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Original Article Emergency Medicine

Suicide attempts and the factors that lead to suicidal ideation: A 3-year analysis

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ABSTRACT

OBJECTIVE: We explored the epidemiological characteristics of suicide attempts and identified suicide trends and associated factors.

METHODS: This retrospective, cross-sectional, observational, and single-center study included consecutive 412 patients who were admitted to Emergency Department for follow-up and treatment after a suicide attempt between June 2019 and June 2022. We assessed patient demographics, suicidal behavior, previous suicide attempts, psychiatric disorders, drug use, visits to the psychiatry clinic within the past 6 months, the persistence of suicidal ideation, and clinical outcomes.

RESULTS: The study population consisted of 259 females (62.86%) and 153 males (37.14%), with a mean age of 29.50±11.51 (range: 13–72) years. Females attempted suicide more often than males, but suicide completion was more common in males. Overall, 79.37% (n=327) of the suicide attempters were aged <40 years and most were 20–29 years old (n=147, 35.68%). Non-fatal suicide attempts were more common in single, unemployed, and poorly educated individuals, but this was not the case for suicide completers. However, there was no significant difference in marital status, education, and occupation among suicide completers. Drug poisoning was the major form of suicide attempt (n=345, 83.74%). Mental disorders, family or relationship conflicts, and separation from a partner were common causes of suicidal ideation. Patient numbers were particularly high in the autumn (i.e., September), and at night.

CONCLUSION: Females, young adults, singletons, the unemployed, and individuals with psychiatric disorders and low education levels are more likely to attempt suicide, particularly during hours when they are likely to be alone.

Keywords: Attempted suicide; demographic characteristics; drug poisoning; suicidal behaviors; suicidal ideation.

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About 1 million people worldwide die from self-harm every year; this number of deaths is higher than those attributable to murder and war. The World Health Organization (WHO) estimates that the annual suicide rate is 10.7 per 100,000 individuals [1, 2]. On average, one person intentionally kills themself every 40 seconds.

According to the Global Health Observatory, Eastern Europe and East Asian countries have the highest suicide rates. Deaths from suicide are more common in males than females in almost every country [3]. According to the United States Centers for Disease Control and Prevention (CDC), suicide is the third leading cause of death among children aged 10–14 years, and the second leading cause of death among individuals aged <34 years [4]. In a study conducted at Griffith University (Australia), De Leo et al. [5] reported that suicidal behaviors were more

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common among retired, unemployed, poor, divorced, and childless people, and among those residing in cities. Almost 70% of all suicide-related deaths occur in low- and middle-income countries [1]. Foster et al. [6] reported that an Axis II personality disorder and history of previous suicide attempts were independent risk factors for mortality from suicide. Lindert et al. [7] found that refugees, asylum seekers, and migrants attempt suicide more often than the general population.

Suicide is a serious global health problem. It is important to study suicide trends, identify risk groups, and introduce measures that reduce suicide attempts and deaths. Support programs reduce suicidal behaviors [6]. We retrospectively analyzed the epidemiological characteristics of patients admitted to the emergency department (ED) after suicide attempts and studied suicide trends and associated factors.

Highlight key points

- Data on non-fatal suicide attempts are limited worldwide, and the WHO provides no such information.
- Females attempted suicide more often than males while completing suicide was more common in males.
- Non-fatal suicide attempts were more common in single, unemployed, and poorly educated individuals.
- Mental disorders, family conflict, and separation from a partner or a relationship conflict were common causes of suicidal ideation.
- People did not attempt suicide during daylight hours when they are less likely to be alone.

MATERIALS AND METHODS

Ethics Committee Approval and Patient Consent

This study was conducted in accordance with the 1989 Declaration of Helsinki and was approved by the Ethics Committee of Haseki Training and Research Hospital, Istanbul, Turkiye (approval no. 109-2022, 08.06.2022)

Study Design and Setting

This retrospective, cross-sectional, observational, and single-center study included 412 consecutive patients admitted to our ED for follow-up and treatment after a suicide attempt made between June 2019 and June 2022. An attempt was defined as any self-injurious behavior intended to cause death [1]. We retrieved patient data from the electronic hospital records, including age, sex, marital status, educational level, occupation, complaints and symptoms on admission, characteristics of suicidal behaviors (method and timing of the attempt, and cause of suicidal ideation), history of previous suicide attempts, psychiatric disorders, or drug use, visits to a psychiatry clinic during the last 6 months, persistence of suicidal ideation, and clinical outcomes (discharge, hospitalization or death). Patients were divided into those who survived attempts and those who did not; demographics, clinical characteristics and suicidal behaviors were compared between the two groups.

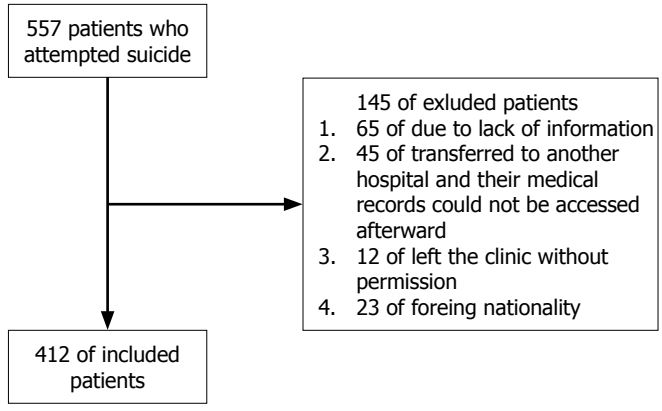

Figure 1. Flowchart for the study population.

Study Population and Sampling

All cases meeting the eligibility criteria were included to prevent selection bias. We identified 557 patients admitted to the ED for treatment or follow-up between June 2019 and 2022. Of these patients, 65 were excluded because of a lack of information, 45 because they were transferred to another hospital for treatment or follow-up, such that their medical records could not be accessed, and 12 because they left the clinic without permission and could not be followed up. Finally, we excluded 23 patients of foreign nationality because they were not representative of the study population. The remaining 412 patients were included in the analysis. Figure 1 shows a flow chart of the patient selection process.

Outcome Definition

The outcome was suicide risk, according to which the patients were classified into groups.

Table 1. Patients' demographic and clinical characteristics

	Suicide attempters (n=412)		Suicide completers (n=14)	
	%	p*	%	p*
Total	100.00		3.40	
Sex				
Male	37.14	<0.001	85.71	0.008
Female	62.86		14.29	
Age distribution (years)				
<20	20.87	<0.001	14.29	0.284
20–29	35.68		28.58	
30–39	22.82		7.14	
40–49	14.32		35.71	
50–59	4.85		7.14	
>60	1.46		7.14	
Marital status				
Unmarried	57.28	<0.001	35.71	0.304
Divorced	7.04		14.29	
Married	35.68		50.00	
Education level				
Elementary school and below	26.94	<0.001	50.00	0.304
High school	50.24		14.29	
College degree or more	22.82		35.71	
Occupation				
Employed	28.16	<0.001	35.71	0.285
Unemployed	71.84		64.29	
Clinical outcome				
Death	3.40	<0.001		
Discharged	31.07			
Hospitalization	44.90			
ICU	20.63			

Data are expressed as numbers (n) and percentages (%). Intergroup comparisons were conducted using Chi-squared test for normally distributed data. ICU: Intensive care unit.

Statistical Analysis

All analyses were conducted using SPSS statistical software for Windows (version 15.0; SPSS Inc., Chicago, IL, USA). Categorical variables (sex, age, marital status, educational level, and occupation) are expressed as number of patients (n) with percentages (%). Numerical data (age) are expressed as mean±standard deviation (SD). Groups were compared using the Pearson's Chi-squared test for normally distributed data (sex, marital status, educational levels, occupation) and the Mann–Whitney U-test for non-normally distributed data (age). The alpha significance level was set to $p<0.05$.

RESULTS

Of the 412 patients, 259 were female (62.86%) and 153 were male (37.14%); the mean age was 29.50±11.51 (range: 13–72) years. The number of patients aged <40 years was 327 (79.37%). The smallest age group was the >60 years group (n=6, 1.46%) and the largest was the 20–29 years group (n=147, 35.68%). Sex and age differed significantly between those who survived attempts and those who did not (both $p<0.001$). In total, 64.32% (n=265) of those who attempted suicide were single, and 77.18% (n=318) were educated to high school level or be-

Table 2. Suicidal behaviors of patients

	Suicide attempters (n=412)		Suicide completers (n=14)	
	%	p*	%	p*
Method of suicide attempts				
Drug poisoning	83.74	<0.001	21.43	0.594
Stabbing	10.19		–	
Jumping from heights	3.40		35.71	
Drowning	1.70		21.43	
Gunshot wound	0.49		14.29	
Hanging	0.49		7.14	
Cause of suicidal ideation				
Family conflict	19.42	<0.001	7.14	0.059
Family violence	3.40		–	
Relationship conflict	17.23		7.14	
Economic stressors	10.44		35.71	
School failure	2.91		–	
Mental disorders	36.41		50.00	
Others	10.19		–	
History of psychiatric disorders				
Absence	62.62	0.014	21.43	0.033
Presence	37.38		78.57	
Alcoholism	3.64		–	
Anxiety disorders	8.25		21.43	
Bipolar disorder	0.98		14.29	
Borderline personality disorder	1.45		–	
Depression	18.67		35.71	
Substance abuse	3.17		7.14	
Schizophrenia	1.22		–	
History of previous suicide attempts				
Absence	86.41	<0.001	71.43	0.109
Presence	13.59		28.57	
Visits to the psychiatry outpatient clinic within the previous 6 months				
Absence	74.76	<0.001	42.86	0.593
Presence	25.24		57.14	
Persistence of suicidal thoughts				
Absence	61.41	<0.001		
Presence	38.59			

Data are expressed as numbers (n) and percentages (%). Intergroup comparisons were conducted using Chi-squared test for normally distributed data.

low; 71.84% (n=296) were unemployed. Significant differences between the survivors and non-survivors were apparent in marital status, educational level, and occupation (all p<0.001) (Table 1). The mortality rate was 3.40% (n=14) and was significantly higher in males than females (p=0.008 and Table 1). However, there was no significant sex difference in age, marital status, educational level, or occupation among the suicide completers (p=0.284, p=0.304, p=0.304, p=0.285 respectively) (Table 1).

Drug poisoning (n=345, 83.74%) was the most common method of attempted suicide, followed by stabbing (n=42, 10.19%) and jumping from a height (n=14, 3.40%). Common causes of suicidal ideation included mental disorders (n=150, 36.41%), family con-

TABLE 3. Comparison of demographic characteristics between survivors and non-survivors

	Survivors	Non-survivors	p*
Female/Male (n)	257/141	2/12	<0.001
Age (mean±SD)	29.27±11.29	36.14±15.75	0.090
Single/Married (n)	258/140	7/7	0.268
High school and below/College degree or more education (n)	309/89	12/2	0.744
Unemployed/Employed (n)	287/111	9/5	0.550

Data are expressed as numbers (n), percentages (%), mean, and standard deviation (SD). Intergroup comparisons were conducted using Chi-squared test for normally distributed data (sex, marital status, education, and occupation) and the Mann–Whitney U-test for non-normally distributed data (age).

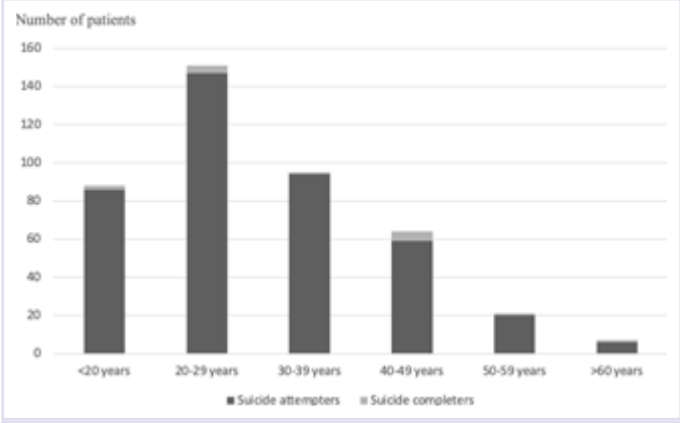

FIGURE 2. Suicides by age distribution.

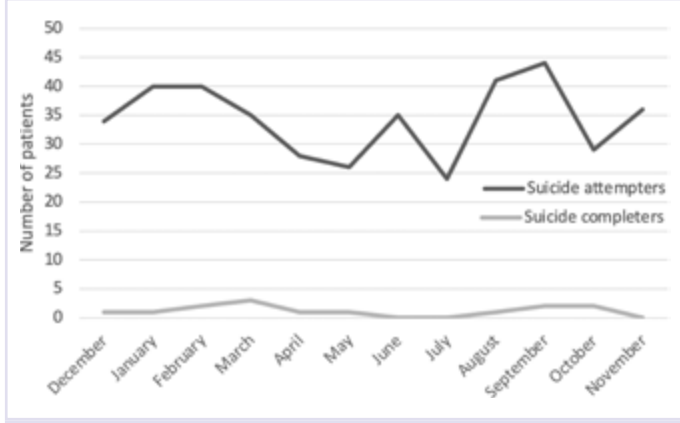

FIGURE 3. Seasonality of Suicidal Behavior.

flict (n=80, 19.42%), and separation from a partner or a relationship conflict (n=71, 17.23%). Overall, 37.38% (n=154) of those who attempted suicide had psychiatric disorders. In addition, 25.24% (n=104) of those who committed suicide had visited the psychiatry outpatient clinic within the previous 6 months. The most common psychiatric disorders were depression (n=77, 18.67%), anxiety disorders (n=34, 8.25%), and alcoholism or other types of substance abuse (n=28, 6.81%). A total of 56 patients (13.59%) had a history of suicide attempts. Furthermore, 159 survivors (38.59%) had persistent suicidal thoughts (Table 2).

There was no significant difference in suicide method between survivors and non-survivors (p=0.594). Mental disorders (n=7, 50.00%) and economic stressors (financial problems, unemployment) (n=5, 35.71%) were the most common causes of suicidal ideation among completers. Furthermore, the mortality rate of patients with a history of psychiatric disorders was significantly higher than that of those with no such history (p=0.033). Depression (n=5, 35.71%) was the most common psychiatric disorder in completers (Table 2). Females attempted suicide more frequently than males, but the mortality rate was higher in males (p<0.001). There was no significant difference in age, marital status, educational level, or occupation between survivors and non-survivors (p=0.090, p=0.268, p=0.744, and p=0.550, respectively) (Table 3).

The month with the most patient (n=44, 10.68%) admissions was September and that with the lowest number (n=24, 5.82%) was July. The total number of patients by season (in decreasing order) was 114 (27.67%) in winter, 109 (26.46%) in autumn, 100 (24.27%) in summer, and 89 (21.60%) in spring. A total of 305 (74.03%) attempters were admitted on weekdays, and 107 (25.97%) on weekends. No significant difference in patient numbers was observed among months, seasons, or days of the week (p=0.285, p=0.319, and p=0.169, respectively). However, the number of suicide attempts at night (22:00–06:00) was significantly higher than

Table 4. Trends of suicide attempts

Suicide attempters n=412													
Month	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	p*
Patients, (%)	8.25	9.71	9.71	8.49	6.80	6.31	8.49	5.82	9.95	10.68	7.04	8.74	0.285
Season		Winter			Spring			Summer			Autumn		
Patients, (%)		27.67			21.60			24.27			26.46		0.319
Days of the week		Monday	Tuesday	Wednesday		Thursday	Friday			Saturday	Sunday		
Patients, (%)		16.02	11.89	12.38		16.99	16.75			11.89	14.08		0.169
Times of the day		22:00–06:00				06:00–14:00				14:00–22:00			
Patients, (%)		48.79				18.69				32.52			0.001
Suicide completers n=14													
Patients, (%)	7.14	7.14	14.28	21.43	7.14	7.14	0	0	7.14	14.28	14.28	0	0.951
Season		Winter			Spring			Summer			Autumn		
Patients, (%)		28.57			35.71			7.14			28.57		0.463
Days of the week		Monday	Tuesday	Wednesday		Thursday	Friday			Saturday	Sunday		
Patients, (%)		14.28	14.28	7.14		0.0	14.28			28.57	21.43		0.808
Times of the day		22:00–06:00				06:00–14:00				14:00–22:00			
Patients, (%)		57.14				14.28				28.57			0.057

Data are expressed as numbers (n) and percentages (%). Intergroup comparisons were conducted using Chi-squared test for normally distributed data.

during the daytime (p<0.001) (Table 4). The number of suicide completers did not differ significantly by month, season, day of the week, or time of day (p=0.951, p=0.463, p=0.808, and p=0.057, respectively) (Table 4).

DISCUSSION

Suicide data are regularly updated by the WHO. The methods and causes of suicide vary among countries and cultures [8]. We comprehensively analyzed the epidemiological characteristics of suicide attempters and completers in Turkiye to determine suicide trends and associated factors; there were five key findings. First, females attempted suicide more often than males, but males had a higher mortality rate. Second, 79.37% of suicide attempters were aged <40 years, and most were 20–29 years old. Third, non-fatal suicide attempts were more common in single, unemployed, and poorly educated individuals. There was no significant difference in marital status, educational level, or occupation between survivors and non-survivors. Fourth, drug poisoning was the leading method of suicide attempts. Mental disorders, family conflict, and separation from a partner or a relationship conflict were common causes of suicidal ideation. Fifth, patient numbers were particularly high in the autumn (i.e., September), and at night.

Suicide is defined as self-harm with the intention to die. However, intentional self-harm can be non-fatal or limited to thoughts. Suicidal ideation refers to thoughts of killing oneself; however, these thoughts may not be acted upon. Suicide attempts are self-harm behaviors that do not result in death, while fatal self-injurious behavior is classified as suicide. Data on non-fatal self-harm behavior and ideation are limited worldwide, and the WHO provides no such information. Therefore, studies in EDs are crucial for evaluating suicidal behaviors [2]. Several studies have found that suicide attempts are 10–30-fold more common than completed suicides [9, 10]. According to the CDC, the number of suicide attempts among adolescents is 100–200-fold higher than that of completed suicides [11]. Consistent with this, the mortality rate was only 3.4% (412 suicide attempts) in our study. Population-based studies have shown that suicidal thoughts are more common in females than males. However, males complete suicide more frequently [12]. This situation is termed the "suicide gender paradox" [13, 14]. Schrijvers et al. [13] found that males use more violent and quicker methods of suicide than females. Evaluation of cognitive processes and help-seeking behaviors

revealed that, compared with females, males make more decisive decisions to reach their goals as quickly as possible, and prefer to solve their problems on their own [15]. Conversely, females prefer to solve problems by seeking help [15, 16]. Therefore, the suicide process in males is shorter and more likely to be successful than in females. A systematic review of WHO databases for 194 member countries found that the suicide rates of females exceeded those of males only in China and Bangladesh. In the remaining 192 countries, suicide rates in males were higher than in females. The WHO data show that both male and female suicide rates are higher in high- than middle- and low-income countries [2]. Similarly, in our study, suicidal thoughts were more common in females, whereas males completed suicide more frequently. In addition, although drug poisoning was the leading method of attempted suicide, suicide completers used more direct methods such as jumping from a height, drowning, or shooting.

Suicide is more common among younger than older people. According to the CDC, suicide is the second leading cause of death among individuals aged <34 years [4]. Sogut et al. [17] reported that 60.4% of people who attempted suicide were aged 20–28 years. Most of our patients were aged 20–29 years, and 79.37% of attempters were <40 years of age. The death rates were highest in the 20–29 and 40–49 years age groups. Thus, protective, and preventative measures should be directed toward young adults.

Socioeconomic factors strongly influence the likelihood of death from suicide. According to the WHO, almost 70% of all suicide deaths occur in low- and middle-income countries [1]. Low incomes, economic stressors, and unemployment may trigger self-harm or suicidal ideation, especially in lower-income countries. In a nationwide study conducted in New Zealand, Blakely et al. [18] found that unemployment (compared to employment) was associated with an increased risk of suicide. In a Norwegian study, Næss et al. [19] reported that unmarried, divorced, and widowed people were at higher risk of suicide than those who were married. Similarly, Kposowa reported a higher risk of suicide in single than married persons [20]. Our data are similar; 64.32% of patients who attempted suicide were single and 71.84% were unemployed. Moreover, 77.18% were poorly educated. A US study on the relationship between suicide and education reported that the rate of suicide among high school graduates was approximately twice that of those with higher education [21]; our data are similar.

A Korean study of 3,698 patients reported that 66.5% of those who attempted suicide had poisoned themselves [22]. In another study from Turkiye, Sogut et al. [17] reported that 96.9% of patients used drug poisoning in suicide attempts. We found that drug poisoning was the leading method of suicide attempt, followed by stabbing and jumping from a height. However, only 3 of the 14 suicide completers used drug poisoning. Suicide methods vary by country and culture. American people who die from suicide are most likely to shoot themselves, while in Europe and Asia hanging is more common [2]. Therefore, it is very important to elucidate suicidal behaviors and tendencies at the national level.

Kim et al. [22] reported that interpersonal issues (couple or family conflict) were the most common causes of suicide attempts. In contrast, we found that the most common cause of suicidal thoughts was a mental disorder. Similarly, Sogut et al. [17] found that mental disorders were the most common cause of suicidal ideation.

In this study, the suicide mortality rate was significantly higher in those with than without a history of psychiatric disorders, and depression was the most common psychiatric disorder among suicide completers. Also, 57.14% of those who died had visited a psychiatry clinic within the last 6 months. Many studies have shown that psychiatric disorders are strong predictors of suicide [23, 24]. Hirschfeld et al. [25] reported that >90% of suicide attempters and >95% of completers had psychiatric disorders. Preventative and protective measures should focus on such patients.

In a nationwide study in Finland, Haukka et al. [24] reported that a history of previous suicide attempts was predictive of suicide. Furthermore, in a study including 1,490 individuals, Bostwick et al. [26] found that 27 of 33 survivors of nonfatal suicide attempts killed themselves within 1 year. However, only 13.59% of our patients had a history of suicide attempts. Therefore, identifying the epidemiological characteristics of individuals considered at risk of committing suicide, but who have never attempted it before, is required. Clinicians should be alert to signs that a patient may be at risk of suicide.

Many studies have examined seasonal and daily variations in suicide frequency [27]. Altamura et al. [28]found that suicide frequency increased in the spring and early summer. Chew et al. [29] reported that most patients attempted suicide in spring. However, a recent study found no seasonality in suicide frequency [30]; similarly, we found no difference by month, season, or day of the week.

However, more suicide attempts occurred at night than during the daytime, possibly because suicide attempts are less feasible during daylight hours, i.e., when people are less likely to be alone.

This study had several limitations. First, the sample size was small and all patients were recruited from a single center. Nationwide studies are required to identify general risk factors and obtain more accurate data. Second, we did not include suicide attempters not seen by doctors. Furthermore, those who died after consuming alcohol or another legal substance were not included, which may reduce the accuracy of our findings. Third, a cross-sectional design was used, so cause and effect could not be inferred; these issues should be considered in future studies.

Conclusion

In conclusion, females, young adults, singles, the unemployed, and individuals with psychiatric disorders are more vulnerable to suicide attempts, as are those who are poorly educated. Furthermore, people typically attempt suicide when alone. Additional clinical trials with larger samples are needed to confirm these findings.

Ethics Committee Approval: The Haseki Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 08.06.2022, number: 109-2022).

Conflict of Interest: No conflict of interest was declared by the authors.

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Authorship Contributions: Concept – AA, CO, OS; Design – AA, CO, OS; Supervision – OS; Materials – CO, OS; Data collection and/or processing – AA, CO; Analysis and/or interpretation – AA, CO, OS; Literature review – AA, CO, OS; Writing – AA, OS; Critical review – AA, OS.

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