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의도적 음독 후 응급실에 내원한 환자의 음주 여부와 관련된 임상 양상

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Clinical features related to alcohol co-ingestion of deliberate self-poisoning patients visiting the emergency department

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Purpose: Alcohol is one of the most commonly co-ingested agents in deliberate self-poisoning (DSP) cases presenting at the emergency department (ED). The increased impulsivity, aggressiveness, and disinhibition caused by alcohol ingestion may have different clinical features and outcomes in cases of DSP. This study investigates whether alcohol co-ingestion affects the clinical features and outcomes of DSP patients in the ED.

Methods: This was a single-center retrospective study. We investigated DSP cases who visited our ED from January 2010 to December 2016. Patients were classified into two groups: with (ALC+) or without (ALC–) alcohol co-ingestion. The clinical features of DSP were compared by considering the co-ingestion of alcohol, and the factors related to discharge against medical advice (AMA) of DSP were analyzed.

Results: A total of 689 patients were included in the study, with 272 (39.5%) in the ALC+ group. Majority of the ALC+ group patients were middle-aged males (45-54 years old) and arrived at the ED at night. The rate of discharge AMA from ED was significantly higher in the ALC+ group (130; 47.8%) compared to the ALC– group (p=0.001). No significant differences were obtained in the poisoning severity scores between the two groups (p=0.223). Multivariate analysis revealed that alcohol co-ingestion (odds ratio [OR]=1.42; 95% confidence interval [CI], 1.01-1.98), alert mental status (OR=1.65; 95% CI, 1.17-2.32), past psychiatric history (OR=0.04; 95% CI, 0.01-0.28), age >65 years (OR=0.42; 95% CI, 0.23-0.78), and time from event to ED arrival >6 hrs (OR=0.57; 95% CI, 0.37-0.88) were independent predictive factors of discharge AMA (p=0.043, p=0.004, p=0.001, p=0.006, and p=0.010, respectively).

Conclusion: Our results determined a high association between alcohol co-ingestion and the outcome of discharge AMA in DSP patients. Emergency physicians should, therefore, be aware that DSP patients who have co-ingested alcohol may be uncooperative and at high risk of discharge AMA.

Key Words: Poisoning, Emergencies, Alcohol drinking, Discharge against medical advice

INTRODUCTION

Alcohol is one of the most commonly co-ingested agents in acute poisoning patients visiting the emergency department (ED)[1]. Acute poisoning includes unintentional poisoning and deliberate self-poisoning (DSP). The majority of adult poisoning patients who visit the ED are DSP patients, which has become a global problem related to suicide attempts[2-6]. DSP patients who co-ingest alcohol are often uncooperative to treatment in clinical situations, and demonstrate irritability and aggressive behavior, demanding discharge. They may often refuse psychiatric interviews and psychological interventions by psychiatrists. One study found that alcohol use disorder was not associated with admission for inpatient psychiatric care in the DSP of ED in France[5]. Moreover, the

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patient's consciousness may change depending on the interactions of poisonous substances and alcohol[7]. Therefore, alcohol co-ingestion may affect the identification of the present illness, neurologic examination, treatment, and outcomes of DSP patients in the ED. This can hinder initiating treatment for suspected substances if the patient is unable to provide information on the type and amount of other potential life-threatening co-ingestants, delaying the diagnosis of poisoning. In DSP patients with alcohol co-ingestion, more time may be needed to evaluate the obscured toxic symptoms of poisoning substances, recovery of consciousness, or accompanying systemic effects.

Among DSP patients, the increased impulsivity, aggressiveness, and disinhibition caused by alcohol ingestion may have different clinical features and outcomes. DSP with alcohol co-ingestion who were discharged patients against medical advice are not uncommon in ED. In a retrospective, multi-center analysis over 5 years, 7% of DSP patients were discharged against medical advice (AMA)[8]. Currently, there is limited analytical research on the clinical features and outcomes according to alcohol co-ingestion status of DSP patients in the ED.

This study included two main components. First, we analyzed the clinical features and outcomes according to alcohol co-ingestion status in DSP patients visiting the ED. Secondly, we explored the predictors affecting discharge AMA among demographic and clinical factors associated with DSP patients.

METHODS

We conducted a retrospective study of acute-poisoning patients from January 2010 to December 2016 in the ED at our Hospital. Patients who were older than 15 years of age and had visited the ED after DSP were included in the study. The exclusion criteria were patients who were inhalation poisoning, patients who were unintentional poisoning, patient transferred to our hospital after admission at another hospital and patients who had missing data.

The protocol was approved by the Institutional Review Board of the Incheon St. Mary's hospital. Clinical measurements were included in routine patient management in the ED (OC18RESI0031). This Hospital is a tertiary teaching hospital that treats 55,000 patients annually in the ED. Informed consent was waived due to the retrospective nature of the study, as confirmed by the Institutional Review Board.

After reviewing the patients' medical charts, the demographic data and clinical characteristics of the patients were collected. Information on age, sex, poisonous substances consumed, alcohol co-ingestion, psychiatric history, reasons for poisoning, time since ingestion of a substance(s), previous history of attempting suicide and comorbidities (hypertension, diabetes mellitus, respiratory disease, cardiovascular disease, cerebrovascular disease and malignancy status) were collected. The history of self-reported alcohol ingestion and poisoning substances were collected from the patient or their guardian (e.g., parent, friend, sister, brother, or witness) during the ED visit. Subjects were divided into two groups: patients who had ingested poisonous substances with or after consuming alcohol (ALC+) and those who had not (ALC–).

In addition, initial vital signs (systolic blood pressure [SBP], diastolic blood pressure [DBP], heart rate [HR], and respiratory rate [RR]), initial Glasgow coma scale (GCS) and mental status in the ED, final diagnosis, discharge, discharge AMA, intensive care unit (ICU) admission, general ward (GW) admission, endotracheal intubation, and death were recorded. A previous suicide attempt was defined as past self-injurious behavior with failed results, or a plan or an idea by the patient to kill himself/herself. History of alcohol co-ingestion was collected from the patient or their guardian (e.g., parent, friend, sister, brother, or witness) during the ED visit.

The severity of initial acute poisoning in the ED was ranked based on the poisoning severity score (PSS), as follows: (0) no symptoms or signs (none), (1) mild, transient, and spontaneously resolving symptoms or signs (minor), (2) pronounced or prolonged symptoms or signs (moderate), (3) severe or life-threatening symptoms or signs (severe), and (4) death (fatal)[9,10].

1. Statistical analyses

Statistical analyses were performed using SPSS ver. 16.0 (SPSS, Chicago, IL, USA). Age groups were divided into one of the following: 15 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and ≥65 years. The PSS grade and age distribution of each patient were classified according to alcohol co-ingestion. The chi-square tests were used to assess these categorical variables and data was presented by frequencies and percentages. Differences between the two groups were compared using Student's *t*-test was used to analyze continuous variables. Univariable logistic regression analysis was used to choose variables affecting discharge AMA for the multivariable binary logistic regres-

sion analysis among the demographic and clinical factors. Multivariable binary logistic regression was used to identify independent predictors of discharge AMA. We reported the odds ratios (ORs) with 95% confidence intervals (CI). p values ⟨0.05 were considered statistically significant.

RESULTS

1. Clinical features of the deliberate self-poisoning

A total of 808 such poisoning patients visited the ED during the study period. Of these, 32 were excluded due to unclear or missing data regarding alcohol co-ingestion. In addition, the study excluded 45 subjects who experienced inhalation poisoning and 1 subject transferred to our hospital after admission at another hospital. Therefore, 689 subjects were included (Fig. 1).

There were 272 subjects (39.5%) in the ALC+ group and 417 (60.5%) in the ALC– group. Hypnosedatives and benzodiazepines were the most common substances and were consumed by 227 (32.9%) patients and the poisonous substances consumed did not differ between the two groups (Table 1). The distribution by age group and proportion of males were significantly different between the two groups (p⟨0.001, p⟨0.001). In the ALC+ group, the peak age distribution was 45-54 years old (74; 27.2%), while only 10.7% of patients were 65 years and older (Fig. 2). The distribution of patients who had attempted suicide previously and their comorbidities did not differ between the two groups. The majority (140; 52.2%) of ALC+ group in DSP were visited

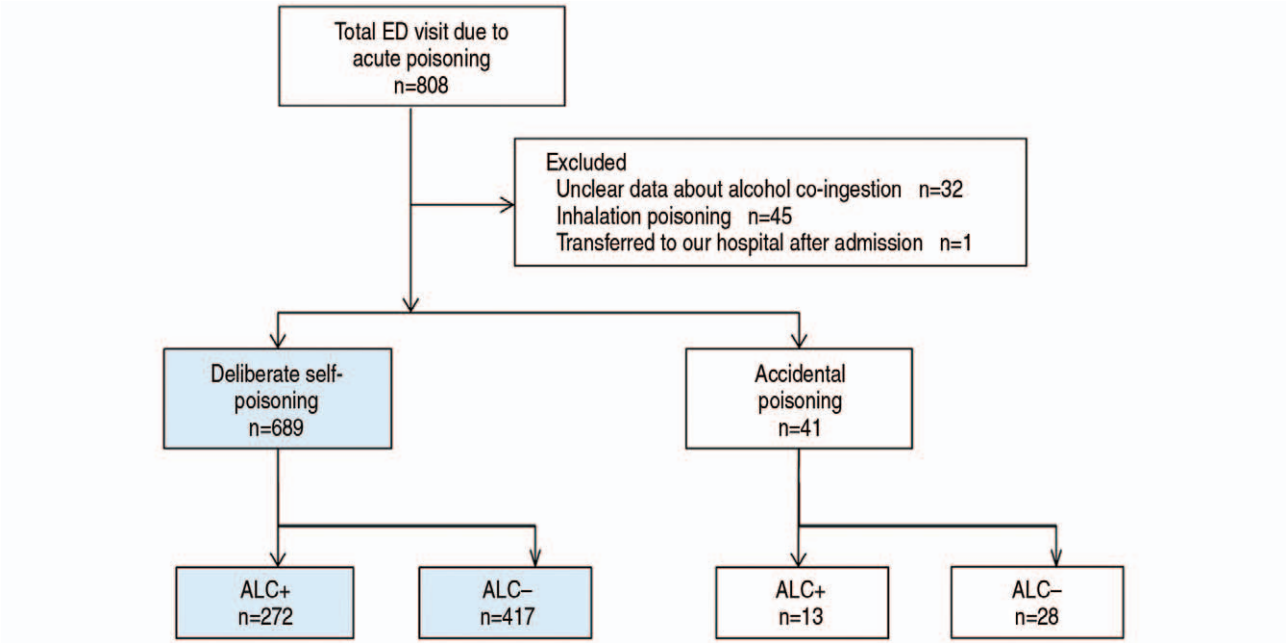

Fig. 1. Flow chart of study criteria

Table 1. Substance exposure in DSP patients.

Substance	ALC+ (n = 272)	ALC– (n = 417)	*p*-value
Over-the-counter drug, n (%)			
Antihistamine	15 (5.5)	25 (6.0)	0.792
Acetaminophen & Salicylates	27 (9.9)	26 (6.2)	0.075
Others	6 (2.2)	5 (1.2)	0.303
Antidepressants & Antipsychotics	32 (11.8)	35 (8.4)	0.144
Hypnosedatives & Benzodiazepine	79 (29.0)	148 (35.5)	0.078
Pesticides & Insecticides	36 (13.2)	42 (10.1)	0.200
Mixture of drugs (>3 types)	34 (12.5)	71 (17.0)	0.106
Others	43 (15.8)	65 (15.6)	0.938

ALC+: alcohol co-ingestion group, ALC–: non-alcohol group

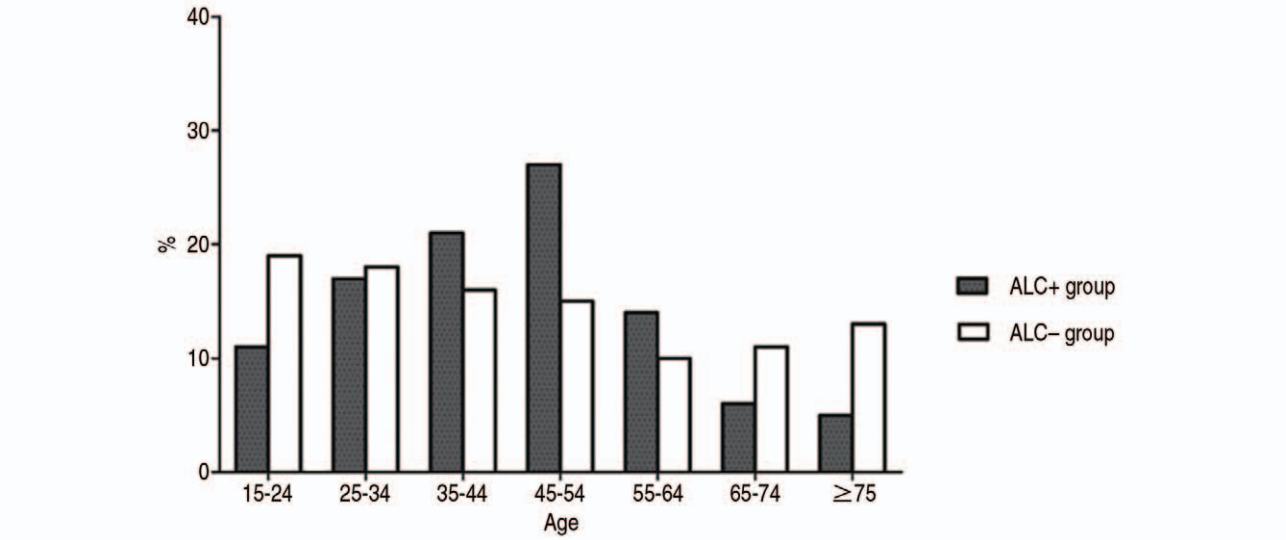

Fig. 2. Age distribution of deliberate self-poisoning patients
The distribution by age group differed between the ALC+ and ALC– groups (p<0.001).

the ED within 1 h of poisoning and most arrived at night (18:00-00:00). There were no significant differences in the number of substances taken during the poisoning event between the two groups (Table 2).

Seventy-six (27.9%) patients in the ALC+ group were admitted to the ICU. There were no statistical differences in the outcomes of GW, ICU admission, endotracheal intubation, and death between the two groups. The rate of discharge AMA from ED was higher in the ALC+ group (130; 47.8%) than the ALC- group (p=0.001) (Table 3). There were no significant differences in the frequencies of each PSSs between the two groups (p=0.223) (Fig. 3).

2. Predictive factors affecting discharge AMA from ED

Univariate logistic regression analysis revealed that the age 〉65 years, alert mental status, previous suicide attempt, past psychiatric history, time from event to ED arrival and alcohol co-ingestion were significantly associated with discharge AMA from ED for DSP. Multivariate analysis showed that the patients with a past psychiatric history, older adults (〉65 years) and time from event to ED arrival (〉6 hr) were significantly more likely to reduce discharge AMA by 96%, 58% and 43% (p=0.001, p=0.006 and p=0.010, respectively). The alert mental status in ED (OR=1.65; 95% CI, 1.17-2.32), and alcohol co-ingestion (OR=1.42; 95% CI, 1.01-1.98) were independent predictive factors of higher discharge AMA rate from ED (p=0.004, p=0.043) (Table 4).

DISCUSSION

The DSP patients displayed distinct differences in sex, age distribution, and timing of ED arrival according to alcohol co-ingestion status. In addition, more ALC+ patients were male, middle-aged (45-54 years old), and arrived at the ED at night. These results are similar to those observed by Chitty (36.2%) and Hendrix (36%)[2,11]. Meanwhile, 64.2% of DSP patients were female in this study, the proportion of male in the ALC+ group was higher than in the ALC– group. In previous study, females generally consider and attempt suicide more frequently than males, but males have higher rates of success and physical self-harm[12-14].

Regarding patient outcomes, there were no differences between the ALC+ and ALC– groups in terms of PSS, ICU admission rate, endotracheal intubation, and mortality. Alcohol co-ingestion was associated with discharge AMA outcomes in DSP patients. DSP who was discharged AMA may not have had enough time for psychosocial intervention in the ED. Concerns of repeated suicide attempts are a common problem that can be applied to both discharged AMA and discharged patients from the ED[15]. Patients discharged AMA may require more active telephone-delivered intervention programs or community-based suicide prevention for reducing suicidal ideation and suicide reattempt. Thus, emergency physicians need to consider the risk factors associated with DSP patients discharged AMA. This study showed that alcohol co-ingestion and alert mental status in DSP patients were independent factors associated

Table 2. Clinical characteristics of deliberate self-poisoning patients

Parameter	ALC+ (n=272)	ALC– (n=417)	*p*-value
Age (years)			
15-24	29 (10.7)	77 (18.5)	
25-34	45 (16.5)	70 (16.8)	
35-44	56 (20.6)	66 (15.8)	<0.001
45-54	74 (27.2)	64 (15.3)	
55-64	39 (14.3)	42 (10.1)	
>65	29 (10.7)	98 (23.5)	
Sex (male), n (%)	119 (43.7)	128 (30.7)	<0.001
Comorbidities, n (%)			
Hypertension	47 (17.3)	72 (17.3)	0.996
Diabetes mellitus	36 (13.2)	57 (13.7)	0.871
Respiratory disease	4 (1.5)	9 (2.2)	0.517
Cardiovascular disease	2 (0.7)	11 (2.6)	0.073
Cerebrovascular disease	2 (0.7)	4 (1.0)	0.757
Malignancy	10 (3.7)	16 (3.8)	0.914
Past psychiatric history, n (%)	15 (5.5)	27 (6.5)	0.607
Previous suicide attempt, n (%)	72 (26.5)	91 (21.8)	0.161
Time from event to ED arrival, n (%)			
<1 h	140 (52.2)	142 (34.8)	
1-3 h	65 (24.3)	118 (28.9)	<0.001
3-6 h	23 (8.6)	50 (12.3)	
>6 h	40 (14.9)	98 (24.0)	
Time of ED arrival, n (%)			
00:00-06:00	78 (28.7)	84 (20.1)	
06:00-12:00	49 (18.0)	93 (22.3)	0.001
12:00-18:00	50 (18.4)	120 (28.8)	
18:00-00:00	95 (34.9)	120 (28.8)	
Types of substance (n=682), n (%)			
1	154 (56.8)	228 (55.5)	
2-3	72 (26.6)	93 (22.6)	0.182
≥4	45 (16.6)	90 (21.9)	
Initial vital signs at the ED			
Systolic blood pressure (mmHg)	123.1 ± 22.0	125.4 ± 26.7	0.229
Diastolic blood pressure (mmHg)	75.7 ± 14.3	75.5 ± 15.4	0.998
Heart rate (pulse/min)	93.7 ± 19.2	89.1 ± 21.6	0.004
Respiratory rate (breaths/min)	19.5 ± 4.3	19.3 ± 2.6	0.340
Initial mental status, n (%)			
Alert	148 (54.4)	227 (54.4)	
Verbally responsive	95 (34.9)	132 (31.7)	0.586
Painfully responsive	21 (7.7)	43 (10.3)	
Unresponsive	8 (2.9)	15 (3.6)	
GCS score <13, n (%)	80 (29.4)	139 (33.3)	0.280

ALC+: alcohol co-ingestion group, ALC–: non-alcohol group, ED: emergency department, EMS: emergency medical services, GCS: Glasgow coma scale

with increased discharge AMA. Impaired consciousness was one of the risk factors for Risk-Rescue Rating scale (RRRS)[16]. Patients with alert mental status corresponded to one point of the risk factor, implying low-risk suicide attempts. The high-rescue and low-risk suicide attempts among DSP were considered less-lethal suicide attempts. Impulsive and less serious toxic poisoning may occur relatively frequently under the influence of alcohol, many patients and guardians do not realize the need for admission. Therefore, it is important to actively explain the need for admission and treatment to the patient and thoroughly explain the patient's condition and complications of poisoning to both the guardian and patient.

Among DSP patients, the mean age was 45 years and 46 years in the ALC+ and ALC– groups, and more than 65% of patients were 〈55 years old. The DPS patients in this study were older than those reported in international data, in which

Table 3. Outcomes of deliberate self-poisoning patients in the ED

Outcomes	ALC+ (n=272)	ALC– (n=417)	*p*-value
Admission to GW	21 (7.7)	44 (10.6)	0.214
Admission to ICU	76 (27.9)	139 (33.3)	0.135
Discharge	43 (15.8)	84 (20.1)	0.108
AMA discharge from ED	130 (47.8)	148 (35.5)	0.001
Death	2 (0.7)	2 (0.5)	0.972
Endotracheal intubation	17 (6.3)	30 (7.2)	0.631
Psychiatric interview	122 (44.9)	189 (45.3)	0.903

ALC+: alcohol co-ingestion group, ALC–: non-alcohol group, GW: general ward, ICU: intensive care unit, ED: emergency department, AMA: against medical advice

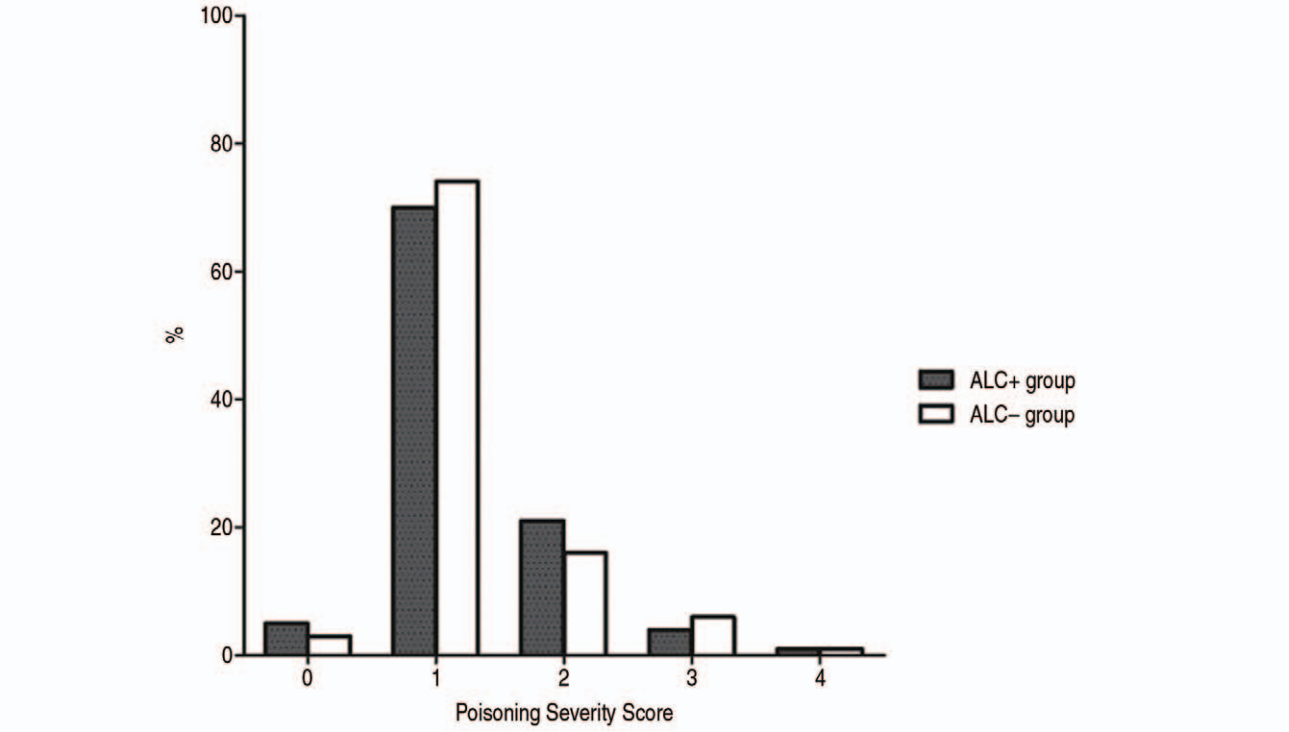

Fig. 3. Poisoning severity score according to the alcohol co-ingestion
There were no significant differences in the frequencies of each PSSs between the two groups (p=0.223).

the average age of presentation of DSP ranges from 30 to 44 years[2,3,11,17]. The present study was based on 7 years of data from one teaching hospital in South Korea; therefore, this difference may have been due to regional demographics and cultural drinking patterns, which also resulted in a significant difference in the age distribution according to alcohol co-ingestion. In addition, older adults with DSP were significantly more likely to reduce discharge AMA by 58%. In Hong' s study, older adults showed high PSS and poor prognosis requiring more ICU admission[9]. Types of poisoning substances, pre-existing general conditions, and comorbidities in older adults can affect the decision to admit a patient to the GW or ICU from the ED[9].

The time of ED arrival differed markedly between the ALC+ and ACL– groups. Approximately 35% of ALC+ DSP patients visited the ED between 18:00 and 00:00, similar to a previous study[2,17-19]. In that study, an alcohol co-ingestion group showed a significant peak in poisoning later in the evening (-20:00) compared to poisonings that did not involve alcohol[19]. This trend was likely associated with the timing of exposure to poisonous substances. This implies that DSP in the ALC+ group might not have been attempted in the absence of alcohol ingestion. Interestingly, 52.2% of ALC+ patients visited the ED within 1 h of poisoning, which could be explained by a variety of factors, including their suicide attempt being impulsive

Table 4. Multivariate analysis for prediction of discharge against medical advice

	Univariate odds ratio (95% CI)	*p*-value	Multivariate odds ratio (95% CI)	*p*-value
Age (years)				
15-24	(Reference)		(Reference)	
25-34	1.20 (0.71-2.04)	0.501	1.22 (0.70-2.14)	0.482
35-44	1.27 (0.75-2.14)	0.372	1.33 (0.76-2.32)	0.315
45-54	1.21 (0.73-2.01)	0.470	1.33 (0.77-2.30)	0.304
55-64	0.84 (0.47-1.52)	0.564	0.99 (0.52-1.86)	0.962
>65	0.32 (0.18-0.57)	<0.001	0.42 (0.23-0.78)	0.006
Sex (male)	0.85 (0.62-1.16)	0.305		
Types of substance	0.96 (0.89-1.03)	0.208		
Alert mental status	1.79 (1.31-2.45)	<0.001	1.65 (1.17-2.32)	0.004
Hypertension	0.81 (0.54-1.22)	0.303		
Diabetes mellitus	0.83 (0.53-1.31)	0.424		
Previous suicide attempt	1.76 (1.24-2.51)	0.002	1.43 (0.98-2.09)	0.062
Past psychiatric history	0.03 (0.00-0.24)	0.001	0.04 (0.01-0.28)	0.001
Time from event to ED arrival>6 hrs	0.58 (0.39-0.87)	0.008	0.57 (0.37-0.88)	0.010
EMS visit to the ED	1.24 (0.88-1.73)	0.214		
Time to ED arrival (18:00-06:00)	1.18 (0.87-1.61)	0.283		
Alcohol co-ingestion	1.66 (1.22-2.27)	0.001	1.42 (1.01-1.98)	0.043

ED: emergency department, EMS: emergency medical services

under the influence of alcohol, attempting suicide when someone was nearby, leaving clues for friends and family, or calling for help[4,5,16]. ED visits within 1 hour after the poisoning event are correlated with a delay until discovery of 〈1 hour of RRRS[16]. The DSP patients with acute alcohol intake had lower suicide intentionality in previous study[4]. This is in line with study of Oh et al., who reported a high rescue attempt rate in DSP cases[12]. In the future, a large-scale additional study of time from event to ED arrival and outcomes of DSP is required.

The PSS has been proposed to be an effective grading scale for acute-poisoning patients[9,20-22]. Along with GCS scores, it has proven useful for predicting mortality among organophosphate poisoning patients. A previous study conducted in Korea showed that alcohol co-ingestion was a risk factor for a higher PSS in DSP patients. These results are inconsistent with our results due to the exclusion of DSP patients discharged AMA. Peter[20] reported that PSS was a poorer discrimination tool than APACHE-II and SAPS-II scores for prediction of mortality in acute organophosphate poisoning. Thus, prospective studies using such clinical scoring systems are necessary to further explore the differences in the severity of DSP according to alcohol co-ingestion.

Many DSP patients ingest poison or substances for the first time as an impulse or as a suicide attempt with no previous diagnosis of depression; however, some patients that ingest medications as a suicide attempt have a previous psychiatric history. A previous study on intentional self-poisoning found that the likelihood of alcohol co-ingestion was lower in patients prescribed antidepressants and antipsychotics, which suggests that psychotropic medication may reduce alcohol co-ingestion during times of acute distress[11]. However, hypnosedatives and antipsychotic drugs are easily accessible to patients with a previous psychiatric history, which would enable suicide attempts via prescription medication overdose[23]. Therefore, emergency physicians need to ask poisoning patients who visit the ED and their families' detailed questions related to previous psychiatric history and medication. In this study, patients with a previous psychiatric history were significantly more likely to reduce discharge AMA by 96%. DSP patients with a previous psychiatric history may be required to be hospitalized for medical treatment caused by overdosing on prescribed medications. Admission for psychiatric treatment may be required due to deterioration of their psychiatric disorder and active suicide ideation. However, in this study, no additional analysis was conducted on whether DSP patients were recommended to be admitted for psychiatric treatment or medical treatment. There is a limit to the interpretation of this study's outcomes due to its retrospective design.

This study had several limitations. First, since this study of a single center was retrospectively analyzed and included a small sample size, selection bias may exist. Second, there were limitations related to the categorization of poisoning patients into only two groups (ALC+ and ALC–) without the consideration of various types and different amounts of substances. In addition, alcohol co-ingestion was determined by a history of self-reported alcohol ingestion, and the blood alco-

hol concentration of patients was not measured from blood samples in the ED. Third, the mortality analyses only included in-hospital mortality, because there was no long-term follow-up of discharged patients. Therefore, prospective studies of alcohol co-ingestion and clinical features that subdivide patients by poisoning substances are required.

CONCLUSION

In conclusion, alcohol co-ingestion was associated with outcome of the discharge AMA in DSP patients of ED. Emergency physicians should be aware that DSP patients who have co-ingested alcohol may be uncooperative and at high risk of discharge AMA.

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