Assessment of Depressive Tendency, Coping Strategies, and Type D Personality in Japanese Patients with Coronary Artery Disease

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Background : Type D personality, characterized by social inhibition and negative affectivity, is a psychological risk of coronary artery disease (CAD). This study aims to identify self-ratings of depression and its associations with coping strategies, Type D personality, and with sociodemographic or clinical factors among Japanese patients with CAD.

Methods : Participants were CAD patients who underwent percutaneous coronary intervention. The Zung Self-Rating Depression Scale, the Type D Personality Scale, and the Tri-axial Coping Scale 24 were used to survey the presence of depressive tendency, Type D personality, and type of coping strategy, respectively. Logistic regression analysis was performed to identify characteristics associated with depressive tendency.

Results : Among 100 respondents who returned fully completed questionnaires (effective response rate : 92.6 %), 59 were found to be depressed, and 44 presented with Type D personality. The self-ratings of depression were significantly associated with Type D personality (odds ratio [OR] = 2.78, 95 % confidence interval [CI] [1.06, 7.24], P = 0.037), and inversely associated with full-time work (OR = 0.23, 95 % CI [0.08, 0.64], P = 0.005). Analysis of the types of coping strategy revealed that abandonment or resignation coping style was significantly associated with depressive tendency (OR = 1.33, 95 % CI [1.07, 1.65], P = 0.010).

Conclusions : CAD patients with higher depressive tendency are significantly more likely to display a Type D personality, to employ abandonment or resignation coping strategies, and are less likely to be in full-time employment. Employment of strategies to prevent negative coping behavior could be beneficial to prevent future depressive tendency in CAD patients with Type D personality. *Shinshu Med J 68 : 97—105, 2020*

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I Introduction

The Global Burden of Disease Study has demonstrated that cardiovascular diseases are leading causes of death in the world[1] and also in Japan[2]. Coronary artery disease (CAD), a mainstay of atherosclerotic cardiovascular disease, could be attributed in Japan to the westernization of lifestyles, an in-creasingly high-stress society, a super-aging population, and the work-centered way of life. While strategies for percutaneous coronary intervention (PCI) have been established, interventions for psychosocial stress and illness are still needed to prevent further major cardiovascular events in patients with CAD. The prevalence of depression is strikingly higher among patients with acute myocardial infarction (45 %) than among the general population (2-3 % in males, 5-9 % in females)[3][4]. Importantly, the mortality rate after two years among depressive CAD patients has been twice as high as non-depressed CAD patients[5].

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Personality types have been linked to CAD as follows : Type A personality, which is characterized by hostility, i.e., anger and animosity, has been associated with greater vulnerability to CAD[6)7)]. Type D personality, characterized by social inhibition and negative affectivity[8)], has been also associated with psychological CAD risks. In fact, approximately 76 % of CAD patients with the Type D personality have experienced significant anxiety and depressive symptoms[9)], suggesting proneness to psychological stress[10)], and thus having higher mortality rates when compared to non-Type D CAD patients[8)].

CAD patients may be further stressed after discharge because of increased medical supervisions with multiple medications, diet restrictions, and especially with concerns over the risk for a secondary cardiovascular event[11)]. These stressors can reduce the physical and psychological quality of life, and increase the risk of depressive tendency. It has been demonstrated that an increase in depression in CAD patients is correlated with negative coping strategies[12)]. Although it has been suggested that avoidance-oriented coping is associated with depressive symptoms soon after the onset of acute coronary syndrome, the details are not clear[9)]. A key intervention for mental health care is to instruct in specific positive coping strategies, thereby improving an individual's cognitive and behavioral practices to reduce stressors[13)].

Currently, however, there is little data from Japan as to specific types of coping strategies and/or types of personalities, which are associated with depression in CAD patients. This study therefore aims to examine depressive tendency and its relationships between coping strategies and Type D personality in Japanese CAD patients. The findings are expected to support mental care instructions to prevent depression and adverse cardiovascular outcomes in Japanese CAD patients.

II Materials and Methods

A Participants and procedure

Participants were inpatients who underwent PCI at Shinshu University Hospital. The day following PCI, patients who consented to participate were asked to anonymously complete the survey questionnaires. The exclusion criteria were as follows : (1) decompensated heart failure ; (2) prior history of myocardial infarction (excluded owing to possible depression following the previous infarction episode[3)4)]) ; (3) prior history of cognitive impairment ; (4) inability to communicate verbally ; (5) inability to complete the survey questionnaire ; (6) the patient's consent could not be obtained ; and (7) severely diseased patients who were not able to participate in this study. The data collection period was July 2016 to June 2017.

B Data collection

1 Sociodemographic and other characteristics

A range of data were collected : age, gender, presence/absence of employment, co-residents, smoker/non-smoker, presence/absence of cardiovascular risk factors (e.g., hyperlipidemia, hypertension, diabetes, body mass index), and type of CAD.

2 Type D personality

The Japanese version[14)] of the Type D Personality Scale developed by Denollet[15)] was utilized. The reliability and validity of this 14-item, two-factor scale (negative affectivity [Cronbach's α=.799] and social inhibition [Cronbach's α=.826]) have been verified[14)]. For each item, responses are made on a 5-point scale (0=*false* ; 1=*rather false* ; 2=*neutral* ; 3 =*rather true* ; and 4=*true*). Scores of 10 or higher on both subscales denote a tendency toward Type D personality. The Cronbach's α coefficients of the subscales in this study were .829.

3 Coping strategy

The Tri-Axial Coping Scale 24 (TAC-24) developed by Kamimura et al[16)] was utilized. This scale assesses how an individual facing psychologically stressful circumstances thinks and behaves about surmounting those circumstances. This scale comprises eight subscales and 24 items. The reliability (Cronbach's α=.65-.84) and validity have been verified[16)]. Each item is rated on a scale of 1-5 (1=*I've never done this,* 2=*I've very seldom done this,* 3= *I've done this several times,* 4=*I've frequently done this,* and 5=*I've always done this*). Higher scores indicate more likely to be performed. The Cron-

bach's α coefficient in this study was .813.

4　Depressive tendency

The Japanese version[17)] of the Zung Self-Rating Depression Scale (SDS), developed by Zung[18)], was utilized in this study. The reliability and validity of this scale have been verified. This scale comprises 20 items rated on a scale of 1-4 (1 = *a little of the time,* 2 = *some of the time,* 3 = *a good part of the time,* and 4 = *most of the time*). A total score of 40 or more on all 20 items indicates depressive tendency. The Cronbach's α coefficient for this study was .715.

C　Data analysis

Associations between depression, sociodemographic, and health characteristics, Type D personality, and all eight TAC-24 subscales were assessed via a two-sample test, a chi-squared test, and Spearman's rank correlation coefficient. As the presence/absence of employment was divided into three variables, the chi-squared test for comparison was used and corrected for the multiple comparisons using Bonferroni's method. Multiple logistic regression analyses were performed to identify factors associated with depressive tendency. Independent variables were age, gender and factors that were p<0.1 in univariate analysis. To clarify the characteristics of the coping strategies of patients with Type D personality, a comparative analysis of TAC-24 subscale scores between patients with and without a Type D personality was conducted using the Mann-Whitney U test. The significance level was set at 5 %, and all analyses were performed with SPSS Statistics 24.0 for Windows (IBM Corp., Armonk, NY).

D　Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki. The protocol of this study was approved by the Medical Ethics Committee of Shinshu University School of Medicine (No. 3428).

Ⅲ　Results

The design and protocol of this study were explained to 115 eligible patients, and then 108 patients consented to participate. The survey questionnaires were returned from all participants (response rate : 100 %) ; however, eight questionnaires were excluded because of the incomplete response to essential values. The remaining 100 questionnaires were analyzed (effective response rate : 92.6 %).

A　Descriptive statistics

Participants' median age was 66.0 (quartiles : 58.0, 72.0). Sixty-four of the participants were employed : 55 full-time and 9 part-time. Forty-four (44.0 %) of the participants presented with a Type D personality and 59 participants reached the criteria for depressive tendency. **Table 1** shows the distribution of all sociodemographic and health characteristics.

Table 2 shows the descriptive statistics for the Type D Personality Scale, TAC-24 subscale scores, and SDS scores. The median score of the Type D Personality Scale was 23.0 (quartiles : 16.3, 30.0), while that of the SDS was 41.0 (quartiles : 35.0, 47.8).

B　Comparison of coping strategies between patients with and without Depressive tendency

Table 3 shows comparisons of the sociodemographic and health characteristics between the patients with and without depressive tendency. Patients with depressive tendency had significantly higher Type D personality scores (p = .004) than those without depressive tendency. Significantly larger population of patients without depressive tendency were full-time employee (p=.009) than those with depressive tendency.

Table 4 shows comparisons of the TAC-24 subscale scores between the patients with and without depressive tendency. Patients with depressive tendency had significantly higher scores on abandonment or resignation and responsibility shifting (p = .001 and .035, respectively) than those without depressive tendency. Meanwhile, participants with non-depressive tendencies had higher scores (p = .010) on planning.

The independent variables selected for the binomial logistic regression analysis included presence/absence of Type D personality, abandonment or resignation, planning, responsibility shifting, BMI and full-time work (**Table 3, 4**). For the TAC-24 subscales, the total score of each item was entered. The chi-square statistic of the model was significant (p<.01), and the Hosmer-Lemeshow test was p<.627. The discriminant predictive value was 74.0 %. The most notable

Table 1 Sociodemographic and other characteristics

	Median (Interquartile range)	n
Age (years)	66.0 (58.0, 72.0)	
30–39		3
40–49		6
50–59		22
60–69		37
70–79		32
Sex		
Male		88
Female		12
Living		
With family		89
Alone		11
Employment		
Full-time work		55
Part-time work		9
Unemployed/retired		36
Type of coronary artery disease		
Acute myocardial infarction		39
Angina pectoris		61
Unstable angina pectoris		12
Stable angina pectoris		49
Clinical variables		
Smoking		32
Hypertension		60
Dyslipidemia		71
Diabetes mellitus		33
Body mass index	24.2 (21.6, 26.8)	
Body mass index≧25		39
Type D personality		44
Depressive tendency		59

relationship was observed inversely between depressive tendency and full-time work (OR = 0.23, 95 % CI [0.08, 0.64]). We also found significant correlations between depressive tendency and Type D personality (OR : 2.78, 95 % CI [1.06, 7.24]) and between depressive tendency and abandonment or resignation (OR = 1.33, 95 % CI [1.07, 1.65]) (**Table 5**).

C Comparison of coping strategies between patients with and without Type D personality

Table 6 shows comparisons of the TAC-24 subscale scores between the patients with and without Type D personality. Patients with the Type D personality

had significantly higher scores on abandonment or resignation and responsibility shifting subscales (p = .002 and .010, respectively) than those with non-Type-D personalities. In contrast, participants with non-Type-D personalities had higher scores (p = .004) on positive interpretation.

Ⅳ Discussion

Among 100 CAD patients in this study, 59 patients (59 %) reached the criteria for depressive tendency, as measured by the SDS. This value was high as compared with the global prevalence of depressive

Table 2　Descriptive statistics for Type D personality, coping strategy, and depressive tendency

	Scoring range	Median (Interquartile range)
Type D personality scale	0–56	23.0 (16.3, 30.0)
Negative affectivity	0–28	11.0 (6.0, 14.8)
Social inhibition	0–28	13.0 (9.0, 17.0)
Subscales of the Tri-Axial Coping Scale 24		
Catharsis	3–15	8.0 (6.3, 11.0)
Abandonment / Resignation	3–15	7.0 (6.0, 9.0)
Information gathering	3–15	9.0 (7.0, 11.0)
Distraction	3–15	8.0 (7.0, 10.0)
Evasive thinking	3–15	9.0 (7.0, 10.0)
Positive interpretation	3–15	10.0 (9.0, 13.0)
Planning	3–15	10.0 (8.3, 12.0)
Responsibility shifting	3–15	4.0 (3.0, 6.0)
Zung self-rating depression scale	20–80	41.0 (35.0, 47.8)

Table 3　Differences in characteristics between patients with and without depressive tendency

	With depressive tendency	Without depressive tendency	t or χ^2	p
n	59	41		
Age, mean (SD)	61.8 (9.4)	65.0 (10.7)	t = − 1.530	0.129
Sex, n (%)				
Male	51 (86.4)	37 (90.2)	$\chi^2 = 0.331$	0.565
Female	8 (13.6)	4 (0.8)		
Living, n (%)				
With family	52 (88.1)	38 (92.7)	$\chi^2 = 0.556$	0.456
Alone	7 (11.9)	3 (7.3)		
Employment, n (%)				
Full-time work	26 (44.1)	29 (70.7)		
Part-time work	6 (10.2)	3 (7.3)	$\chi^2 = 6.878$	0.009
Unemployed/retired	27 (45.7)	9 (22.0)		
Type of coronary artery disease, n (%)				
Acute myocardial infarction	23 (39.0)	16 (39.0)	$\chi^2 = 0.000$	0.997
Angina pectoris	36 (61.0)	25 (61.0)		
Clinical variables, n (%)				
Smoking	18 (30.5)	14 (34.2)	$\chi^2 = 0.147$	0.701
Hypertension	37 (62.7)	23 (56.1)	$\chi^2 = 0.441$	0.507
Dyslipidemia	42 (71.2)	34 (82.9)	$\chi^2 = 1.828$	0.176
Diabetes mellitus	19 (32.2)	14 (34.1)	$\chi^2 = 0.041$	0.859
Body mass index, mean (SD)	25.5 (4.07)	24.0 (4.35)	t = 1.712	0.090
Personality, n (%)				
Type D	33 (55.9)	11 (26.8)	$\chi^2 = 8.315$	0.004
Non-Type D	26 (44.1)	30 (73.2)		

Table 4　Differences in subscale scores of the Tri-Axial Coping Scale 24 between patients with and without depressive tendency

	With depressive tendency	Without depressive tendency	p
n	59	41	
Catharsis	8.0 (6.0, 11.0)	9.0 (6.5, 11.0)	.554
Abandonment / Resignation	8.0 (6.0, 9.0)	6.0 (4.0, 8.0)	.001
Information gathering	8.0 (7.0, 10.0)	9.0 (8.0, 12.0)	.099
Distraction	8.0 (7.0, 10.0)	8.0 (7.0, 10.0)	.581
Evasive thinking	9.0 (7.0, 10.0)	8.0 (7.0, 10.5)	.798
Positive interpretation	10.0 (9.0, 13.0)	10.0 (9.0, 14.0)	.371
Planning	10.0 (8.0, 12.0)	11.0 (9.0, 14.0)	.010
Responsibility shifting	5.0 (3.0, 6.0)	4.0 (3.0, 5.0)	.035

Data are shown as median (interquartile range) and analyzed by the Mann-Whitney U test.

Table 5　Characteristics associated with depressive tendency

	Univariable			Multivariable		
	OR	95 %CI	p	OR	95 %CI	p
Type D personality	3.46	1.46 – 8.19	.005	2.78	1.06 – 7.24	.037
Subscales of coping strategy						
Catharsis	0.96	0.84 – 1.09	.958			
Abandonment / Resignation	1.36	1.12 – 1.65	.002	1.33	1.07 – 1.65	.010
Information gathering	0.89	0.78 – 1.03	.107			
Distraction	0.97	0.82 – 1.14	.688			
Evasive thinking	1.04	0.89 – 1.21	.614			
Positive interpretation	0.93	0.81 – 1.07	.319			
Planning	0.82	0.71 – 0.96	.012			
Responsibility shifting	1.37	1.05 – 1.80	.021			
Age	1.03	0.99 – 1.07	.131			
Sex	1.45	0.41 – 5.18	.566			
Full-time work	0.30	0.12 – 0.75	.010	0.23	0.08 – 0.64	.005
Part-time work	0.67	0.14 – 3.23	.615			
Living with family	0.59	0.14 – 2.42	.460			
Acute myocardial infarction	0.99	0.44 – 2.26	.997			

Table 6　Differences in subscale scores of the Tri-Axial Coping Scale 24 between patients with Type D and non-Type D personality

	Type D	Non-Type D	p
n	44	56	
Catharsis	8.0 (7.0, 11.8)	8.0 (6.0, 11.0)	.489
Abandonment / Resignation	8.0 (6.3, 9.0)	6.0 (5.0, 8.0)	.002
Information gathering	9.0 (7.0, 11.0)	9.0 (7.0, 12.0)	.680
Distraction	9.0 (6.3, 10.0)	8.0 (7.0, 10.0)	.535
Evasive thinking	9.0 (7.0, 10.8)	8.0 (7.0, 9.8)	.129
Positive interpretation	10.0 (8.0, 12.0)	11.5 (9.0, 14.0)	.004
Planning	9.5 (8.0, 11.8)	11.0 (9.0, 13.0)	.050
Responsibility shifting	5.0 (3.0, 6.8)	4.0 (3.0, 5.0)	.010

Data are shown as median (interquartile range) and analyzed by the Mann-Whitney U test.

tendency : approximately 45% among CAD patients[3)4)19]. The presence of depressive tendency in CAD patients was significantly correlated with Type D personality and abandonment or resignation coping strategy, and inversely related with full-time employment.

The association observed in this study between depressive tendency in CAD patients and Type D personality was consistent with a previous report[20]. Since Type D personality is a stable personality category that undergoes minimal change[21], it tends to enhance the risk of depressive tendency in CAD patients. Type D patients had a higher frequency of stressful life events and had more mental disorders, including depression and anxiety disorders, than non-Type D patients[22]. Type D personality has been associated with symptoms linked to stress[23], which could result in the development of depression. In fact, the risk of depression in patients with a Type D personality increases by 3.69 times after a 10-year period[24]. Importantly, 44 % of CAD patients in this study presented with the Type D personality, indicating a substantial need for CAD patients to be screened for the Type D personality, as they are more likely to develop depressive tendency subsequently.

Abandonment or resignation, a negative coping strategy, was also associated with depressive tendency in CAD patients in this study. In addition, patients with the Type D personality, compared with those with non-Type D personalities, resorted more frequently to abandonment or resignation, and less frequently to the positive interpretation strategy. It has been reported that depressive tendency in CAD patients is correlated with negative coping strategies, and inversely related with positive coping strategies[9]. In addition, cardiac rehabilitation patients with perfectionistic Type D personality are likely to have maladaptive coping[25]. The abandonment or resignation strategy provides a temporal escape from psychosocial stressors, but does not change reality or resolve stressors. This negative coping, over time, possibly leads to a vulnerability to depression[12]. According to a recent report on patients engaging in cardiac reha-

bilitation, stress management training with coping instructions has produced significant reductions in stress and greater improvements in medical outcomes[26]. These results, taken together, suggest that positive coping strategies are beneficial for CAD patients with the Type D personality.

A prospective study has shown that unemployment status among outpatients with cardiovascular diseases was independently associated with depression and the risk of major cardiovascular outcomes[27]. In accordance with the previous study, the present study indicated that full-time work was inversely associated with depressive tendency. Mental health care should therefore focus predominantly on part time workers and/or unemployed and retired patients. The possible protection against depressive tendency among full-time workers can be explained, at least in part, by their opportunities for annual health screening, which has been required by the Japan's Industrial Safety and Health Law[28]. Moreover, enterprises with 50 or more employees are required to employ a physician specializing in occupational health and safety, perform stress check-ups, and carry out interviews with workers whenever necessary. Despite the presence of these occupational health interventions, patients do not always recognize and take care of their mental burdens. Particularly, in the case of patients at the onset of acute coronary syndrome, the emergent PCI and major cardiovascular burdens can be overwhelming, and thus, assessment and interventions for mental stressors are often delayed and insufficient. Hence, mental health assessment and optimal interventions should be timely and sufficiently provided to CAD patients before discharge.

Based on the results of this study, mental health screening and identification of the Type D personality in CAD patients would be warranted to prevent the development of depressive tendency. Patients with the Type D personality are potential candidates who should receive positive coping instructions to cope with stressors. Post-discharge mental health care should also focus predominantly on part-time workers and/or unemployed and retired patients. Future longitudinal studies are expected to determine effec-

tive coping strategies that CAD patients could independently practice in their daily lives to prevent depression.

Limitations

This study has some limitations. First, a single-center, cross-sectional study could not elucidate causal relationships between types of personalities, depressive tendency, and coping strategies. Second, there could be sampling biases due to the small population of females and part-time workers. Third, the presence of depressive tendency was based on the SDS score of 40 or more, but not on clinical diagnosis by psychiatrists.

Conclusions

The prevalence of depressive tendency among Japanese CAD patients in this study was 59 %, and the Type D personality was 44 %. Depressive tendency was significantly correlated with Type D personality and abandonment or resignation coping strategy, and inversely correlated with full-time work. In contrast to patients with non-Type D personalities, patients with the Type D personality were more prone to use the abandonment or resignation strategy. Assessment of personality types and improvement of coping strategies could suggest preventing the development and/or progression of depressive tendency in CAD patients with Type D personality.

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