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Original Article

The Potential Risk Factors of Reattempt Suicide by Self-Poisoning in Older Adults

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SUMMARY

Background: Older adults have high rates of suicide in most countries, and a history of suicide attempts is consistently cited as one of the strongest predictors of future suicidal behavior.

Methods: This was a retrospective cross-sectional study. The medical records of all patients aged 65 years and older who presented to the emergency department (ED) of a tertiary teaching hospital after a deliberate self-poisoning (DSP) event between January 1, 2001, and December 31, 2016, were retrospectively reviewed. The following variables were considered: age, sex, history of suicide attempts, occupation, living condition (with or without family), alcohol co-ingestion, previous psychiatric history and reason for the suicide attempts. The DSP patients were classified into the following two groups according to the number of suicide attempts: the first attempt group and the reattempt group.

Results: Of the 129 patients, 30 (23%) patients presented with repeated suicide attempts. The patients with repeated suicide attempts differed in sex, living condition, and history of psychiatric treatment. In the multivariate regression analysis, only living condition (without family) (odds ratio (OR): 3.73, 95% confidence interval (CI): 1.25–11.11, $p = 0.018$) and history of psychiatric treatment (OR: 4.52, 95% CI: 1.70–12.00, $p = 0.002$) were reliably associated with repeated suicide attempts.

Conclusion: In older adults with DSP, targeted prevention strategies are required for patients who do not live with family and have a history of psychiatric treatment.

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1. Introduction

Suicide is a major public health concern; nearly one million people die from suicide annually worldwide.¹ Older adults have a higher completed suicide rate than younger people.² According to the American Association of Suicidology, in the general population, 1 per 25 suicide attempts results in death; among young people, 1 per 100 to 200 suicide attempts results in death, whereas among older adults, 1 per 4 suicide attempts results in death.³ However, suicide in older adults remains a neglected topic in suicide research studies, and suicide prevention activities targeting older adults are lacking.⁴

In 2013, older adults in South Korea had the highest suicide rate among the 34 countries of Organization for Economic Cooperation and Development (OECD), which was nearly three times the mean rate of the OECD countries. Suicide rates have increased rapidly in South Korea, particularly in older adults, since 1980. In contrast, the suicide rate in most OECD countries has decreased or remained the same.⁵ Furthermore, South Korea has a rapidly growing aging population. In 2014, the elderly population accounted for 12% of South Korea's total population and is expected to increase to 20.8% by 2026.⁶ Due to the increasing number of older adults, the suicide rate is expected to similarly increase.⁷ Therefore, the high suicide

rate among older adults has become an alarming public health issue in South Korea.

A history of suicide attempts is consistently cited as one of the strongest risk factors for future suicide attempts and suicide completion.^{8,9} Following a suicide attempt, there is a 70-fold increase in subsequent suicide attempts and a 40-fold increase in suicide completion.⁹ Deliberate self-poisoning (DSP) is the leading method of attempted suicide.¹⁰ In addition, suicidal behavior in older adults is highly lethal, and older DSP patients have poorer outcomes and are more frequently admitted for treatment.^{11–13} Thus, preventing repeated suicide attempts by aggressively treating the first suicide attempt in older adults is critical. However, in the elderly, the factors related to repeated suicide attempts were not yet clear.

In this study, we focused on the epidemiological and socio-environmental factors that lead to repeated suicide attempts by self-poisoning. The main aim of this study was to determine the potential risk factors associated with repeated suicide attempt by self-poisoning in older adults. Our results can be used to develop and refine strategies for preventing further suicide attempts and completed suicides.

2. Materials and methods

We retrospectively reviewed the medical records of DSP patients who were treated at emergency department (ED) of a tertiary teaching hospital between January 1, 2001 and December 31, 2016. We used a researcher-created record form that was based on a

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toxicology manual and has been in use since 1997.

We included all patients older than 65 years who presented with objective evidence of a suicide attempt with self-poisoning, and we excluded patients who did not present with objective evidence of a suicide attempt. We assessed the patients' age, sex, history of suicide attempts, occupation, living condition (with or without family), alcohol co-ingestion, previous psychiatric history and reason for the suicide attempts. Two emergency physicians independently reviewed the medical service records, medical records and psychiatric records. Any discrepancies were arbitrated by a third investigator.

The suicide attempts by self-poisoning patients were classified into the following two groups according to the number of suicide attempts: the first attempt group and the reattempt group. Then, we investigate the potential risk factors associated with the repetition of DSP in older adults.

The distribution of the patient characteristics is presented as either a percentage or the mean \pm standard deviation. To compare the distribution of the characteristics between the two groups, we performed Student's t-tests to analyze the continuous variables and chi-squared tests to analyze the categorical variables. All statistical analyses were performed using SPSS 16 (SPSS, Chicago, IL), and differences with a p-value $<$ 0.05 were considered statistically significant. All variables with a significance level of $p <$ 0.05 in the univariate analysis were included in a multivariable logistic regression model, and the odds ratios (ORs) and 95% confidence intervals (CIs) were estimated.

The institutional review board of the The Catholic University of Korea, Seoul Saint Mary's Hospital approved the study protocols prior to data analysis. Informed consent was waived because of the retrospective nature of the study.

3. Results

During the study period, 1,471 suicide attempts by self-poisoning

patients were admitted to the ED, which constituted 0.19% of all ED visits. One hundred thirty-nine (9.4%) patients were older than 65 years. Seven patients visited our ED 2 or more time. Therefore, 10 revisits were excluded. In total, 129 patients were enrolled in this study. Of the 129 patients, 30 (23%) patients presented with repeated suicide attempts (Fig. 1).

The mean age of the patients at the first suicide attempt was 76.3 ± 7.7 years, and the mean age of the patients at the suicide reattempt was 74.7 ± 7.3 years. Sedatives were the most commonly chosen drug for attempted suicide (44.2%), followed by pesticides (20.9%), and antidepressants (13.2%). Furthermore, the co-ingestion of alcohol was present in 32 (24.8%) of the patients who attempted suicides and 32 (24.8%) patients reported receiving previous psychiatric treatment. The first attempt group had a higher proportion of male patients ($n = 39, 39.4%$) than the reattempt group ($n = 7, 23.3%$) (Table 1). The age and sex distribution of the patients is shown in Fig. 2.

While only 19% of the patients were employed, being unemployed was not related to the repeated suicide attempts ($p = 0.532$).

The living condition (with or without family) of the patients was significantly different between the two groups ($p = 0.018$). The proportion of patients in the reattempt group who lived alone ($n = 10, 33.3%$) was higher than that in the first attempt group ($n = 14, 14.1%$). The history of previous psychiatric treatment was significantly different between the two groups ($p <$ 0.001).

The study population's reasons for attempting suicide are presented in Table 2. Among the patients, the reason for attempting suicide was unknown in 5 cases. Physical illness ($n = 52, 41.9%$) was cited as the most common reason. The second most common reason for the suicide attempts was interpersonal relationship issues ($n = 46, 37.1%$). The most frequent reason for suicide attempt associated with interpersonal relationship issues was a worsening relationship with their children ($n = 27, 58.7%$).

The multivariate logistic regression analyses revealed a

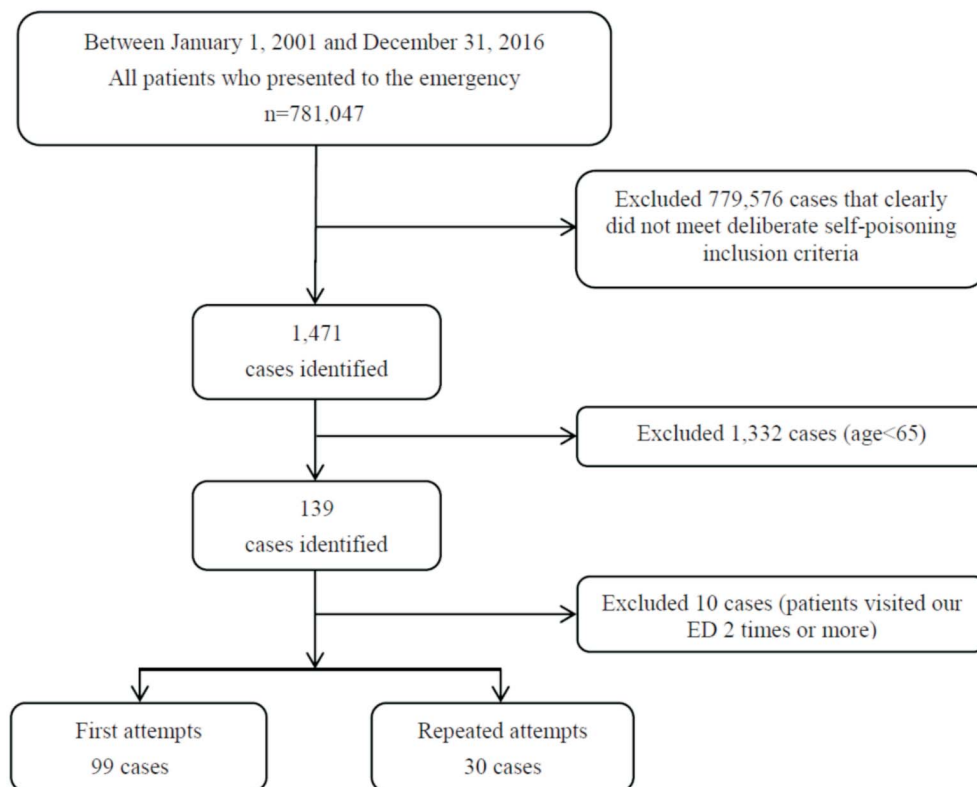


Fig. 1. Flow chart of study inclusion.

Table 1
Demographic and clinical characteristics of patients with and without a history of previous deliberate self-poisoning.

	First attempt (n = 99)	Reattempt (n = 30)	p
Male, n (%)	39 (39.4)	7 (23.3)	0.108
Age, years, mean ± SD	76.3 ± 7.7	74.7 ± 7.3	0.356
Unemployed, n (%)	81 (81.8)	23 (76.7)	0.532
Living condition (without family), n (%)	14 (14.1)	10 (33.3)	0.018
Drug			0.491
Analgesics	3 (3.0)	1 (3.3)	
Antidepressants	13 (13.1)	4 (13.3)	
Cleanser and caustics	5 (5.1)	2 (6.7)	
Pesticides	21 (21.2)	6 (20.0)	
Sedatives	44 (44.4)	13 (43.3)	
Rodenticide	2 (2.0)	3 (10.0)	
Others	11 (11.1)	1 (3.3)	
Alcohol co-ingestion, n (%)	28 (28.3)	4 (13.3)	0.097
Psychiatric history, n (%)	17 (17.2)	15 (50.0)	< 0.001
Cause of deliberate self-poisoning			0.611
Interpersonal relationship issues	36 (38.3)	10 (33.3)	
Social issues	6 (6.4)	1 (3.3)	
Psychiatric illness	8 (8.5)	1 (3.3)	
Physical illness	36 (38.3)	16 (53.3)	
Death of acquaintance	8 (8.5)	2 (6.7)	
Death prior to discharge, n (%)	9 (9.1)	2 (6.7)	0.677

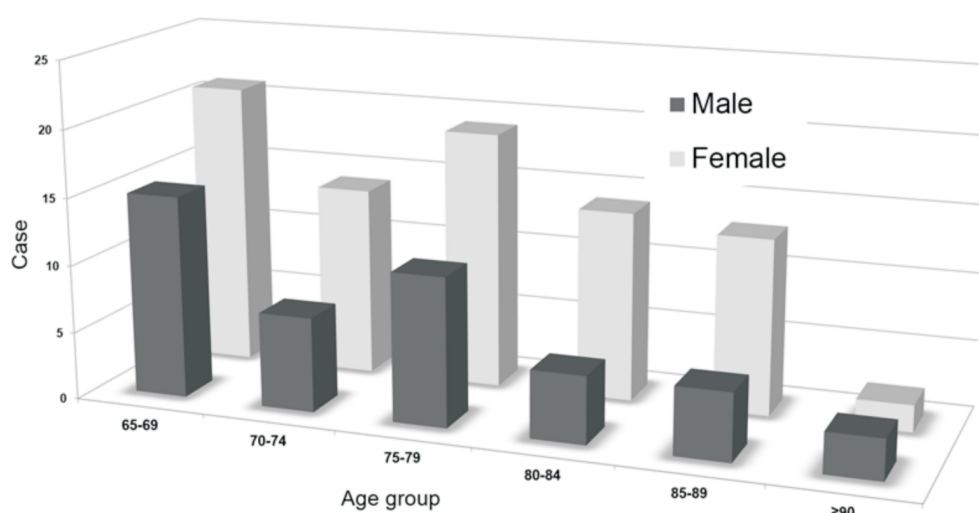


Fig 2. The age distribution of elderly deliberate self-poisoning patients.

significant association between repeated suicide attempts and not living with family (OR: 3.73, 95% CI: 1.25–11.11, $p = 0.018$) and a psychiatric history (OR: 4.52, 95% CI: 1.70–12.00, $p = 0.002$) (Table 3).

4. Discussion

This study examined the risk factors for repeated suicide attempt by self-poisoning in older patients. Among those over the age of 65 years who attempted suicide, the patients who lived alone and/or had a psychiatric history were more likely to perform repeated suicide attempt by self-poisoning, and hence, these patients should be the focus of interventions to decrease their suicidal behaviors.

In this study, no sex differences were observed between the first attempt group and the reattempt group ($p = 0.108$). This result is inconsistent with the results of a prior study investigating repeated self-poisoning. In the prior study, women tended to repeatedly self-poison.^{9,14} In general, women attempt suicide more frequently

than men. However, the suicide attempt rates do not differ among people who are 65 years or older.¹⁵ The DSP rate in males and females is consistent with the suicide attempt rate.

Unemployment is a risk factor for suicide attempts, reattempts and, particularly, DSP reattempts.^{2,9} However, unemployment was not a risk factor for DSP reattempts in older adults ($p = 0.532$). Unemployment likely did not differ because a high unemployment rate was observed in both groups.

Living condition was one of the two associated factors. Older adults who live alone are more likely to repeat DSP than older adults who live with family. An older adult without a family could be more socially isolated, lonely, and more likely to be widowed, all of which are risk factors for suicide attempts. Therefore, social support is important for developing preventative strategies for older adults who live alone.

In this study, a previous psychiatric history was the most powerful risk factor for DSP reattempts in older adults. This finding is consistent with previous studies.^{9,14} However, it is disappointing that we could not identify specific psychiatric diseases related to

Table 2
Reasons for attempting suicide.

Cause of deliberate self-poisoning	Total (n = 124)	First attempt (n = 94)	Reattempt (n = 30)
Interpersonal relationship issues			
Couple conflicts	15	12 (12.8)	3 (10.0)
Family conflicts	31	24 (25.5)	7 (23.3)
Other	0	0 (0.0)	0 (0.0)
Social issues			
Job loss	0	0 (0.0)	0 (0.0)
Financial stress	6	5 (5.3)	1 (3.3)
Work stress	1	1 (1.1)	0 (0.0)
Psychiatric illness			
Mood disorder: depressive, bipolar	8	7 (7.4)	1 (3.3)
Adjustment disorder	0	0 (0.0)	0 (0.0)
Schizophrenia, other psychotic disorder	0	0 (0.0)	0 (0.0)
Anxiety disorder	1	1 (1.1)	0 (0.0)
Panic disorder	0	0 (0.0)	0 (0.0)
Substance-related	0	0 (0.0)	0 (0.0)
Personality disorder	0	0 (0.0)	0 (0.0)
Physical illness			
Oneself	49	34 (36.2)	15 (50.0)
Others	3	2 (2.1)	1 (3.3)
Death of acquaintance			
Spouse	7	7 (7.4)	0 (0.0)
Family	2	1 (1.1)	1 (3.3)
Others	1	0 (0.0)	1 (3.3)

repeated DSP or the mechanism by which these disease influence suicide reattempts. Even patients who had received psychiatric treatment were not classified as having a psychiatric illness if they demonstrated a clear cause at the time of the suicide attempt. Therefore, the results do not seem to be statistically significant. Many psychiatric diseases are risk factors for suicide attempts and reattempts. Depression, schizophrenia related disorders, bipolar disorder, personality disorder, anxiety disorders, obsessive-compulsive disorder, and psychotic disorders are all risk factors for suicide attempts and reattempts.^{2,15} Further investigation is needed to evaluate which psychiatric disorders influence DSP reattempts in older adults.

Pain, the loss of independence due to physical illness and vascular disease has been shown to be risk factors for suicidal attempts in previous studies.^{3,15} The proportion of patients who had a physical illness was much higher in the reattempt group, but physical illness was not a statistically significant cause of repeated DSP in our study. According to Stefan et al., patients with cancer appear to be at a higher risk of suicide during the first year of their diagnosis, and patients on dialysis are at a higher risk during the first 3 months of their treatment.¹⁶ In another study, the severity of the physical illness resulted in differences in the cause of suicide among patients in their 70s, but it was a relevant factor in patients in their 80s or older.¹⁷ A period of adjustment to a new situation likely exists during which an individual is vulnerable to possible suicide or psychological responses to physical illness, and this period likely differs with age, making physical illness not a viable risk factor for repeated suicide attempt by self-poisoning.

Many strategies and programs have been developed to prevent suicide attempt. However, even with these efforts, there are limitations to these programs, and hence, the suicide rate continues to rise. Emergency service providers tend to be skeptical regarding the prevention of suicide, but emergency visits occur during vulnerable times. In this setting, providing high-quality depression management, education regarding suicide reattempt risks and tools to pre-

Table 3
Multivariate logistic regression analysis for factors associated with repetition of deliberate self-poisoning.

	Odds ratio	95% confidence interval	p
Living condition (without family)	3.73	1.25–11.11	0.018
Psychiatric history	4.52	1.70–12.00	0.002

vent suicidal behaviors to those identified high risk patients is crucial and life-saving. The successful prevention of suicide in late life could be determined by our ability to understand and modify the relevant risk factors.

There are several limitations to our study. First, the data are restricted to one tertiary hospital, in Seoul, South Korea. This region may not be representative of the entire country. Furthermore, patients who reattempt suicide may have visited another hospital for a previous attempt. Multicenter trials are needed to identify more generalizable risk factors and acquire more accurate data. Second, only the patients who presented to the ED after a suicide attempt by self-poisoning were investigated and only the patients with a previous suicide attempt by self-poisoning were included in the reattempt group. Therefore, patients who previously attempted suicide by other methods or who reattempted suicide by other methods after DSP were excluded. Eventually, a large number of patients with repeated suicide attempts were excluded. Third, several known risk factors associated with suicide were not able to obtain; certain factors could be more specific. Emotions, such as intense feelings of despair, the loss of one's sense of social relevance and the meaning of one's existence, and unbearable emotional suffering, are additional risk factors for suicide attempts.³ A low educational level, stressful life events, an unmarried status, traumatic or abusive experiences during childhood, frequent nightmares, and a family history of suicidal behavior are all risk factors for suicide reattempts.² Finally, alcohol dependence and a low socioeconomic status are risk factors for DSP reattempts.¹⁴ These factors should be evaluated in further studies.

5. Conclusion

Among older adults, suicide attempt by self-poisoning patients who have a psychiatric history and live alone should be informed of their risk factors, and extensive assistance should be provided. More studies should be conducted to identify specific risk factors and develop proper management techniques.

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Conflict of interest

The authors declare that they have no conflict of interest.

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