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ORIGINAL RESEARCH

Epidemiologic characteristics of intentional poisoning in Korea—a retrospective analysis of the EDIIS database (2011–2020)

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Abstract

Background: Suicide remains a significant public health issue globally, including in South Korea. To devise effective prevention strategies, analyzing trends among individuals who have attempted suicide is essential. This study aimed to assess the epidemiologic characteristics of suicide attempts through intentional poisoning using data from 23 hospital emergency departments (EDs) across Korea. **Methods**: A retrospective analysis was conducted using the Emergency Department-Based Injury In-depth Surveillance (EDIIS) database over a 10-year period (2011–2020). The cases were selected based on intentional self-harm or suicide as the cause of injury and poisoning as the mechanism. **Results**: During the study period, 45,936 cases of intentional poisoning were identified, with 61.7% of cases being females. The mortality rate among males was 6.7%, significantly higher than the 2.1% observed in females, representing a 3.2-fold difference. Analysis of previous EDIIS data (2011–2015) indicated that suicide attempts were most frequent among females aged 40 years or older. However, the current analysis, which extended the study period to 2011–2020, demonstrated a notable increase in poisoning-related suicide attempts among females in their 20s. The substances most frequently involved in poisoning incidents differed by gender. Among males, pesticides accounted for 30.2% of cases, whereas sedative-hypnotics were the most common agents among females, comprising 36.0% of cases. Despite this variation, pesticides were the leading cause of death in both genders, contributing to 71.1% of male fatalities and 57.1% of female fatalities. Psychiatric disorders were identified as the predominant underlying cause of suicide attempts, followed by interpersonal conflicts involving family or friends. **Conclusions**: These findings indicate a gradual increase in the incidence of suicide attempts in the EDs of South Korea, indicating the importance of implementing patient-centered treatment strategies and developing preventive systems specifically tailored to gender and age-related factors.

Keywords

Emergency department; Epidemiology; Poisoning; Suicide

1. Introduction

Suicide is a significant global health challenge, and its incidence in South Korea has escalated rapidly in recent years. According to 2020 statistics, the suicide rate in South Korea was 24.1 per 100,000 population, more than double the average rate of 11.1 reported by the Organization for Economic Cooperation and Development (OECD) [1]. In addition, the 2021 mortality data revealed that 13,352 deaths were attributed to suicide, marking a 1.2% increase from the previous year and underscoring the urgent need for enhanced suicide prevention efforts [2].

Suicide was the fifth leading cause of death in South Korea in 2020, and when analyzed by age, it was the most common cause of death among individuals aged 10–30 years and the second leading cause of death in the 40–50 age group. Notably, the suicide rate in the 10–30 age group has increased compared to the previous year, signaling a concerning trend [3]. While hanging remains the most frequent method of completed suicide (51.9%) [4], emergency department (ED)-based studies have consistently reported intentional poisoning as the most common method of suicide attempts, accounting for 55.8%–67.6% of cases [5, 6].

The progression to suicide often involves suicidal ideation, planning and attempts [7]. Although not all individuals with suicidal ideation progress to attempts or death by suicide, suicide is widely recognized as a continuum that begins with ideation [8], and identifying individuals who are at high risk of attempting suicide is therefore important to initiate early

prevention strategies. Existing studies on suicide have predominantly focused on completed suicides, leaving a gap in understanding the characteristics of suicide attempts. Given that most suicide attempts are reported in EDs, it is essential to investigate the epidemiologic characteristics of these cases, which provides valuable insights for designing targeted interventions and shaping future suicide prevention policies.

This study aims to explore the epidemiologic characteristics of patients from 23 tertiary hospitals across South Korea over a 10-year period from 2010 to 2020 who presented with intentional poisoning as they represent the largest group of suicide attempters visiting the ED.

2. Materials and methods

2.1 Study design and population

This study utilized data from the Emergency Department-Based Injury In-depth Surveillance (EDIIS) database for the period between 2011 and 2020. EDIIS is managed by the Korea Centers for Disease Control and Prevention and was established to collect injury-related statistics and inform injury prevention policies. The surveillance program was initiated in 2006 and involved 20 hospitals from 2011 to 2014, expanding to 23 hospitals from 2015 onwards. The registry compiles data through surveys and medical records of patients visiting EDs for injury-related incidents, specifically including individuals with a history of drug use classified under "self-harm and suicide" and "poisoning" as the mechanism of injury.

2.2 Data collection

The study analyzed various variables recorded in the EDIIS database, including gender, age, mode of ED visit, season, time of arrival, alcohol consumption, prior suicide attempts, causes of suicide attempts, substances of intoxication and medical outcomes. The patients were categorized into four age groups: adolescents (<20 years), young adults (20–40 years), middle-aged adults (40–65 years) and elderly adults (>65 years). The arrival time was divided into six-hour intervals for analysis. Medical outcomes were classified into five categories: discharge, discharge against medical advice, admission, transfer and death. The causes of suicide attempts were categorized as conflicts with family or friends, bereavement (death of family or friends), psychiatric problems, health problems, economic issues, workplace or school-related problems, abuse and other causes. Substances of intoxication were divided into therapeutic drugs (*e.g.*, sedative-hypnotics, analgesics, psychotropic drugs, cardiovascular drugs) and toxic substances (*e.g.*, pesticides, carbon monoxide (CO), corrosive agents, alcohol, solvents).

2.3 Statistical analysis

The frequency of ED visits and deaths by gender and 10-year age intervals was recorded for the entire study period, and the demographic characteristics, poisoning-related characteristics, and medical outcomes were analyzed and compared between genders. The causes of suicide attempts and substances of intoxication were stratified by gender and age group. Additionally, the frequency of deaths caused by different substances of intoxication was analyzed over time, and the trends in poisoning and death over the 10-year period were evaluated based on gender and age groups.

Categorical variables are expressed as counts and percentages, and continuous variables are presented as means and standard deviations. Comparisons were performed using the chi-square test for categorical variables and independent samples *t*-test for continuous variables. A p-value of < 0.05 was considered statistically significant. All statistical analyses were conducted using Stata Statistical Software: Release 18 (StataCorp LLC, College Station, TX, USA).

3. Results

Between 2011 and 2020, the EDIIS database included a total of 2,627,450 patients, among whom 74,449 (2.9%) had self-harm and suicide as their primary cause of injury. Of these, 45,936 patients (61.7%) presented with intentional poisoning, with females accounting for 59.2% (27,172 cases).

We analyzed the frequency of poisoning and deaths by gender and age group (Fig. 1). Among individuals under the age of 40, females were more frequently admitted for poisoning compared to males. However, this trend diminished after the age of 50, with males showing a higher frequency of admissions for poisoning between the ages of 60 and 70. Analysis of the annual trends revealed that the frequency of poisoning cases among males remained relatively stable throughout the study period. In contrast, among females, there was a significant fluctuation in the frequency of drug poisoning cases in those in their 40s between 2011 and 2016. Notably, since 2017, there has been a marked increase in drug poisoning cases among females in their 20s. By 2019 and 2020, females in their 20s represented the largest group of drug poisoning cases, and in 2020, this group accounted for 28.3% of all female patients admitted for drug poisoning.

The incidence of poisoning-related deaths increased with age across all groups, with males showing higher mortality rates than females in all age categories except adolescents. Among individuals aged 30 years and older, the mortality rate for males was approximately double that for females.

Table 1 compares the characteristics of poisoning patients by gender. The results showed that the mean age of male patients (49.1 $\pm$ 19.2 years) was higher than that of females (42.1 $\pm$ 18.7 years). Poisoning occurred most frequently during the summer months (27.8% in males and 27.3% in females) and during evening hours (18:00–24:00; 33.7% and 33.9%, respectively). Males were more likely than females to use ambulance services (62.5% *vs.* 59.9%) and to combine alcohol with overdose (44.7% *vs.* 35.0%). The first suicide attempts were also more common among males (63.8% *vs.* 57.2%). Among patients admitted to the ED, 46.8% of males and 38.9% of females required hospital admission, with mortality rates of 3.4% in males and 1.1% in females.

The causes of suicide attempts were categorized and analyzed by gender and age group (Table 2), and psychiatric problems were identified as the most common cause of suicide attempts, followed by interpersonal conflicts with family and friends. These issues were more prevalent among women

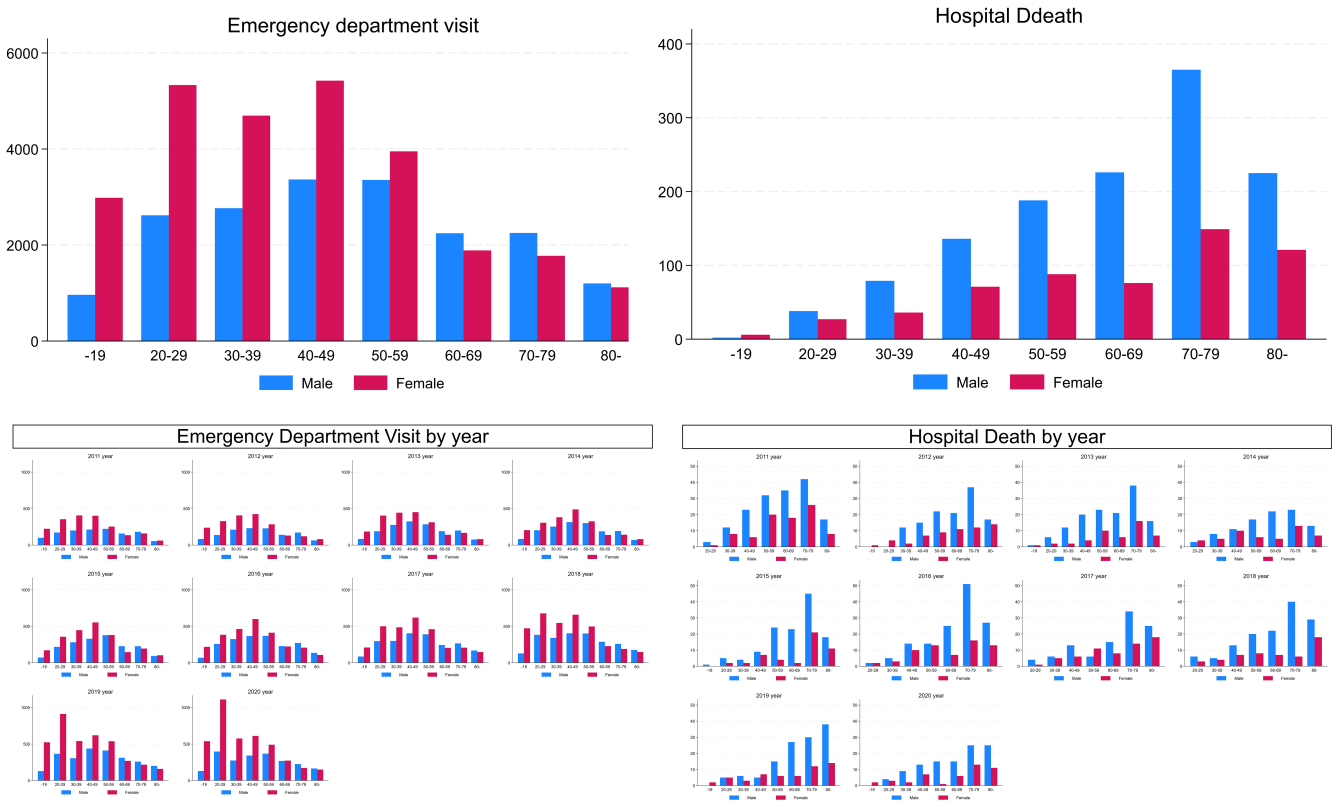

FIGURE 1. Gender and age distribution of emergency department visits and hospital deaths following intentional poisoning, stratified by year.

TABLE 1. Characteristics of emergency department visits due to intentional poisoning.

Characteristics	Male (N = 18,764)	Female (N = 27,172)	*p*-value
Age, mean ± SD	49.1 ± 19.2	42.1 ± 18.7	<0.001
Season, n (%)			
Spring (Mar–May)	4891 (26.1)	6844 (25.2)	0.022
Summer (Jun–Aug)	5211 (27.8)	7415 (27.3)	
Fall (Sep–Nov)	4597 (24.5)	6942 (25.5)	
Winter (Dec–Feb)	4065 (21.7)	5971 (22.0)	
ED arrival time, n (%)			
0–6	3817 (20.3)	6560 (24.1)	<0.001
6–12	3403 (18.1)	4645 (17.1)	
12–18	5222 (27.8)	6748 (24.8)	
18–24	6322 (33.7)	9219 (33.9)	
Mode of arrival, n (%)			
Prehospital ambulance service	11,745 (62.5)	16,272 (59.9)	<0.001
Interhospital transfer ambulance	4082 (21.8)	3481 (12.8)	
Others	2937 (15.7)	7419 (27.3)	
Alcohol drinking, n (%)	8387 (44.7)	9500 (35.0)	<0.001
First suicide attempt, n (%)	11,887 (63.8)	15,411 (57.2)	<0.001

TABLE 1. Continued.

Characteristics	Male (N = 18,764)	Female (N = 27,172)	*p*-value
Disposition at ED, n (%)			
Discharge	2784 (14.8)	5605 (20.6)	<0.001
DAMA	4795 (25.6)	9204 (33.9)	
Admission (ICU)	5217 (27.8)	5353 (19.7)	
Admission (General ward)	3568 (19.0)	5204 (19.2)	
Transfer	1550 (8.3)	1374 (5.1)	
Death	647 (3.4)	309 (1.1)	
Other	203 (1.1)	123 (0.5)	
Results after admission, n (%)			
Discharge	5483 (62.8)	7274 (69.2)	<0.001
DAMA	1384 (15.9)	2082 (19.8)	
Transfer	1251 (14.3)	893 (8.5)	
Death	612 (7.0)	265 (2.5)	
Hospital death, n (%)	1259 (6.7)	574 (2.1)	<0.001
Hospital day, mean ± SD	7.9 ± 12.2	7.2 ± 12.5	<0.001

ED: emergency department; ICU: intensive unit care; DAMA: discharge against medical advice; SD: standard deviation.

TABLE 2. Causes of suicide attempts with poisoning according to gender and age group.

Cause	Males, n (%)					Females, n (%)				
	<20	20–39	40–65	>65	Total	<20	20–39	40–65	>65	Total
Conflict with family or friends	296 (30.8)	1268 (23.5)	1778 (22.4)	805 (17.9)	4147 (22.1)	963 (32.3)	3308 (33.0)	3917 (37.5)	769 (20.7)	8957 (33.0)
Psychiatric problem	307 (31.9)	1637 (30.4)	1951 (24.6)	932 (20.7)	4827 (25.7)	1104 (37.0)	3884 (38.7)	3135 (30.0)	979 (26.3)	9102 (33.5)
Health problem	22 (2.3)	198 (3.7)	580 (7.3)	1178 (26.2)	1978 (10.5)	49 (1.6)	302 (3.0)	549 (5.3)	872 (23.4)	1772 (6.5)
Economical problem	13 (1.4)	614 (11.4)	999 (12.6)	149 (3.3)	1775 (9.5)	14 (0.5)	324 (3.2)	516 (4.9)	67 (1.8)	921 (3.4)
School or occupational problem	115 (12.0)	347 (6.4)	373 (4.7)	39 (0.9)	874 (4.7)	350 (11.7)	443 (4.4)	193 (1.8)	6 (0.2)	992 (3.7)
Loss of family or friends	6 (0.6)	55 (1.0)	88 (1.1)	133 (3.0)	282 (1.5)	19 (0.6)	112 (1.1)	157 (1.5)	91 (2.4)	379 (1.4)
Abuse	7 (0.7)	11 (0.2)	7 (0.1)	3 (0.1)	28 (0.1)	35 (1.2)	60 (0.6)	18 (0.2)	2 (0.1)	115 (0.4)
Others	196 (20.4)	1255 (23.3)	2145 (27.1)	1256 (27.9)	4852 (25.9)	449 (15.1)	1594 (15.9)	1951 (18.7)	933 (25.1)	4927 (18.1)
Total	962 (5.1)	5385 (28.7)	7921 (42.2)	4495 (24.0)	18,763 (100.0)	2983 (11.0)	10,027 (36.9)	10,436 (38.4)	3719 (13.7)	27,165 (100.0)

than men, with psychiatric problems accounting for 33.5% of cases in women compared to 25.7% in men, and conflicts with family and friends observed in 33.0% of women compared to 22.1% of men. In contrast, economic problems were reported more frequently among men than women (9.5% *vs.* 3.4%). Age-stratified analysis revealed that financial problems were most commonly associated with suicide attempts among young adults (20–39 years) and middle-aged men (40–65 years), accounting for 11.4% and 12.6% of cases, respectively. In individuals aged 65 years and older, health-related issues emerged as a notable cause of suicide attempts, with an increasing prevalence observed in both men and women.

Pesticides were the most frequently used substance for poisoning among men (30.2%), whereas hypnotics were the most common substance among women (36.0%) (Table 3). Stratification by gender and age group revealed that painkillers were the most prevalent substance among both men and women under the age of 20. Among men, analgesics were the most common substance used in adolescents (<20 years), CO and gas were predominant in young adulthood (20–39 years), and pesticides were most frequently used in middle-aged and older individuals (≥40 years). Further analysis showed that CO and gas poisoning occurred more frequently in men than women (19.4% *vs.* 6.2%), while analgesics were more commonly used at younger ages, and pesticides were more prevalent among older age groups.

In poisoning-related deaths, pesticides were the most frequently implicated substance, accounting for 71.1% of male deaths and 57.1% of female deaths, followed by CO and gas (15.6% and 14.8%, respectively) (Table 3). The trends in poisoning-related deaths by substance are shown in Fig. 2, demonstrating a gradual decline in deaths attributed to pesticide poisoning over time. Conversely, there has been a significant increase in fatalities associated with sedative-hypnotics since 2016.

Table 4 presents the annual frequency of ED visits and mortality rates among poisoning patients from 2011 to 2020. Over the study period, mortality rates decreased across both sexes, from 12.6% to 4.9% in men and from 4.5% to 1.1% in women. This downward trend was observed in all age groups except adolescents under 20 years, where mortality rates remained consistently low. For both sexes, the highest number of deaths occurred among individuals aged 65 years and older, followed by middle-aged adults and young adults. Mortality rates were consistently higher in men than women across all age groups.

4. Discussion

This study investigated the epidemiologic characteristics of suicide attempts by poisoning in 23 hospital EDs across South Korea, and several important findings were identified, among which the key risk factor for suicide was found to be a previous suicide attempt [9, 10]. By examining gender- and age-specific characteristics of suicide attempts, this study provides valuable insights into identifying target population groups for prevention policies. Although the mortality rate from poisoning in suicidal patients is relatively low [4, 11], understanding the profiles of individuals who attempt suicide by poisoning may help reduce the incidence of disability-related impairments and the associated societal costs.

The findings indicate that while men accounted for 40.8% of suicide attempts by poisoning compared to 59.2% for women, the mortality rate for men was 3.2 times higher than that for women (6.7% *vs.* 2.1%), which aligns with previous reports on the characteristics of intentional poisoning in suicide attempts [12–14].

The disparity in mortality rates between genders is often attributed to differences in the lethality of the methods chosen. In this study, 67.5% of women used drug poisoning, including sleeping pills (36.0%), whereas 49.6% of men selected more lethal methods such as pesticide or CO and gas poisoning. Similar trends have been noted in other studies, which suggest that men are more likely to employ highly lethal methods and exhibit higher mortality rates, even when using the same method as women [15–17]. Additionally, the higher prevalence of alcohol consumption among men during suicide attempts (44.7% *vs.* 35% for women) may have contributed to the severity of these incidents [18, 19].

In this study, sedative-hypnotics, including both prescription benzodiazepines and over-the-counter sleep aids such as doxylamine and diphenhydramine, were found to be the most commonly used substances in intentional drug poisoning among women. Thus, to enhance the effectiveness of suicide prevention strategies, future research should consider distinguishing between prescription and non-prescription sedative-hypnotics, as these categories may differ in their accessibility and risk profiles. Among men, pesticides were the most frequently used substances for poisoning and were associated with the highest mortality rates in both sexes. However, a decline in deaths from pesticide poisoning was observed over the study period, possibly due to the ban on paraquat production implemented in November 2011. Studies have shown that this regulation has significantly decreased the rates of suicide by paraquat poisoning and reduced overall pesticide-related fatalities [20, 21]. Conversely, deaths involving sedative-hypnotics have increased since 2016, and this trend aligns with the observation that overdoses on sedative-hypnotics are the most common method of suicide among women. Additionally, the rise in female suicide attempts since 2017 underscores the importance of addressing this demographic and method-specific trend in future prevention efforts.

An important finding of this study is the percentage of women presenting to EDs for suicide attempts by poisoning, stratified by age. Previous studies analyzing suicide attempts from 2011 to 2015 using data from the EDIIS [22] reported that the proportion of women by age group increased gradually from adolescence, peaked in individuals aged ≥40 years and then declined. However, in the current study, which spans from 2010 to 2020, a notable increase in suicide attempts due to poisoning was observed among women in their 20s. This shift began in 2017, with a marked rise in cases involving women in this age group. By 2020, women in their 20s accounted for 28.3% of all female suicide attempts by drug poisoning, and the underlying causes of this significant increase in suicide attempts among women in their 20s since 2017 remain unclear.

TABLE 3. Substances used for poisoning according to gender and age group.

Poisonous substance	Males, n (%)						Females, n (%)					
	<20	20–39	40–65	>65	Total	Hospital death	<20	20–39	40–65	>65	Total	Hospital death
Medical drug												
Sedative-hypnotics	209 (21.7)	1242 (23.1)	1860 (23.5)	1006 (22.4)	4317 (23.0)	42 (3.3)	664 (22.3)	3592 (35.8)	4251 (40.7)	1285 (34.6)	9792 (36.0)	24 (4.2)
Analgesics	216 (22.5)	326 (6.1)	176 (2.2)	27 (0.6)	745 (4.0)	4 (5.3)	1072 (35.9)	1161 (11.6)	445 (4.3)	77 (2.1)	2755 (10.1)	8 (1.4)
Psychotropic drugs	149 (21.5)	536 (10.0)	375 (4.7)	94 (7.1)	1154 (6.2)	8 (10.7)	454 (15.2)	1452 (14.5)	1034 (9.9)	167 (4.5)	3107 (11.4)	7 (1.2)
Cardiovascular drugs	16 (1.7)	97 (1.8)	145 (1.8)	48 (1.1)	306 (1.6)	4 (5.3)	68 (2.3)	193 (1.9)	224 (2.1)	69 (1.9)	554 (2.0)	9 (1.6)
Others	99 (10.3)	290 (5.4)	361 (4.6)	141 (3.1)	891 (4.7)	17 (22.7)	285 (9.6)	909 (9.1)	765 (7.3)	212 (5.7)	2171 (8.0)	24 (4.2)
Non-medical substance												
Pesticides	23 (2.4)	446 (8.3)	2584 (32.6)	2610 (58.1)	5663 (30.2)	895 (71.1)	22 (0.7)	281 (2.8)	1458 (14.0)	1252 (33.7)	3013 (11.1)	328 (57.1)
Co and gas	100 (10.4)	1790 (33.2)	1556 (19.6)	193 (4.3)	3639 (19.4)	196 (15.6)	99 (3.3)	931 (9.3)	585 (5.6)	75 (2.0)	1690 (6.2)	85 (14.8)
Corrosive substances	46 (4.8)	183 (3.4)	210 (2.7)	114 (2.5)	553 (2.9)	42 (3.3)	108 (3.6)	383 (3.8)	441 (4.2)	221 (2.9)	1153 (4.2)	56 (9.8)
Alcohol and solvents	4 (0.4)	22 (0.4)	33 (0.4)	4 (0.1)	63 (0.3)	2 (0.2)	7 (0.2)	29 (0.3)	29 (0.3)	10 (0.3)	75 (0.3)	2 (0.3)
Others	34 (3.5)	157 (2.9)	255 (3.2)	99 (2.2)	545 (2.9)	36 (2.9)	65 (2.2)	217 (2.2)	211 (2.0)	102 (2.7)	595 (2.2)	24 (4.2)
Total	962	5385	7921	4495	18,763	1259	2983	10,027	10,436	3719	27,165	574

CO: carbon monoxide.

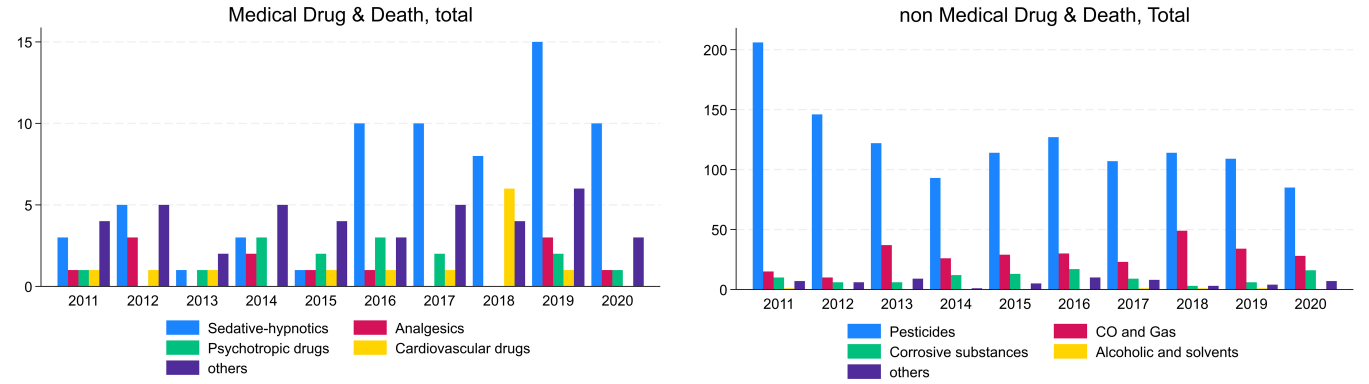

FIGURE 2. Distribution of substances used in poisoning and associated hospital deaths following intentional poisoning, stratified by year. CO: carbon monoxide.

However, studies have reported that the prevalence of depression and anxiety disorders among women aged 20 years and older has increased by 127% and 86.8%, respectively, over the past 21 years. Women are also 2.1 times more likely to attempt suicide than men [23]. Additionally, a 2020 report on ED-based medical care for suicide attempts highlighted an increase in suicide attempts among women in their 20s since the onset of the COVID-19 pandemic, with a 19.7% rise in COVID-19-related suicide attempts [2, 24, 25].

Among young individuals, the shift to telecommuting and online classes during the COVID-19 pandemic reduced the boundaries between work, study and rest, and this lack of separation, combined with reduced emotional interaction, may have contributed to an increase in depression [26]. Restrictions on international travel and business trips further disrupted personal development, hobbies and career progression, while decreased hiring opportunities intensified the challenges of securing employment. These economic difficulties were particularly pronounced among women [27, 28]. The cumulative impact of these factors likely exacerbated psychiatric issues, particularly as declining life satisfaction among young women became evident. The pandemic also imposed barriers to accessing healthcare services, including emergency and hospital care, which may have further complicated the management of psychiatric conditions [29]. Individuals with pre-existing mental health disorders may have experienced worsening symptoms, while those previously undiagnosed may have developed depressive symptoms, leading to an increase in suicide attempts. Studies have consistently shown a significant rise in depression rates during the COVID-19 pandemic compared to the pre-pandemic period. Overall, these suggest the necessity of implementing a comprehensive psychological response system to address the increased mental health challenges since the pandemic [30].

Between 2017 and 2019, several high-profile suicides of South Korean celebrities were reported and have often been associated with the Werther effect, a phenomenon in which celebrity suicides are imitated. Given the significant influence these individuals on young women, it is plausible that these events disproportionately impacted women in their 20s. Additionally, the 2017 amendments to the Mental Health and Welfare Act [31] may have inadvertently raised the threshold for psychiatric admissions, potentially limiting access to care for individuals with mental health conditions.

These trends are also reflected in the shifting causes of suicide attempts. A previous study analyzing suicide attempts from 2011 to 2015 using data from EDIIS identified conflict with family or friends as the most common cause, followed by psychiatric problems. However, in the current analysis of data from 2011 to 2020, psychiatric problems emerged as the leading cause of suicide attempts for both men and women. The prevalence was higher among women, with 38.7% of women in their 30s citing psychiatric issues as the primary cause. Additionally, a recent increase in suicide attempts among women in their 20s due to psychiatric problems has been observed. Historically, women have been more likely to attempt suicide due to interpersonal conflicts, with some studies reporting rates as high as 87%. However, this pattern appears to be changing in recent years. Among older individuals, suicide attempts due to health-related problems increase significantly with age. Conversely, young men are more likely than women to attempt suicide as a result of economic or professional difficulties, consistent with findings from previous research.

This study has several limitations. First, while the data were collected from patients who visited 23 EDs across South Korea, it may not fully represent all patients nationwide due to potential sampling bias. Nevertheless, the use of a large dataset comprising approximately 46,000 cases over a 10-year period helps minimize this limitation. Second, suicidal patients who died were likely underrepresented in the dataset, as such individuals rarely present to EDs, leading to selection bias. Third, the study relied on patients' medical records, which may have contained omissions or errors, potentially affecting the accuracy of the data. Fourth, critical information, such as the exact dosage of substances ingested and the time interval between the overdose and ED presentation, was not available. Additionally, variations in admission criteria across hospitals for intensive care units or general wards may have influenced the findings. Fifth, the database did not capture detailed information on patient comorbidities, particularly psychiatric disorders, which may introduce interpretation bias if not accounted for. Lastly, data on key epidemiologic characteristics, such as the patients' living environments (urban or rural) or

TABLE 4. Emergency department visits with intentional poisoning and hospital mortality according to gender and age group per year.

Year	Males					Females				
	<20	20–39	40–65	>65	Total	<20	20–39	40–65	>65	Total
2011 ED visit, n	99	371	521	307	1298	223	760	725	284	1992
Death, n (%)	0	15 (4.0)	77 (14.8)	72 (23.5)	164 (12.6)	0	9 (1.2)	36 (5.0)	42 (14.8)	87 (4.3)
2012 ED visit, n	83	347	522	312	1264	238	734	780	259	2011
Death, n (%)	0	12 (3.5)	47 (9.1)	65 (20.8)	124 (9.8)	1 (0.4)	6 (0.8)	22 (2.8)	31 (11.9)	60 (3.0)
2013 ED visit, n	83	465	709	364	1621	185	837	844	308	2184
Death, n (%)	1 (1.2)	18 (3.9)	52 (7.3)	66 (18.1)	137 (8.5)	1 (0.5)	4 (0.5)	16 (1.9)	27 (8.8)	48 (2.2)
2014 ED visit, n	83	456	707	357	1603	204	686	884	289	2063
Death, n (%)	0	11 (2.4)	37 (5.2)	49 (13.7)	97 (6.1)	0	98 (1.3)	18 (2.0)	22 (7.6)	138 (6.9)
2015 ED visit, n	72	499	816	439	1826	171	803	1016	361	2351
Death, n (%)	1 (1.4)	9 (1.8)	42 (5.0)	78 (17.8)	129 (7.1)	0	4 (0.5)	12 (1.2)	34 (9.3)	50 (2.1)
2016 ED visit, n	69	583	845	527	2024	218	847	1133	415	2613
Death, n (%)	0	7 (1.2)	38 (4.5)	93 (17.6)	138 (6.8)	2 (0.2)	5 (0.6)	27 (2.4)	32 (7.7)	66 (2.5)
2017 ED visit, n	86	597	931	541	2155	209	986	1207	430	2832
Death, n (%)	0	10 (1.7)	28 (3.0)	65 (12.0)	103 (4.8)	0	6 (0.6)	22 (1.8)	35 (8.1)	63 (2.2)
2018 ED visit, n	128	724	981	548	2381	473	1223	1283	438	3417
Death, n (%)	0	11 (1.5)	43 (4.4)	81 (14.8)	135 (5.7)	0	7 (0.6)	21 (1.6)	25 (5.7)	53 (1.6)
2019 ED visit, n	129	672	1015	605	2421	524	1454	1314	489	3781
Death, n (%)	0	11 (1.6)	30 (3.0)	85 (14.0)	126 (5.2)	2 (0.4)	8 (0.6)	17 (1.3)	28 (5.7)	53 (1.4)
2020 ED visit, n	130	671	874	495	2170	538	1687	1250	446	3921
Death, n (%)	0	13 (1.9)	33 (3.8)	60 (12.1)	106 (4.9)	2 (0.4)	5 (0.3)	11 (0.9)	27 (6.1)	45 (1.1)
Total ED visit, n	962	5385	7921	4495	18763	2983	10027	10436	3719	27165
Death, n (%)	2 (0.2)	118 (2.2)	427 (5.4)	714 (9.0)	1261 (6.7)	8 (0.3)	152 (1.5)	202 (1.9)	303 (8.1)	665 (2.4)

ED: emergency department.

household income, were not included. This is a fundamental limitation as the EDIIS database does not provide these variables. To address these limitations, future studies could aim to complement the EDIIS data by integrating additional statistics, including variables such as cause of death, living conditions and socioeconomic factors, to provide a more comprehensive understanding of suicide attempts and their contributing factors.

Despite these limitations, this study provides valuable insights into the epidemiologic characteristics of patients who presented to multicenter EDs after attempting suicide by intentional poisoning over 10 years. In particular, it highlights changes in the patterns of suicide attempts in recent years. Among developed countries, South Korea has the highest suicide rate, emphasizing the urgency of addressing this public health challenge. The findings of this study contribute to the development of targeted healthcare measures and strategies for suicide prevention in Korea.

5. Conclusions

The incidence of suicide attempts by poisoning in South Korea has shown a steady increase, particularly among young women, highlighting the pressing need for tailored suicide prevention strategies that consider the distinct gender- and age-specific factors driving these trends. Future efforts should prioritize the development of integrated mental health support systems and the implementation of community-based interventions. By focusing on younger populations, these initiatives can help mitigate the rising incidence of suicide attempts and promote mental well-being across vulnerable groups.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of this study are available from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

JYL—Conception and design; Acquisition, analysis, and interpretation of data; Study supervision. SHL and DHL—Drafting the manuscript for intellectual content. JSO—Statistical analysis. All authors reviewed: revised and approved the manuscript for submissions.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the institutional review board of Ewha Womans University Seoul Hospital (IRB No 2023-04-013), and the requirement for written informed consent was waived by Institutional Review Board of Ewha Womans University Seoul Hospital.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest relevant to the content of this article.

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