

## Comparison of the Suicide Attempt Characteristics Associated with Mixed and Non-Mixed Depression in Koreans

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### ABSTRACT

**Objectives** : This study aimed to compare the characteristics of suicide attempts among Korean patients with mixed and non-mixed depression.

**Methods** : Patients who visited the emergency room due to a suicide attempt and participated in the Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior study were included. Using the Montgomery-Asberg Depression Rating Scale (MADRS) and Young Mania Rating Scale (YMRS), 111 patients were classified into the mixed depression (n=46) and non-mixed depression groups (n=65). The Koukopoulos Mixed Depression Rating Scale (KMDRS) score was calculated using the MADRS and YMRS scores. Suicide attempt characteristics were evaluated using the Columbia Suicidal Severity Rating Scale (C-SSRS) and Suicide Intent Scale (SIS).

**Results** : In the mixed depression group, the reason item among the ideation intensity score of the C-SSRS was higher, and the deterrent item score was lower. Scores on the timing and suicide note items of the SIS were higher, and scores for overt communication items were lower in the mixed depression group. The KMDRS score was positively correlated with the C-SSRS ideation intensity and total SIS score. After adjusting for additional variables, the KMDRS scores had a significant effect on the C-SSRS ideation intensity and total SIS scores.

**Conclusions** : The mixed depression group showed a difference in the intensity of suicidal ideation and suicidal intention compared to those in the non-mixed depression group. The overall suicidal ideation intensity and suicidal intention increased according to the degree of mixed depression.

**KEYWORDS** : Suicide; Depression; Mixed depression; Mood disorder.

### INTRODUCTION

Suicide is defined as the death of the self through fatal actions, and more than 700,000 people die from suicide annually worldwide.<sup>1)</sup> This has a lasting impact on family, friends,

co-workers, communities, and society, including the suicidal individual, and causes a great economic burden.<sup>2)</sup> The Centers for Disease Control and Prevention reported that the medical and occupational costs of suicide in the United States in 2013 were approximately \$50.8 billion.<sup>3)</sup>

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Suicidal behavior is the complex result of multiple factors, which includes existing mental disorders such as depression, other medical conditions, external events including stress and abuse, and socio-economic difficulties. In particular, patients' mental disorders are known to be a significant risk factor.<sup>4)</sup> Suicide attempters exhibit various clinical characteristics, and distinguishing them according to psychiatric diagnosis can positively affect treatment interventions.<sup>5)</sup> This is essential because most suicide attempters report psychiatric diagnoses, and the difference in clinical progress according to the diagnosis makes individual suicide prevention strategies different.<sup>6)</sup>

Depression is the most common underlying mental disorder among suicide deaths, and it is known that over 50% of suicides are associated with depression.<sup>7,8)</sup> In a recent study examining the characteristics of depressed patients who attempted suicide, the rate of bipolar depression (51%) was higher than that of unipolar depression (33%).<sup>9)</sup> Another study found that approximately 50% of the included depressed patients with a history of suicide attempts satisfied the diagnosis of mixed pattern depression.<sup>10)</sup> Judging from these results, identifying mixed depression symptoms will have important clinical implications for suicide.

Mixed depression is a concept presented in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), replacing the existing definition for mixed episodes of bipolar disorder. It can be diagnosed in patients who experience major depressive episodes and show three or more manic or hypomanic symptoms such as irritable mood, racing thoughts, psychomotor agitation, and increased talkativeness.<sup>11,12)</sup> However, as the diagnostic criteria changed from DSM-4 to DSM-5, criticisms arose that the boundary between major depression and bipolar disorder was unclear, and when diagnosing mixed depression, the range of mania was too narrow, and the range of depression too wide.<sup>13)</sup>

Koukopoulos et al.<sup>14)</sup> noted that the difference in treatment progress according to mixed patterns in depression was remarkable in many patients. In this regard, a new mixed depression diagnosis scale called the Koukopoulos mixed depression rating scale (KMDRS), which combines the existing manic and depression scales by developing the concept of agitated depression, was proposed.<sup>13)</sup> The KMDRS is used in various clinical studies because it can separately identify symptoms such as irritable mood, psychomotor agitation, impulsiveness, and aggression, and it can make a more critical diagnosis than the existing DSM-based scale.<sup>15)</sup>

The annual suicide rate in Korea is 24.6 per 100,000 people as of 2019, twice that of the Organization for Economic Co-

operation and Development (OECD) standard, showing the highest suicide rate among OECD countries since 2003.<sup>16)</sup> Suicide is the sixth most prevalent cause of death in Korea, which makes it a national economic burden.<sup>17)</sup> Accordingly, studies to analyze the characteristics and risk factors of Korea's high suicide rate have been conducted on suicide attempters who visited the emergency room, and the need for additional studies on factors related to suicide severity have been suggested.<sup>18,19)</sup>

Park et al.<sup>20)</sup> reported that Korea has a dynamic and competitive environment due to its high population density and educational standards and hence, more attention on mixed depression is required given the high suicide and acute stress event rates. They also emphasized that Italy, where research by Koukopoulos et al.<sup>14)</sup> was conducted, and Korea had similarities in various factors, such as the geographical characteristics of the peninsula, strong family connections, and urgency nature of the citizens. Considering the above findings, examining the characteristics of suicide attempts due to mixed depression in Koreans may clinically help in understanding the relatively high suicide rate in Korea. The Korean Ministry of Health and Welfare established the Korean Cohort for the Model Predicting Suicide and Suicide-related Behavior (K-COMPASS) study as a suicide-related research project.<sup>21)</sup> This is the first long-term, large-scale, multicenter cohort model implemented in Korea, with the primary goals of analyzing the relationship between suicide attempts and potential risk factors and developing prevention guidelines. To date, several studies have been published that have analyzed the suicidal characteristics of Koreans using K-COMPASS, and studies are being conducted to develop a Korean suicide behavior prediction model.<sup>22,23)</sup> The primary goal of this study was to compare suicide attempt characteristics among patients with mixed and non-mixed depression based on data gathered during the K-COMPASS study. In addition, as a secondary goal, the difference in suicide attempt characteristics according to the degree of mixed depression was also investigated.

## METHODS

### 1. Participants

K-COMPASS is a long-term, large-scale, multicenter, prospective observational cohort study for a biopsychosocial follow-up model of suicide ideators and attempters.<sup>21)</sup> In the present study, among the K-COMPASS cohort, an analysis was performed on the group of suicide-related patients who visited eight emergency medical centers in Korea from December 22, 2015, to March 8, 2018.

A total of 800 people participated, and only those who were 15 years of age or older, had no history of intellectual disability or organic brain damage, and could speak Korean were included in the study. In this study, mixed depression was classified as a Montgomery-Asberg Depression Rating Scale (MADRS) score of  $>20$  and a Young Mania Rating Scale (YMRS) score of 4–19, the criteria presented in the KMDRS study by Sani et al.<sup>13)</sup> The number of participants who performed both YMRS and MADRS was 375.

Additional classification was performed on 249 participants, excluding 36 with a history of bipolar disorder, 18 with a YMRS score of 20 or higher, and 72 with a MADRS score of 20 or less. Of these, 111 suicide attempters with no missing values in other major evaluation items were finally analyzed in this study, except for those who had only suicidal thoughts without attempting suicide. The K-COMPASS data collection method has been described in previous studies.<sup>21)</sup> All participants provided written informed consent (Fig. 1). The study was approved by the Institutional Review Board of Busan Paik Hospital, Inje University College of Medicine (IRB number: 19-0211).

## 2. Measures

The evaluation was conducted when the participant first participated in the K-COMPASS study, upon their first visit to the emergency room, and included a structured interview that provided socio-demographic and clinical information and a clinical scale evaluation that included both a self-report and evaluator reports. The participants were classified into 46 mixed and 65 non-mixed depression groups, and demographic information, clinical symptoms, and suicide attempt characteristics were evaluated.

## 1) Demographic characteristics

Information on age, sex, marital and residential status, education level, employment status, and health insurance status was collected in a self-report format.

## 2) MADRS

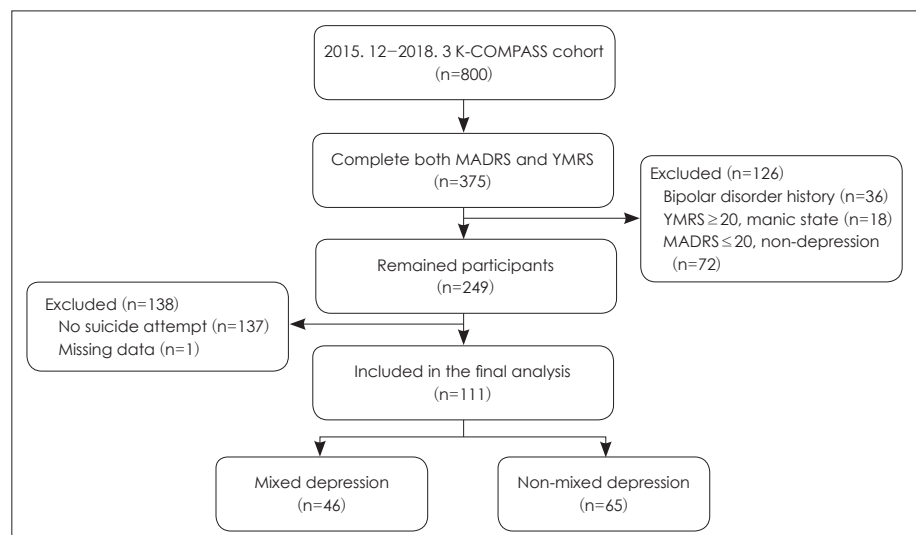
The MADRS is a 10-item clinician rating scale covering a wide range of cognitive, affective, and biological characteristics of depression.<sup>24)</sup> The 10 items are as follows: 1) apparent sadness, 2) reported sadness, 3) inner tension, 4) reduced sleep, 5) reduced appetite, 6) concentration difficulty, 7) lassitude, 8) inability to feel, 9) pessimistic thoughts, and 10) suicidal thoughts. Each item is rated from 0–6, and the higher the score, the more severe the depressive symptoms.

## 3) YMRS

The YMRS is an 11-item clinician rating scale developed to assess the severity of mania symptoms.<sup>25)</sup> The 11 items are as follows: 1) elevated mood, 2) increased motor activity, 3) sexual interest, 4) sleep, 5) irritability, 6) speech, 7) language-thought disorders, 8) thought content, 9) disruptive-aggressive behavior, 10) appearance, and 11) insight. The higher the score, the more severe the symptoms of mania.

## 4) KMDRS

The KMDRS is a newly proposed 14-item clinician rating scale for the study of mixed depression.<sup>13)</sup> The 14 items are the following: 1) expression of suffering, 2) vivacious facial expression, 3) speech, 4) emotional lability, 5) psychomotor activity, 6) subjective irritability, 7) overt anger, 8) accelerated thinking, 9) inner tension, 10) muscular tension, 11) insomnia, 12) suicidal impulsivity, 13) sexuality, and 14) psychotic symptoms.



**Fig. 1.** Participant flow diagram. K-COMPASS, Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior; MADRS, Montgomery Asberg Depression Rating Scale; YMRS, Young Mania Rating Scale.

The twelve items other than 2) Vivacious facial expression and 10) muscular tension can be replaced with items from the MADRS or YMRS15): KMDRS 1=MADRS 1×0.5; KMDRS 3=YMRS 6×0.375; KMDRS 4=MADRS 2×0.5; KMDRS 5=YMRS 2×1.5; KMDRS 6=YMRS 5×0.375; KMDRS 7=YMRS 9×0.75; KMDRS 8=YMRS 7×0.75; KMDRS 9=MADRS 3×0.5; KMDRS 11=YMRS 4×0.75; KMDRS 12=MADRS 10×1; KMDRS 13=YMRS 3×0.75; KMDRS 14=YMRS 8×0.375. The higher the total score, the more severe the mixed depression.

### 5) Columbia Suicidal Severity Rating Scale (C-SSRS)

The C-SSRS is a semi-structured clinician rating scale evaluating suicidal ideations and behaviors in clinical and research settings.<sup>26)</sup> The C-SSRS consists of the suicidal ideation severity subscale, suicidal ideation intensity subscale, suicidal behavior subscale, and suicidal behavior lethality subscale. The severity of suicidal ideation was scored on a scale of 1–5 (1=wish to be dead, 2=non-specific active suicidal thoughts, 3=active suicidal ideation with any method without intent to act, 4=active suicidal ideation with some intent to act, without a specific plan, and 5=active suicidal ideation with a specific plan and intent).

The intensity of suicidal ideation was scored from 0–25 by scoring the frequency, duration, controllability, deterrents, and reasons for ideation, with higher scores indicating more severe and persistent suicidal ideation. Suicidal behavior is classified into actual attempts, interrupted attempts, aborted/self-interrupted, preparatory, and non-suicidal self-injurious behaviors. The lethality of suicidal behavior can be divided into actual and potential lethality, and the actual lethality is scored as 0=none or very minor physical damage, 1=minor physical damage, 2=moderate physical damage, 3=moderately severe physical damage, 4=severe physical damage, and 5=death. In this study, the severity and intensity of suicidal ideation and the actual lethality of suicidal behavior were evaluated, and suicidal behavior was excluded from the analysis because it is often difficult to classify.

### 6) Suicide Intent Scale (SIS)

The SIS measures suicide attempters' intention to die at the time of the attempt,<sup>27)</sup> and consists of 15 items related to isolation, timing, precautions against discovery/intervention, acting to get help during/after attempt, final acts in anticipation of death, active preparation for the attempt, suicide note, overt communication of intent before the attempt, the alleged purpose of the attempt, expectations of fatality, the conception of the method's lethality, the seriousness of the attempt, attitude

toward living/dying, the conception of medical rescuability, and the degree of premeditation. Each item is rated from 0–2 points. The first eight items were related to objective circumstances, and the last seven were evaluated on subjective thoughts and feelings. A higher score indicated greater intentionality.

### 3. Statistical analysis

We report continuous variables using the mean and standard deviation and discrete variables using frequency and percentage. Between-group comparisons were performed using the chi-square and Student's t-tests. Correlation analysis was performed to analyze the correlation between the degree of mixed depression and the characteristics of suicide attempts, and a linear regression analysis was performed to confirm the effect of the degree of mixed depression on the characteristics of suicide attempts. In the linear regression analysis, age, gender, and depression score, which are considered to influence the results, were also included as covariates. We used SPSS (version 25.0; IBM Corp, Armonk, NY, USA) for all analyses, and the significance level for all tests was set at  $p < 0.05$ .

## RESULTS

### 1. Demographic and clinical characteristics

Table 1 shows the demographic and clinical characteristics of the two groups. There was a significant difference in marital status between the mixed and non-mixed depression groups ( $p = 0.010$ ), but there were no significant differences in age, sex, residential status, education level, employment status, or health insurance status. There was no significant difference in the mean MADRS scores, but the mean YMRS score was significantly higher in the mixed depression group than in the non-mixed depression group ( $8.87 \pm 4.37$  vs.  $0.52 \pm 1.00$ ;  $p < 0.001$ ). The KMDRS scores of the mixed and non-mixed depression groups were statistically significantly different ( $13.27 \pm 4.08$  vs.  $10.05 \pm 2.51$ ;  $p < 0.001$ ).

### 2. Suicide attempt characteristics

In the C-SSRS, the deterrents item in the suicide ideation intensity subscale scored significantly higher in the non-mixed depression group than in the mixed depression group ( $3.00 \pm 1.27$  vs.  $2.40 \pm 1.64$ ;  $p = 0.043$ ). The reason item in the mixed depression group scored significantly higher in the mixed depression group than in the non-mixed depression group ( $4.16 \pm 1.01$  vs.  $3.42 \pm 1.53$ ;  $p = 0.008$ ). No significant between-group differences were identified in the other items of the C-SSRS (Table 2).

In the SIS, the timing of suicide attempt item scored signifi-

**Table 1.** Comparisons of demographic and clinical characteristics

	MXD (n=46)	NMXD (n=65)	p- value
Age	33.98 (16.27)	38.98 (15.43)	0.103
Sex			
Male	21 (45.65)	21 (32.31)	0.153
Female	25 (54.35)	44 (67.69)	
Marital status			0.010
Never	25 (54.35)	26 (40.00)	
Currently	10 (21.74)	31 (47.69)	
Cohabiting	0 (0.00)	2 (3.08)	
Previous-separated	0 (0.00)	1 (1.54)	
Previous-divorced	10 (21.74)	3 (4.62)	
Previous-widowed	1 (2.17)	2 (3.08)	
Living status			0.577
With family	31 (67.39)	47 (72.31)	
With nonfamily/ institutionalized	15 (32.61)	18 (27.69)	
Educational level			0.930
Less than elementary school	1 (2.17)	2 (3.08)	
Elementary school	4 (8.70)	9 (13.85)	
Middle school	7 (15.22)	10 (15.38)	
High school	25 (54.35)	33 (50.77)	
College or higher	9 (19.57)	11 (16.92)	
Employment status			0.184
Employed	10 (21.74)	8 (12.31)	
Unemployed	36 (78.26)	57 (87.69)	
Health security status			0.117
National health insurance	37 (80.43)	59 (90.77)	
Medical aid	9 (19.57)	6 (9.23)	
MADRS	33.85 (9.12)	35.95 (10.59)	0.277
YMRS	8.87 (4.37)	0.52 (1.00)	<0.001
KMDRS	13.27 (4.08)	10.05 (2.51)	<0.001

For continuous variables, mean (SD); For categorical variables, n (%). MXD, Mixed-depression; NMXD, Non-mixed depression; KMDRS, Koukopoulos Mixed Depression Rating Scale; MADRS, Montgomery Asberg Depression Rating Scale; YMRS, Young Mania Rating Scale; SD, standard deviation

cantly higher in the mixed depression group than in the non-mixed depression group ( $1.04 \pm 0.82$  vs.  $0.58 \pm 0.77$ ;  $p=0.003$ ). Suicide note item scores were also significantly higher in the mixed depression group than in the non-mixed depression group ( $0.50 \pm 0.84$  vs.  $0.18 \pm 0.56$ ;  $p=0.029$ ). The overt communication item score was significantly higher in the non-mixed depressed group than in the mixed depressed group ( $0.54 \pm 0.72$  vs.  $0.85 \pm 0.83$ ;  $p=0.049$ ) (Table 3).

### 3. Correlation between the degree of mixed depression and suicide attempt characteristics

In the correlation analysis, the KMDRS score, indicating the degree of mixed depression, had a significant positive correla-

**Table 2.** Comparisons of C-SSRS

	MXD (n=46)	NMXD (n=65)	p-value
Ideation severity	3.78 (1.46)	4.05 (1.04)	0.296
Ideation intensity	15.54 (5.25)	14.95 (4.15)	0.511
Frequency	3.56 (1.37)	3.31 (1.28)	0.347
Duration	2.98 (1.50)	2.53 (1.34)	0.107
Controllability	2.80 (1.77)	2.92 (1.65)	0.713
Deterrents	2.40 (1.64)	3.00 (1.27)	0.043
Reason for ideation	4.16 (1.30)	3.42 (1.53)	0.008
Actual damage	2.83 (1.48)	2.33 (1.26)	0.083

For continuous variables, mean (SD); MXD, Mixed-depression. NMXD, Non-mixed depression; C-SSRS, Columbia-Suicide Severity Rating Scale; SD, standard deviation

**Table 3.** Comparisons of SIS

	MXD (n=46)	NMXD (n=65)	p- value
Isolation	1.17 (0.93)	1.03 (0.92)	0.422
Timing	1.04 (0.82)	0.58 (0.77)	0.003
Precautions	0.67 (0.84)	0.43 (0.59)	0.096
Acting to get help	1.22 (0.92)	1.37 (0.88)	0.380
Final acts to anticipate	0.59 (0.80)	0.42 (0.73)	0.244
Active preparation	0.63 (0.74)	0.42 (0.66)	0.111
Suicide note	0.50 (0.84)	0.18 (0.56)	0.029
Overt communication	0.54 (0.72)	0.85 (0.83)	0.049
Alleged purpose	1.54 (0.78)	1.31 (0.73)	0.105
Expectations of fatality	1.20 (0.83)	1.00 (0.73)	0.203
Conception of method's lethality	0.85 (0.84)	0.83 (0.67)	0.910
Seriousness of attempt	1.24 (0.82)	1.15 (0.71)	0.571
Attitude towards living/dying	1.54 (0.69)	1.38 (0.70)	0.239
Conceptions of medical reus- ability	1.02 (0.83)	0.78 (0.67)	0.100
Degree of premeditation	0.83 (0.88)	0.57 (0.88)	0.133
Total	14.59 (7.20)	12.31 (5.13)	0.069

For continuous variables, mean (SD). MXD, Mixed-depression; NMXD, Non-mixed depression; SIS, Suicide Intent Scale; SD, standard deviation

tion with the C-SSRS suicidal ideation intensity total score ( $r=0.237$ ,  $p=0.012$ ) and SIS total score ( $r=0.262$ ,  $p=0.006$ ) (Table 4).

In the linear regression analysis, even after adjusting for age, sex, and depression score, the KMDRS score had a significant effect on the C-SSRS suicidal ideation intensity total score ( $\beta=0.259$ ,  $p=0.031$ ) and SIS total score ( $\beta=0.270$ ,  $p=0.022$ ) (Table 5).

## DISCUSSION

Through this study, the authors aimed to improve the understanding of the suicide attempt characteristics seen in the mixed depression group and help develop clinical interventions to lower the Korean suicide rate. In this study, the YMRS and KMDRS scores were significantly higher in the mixed depres-



**Table 4.** Correlations between KMDRS and suicidal attempt characteristics

	KMDRS	
	r	p-value
C-SSRS ideation severity	0.160	0.093
C-SSRS ideation intensity	0.237	0.012
C-SSRS actual damage	0.024	0.816
SIS total	0.262	0.006

KMDRS, Koukopoulos Mixed Depression Rating Scale; C-SSRS, Columbia-Suicide Severity Rating Scale; SIS, Suicide Intent Scale

**Table 5.** Linear regression analyses for KMDRS and suicidal attempt characteristics

	$\beta$	t	p-value
C-SSRS ideation severity			
Age	-0.029	-0.294	0.769
Sex	0.081	0.851	0.397
MADRS	0.026	0.219	0.827
KMDRS	0.141	1.164	0.247
C-SSRS ideation intensity			
Age	-0.110	-1.134	0.259
Sex	-0.016	-0.167	0.867
MADRS	-0.079	-0.681	0.497
KMDRS	0.259	2.181	0.031
C-SSRS actual damage			
Age	0.068	0.661	0.510
Sex	-0.237	-2.363	0.020
MADRS	-0.27	-1.712	0.090
KMDRS	0.161	1.327	0.188
SIS total			
Age	-0.132	-1.390	0.168
Sex	-0.187	-2.041	0.044
MADRS	-0.061	-0.538	0.591
KMDRS	0.270	2.332	0.022

KMDRS, Koukopoulos Mixed Depression Rating Scale; C-SSRS, Columbia-Suicide Severity Rating Scale; SIS, Suicide Intent Scale; MADRS, Montgomery Asberg Depression Rating Scale

sion group than in the non-mixed depression group, but there was no significant difference in the MADRS scores. Therefore, it can be considered that the group classification was correctly performed to compare the characteristics of suicide attempts according to mixed depression, which was the purpose of this study.

Sani et al.<sup>13)</sup> presented a cut-off score when developing the KMDRS, wherein 0–4 points can be classified as no mixed, 5–9 points as possible mixed, 10–15 points as mild mixed, 16–20 points as moderate mixed, and  $\geq 21$  points as severe mixed depression. In this study, the mean KMDRS score of the mixed depression group was 13.27, which is considered to represent a significant proportion as having mild mixed depression. In addition, the mean score of the non-mixed depression group was

10.05, indicating that the group could be classified in a section relatively close to that suggested by the cut-off score.

According to our results, the reason item of the C-SSRS suicidal ideation intensity subscale scored significantly higher in the mixed depression group than in the non-mixed depression group, while the deterrent item score was lower. In other words, in the mixed depression group, the potential reason for suicide was wanting to end one's suffering than to gain attention or seek revenge, suggesting that these attempts are associated with a high degree of seriousness. Since many factors hinder suicide, it is the lethality of suicide is considered to be relatively low. In the mixed depression group, SIS timing and suicide note item scores were significantly higher than in the non-mixed depression group, and overt communication item scores were lower. Therefore, suicide attempts among the mixed depression group occur when intervention is relatively difficult, and there is a high possibility that suicidal thoughts are already organized. However, it can be seen that the degree of expressing this suicidal intention to others is lesser.

From the results of the correlation and linear regression analyses, the degree of mixed depression is considered to be a significant factor that can increase the intensity of suicidal ideation and intention. The results of this study may be more meaningful when considering the previous studies suggesting that mixed depression is associated with a higher number of suicide attempts than non-mixed depression.<sup>10)</sup> Therefore, screening patients with mixed characteristics among patients with depression at risk of suicide and implementing the appropriate treatment and suicide prevention interventions will help lower the suicide rate.

In particular, mixed depression is more clinically important than non-mixed depression because the appropriate pharmacotherapeutic approach may differ. According to the guidelines for the treatment of mixed depression presented by Stahl et al.,<sup>28)</sup> administration of antipsychotics and mood stabilizers considered and presence of significant risks such as suicide should be assessed. There is still no direct evidence that antipsychotics or mood stabilizers prevent suicide attempts in patients with mixed depression, and no officially approved drugs exist. However, since it has already been established that these drugs prevent the progression and deterioration of mixed depression symptoms,<sup>28)</sup> it can be expected that these drugs will partially help the prognosis, including reducing the possibility of suicide in the future. In future studies, it will be helpful to clearly classify mixed depression and analyze the differences in suicide-related responses in each depression group according to the use of antipsychotics or mood stabilizers.

According to previous studies, psychomotor agitation is

known to be highly related to suicide risk.<sup>29)</sup> Several suicide treatment-related guidelines mention the need for the appropriate evaluation and control of psychomotor agitation, which is thought to be particularly important in mixed depression.<sup>30)</sup> Dougherty et al.<sup>31)</sup> studied the relationship between impulsivity and suicidal behavior in adults with a history of suicidal attempts and found a significant correlation between motor impulsivity and suicidal behavior. In addition, other previous studies have reported that impulsivity is included as a factor necessary to reduce the inhibition of suicidal behavior.<sup>32)</sup> Impulsivity is a more prominent symptom of mania or hypomania than depression and may be associated with suicide attempts in patients with mixed depression.

The limitations of this study are as follows: First, this study has limitations in interpretation, as it was a cross-sectional study that used data taken only at the initial evaluation during the patients' first emergency room visit. Since K-COMPASS is designed to follow up every 3–6 months after the emergency room visit, the change in symptoms and dropout rate will also be meaningful, so there is a need for additional research. Second, in this study, due to the cohort characteristics, the diagnosis of mixed depression could not be evaluated by a psychiatrist. In particular, since the KMDRS could not be directly implemented, the KMDRS scores were estimated using the YMRS and MADRS, so items 2 and 10 of the KMDRS could not be evaluated. For this reason, it was not possible to clearly classify the mixed depression group using the cut-off score of the KMDRS suggested by Sani et al.,<sup>13)</sup> or other professional diagnostic criteria. Third, the KMDRS score of the mixed group participating in the study was 13.27, which was relatively low. Correlation and linear regression analyses were performed according to the KMDRS score, but most of the participants had a mild degree of mixed depression; hence, the interpretation of the study results is limited.

This study investigated the suicide attempt characteristics of a mixed depression group through a retrospective cohort analysis. The mixed depression group showed significant differences in suicidal ideation intensity and suicidal intention compared to those in the non-mixed depression group. In addition, it was confirmed that overall suicidal ideation intensity and suicidal intention increased according to the degree of mixedness of depression. Based on these findings, it is expected that the diagnostic usefulness of mixed depression and the need for effective intervention will receive more attention.

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#### Conflicts of Interest

The authors have no financial conflicts of interest.

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