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ORIGINAL RESEARCH

The association between suicide risk and self-esteem in Japanese university students with major depressive episodes of major depressive disorder

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Background: The suicide risk among young adults is related to multiple factors; therefore, it is difficult to predict and prevent suicidal behavior.

Aim: We conducted the present study to reveal the most important factors relating to suicidal ideation in Japanese university students with major depressive episodes (MDEs) of major depressive disorder (MDD).

Methods: The subjects were 30 Japanese university students who had MDEs of MDD, and were aged between 18 and 26 years old. They were divided into two groups – without suicide risk group (n=15), and with suicide risk group (n=15) – based on the results of the Mini-International Neuropsychiatric Interview. Additionally, healthy controls were recruited from the same population (n=15). All subjects completed the self-assessment scales including the Beck Depression Inventory 2nd edition (BDI-II), the Beck Hopelessness Scale (BHS), Rosenberg's Self-Esteem Scale (RSES), and SF-36v2™ (The Medical Outcomes Study 36-item short-form health survey version 2), and they were all administered a battery of neuropsychological tests.

Results: The RSES score of the suicide risk group was significantly lower than the RSES score of the without suicide risk group, whereas the BDI-II score and the BHS score were not significantly different between the two groups. The mean social functioning score on the SF-36v2 of the with suicide risk group was significantly lower than that of the without suicide risk group.

Conclusion: The individual's self-esteem and social functioning may play an important role in suicide risk among young adults with MDEs of MDD.

Keywords: suicide risk, self-esteem, quality of life, young adults

Introduction

Youth suicide is one of the major concerns in present-day Japan, as it has been the leading cause of death among young adults in Japan.[1] Suicidal behaviors are thought to be a multifactorial phenomenon;[2,3] therefore, it is very difficult to predict and prevent the occurrence of suicidal behavior.[4,5] In previous studies, many factors correlated with suicidal behavior have been reported.[2,6,7] The factors correlated with suicide are categorized as state-dependent or trait-dependent factors. Psychiatric disorders, physical disorders, and psychosocial crises can be categorized as state-dependent factors. Genetic loadings, personality characteristics, and early traumatic life events are categorized as trait-dependent factors.[2] Major depressive episodes (MDEs) are one of the most important state-dependent factors in major depressive disorder (MDD) because patients with an affective disorder generally commit suicide during an MDE.[7,8] In previous studies, 47% to 69% patients with MDD had suicidal ideation during an MDE.[7]

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Although an MDE is significantly correlated with suicide risk in MDD, the prediction of suicide remains difficult. Because the mean rates of suicide in MDD patients are reported to be approximately 10%, the majority of MDD patients do not commit suicide.[9] Therefore, correlated factors with suicide risk other than MDEs, such as hopelessness,[10] cognitive rigidity,[11–14] low self-esteem,[15–23] and low quality of life,[24,25] could play additional significant roles in MDD. In addition, personality traits including neuroticism, introversion, and harm avoidance are risk factors for suicide.[26,27] In an earlier study, we reported the relationship between suicidality and personality in Japanese undergraduate students using Temperament and Character Inventory (TCI).[28]

In the present study, we focused on several risk factors for suicide, such as hopelessness, cognitive rigidity, low self-esteem, and low quality of life. Concerning cognitive rigidity, few previous studies have investigated the cognitive function of young adults with suicide risk.[29] Moreover, the relationship between cognitive rigidity and other contributory factors of suicide risk have not been previously examined in young adults with MDE of MDD. This study was conducted in unmedicated undergraduate student populations to reduce the bias of the effects of drugs on cognition. We examined psychological, cognitive, and social factors to reveal the effects of these factors on suicide risk in unmedicated Japanese young adult populations with MDEs of MDD.

Methods

Participants and procedure

Participants were recruited from the Hokkaido University Health Care Center consecutively between May 2011 and July 2012. Psychiatrists at the Health Care Center evaluated 34 unmedicated students aged between 18 and 26 years old, who had depressive symptoms. Then, a Mini-International Neuropsychiatric Interview (MINI)[30] was conducted and the DSM-IV-TR (*Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition, Text Revision) diagnoses for these students were confirmed. Three students were excluded due to the following diagnoses: panic disorder without an MDE in one student, bipolar disorder in one student, and dysthymia without an MDE in another student. Another student was excluded because of an incomplete self-report questionnaire. The 30 remaining students with MDE of MDD were included as subjects in this study. The section on "suicidality" in MINI was used as the assessment of suicidal ideation and suicidal behavior. Subjects who had more than five points in the "suicidality" category, which is the threshold of moderate suicide risk, were defined as the suicide risk group. As a result, 15 out of the 30 subjects were defined as the suicide risk group.

Healthy controls were recruited from among Hokkaido University undergraduate students who visited the Hokkaido University Health Care Center for routine medical examinations. Students aged 18 to 26 years old were included in this study. Twenty-three students participated in the study, but three subjects were excluded by the MINI screen, which was a self-report questionnaire for the screening of several psychiatric illnesses. Moreover, five subjects were excluded for incomplete self-report questionnaires. Fifteen healthy controls were included in the analyses.

Written informed consent was obtained from all subjects prior to participation in the study. This study was approved by the Institutional Review Board of Hokkaido University Hospital and was conducted in accordance with the ethical standards established in the 1964 Declaration of Helsinki.

Measurements

Mini-International Neuropsychiatric Interview (MINI)

The MINI was used to diagnose MDE and confirm the psychiatric comorbidities. The MINI, which is a short, structured interview with high validity and reliability, was developed to diagnose 17 psychiatric disorders according to the DSM-IV-TR in adults aged 18 years or older.[30] Although the MINI should not be a substitute for a psychiatric clinical interview, validation studies confirmed the validity of this instrument as a reliable tool in psychiatric diagnosis for the DSM-IV-TR.[30] The MINI was translated into Japanese in a previous study using the standard procedure of back translation. The Japanese version of the MINI was validated using the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders*, 3rd Edition, Text Revision in a previous study.[31] The section for suicidality in the MINI classifies subjects into four groups: no suicide risk, low suicide risk, moderate suicide risk, and high suicide risk. For the present analysis, subjects with moderate suicide risk or high suicide risk based on MINI suicidality category scoring ($\geq$6) were classified into the MDEs with suicide risk group.

Self-report methods

The severity of depression was assessed using the Beck Depression Inventory 2nd edition (BDI-II), which is a 21-item self-report questionnaire (range 0–60).[32] The BDI-II has been determined to represent a reliable and valid measure of depression; it was validated for college students aged 18 years or older.[33] The Japanese version of the BDI-II was also validated.[34] Negative expectancies and hopelessness were assessed using

the Beck Hopelessness Scale (BHS). The BHS is a self-report measure that assesses negative expectancies about the future based on 20 true-false statements, and that has been validated for adults aged 18 years or older.[35] Patients with a score of nine or higher were reported to be eleven times more likely to die by suicide than those with lower scores.[36] The Japanese version of the BHS, the validity of which has been confirmed, was used.[37] Self-esteem was assessed using the Rosenberg's Self-Esteem Scale (RSES),[38] which has been validated for undergraduate students.[39] This scale is widely used for measuring a person's global self-esteem. The Japanese version of the RSES was used.[40]

Health-related quality of life was measured using the Medical Outcomes Study 36-item short-form health survey (SF-36v2™; QualityMetric Incorporated, Lincoln, RI, USA). This scale measures the following eight health concepts: limitations in physical activities because of health problems (physical functioning); limitations in social activities because of physical or emotional problems (social functioning); limitations in usual role activities because of physical health problems (role physical); bodily pain (BP); general mental health; limitations in usual role activities because of emotional problems (role emotional, RE); vitality (VT); and general health perception (GH).[41] A self-report version for measuring health status and outcomes from the patient's perspective was used. The Japanese version of the SF-36v2™ has been validated for Japanese subjects aged 15 years or older.[42]

Neuropsychological assessment

A battery of neuropsychological tests was administered to all subjects to assess the relationship between cognitive dysfunction and suicidality. The neuropsychological tests administered in this study and their cognitive domains were as follows: Wisconsin Card Sorting Test (WCST), executive function; Auditory Verbal Learning Test (AVLT), verbal learning and memory; Word Fluency Test (WFT), verbal fluency; Trail Making Test (TMT), visual-motor processing and motor speed; Stroop Test, response inhibition and selective attention. For the WCST, the computerized Japanese Keio University version was used. The category of achievement (CA) and two types of perseverative errors (Nelson and Milner) were assessed. The TMT had two parts. In part A (TMT-A), the subjects were required to draw lines to connect the circles numbered 1–25 in ascending order. In part B (TMT-B), the subjects were required to draw lines to connect between the circles numbered 1–13 and 12 hiragana (Japanese syllabary order) alternately in ascending order. In the AVLT, the subjects were required to learn a ten item word list over four trials (trials 1–4) and were then assessed 30 minutes later (trial 5). The number of recall words in trial 1 was used as an indication of the immediate recall. The result of trial 5 indicated delayed recall. This battery was described in our previous study.[43]

Statistical analysis

Descriptive statistics were provided regarding demographic data and were subjected to an analysis of variance (ANOVA), the Fisher's exact tests, and the Kruskal–Wallis test. For analyses of self-assessment scales and neuropsychological assessment data, ANOVA and Tukey's honest significant difference (HSD) test as post hoc analyses were applied.

A significance level of $P<0.05$ was selected for the ANOVA, Fisher's exact test, and Kruskal–Wallis test. Bonferroni's correction was not applied because of the small sample size. All data were analyzed using SPSS version 21.0 (IBM Corporation, Armonk, NY, USA).

Results

Demographic data

Demographic data are presented in Table 1. The mean age and the ratio of female to male subjects between three groups were not significantly different. The medical history of psychiatry, the family history of psychiatric illness, and the family history of suicide were not significantly different. The rate of psychiatric comorbidities in the MDEs with suicide risk group was significantly higher than that in the MDEs without

Table 1 Demographic data

	HCs	MDEs without suicidal risk	MDEs with suicidal risk
N	15	15	15
Age, mean ± standard deviation[a]	20.9±1.9	21.7±2.4	22.3±3.3
Sex, female/male[b]	5/10	4/11	7/8
Medical history of psychiatric disorders[b]	0	2	2
Family history of psychiatric disorders[b]	0	0	3
Family history of suicide[b]	0	1	1
History of suicide attempt[b]	0	1	1
Comorbidity[c,*]			
PD	0	1	2
SAD	0	2	3
GAD	0	0	2
BN	0	1	1
BDI-II, #9, Suicidality[d,*]			
0	13	6	0
1	2	9	9
2	0	0	4
3	0	0	2

Notes: [a]ANOVA, ns; [b]Fisher's exact test, ns; [c]Fisher's exact test, $P<0.05$; [d]Kruskal–Wallis test, $P<0.01$. *Statistically significant. #9 refers to suicidal thoughts.
Abbreviations: HC, healthy control; MDE, major depressive episode group; PD, panic disorder; SAD, social anxiety disorder; GAD, generalized anxiety disorder; BN, bulimia nervosa; BDI-II, Beck Depression Inventory, edition two; ns, not significant.

Table 2 Comparison of depressive symptoms, psychological assessment score, neuropsychological test score and SF-36v2 score by ANOVA

	HCs (1)	MDEs without suicide risk (2)	MDEs with suicide risk (3)	*F*	*P*-value	Tukey's HSD test		
	Mean (SD)	Mean (SD)	Mean (SD)			(1) vs (3)	(1) vs (2)	(2) vs (3)
BDI-II	7.1 (5.7)	29.5 (7.0)	32.6 (8.0)	68.2	<0.001	<0.001	<0.001	ns
BHS	7.1 (4.7)	14 (3.3)	14.4 (4.0)	15.3	<0.001	<0.001	<0.001	ns
RSES	34.5 (7.8)	24.8 (6.9)	19.9 (5.4)	19.7	<0.001	<0.001	0.001	<0.05
JART50	107.1 (5.5)	109.3 (4.9)	112.7 (5.0)	3.7	<0.05	<0.05	ns	ns
WCST, CA	5.8 (0.4)	5.5 (0.5)	5.9 (0.4)	2.5	ns			
AVLT, IR	5.6 (1.1)	6.0 (1.2)	5.8 (1.7)	0.6	ns			
AVLT, DR	8.1 (1.2)	7.8 (1.6)	8.5 (1.5)	0.5	ns			
Stroop	4.6 (2.7)	4.5 (3.4)	5.5 (4.0)	0.5	ns			
TMT, A	54.8 (10.4)	64.6 (8.4)	61.2 (18.2)	3.5	<0.05	ns	<0.05	ns
TMT, B	58.9 (11.3)	73.0 (16.4)	63.8 (20.4)	3.7	<0.05	ns	<0.05	ns
WFT	29.1 (6.9)	30.8 (10.3)	32.8 (13.9)	0.6	ns			
SF-36v2								
PF	57.3 (1.9)	50.2 (7.3)	49.5 (8.0)	7.0	<0.01	<0.01	<0.05	ns
RP	45.5 (9.1)	31.6 (18.5)	31.6 (17.6)	4.7	0.001	<0.05	<0.05	ns
BP	47.8 (9.0)	49.1 (10.5)	47.3 (10.8)	0.0	ns			
GH	53.1 (7.4)	43.6 (4.1)	43.4 (5.5)	13.3	<0.001	<0.001	<0.001	ns
VT	48.5 (8.4)	30.1 (5.1)	29.1 (7.2)	36.6	<0.001	<0.001	<0.001	ns
SF	50.6 (11.0)	34.1 (12.4)	27.6 (11.0)	20.6	<0.001	<0.001	<0.001	<0.05
RE	42.7 (15.3)	16.3 (6.3)	16.0 (9.7)	31.0	<0.001	<0.001	<0.001	ns
MH	49.1 (8.4)	29.8 (4.2)	25.5 (7.2)	49.5	<0.001	<0.001	<0.001	ns

Abbreviations: HC, healthy controls; MDE, major depressive episode; BDI-II, Beck Depression Inventory, edition two; BHS, Beck Hopelessness Scale; RSES, Rosenberg's Self-Esteem Scale; JART, Japanese Adult Reading Test; WCST, Wisconsin Card Sorting Test; CA, category achievement; AVLT, Auditory Verbal Learning Test; IR, immediate recall; DR, delayed recall; TMT, Trail Making Test; WFT, Word Fluency Test; SF-36v2, Medical Outcomes Study 36-item short-form health survey version 2; PF, physical functioning; RP, role physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role emotional; MH, mental health; ANOVA, analysis of variance; HSD, honest significant difference; SD, standard deviation; vs, versus; ns, not significant.

suicide risk group (Fisher's exact test, $P<0.05$). Moreover, we confirmed that the distribution of the scores on the BDI for the ninth item, which assessed suicidal thoughts, was significantly different among the healthy controls, the MDEs with suicide risk group, and the MDEs without suicide risk group (Kruskal–Wallis test, $P<0.001$).

Self-report data

The results of self-assessment scale scores are presented in Table 2. The mean BDI-II scores, BHS scores, and RSES scores were compared among the three groups (Table 2). The results of ANOVA revealed significant effects on BDI-II scores ($F[2,42]=68.2$, $P<0.001$), BHS scores ($F[2,42]=15.3$, $P<0.001$), and RSES scores ($F[2,42]=19.7$, $P<0.001$). A post hoc analysis using the Tukey's HSD test was performed. Although both the MDEs with suicide risk group and the MDEs without suicide risk group had significantly higher BDI-II scores ($P<0.001$) and BHS scores ($P<0.001$) than did the healthy controls, no significant difference was found between the MDEs without suicide risk group and the MDEs with suicide risk group. The RSES score of the MDEs with suicide risk group was significantly lower than the scores for the healthy controls ($P<0.001$) and the MDEs without suicide risk group ($P<0.05$), which was lower than that of the healthy controls.

The mean SF-36v2 subscale scores, except BP, were significantly lower in the MDEs with and without suicide risk groups than in the healthy controls. Only the mean social functioning score in the SF-36v2 of the MDEs with suicide risk group was significantly lower than that of the MDEs without suicide risk group ($P<0.05$).

Cognitive functions

The mean TMT-A score and TMT-B score were significantly higher (ie, worse) in the MDEs without suicide risk group than in healthy controls. However, no significant differences in the means of the TMT-A and TMT-B scores were observed between the MDEs with suicide risk group and healthy controls. Furthermore, no significant differences were observed in the WCST CA scores, AVLT scores, Stroop scores, or WFT scores between healthy controls, the MDEs without suicide risk group, and the MDEs with suicide risk group.

Discussion

The main finding of the present study was that the MDEs of MDD with suicide risk group had lower self-esteem than the

MDEs of MDD without suicide risk group, and each group had the same degree of severity of depression. Rosenberg described self-esteem as a global concept of the self and a sense of worth or value, but not as possession or accumulation of specific qualities or abilities.[38] Low self-esteem implies self-rejection, self-dissatisfaction, and self-contempt.[38] In a previous study, self-esteem was negatively associated with suicidal ideation after controlling for depression and hopelessness in psychiatric outpatients.[44] Moreover, a negative relationship was found between the level of suicidality and self-esteem in university undergraduates.[45] It is not surprising that individuals who lack respect for themselves would have suicidal ideation tendencies.

The deterioration in mean social functioning scores was found in MDE of MDD patients with suicide risk in the present study. The low social functioning score indicates extreme and frequent interference with normal social activities due to physical and emotional problems. Normal social activities require good relationships with others, such as colleagues, friends, and family. Previous studies reported poorer quality of life in MDD patients compared with controls.[46] Suicidal ideation was also reportedly correlated with low quality of life, specifically with respect to BP.[47] However, the association between suicide risk and low social functioning scores on the SF-36v2 has not been previously reported.

In our previous study, we reported that immature character profiles with low self-directedness and/or low cooperativeness on the TCI would have a strong impact on the prevalence of depressive episodes and ideas of suicide or self-harm among young adult populations.[28] Self-esteem and the ability to accept one's limitations are crucial aspects of the development of mature self-directedness. In addition, cooperative individuals are described as socially tolerant, empathic, helpful, and compassionate.[48] Taken together, the association of low self-esteem and low social functioning with suicide risk appears to be consistent with and supportive of the results of our previous study.[28]

One of the limitations of this study was the small sample size (n=15 per group), as a small sample size decreases the statistical power. The main reason for this small sample size was the difficulty with administering the neuropsychological battery to large numbers of moderate to severe unmedicated depressive patients. The observational, cross-sectional study design was another limitation of this study, as it does not allow us to evaluate the outcome of suicide risk.

In conclusion, self-esteem and social functioning may play important roles in suicide risk of young adult unmedicated patients with MDEs of MDD.

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