0	1 (5.6)	8 (30.8)	12 (21.8)	1 (6.7)	22 (16.1)
Unspecified	0	0	4 (15.4)	12 (21.8)	0	16 (11.7)
Living environments						
Alone	2 (8.7)	4 (22.2)	10 (38.5)	22 (40)	4 (26.7)	42 (30.7)
With family	8 (34.8)	9 (50)	13 (50)	23 (41.8)	11 (73.3)	64 (46.7)
With friends	2 (8.7)	2 (11.1)	0	2 (3.6)	0	6 (4.4)
Dormitory	2 (8.7)	0	0	0	0	2 (1.5)
Unspecified	9 (39.1)	3 (16.7)	3 (11.5)	8 (14.5)	0	23 (16.8)
Institution						
Government	20 (87)	18 (100)	19 (73.1)	34 (61.8)	12 (80)	103 (75.2)
Private	3 (13)	0	3 (11.5)	16 (29.1)	1 (6.7)	23 (16.8)
Retired/not working	0	0	4 (15.4)	5 (9.1)	2 (13.3)	11 (8)
Psychiatric treatment history	4 (17.4)	4 (22.2)	3 (11.5)	14 (25.5)	1 (6.7)	26 (19)
Previous suicide attempts	2 (8.7)	0	3 (11.5)	4 (7.3)	2 (13.3)	11 (8)
Alcohol or substance abuse	0	0	0	5 (9.1)	1 (6.7)	6 (4.4)
Death time						
Daytime	8 (34.8)	9 (50)	10 (38.5)	18 (32.7)	3 (20)	48 (35)
Night	9 (39.1)	9 (50)	7 (26.9)	15 (27.3)	9 (60)	49 (35.8)
Unknown	1 (4.3)	0	6 (23.1)	15 (27.3)	1 (6.7)	23 (16.8)
Unspecified	5 (21.7)	0	3 (11.5)	7 (12.7)	2 (13.3)	17 (12.4)
Death place						
Home	13 (56.5)	10 (55.6)	16 (61.5)	36 (65.5)	6 (40)	81 (59.1)
Workplace	2 (8.7)	7 (38.9)	1 (3.8)	11 (20)	7 (46.7)	28 (20.4)
Outdoor environments	2 (8.7)	1 (5.6)	3 (11.5)	4 (7.3)	2 (13.3)	12 (8.8)
Other (car, dormitory, hotel, hostels etc.)	5 (21.7)	0	5 (19.2)	3 (5.4)	0	13 (9.6)
Unspecified	1 (4.3)	0	1 (3.8)	1 (1.8)	0	3 (2.2)
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Age	23.48 (3.36)	29.83 (2.96)	41 (10.69)	43.56 (10.79)	50.93 (13.04)	38.71 (12.82)

SD: Standard deviation.

Suicide deaths were most common in the Marmara Region (30.1%), followed by the Aegean Region (21.3%). The Southeastern Anatolia Region had the lowest rate (8.1%). The cities with the highest suicide rates were Istanbul, followed by Izmir. Figure 1 presents the distribution of suicide deaths by cities.

The months with the highest number of suicide deaths were July (11.8%) and January (11%), respectively. While suicides were most common among men in July, deaths among women occurred

Table 3: Suicide methods of definite/probable suicide deaths

	Student n=21 (%)	Resident n=18 (%)	Practitioner n=26 (%)	Specialist n=50 (%)	Academician n=14 (%)	Total n=129 (%, M:F)
Suicide methods						
Drug intoxication	0	8 (44.4)	7 (26.9)	17 (34)	4 (28.6)	36 (27.9, 1.9:1)†
Jumping from height	7 (33.3)	3 (16.7)	4 (15.4)	11 (22)	3 (21.4)	28 (21.7, 1.8:1)
Hanging	8 (38.1)	4 (22.2)	3 (11.5)	4 (8)	4 (28.6)	23 (17.8, 2.8:1)
Firearms	3 (14.3)	1 (5.6)	7 (26.9)	12 (24)	0	23 (17.8, 10:1)†
Other (drowning, gas, substance intoxication etc.)	2 (9.6)	1 (5.6)	1 (3.8)	3 (6)	2 (14.3)	9 (7, 3.5:1)
Cutting tools	0	0	4 (15.4)	1 (2)	1 (7.1)	6 (4.7, 6:0)
Multiple methods	1 (4.8)	1 (5.6)	0	2 (4)	0	4 (3.1, 1:1)
Suicide violence						
Violent methods	19 (90.5)	9 (50)	19 (73.1)	30 (60)	10 (71.4)	87 (67.4, 2.9:1)†
Non-Violent methods	2 (9.5)	9 (50)	7 (26.9)	20 (40)	4 (28.6)	42 (32.6, 2.4:1)†

M:F: Indicates male/female ratio; †: The gender of one suicide case in this subgroup could not be determined.

Table 4: Stressor types of definite/probable suicide deaths

Stressor types	Student n=9 (%)	Resident n=8 (%)	Practitioner n=16 (%)	Specialist n=27 (%)	Academician n=8 (%)	Total n=68 (%, M:F)
Occupational/academic	3 (33.3)	1 (12.5)	3 (18.8)	6 (22.2)	2 (25)	15 (22.1, 2.7:1)
Familial	2 (22.2)	1 (12.5)	3 (18.8)	10 (37)	2 (25)	18 (26.5, 5:1)
Economic	1 (11.1)	0	2 (12.5)	1 (3.7)	1 (12.5)	5 (7.4, 4:1)
Medical illness	0	1 (12.5)	2 (12.5)	1 (3.7)	1 (12.5)	5 (7.4, 4:1)
Legal	0	1 (12.5)	0	3 (11.1)	0	4 (5.9, 4:0)
Psychological	0	1 (12.5)	2 (12.5)	1 (3.7)	0	4 (5.9, 4:0)
Romantic relationships	0	0	1 (6.3)	0	0	1 (1.5, 1:0)
More than one reason	3 (33.3)	3 (37.5)	3 (18.8)	5 (18.5)	2 (25)	16 (23.5, 0.7:1)

M:F: Indicates male/female ratio.

mostly in October and November. An examination of the distribution of suicide deaths by year showed the most deaths in 2021, followed by 2020 and 2019, with the lowest rate in 2014. Figures 2 and 3 show the distribution of suicide deaths by months and year.

DISCUSSION

Drug intoxication was the most frequently used suicide method across all deaths, with the student group most often resorting to hanging or jumping from a height. Regarding medical specialty, suicides were most common among anesthesiologists, psychiatrists, and obstetricians and gynecologists. Familial and occupational/academic problems were the most frequently reported potential stressors.

Anesthesiology and psychiatry are the specialties most often associated with suicide deaths in medicine (11). A study in the United Kingdom found higher rates of suicide among anesthesiologists, psychiatrists, and public health professionals compared to general medicine after adjusting for gender and time period (17). A longitudinal cohort study conducted in the US found psychiatrists to have the highest risk of suicide-related death compared to the general population (16). In a study conducted in India, which was based on online news content, the highest rate of suicide was found among anesthesiologists, followed by obstetricians and gynecologists (18). Our study also found suicide-related deaths to be most common among anesthesiologists, psychiatrists, and obstetricians and gynecologists. Another study conducted in Turkiye found that cardiovascular surgery and family medicine had the highest rates of suicide-related deaths (35). However, that study was conducted over a shorter time period and had a

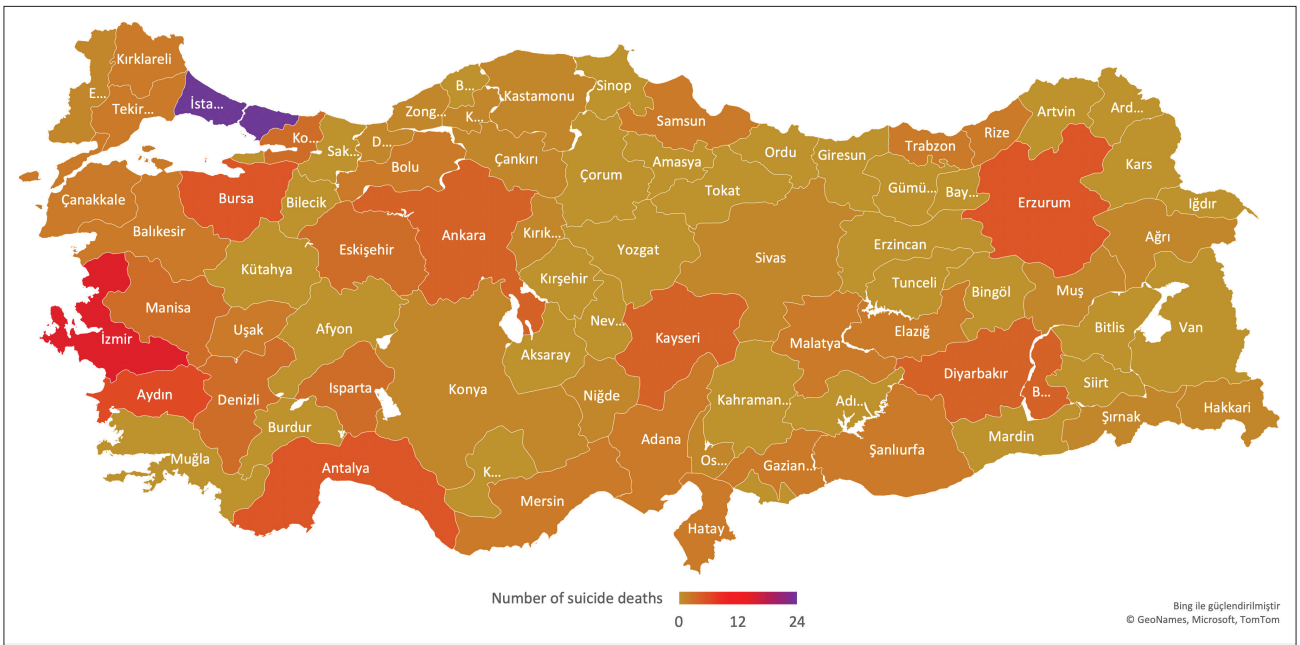

Figure 1. Province wise distribution of overall suicide deaths among physicians and medical students in Turkiye, 2006–2021.

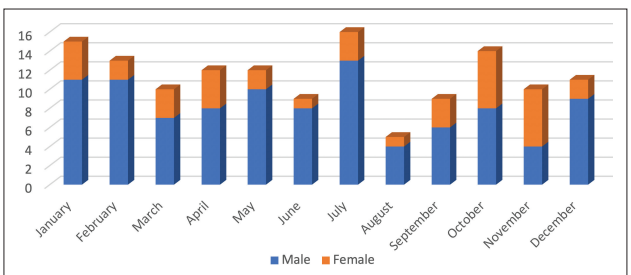

Figure 2. Distribution of number of suicide deaths by months among physicians and medical students in Turkiye, 2006–2021.

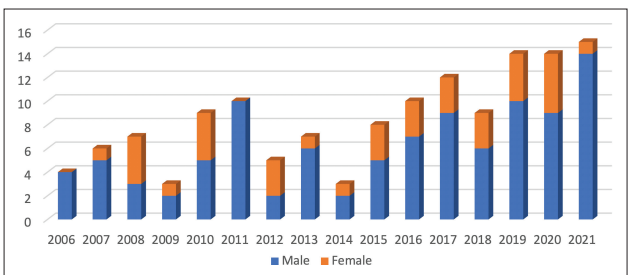

Figure 3. Distribution of number of suicide deaths by years among physicians and medical students in Turkiye, 2006–2021.

smaller research universe than our study. Moreover, most family physicians are general practitioners, and in our study, only physicians specializing in family medicine were included in the comparisons according to medical specialty.

The easy availability of suicide methods implicates a significant risk in the increase of physician suicides (39). Anesthesiologists can easily access risky drugs that can cause respiratory depression, coma, and death in their daily practices. Moreover, it has been shown that anesthesiologists resort to drug abuse more frequently than other physicians do (40,41). In some cases, they may even accidentally cause their own death, depending on the mechanism of action of the drugs they abuse. Similarly, substance abuse is also higher among psychiatrists compared to their colleagues (22). Psychiatrists have easy access to addictive psychotropics. Furthermore, the suicide of psychiatric patients can lead to feelings of guilt among some psychiatrists (42,43).

In this study, the most frequently used method of suicide was drug intoxication. Most studies have shown that drug intoxication is the most common suicide method among physicians (16,20,44). Similarly, in a recent study in which 61 cases in Turkiye were evaluated, the most common method of suicide was drug intoxication (35). Individuals in different cultures and geographical regions may resort to different suicide methods. While the most common suicide methods among physicians in the US were firearms and intoxication, in Europe, Australia, and New Zealand, intoxication was the most common method (11). In contrast, a study conducted in India involving medical students, residents, and other physicians found hanging to be the most common method of suicide. In this study, violent suicide methods were

frequently used by all subgroups (18). Although violent methods were detected more frequently in our study, we did not find a significant difference. In our study, unlike other subgroups, hanging and jumping from a height were more common among students. Similarly, a study examining medical student suicide deaths in Bangladesh found that more than 90% of the cases involved hanging (45). The more frequent use of hanging and jumping from a height in the student group could be attributed to more limited access to drugs.

Several studies have shown that interpersonal relationship problems and heavy workload significantly contribute to physician suicides (6,14,46). In our study, the potential stressors most frequently reported in news were familial and occupational/academic problems, respectively. In the study of Yıldız and colleagues, the most frequently speculated reasons were the presence of mental illness, familial problems, and workplace problems, respectively (35). Familial problems, often related to marital discord, were most frequently reported among specialists. In another study, marital discord was found to be the issue most associated with physician suicides (18). A study evaluating The National Violent Death Reporting System data from 32 states between 2012 and 2016 in the USA found that problems with close partners were less frequently reported among physicians than in the general population (47). Several studies have associated academic/occupational problems with suicide in physicians and medical students (18,28,46,47). Factors contributing to academic stress in medical students include the vastness of the medical syllabus, poor academic performance, anticipation of failure, and problems with the English language (48). Physician burnout is increased by bureaucratic oversight, loss of physician autonomy, increased documentation requirements, administrative burdens, and reduced time spent with patients (13). Moreover, increased patient load and violence against healthcare workers can be considered significant factors in Turkiye (27).

Out of the 137 suicide death cases, only 19% had a history of psychiatric treatment. Physicians are less likely to seek mental health services due to career concerns, cultural factors, and a tendency towards self-reliance (21). As a result, they often resort to self-medication or alcohol and substance abuse to manage their mental health issues (13). In our study, 4.4% of the suicide group had alcohol or substance use disorders, yet they continued to work actively. Physicians are often hesitant to report their colleagues' mental health problems, leading to a significant underreporting of these situations (49). This might explain why physicians continue to work despite the presence of serious problems such as alcohol and substance abuse that could negatively impact their work.

In the student group, deaths related to suicide were most common in the fourth and sixth years. In Turkiye, the internship process related to various clinical disciplines begins from the fourth year in medical education. Therefore, students start interacting with patients and confronting the challenges of the medical profession for the first time. The broad range of the clinical curriculum, frequent night shifts, and taking responsibility for managing human life for the first time can induce stress in some students. Moreover, some students may become emotionally affected by the suffering of their patients. A study demonstrated that the incidence of depression quadrupled during medical internships, especially in the first four months of the year (29). In a study conducted with 1,306 medical students in Turkiye, being in the fourth year was found to predict scores on both The Center for Epidemiologic Studies Depression Scale and Perceived Stress Scale (27).

The study indicated that suicide deaths were most prevalent in the Marmara Region, followed by the Aegean Region. Both these geographical regions house some of Turkiye's most populous cities, including Istanbul, Izmir, and Bursa. The population of the Marmara Region is approximately four times that of the Aegean Region (50). A study comparing the suicide data of the entire population between 2007 and 2016 in Turkiye found the highest suicide rate in the Aegean Region at 4.98 per hundred thousand. The suicide rate in the Marmara Region was calculated as 3.48 per hundred thousand (51). In our study, the fewest suicide-related deaths were observed in the Southeastern Anatolia Region. This geographical region was ranked sixth among seven regions in terms of suicide rates, with 3.61 per hundred thousand (51). When evaluated by provinces, the highest suicide deaths were observed in Istanbul followed by Izmır. Interestingly, although Izmir is the third most populous city, it had more suicide deaths than Ankara, the second most populous city. Suicide is influenced by multiple factors, and it is not precisely known why physician suicide deaths are more frequent in Izmir than Ankara.

The most suicide deaths were observed in 2021, followed by 2020 and 2019, with the lowest rate recorded in 2014. The global problem of burnout associated with COVID-19 may have contributed to the rise in suicide-related deaths among physicians in the past three years. In a study conducted in a university hospital in Turkiye, emotional burnout and depersonalization scores were higher, and personal achievement scores were lower among residents compared to other healthcare worker groups (52). An online survey found that working hours, presence of psychological comorbidities, fear of infection, and perceived friend support were the most signifcant predictors of burnout (53). Furthermore, the recent increase in violence against physicians in Turkiye may have contributed to the rise in physician suicides. One study found that 50.8% of physicians had experienced violence at least once in the past year, and 88.5% had faced verbal violence throughout their professional lives. The frequency of exposure to violence rises as the number of patients cared for daily increases (54). Another study reported that 83.5% of healthcare workers subjected to violence did not pursue legal action, and 74.6% stated that they received no results (55).

Physician suicides appear to be increasing year by year in Turkiye. Health policies may play a role in this trend. The performance-based additional payment system introduced with the health transformation program has significantly changed physicians' working conditions. It has led to competition and wage disparities among physicians, thereby disrupting labor peace. The idea of treating more patients to earn more additional payments has increased workload (56). Additionally, the shift from considering patients as individuals to treating them as customers has negatively impacted the dignity of healthcare professionals (57). However, similarly to physicians, suicide rates have been increasing in the general population over the years in Turkiye (58). Income inequality, decreased purchasing power for a significant portion of society, and other financial difficulties brought on by years of neoliberal policies in Turkiye have led to an increase in criminal and suicidal behaviors in individuals (59–61). As members of society, physicians may be affected by similar circumstances.

This study has several limitations. First, although extensive research has been conducted as mentioned in the methodology, it is likely that not all suicide-related physician deaths have been captured. Some cases may not have been reported in the media or may have appeared only on some local news sites. Nevertheless, efforts were made to include non-national level news sites by conducting searches through the Google database. Second, some cases initially reported as suicides were excluded from the study due to a lack of definitive cause of death. Third, sufficient data for some variables were not available for certain suicide-related deaths, making some findings challenging to generalize. Additionally, the information in the news is often not firsthand information, or some details may have been altered due to the editors' attempt to sensationalize the death events. The absence of toxicology and autopsy reports also serves as a limitation of the study.

CONCLUSION

This study is unique in Turkiye, providing an in-depth investigation of specific factors associated with suicides among physician and medical students over a 16-year period. We found that drug intoxication was the most common method of suicide during this period, although hanging was more prevalent among medical students. The factors most likely to impact individuals were familial and occupational/academic problems. Anesthesiologists, psychiatrists, and obstetricians and gynecologists experienced the highest numbers of suicide deaths.

A substantial portion of the stressors linked to suicides among physicians and medical students are preventable or correctable. Therefore, it is crucial to develop a comprehensive action plan to prevent suicide among physicians in Turkiye. Primarily, burnout should be reduced by making constructive changes to address the issues of heavy workload and violence against physicians. Institutions where medical students can receive psychosocial support should be established. Additionally, both web-based and face-to-face applications that facilitate physicians' access to mental health services should be developed.

Contribution Categories		**Author Initials**
Category 1	Concept/Design	M.U., I.E.E.
	Literature review	M.U.
	Data analysis/Interpretation	M.U., I.E.E.
Category 2	Drafting manuscript	M.U., I.E.E.
	Critical revision of manuscript	I.E.E.
Category 3	Final approval and accountability	M.U., I.E.E.
Other	Technical or material support	M.U.
	Supervision	I.E.E

Supplementary Digital Appendix: https://dusunenadamdergisi.org/storage/upload/files/1694423948-appendix-en.pdf

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