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Original Article

The Relationship Between Mindfulness and Depression in Community-Dwelling Frail Elderly

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SUMMARY

Background: Mindfulness meditation is important in the field of mental health worldwide. In Japan, there is an urgent need to develop a depression prevention program for community-dwelling elderly people. The objective of the present study was to examine which mindfulness traits are associated with depressive symptoms among community-dwelling frail elderly.

Methods: A cross-sectional study of 82 Japanese frail elderly individuals aged ≥ 65 years living in a local city was conducted between December 2015 and March 2016. Participants completed a questionnaire survey that included items on age, sex, family structure, self-rated health, depression, and mindfulness traits. Mindfulness traits were measured with the Five Facet Mindfulness Questionnaire (FFMQ), which is composed of the five facets of "observing", "describing", "acting with awareness", "non-judging", and "non-reacting". Depressive symptoms were assessed using the Geriatric Depression Scale-15 (GDS-15) and participants were categorized as "with depressive symptoms" (GDS-15 ≥ 5) or "without depressive symptoms" (GDS-15 < 5). A multiple logistic regression model was used to elucidate which variables, including each facet of the FFMQ, were independently associated with depressive symptoms.

Results: Among the 82 participants, 32 (39%) had depressive symptoms. Multiple logistic analysis showed that poor self-rated health (odds ratio [OR], 10.28; 95% confidence interval [CI], 2.21-47.84; p = 0.003), a low score for "acting with awareness" (OR, 0.77; 95% CI, 0.64-0.94; p = 0.008), and a low score for "non-judging" (OR, 0.91; 95% CI, 0.84-0.99; p = 0.034) were independently associated with depressive symptoms.

Conclusion: The traits of "acting with awareness" and "non-judging" in mindfulness were associated with depression among community-dwelling frail elderly.

1. Introduction

Depression poses an important medical and public health problem in an aging society.[1] It is difficult to prescribe medication, such as minor tranquilizers and antidepressants, to elderly individuals with depressive symptoms because of the risk of adverse effects like falls.[2] Doctors sometimes fail to notice the symptoms of milder forms of depression in the elderly because elderly individuals tend to complain of physical symptoms rather than psychological symptoms.[2] The estimated prevalence of major depression and milder forms of depression in community-dwelling elderly are reported to be approximately 1.8% and 13.5%, respectively.[3] However, the true prevalence of milder forms of depression may be underestimated, and as many as one in four elderly aged ≥ 65 years may be affected by milder forms of depression.[4] Milder forms of depression contribute significantly to disability and suicidal ideation, and 20% of these cases progress to major depression.[5] Furthermore, frail elderly are at especially high risk of depression owing to decline of physical function, chronic disease,[6] sleeping disorder,[7] comorbidity, and social isolation.[4,8]

In 2006, the Japanese Ministry of Health, Labour and Welfare developed the "Kihon checklist" to screen for frail elderly individuals aged ≥ 65 years, and has been providing a preventive program for elderly individuals with risk of depression.[9] In 2013, however, Ukawa et al.[10] reported that effective and practical intervention methods for depression prevention have not been established, and thus, the development of an effective program to prevent depression in community-dwelling frail elderly is still required.

Recently, mindfulness practice using meditation skills has been used to promote mental health and to prevent depressive illness worldwide. A previous randomized controlled trial demonstrated that mindfulness meditation practice is beneficial in improving depressive symptoms and physical condition, such as chronic pain.[11–15] In 1979, Kabat-Zinn created a mindfulness-based stress reduction (MBSR) program that includes sitting meditation, body scans, mindful yoga, and walking meditations.[15,16] The MBSR program teaches participants to focus their attention using a series of meditative skills. Kabat-Zinn defined mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment".[16,17]

Kuyken et al.[18] conducted a randomized controlled trial with

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424 participants with depression and revealed that the time to relapse or recurrence of depressive disorder with mindfulness meditation was equal to that of antidepressants. Geiger et al.[19] reviewed 15 previous studies and reported that mindfulness-based intervention is a feasible and acceptable intervention for the physical and emotional wellbeing of older adults. Furthermore, Morone et al.[20] reported that a modified mindfulness program for frail elderly that incorporated meditation skills such as short-time sitting meditation, body scans and mindful yoga, was feasible and beneficial in preventing depression and for self-care of mental disorder in elderly individuals.

However, to our knowledge, few studies investigating the associations between depressive symptoms and mindfulness have focused on the frail elderly. Moreover, although mindfulness traits can be represented by the Five Facet Mindfulness Questionnaire (FFMQ),[21] the specific aspects of mindfulness that affect depressive symptoms are not clearly understood. Since mindfulness meditation skills are simple and easy, it is thought that elderly people can easily grasp how to meditate through this method.[17] In addition, although chronic pain and other uncomfortable physical and mental conditions are common among the elderly, it is possible that the benefits of mindfulness stress reduction can change the perception of the relationship between the mind and body through a fresh perspective, even though there is no direct change in the state of the body.[17] We postulated that the basic concept of mindfulness would be familiar to Japanese elderly because there is commonality with "zen", which is an ancient eastern tradition of mental concentration.[16] We therefore hypothesized that mindfulness would be associated with depression in Japanese elderly. To develop a depression prevention program for frail elderly individuals that incorporates mindfulness techniques, we first have to clarify the relationship between mindfulness traits and depressive symptoms. The objective of this study was to examine the relationship between mindfulness based on the FFMQ and depressive symptoms among community-dwelling frail elderly people.

2. Materials and methods

2.1. Procedures and participants

We conducted a questionnaire survey in the local city of Sasebo, Nagasaki Prefecture, Japan, using a cross-sectional study design. First, to recruit potential participants, the Japanese Ministry of Health, Labour, and Welfare's "Kihon checklist" was mailed to elderly individuals aged ≥ 65 years living in the area by the Sasebo municipal government. The "Kihon checklist", which comprises 25 yes/no questions,[9] was used to identify "frail elderly" individuals. A total of 123 potentially eligible individuals were invited to meet with a public health nurse involved in this study to confirm their eligibility for this study. The public health nurse collected data on basic attributes including age, sex, and family composition, and conducted a questionnaire survey between December 2015 and March 2016. None of the potential study participants were eligible for long-term care as defined by the government, but they were considered to be at high risk of requiring long-term care in the near future.[9] Participants who were unable to answer the questions due to cognitive problems (e.g., severe dementia) were excluded. Among the 123 potential study participants, 82 agreed to participate in the study (response rate, 66.7%) and underwent a questionnaire survey concerning mindfulness and mental health status including depressive symptoms and self-rated health. All questionnaire surveys were carried out in face-to-face interviews with the guidance of the public health nurse. No participants had previously experienced or practiced mindfulness meditation.

This study protocol was reviewed and approved by the Ethics Committee of Nagasaki University Graduate School of Biomedical Sciences before the survey was conducted. Informed consent was obtained from all individuals who participated in the study.

2.2. Measures

2.2.1. FFMQ

Mindfulness was measured with the FFMQ,[21] which has 39 items in total. The FFMQ is comprised of the following five facets that index various aspects of mindfulness: (1) "observing", e.g., When I'm walking, I deliberately notice the sensations of my body moving; (2) "describing", e.g., I'm good at finding words to describe my feelings; (3) "acting with awareness", e.g., It seems I am "running on automatic" without much awareness of what I'm doing; (4) "non-judging", e.g., I think some of my emotions are bad or inappropriate and I shouldn't feel them; and (5) "non-reacting", e.g., In difficult situations, I can pause without immediately reacting. Each of the five FFMQ facets is scored on a 5-point Likert scale and the total score ranges from 39–195. The "observing", "describing", "acting with awareness" and "non-judging" facets each have eight items (score range 8–40), and the "non-reacting" facet has seven items (score range 7–35). In all facets, higher scores indicate a higher degree of mindfulness. In the current study, the Japanese version of the FFMQ was used,[22] and Cronbach's α for each of the facets was 0.756 ("observing"), 0.881 ("describing"), 0.744 ("acting with awareness"), 0.932 ("non-judging"), and 0.871 ("non-reacting"), respectively.

2.2.2. Geriatric Depression Scale-15 (GDS-15)

Depressive symptoms were assessed using the Japanese version of the GDS-15.[23] Participants answered 15 dichotomized questions, and the answers were summed (score range 0–15). Cronbach's α in the present study was 0.84. A cutoff point of 5 was adopted in accordance with Almeida et al.[24] and participants were categorized as either "with depressive symptoms" (GDS-15 ≥ 5) or "without depressive symptoms" (GDS-15 < 5).

2.2.3. Self-rated health

Self-rated health was assessed by the question "How would you rate your current overall health". Participants answered on a 5-point Likert scale (1 = very good, 2 = good, 3 = intermediate, 4 = poor, and 5 = very poor), and were categorized as either "healthy" (responses of 1–2) or "non-healthy" (responses of 3–5).

2.3. Statistical analysis

Continuous variables including age, FFMQ score and GDS-15 score are expressed as mean and standard deviation (SD). Nominal scale data such as sex (male or female) and family structure (living alone or living with others), and ordinal scale data such as self-rated health are expressed as number and percentage. The number of participants with and without depressive symptoms was calculated with reference to the GDS-15 cut-off score of 5, and is expressed as number and percentage. The number of healthy and non-healthy participants was also calculated and is expressed as number and percentage.

The t-test and chi-square test were used to compare those "with depressive symptoms" and "without depressive symptoms" in terms of basic attributes, self-rated health and FFMQ score. Furthermore, multiple logistic regression analysis was performed to identify which

variables were independently associated with depressive symptoms, and odds ratios (ORs) with 95% CIs (confidence intervals) were calculated. Independent variables selected in the model were age, sex, family structure, self-rated health, and the score for each facet of the FFMQ.

All statistical analyses were performed using SPSS software, version 23.0 for Windows (IBM Japan).

3. Results

Table 1 summarizes the characteristics of the participants. Approximately 84% of the participants were women, and the mean (standard deviation [SD]) age was 79.3 (5.7) years old. The number of participants living alone was 26 (31.7%). Among the 82 participants, 32 (39%) had depressive symptoms. The mean GDS-15 (SD) score was 3.9 (3.6). Regarding self-rated health, 5 (6.1%) participants scored "very good", 26 (31.7%) "good", 30 (36.6%) "intermediate", 20 (24.4%) "poor", and 1 (1.2%) "very poor". Therefore, 51 participants (62.2%) were considered "non-healthy" with respect to self-rated health.

Table 2 shows a comparison of participants with depressive symptoms (n = 32) and those without depressive symptoms (n = 50) with respect to basic characteristics and FFMQ scores. The healthy group had a significantly lower prevalence of depressive symptoms compared to the non-healthy group ($p < 0.001$). Meanwhile, no significant associations were found with other basic attributes. Those without depressive symptoms had significantly higher scores in all FFMQ facets than those with depressive symptoms, except for "observing".

Table 3 shows the multiple logistic regression analysis results for those with depressive symptoms after adjusting for potential covariates. The results showed that poor self-rated health (OR, 10.28; 95%CI, 2.21-47.84; $p = 0.003$), a low score for "acting with awareness" (OR, 0.77; 95%CI, 0.64-0.94; $p = 0.008$), and a low score for "non-judging" (OR, 0.91; 95%CI, 0.84-0.99; $p = 0.034$) were independently associated with depressive symptoms, respectively.

Table 1
Characteristics of the participants (N = 82)

	N	%
Sex		
Male	13	15.9
Female	69	84.1
Family structure		
Living alone	26	31.7
Living with others	56	68.3
GDS-15, mean ± SD	3.9 ± 3.6	
With depressive symptoms (≥ 5)	32	39.0
Without depressive symptoms (< 5)	50	61.0
Self-rated health		
Very good	5	6.1
Good	26	31.7
Intermediate	30	36.6
Poor	20	24.4
Very poor	1	1.2

GSD-15: Geriatric Depression Scale-15; SD: standard deviation.

4. Discussion

We aimed to elucidate the associations between depression and mindfulness, and we compared mindfulness traits of Japanese frail elderly with and without depressive symptoms based on the FFMQ. Our results showed that those without depressive symptoms had significantly higher mindfulness scores for the FFMQ facets of "describing", "acting with awareness", "non-judging", and "non-reacting" than those with depressive symptoms. Furthermore, multiple logistic analyses also revealed that mindfulness represented by the traits of "acting with awareness" and "non-judging", and self-rated health were independently associated with depression. These results support the hypothesis that mindfulness is associated with depressive symptoms in Japanese frail elderly people.

Physical dysfunction, such as chronic pain, certainly influences self-rated health among frail elderly people,[25] and self-rated health is considered to involve both physical and psychological aspects.[26] Therefore, exercise programs such as Tai chi that intend to control physical functioning are reported to be effective in improving depressive mood among frail elderly people.[27,28] Notably, in our findings, certain mindfulness traits were independently related to depression, suggesting the utility of mindfulness meditation practice as psychotherapy (non-exercise therapy) for depression prevention. The facet of "acting with awareness" is considered to be attending

Table 2
Comparison of basic characteristics and mindfulness in participants with and without depressive symptoms

Variable	With depressive symptoms (n = 32)	Without depressive symptoms (n = 50)	p-value
	n (%)	n (%)	
Age (years), mean ± SD	80.1 ± 5.8	78.7 ± 5.6	0.295[a]
Sex			
Male	6 (18.8)	7 (14.0)	0.566[b]
Female	26 (81.3)	43 (86.0)	
Family structure			
Living alone	13 (40.6)	13 (26.0)	0.165[b]
Living with others	19 (59.4)	37 (74.0)	
Self-rated health			
Healthy	4 (12.5)	27 (54.0)	< 0.001[b]
Non-healthy	28 (87.5)	23 (46.0)	
FFMQ score, mean ± SD			
Total	115.4 ± 15.3	133.4 ± 17.4	< 0.001[a]
Observing	27.1 ± 6.1	28.2 ± 5.5	0.387[a]
Describing	21.1 ± 6.7	24.7 ± 5.8	0.012[a]
Acting with awareness	23.6 ± 3.7	27.9 ± 4.8	< 0.001[a]
Non-judging	22.0 ± 8.9	28.1 ± 8.2	0.002[b]
Non-reacting	21.6 ± 7.2	24.5 ± 5.8	0.047[b]

SD: standard deviation; FFMQ: Five Facet Mindfulness Questionnaire.
[a] t-test. [b] Chi-squared test.

Table 3
Independent predictors of depressive symptoms in Japanese frail elderly

Variable	OR	95% CI	p-value
Age	1.02	0.91–1.15	0.752
Sex (female = 0, male = 1)	2.66	0.52–13.71	0.243
Family structure (living with others = 0, living alone = 1)	2.90	0.78–10.82	0.113
Self-rated health (healthy = 0, non-healthy = 1)	10.28	2.21–47.84	0.003
FFMQ			
Observing	0.94	0.83–1.06	0.314
Describing	0.98	0.88–1.08	0.645
Acting with awareness	0.77	0.64–0.94	0.008
Non-judging	0.91	0.84–0.99	0.034
Non-reacting	1.02	0.92–1.13	0.766

OR: odds ratio; 95% CI: 95% confidence interval; FFMQ: Five Facet Mindfulness Questionnaire.

solely to the present moment, and the facet of "non-judging" is considered to be the ability to not evaluate the internal environment.[29] These two facets are central to the mindfulness philosophy, which is represented by the following definition, "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment".[16,17] Taken together, our finding of the association between mindfulness and depression suggests that learning the philosophy of mindfulness, as represented by the FFMQ, is important for preventing depression in frail elderly people.

Interestingly, humans feel the most happiness when they are not thinking about anything, even compared to when they are having fun.[30] "Mind wandering" is considered to be a shift in thoughts focusing on the external environment to internal thoughts and feelings.[31] People with depression are especially prone to rumination on negative automatic thoughts in this "mind wandering" state. In brief, wandering mind might lead to depressive symptoms in frail elderly people. In contrast, the state of mindfulness is highly concentrated, and mindfulness meditation practice is characterized by attentional control involving focusing on body sensations such as breathing. Our finding of the association between the FFMQ facet of "acting with awareness" and the GDS-15 especially indicates the usefulness of mindfulness meditation practice as a potential means of attentional control training among frail elderly people.

Many functional magnetic resonance imaging (fMRI) studies have examined the neural underpinnings of mind wandering.[31,32] The most consistent neural foundation of mind wandering is activity and functional connectivity in the default mode network (DMN), which is mainly composed of the medial prefrontal cortex, posterior cingulate cortex/precuneus, and bilateral inferior parietal lobule.[31] Some previous fMRI studies showed that DMN in the brain was related to self-referent thoughts, and that such activity increases when at rest.[33,34] Taylor et al.[34] showed that performing mindfulness meditation diminished activity in the medial prefrontal cortex and normalized the connectivity of DMN. In addition, Sato et al.[35] suggested that training using meditation increases the volume of the precuneal cortex and improves subjective happiness. Our finding that mindfulness was associated with depressive symptoms is consistent with these previous studies, suggesting the usefulness of meditation practice as training to regulate emotions when at rest among the frail elderly. The mechanism by which mindfulness meditation could be useful for depression prevention in frail elderly is described below. In daily life, cognitive tasks represented by the FFMQ's "act with awareness" cause a decline in self-referent thoughts represented by the FFMQ's "non-judging" because cognitive tasks and self-related memories are trade-off relationships.[36] In this study, the total FFMQ score, which represents the integrated concept of mindfulness, was significantly higher in people without depressive symptoms than in those with depressive symptoms. The are several training methods to improve cognitive tasks, but cognitive tasks in mindfulness meditation (i.e., approaches that pay attention to bodily sensations such as breathing) could effectively enhance the non-judging attitude.[17,37] Consequently, this may lead to a positive change in the perception of the association between physical and mental condition, which may in turn improve depression in frail elderly.

Clinically, cognitive behavioral therapy (CBT) is known to be effective in preventing depression in elderly people.[36] In conventional CBT, first, a feeling is "described" as it is. Then, in order to transform the feeling into more adapted behavior, the process between automatic negative thoughts and behaviors must be assessed.[5,38] It is thought that CBT could facilitate grasp of the objective view called "decentering" through its process evaluation. On the other hand, mindfulness promotes an objective manner of interpreting thoughts, events and emotions without elaborating or ruminating on their potential implications for the self.[39] In common with CBT, it is thought that learning the concept of decentering, which is represented by the FFMQ facet of "non-judging", could be effective for depression prevention in frail elderly people. Considering that CBT is hardly widespread in depression prevention programs among community-dwelling frail elderly people due to the lack of clinical psychologists,[40] mindfulness meditation practice would be worth trying as self-care to help renew mental health at the community level. In addition, mindfulness has the advantage of being part of the ancient Japanese culture of wisdom for adapting and mental concentration.

This study has several limitations. First, because of the nature of the cross-sectional study design, causal relationships could not be confirmed. Further research is needed to clarify the associations between depression and mindfulness by designing an intervention study. Second, confounding factors, such as economic status and medication use, were not included in this study. Medications for chronic illness such as antihypertensive drugs are commonly used by frail elderly, and such medications could also affect depressive symptoms. Third, since we did not assess anxiety symptoms in this study, further research is needed to investigate the relationship between mindfulness and anxiety among community-dwelling frail elderly. Finally, the results of the present study were obtained from a small sample size, so our findings should be interpreted with caution and cannot be fully generalized to other frail elderly in Japan or other areas. A large study including adjustment for possible confounding factors is also needed to confirm the present results.

The strength of this study is that it is the first to estimate the relationship between mindfulness and depression in frail elderly people. This is valuable since there is an urgent need to develop an effective intervention program to prevent depression in Japanese frail elderly. This study's importance lies in the major finding that frail elderly with a lower level of depressive symptoms have a higher level of mindfulness traits, especially "acting with awareness" and "non-judging" as represented by the FFMQ. The findings of this

study will serve as the first steps in designing depression prevention programs for frail elderly in Japan.

5. Conclusions

In summary, the present study demonstrated that mindfulness as represented by the FFMQ facets of "acting with awareness" and "non-judging" were independently associated with depression in Japanese community-dwelling frail elderly. We provided new and important findings to treat depressive symptoms in the frail elderly. We propose that incorporating mindfulness meditation techniques in future depression prevention programs would be useful and feasible for the frail elderly.

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Conflict of interest

No conflict of interest has been declared by the authors.

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