Relationship between Anxiety Concerning Dementia Onset and Subjective Memory Impairment in Frail Older Individuals

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Abstract

Introduction: This study aimed to clarify the relationship between anxiety about the possibility of developing dementia (dementia onset anxiety) and subjective memory impairment in frail older individuals who require long-term care and are experiencing declining cognitive function. ***Methods:*** This study included 30 frail older individuals requiring long-term care who completed the Everyday Memory Checklist (EMC), which was simultaneously performed by an occupational therapist (OT). Individuals were divided into two groups: with and without anxiety about dementia onset. We examined the relationship between the presence of anxiety about dementia onset and assessment scores on EMC by the individuals and by the OT. ***Results:*** Approximately 40% of participants expressed anxiety about developing dementia. No significant differences existed between the two groups in terms of age, sex, number of years of education, number of ongoing medical conditions under treatment, types of oral medications, Mini-Mental State-Japanese scores, and total functional independence measure scores. Self-assessed EMC scores by the individuals showed a significant difference between the two groups ($p = 0.012$, $\varphi = 0.41$), while no significant difference in the OT-assessed EMC scores. ***Conclusion:*** Despite similar levels of objective cognitive decline and objective everyday memory impairment, individuals with anxiety about developing dementia have more severe subjective memory impairment than those without such anxiety.

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Introduction

Japan is an aging society, with a rapid increase in the number of patients with dementia. In 2012, patients with dementia accounted for 15.0% of the older population, totaling 4.62 million individuals. By 2025, the prevalence of dementia is estimated to increase to 20% among older individuals, with approximately 7 million individuals, according to a report by the Ministry of Health, Labor and Welfare [1]. Therefore, there is an urgent need to establish measures for dementia, such as prevention, early detection, identification of the risk of dementia onset, dementia treatment, and progression prevention.

The most crucial primary symptom of dementia is memory impairment. In the early stages of dementia, cognitive functions, particularly memory functions, decline early [2]. Memory impairment in dementia screening examinations is objectively assessed through tests, including delayed recall, recognition, item naming,

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or memory tests, such as the Wechsler memory scale-revised test [3] and the Rivermead behavioral memory test [4]. However, in recent years, attention has been given to subjective cognitive decline (SCD) [5] or subjective memory impairment (SMI) [6, 7].

SCD neuropsychological testing is used to differentiate between Alzheimer's disease and cognitive decline, with reference to an individual's subjective experience of decline in cognitive function [5]. Meanwhile, SMI involves asking questions, such as, "Do they forget things he/she was told yesterday or a few days ago and have to be reminded of them?" to assess and score how individuals subjectively perceive their memory function in their daily lives. SMI is of interest because it may be a precursor symptom of a mild cognitive impairment [8–10]. Therefore, evaluating SMI could enable the consideration of dementia prevention and early intervention [11].

Among individuals with SMI, those who experience anxiety or worry about their condition have been reported to have a higher risk of transitioning to dementia than those who do not [12]. In Japan, dementia has become a prevalent condition; since most individuals experience occasional forgetfulness, it is often less reported than the more common physical illnesses with high incidence rates, such as cancer, stroke, and heart disease. Dementia is a condition with potentially elevated anxiety during onset. In our previous study, many older individuals expressed anxiety about developing dementia [13].

Individuals with a strong tendency toward anxiety often tend to perceive events in their daily lives negatively [14]. Therefore, individuals with high anxiety about developing dementia may be more likely to subjectively underestimate their memory function despite having comparable actual cognitive and memory functions than those without anxiety about dementia onset. Given the possibility that increased anxiety may increase dementia risk [12], it is important to communicate sensitively to those anxious about dementia that taking steps to mitigate that anxiety may reduce the risk of progression to dementia. This type of communication may help them consciously avoid underestimating their subjective cognitive function more than their objective memory impairment. However, the relationship between anxiety about dementia onset and SMI has not been thoroughly researched to date. Particularly, the relationship between anxiety about dementia onset and SMI has not been investigated in frail older individuals requiring long-term care with declining cognitive function who are not yet diagnosed with dementia.

Illness anxiety disorder, as introduced in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, as a novel diagnosis, refers to a condition where individuals are preoccupied with having a severe illness, experiencing pathological anxiety, and causing significant impairment in their daily lives. In this study, we focused on "individuals with anxiety about potentially developing dementia in the future," which has not reached the level of illness anxiety disorder. Thus, this study aimed to elucidate the relationship between anxiety about developing dementia and SMI in frail older individuals requiring long-term care with declining cognitive function.

Methods

Participants

This study included 30 frail older individuals who were institutionalized in a single long-term care health facility between January 2021 and March 2022. All participants provided consent for the study; if applicable, the informed consent was obtained from patient's legal guardians or healthcare proxies for all vulnerable participants both verbally and in writing. In this study, the term "frail older individuals" refers to people aged ≥65 years certified as requiring long-term care levels 1–5 under Japan's Long-Term Care Insurance Act. The inclusion criteria were individuals aged ≥65 years who completed a self-administered questionnaire or responded verbally to questions. The exclusion criteria were as follows: individuals with consciousness disorders, those who were diagnosed with dementia, those with depression, those who changed medication during the assessment period, those with changes in physical condition (e.g., fractures, pneumonia) during the assessment period, and those deemed unsuitable as participants by the authors for other reasons. Participants' attributes (sex, age, number of years of education after elementary school graduation, ongoing treatment for medical conditions, and number of medications) were obtained by reviewing the medical records upon admission.

Evaluation

Subjective Memory Impairment

SMI was assessed using the Japanese version of the Everyday Memory Checklist (EMC) [15, 16]. The EMC comprises 13 questions concerning issues that may occur in daily life owing to memory impairment, such as "Do you ever forget something told to you yesterday or a few days ago, and would you be incapable of remembering it unless told again?" "Have you ever forgotten when a certain event occurred?" and "Do you ever repeat a story or joke that you have already told?" Each question is rated

Table 1. EMC (Japanese version)

Does he/she
1   Forget things he/she was told yesterday or a few days ago and have to be reminded of them?
2   Forget where he/she had put something or lose things around the department?
3   Forget where things are normally kept or look for things in the wrong places?
4   Forget when something happened, for instance, whether it was yesterday or last week?
5   Forget to take things with him/her or leave things behind and have to go back for them?
6   Forget to do things he/she said he/she would do?
7   Forget important details of what he/she had done the day before?
8   Forget the names of people he/she has met before?
9   Forget details of what someone had said, confused?
10 Forget a story or joke he/she has told before?
11 Forget what he/she had already said, perhaps repeating what he/she had just said or saying, "What was I talking about"?
12 Getting lost on a journey or in a building where he/she has been before?
13 Forget what he/she was originally doing after becoming distracted by something else?

on a four-point scale ranging from 0 (never) to 3 (always). The total score ranges from 0 to 39, with higher scores indicating more severe SMI (Table 1). Participants were asked to either self-administer the survey or have an occupational therapist (OT) read the survey aloud and record their verbal responses or have them complete the written responses, depending on their condition. EMC assessment by the OT involved retaining the questionnaire, observing the individual's daily life, and entering relevant data into the questionnaire during the time frame of a normal working day (9:00 and 17:00) or outside regular working hours. Each participant was observed for at least 1 h per day for 1 week.

Anxiety about Developing Dementia

Anxiety about developing dementia was assessed by reading aloud the question, "How much anxiety do you feel about the possibility of developing dementia in the future?" and providing six response options: "not at all," "hardly any," "neither," "rarely," "sometimes," and "always." Participants either verbally responded or recorded their answers in writing. Participants who responded "rarely," "sometimes," and "always" were assigned to the "presence of anxiety" group, and those who responded "not at all," "hardly any," and "neither" were assigned to the "absence of anxiety" group.

Moreover, the OT assessed the cognitive function (Mini-Mental State-Japanese; MMSE-J) and activities of daily living (functional independence measure; FIM) of partici-

pants. Each assessment conducted in this study was completed within 1 week of admission for all participants, with the exception of the EMC assessment by the OT, which was completed within 10 days of admission for all participants, following 1 week of observation.

Data Analysis

Participants were divided into two groups according to the presence of anxiety about developing dementia. For variables related to demographic attributes, normality was confirmed using the Shapiro-Wilk test and only age followed a normal distribution. Therefore, a Welch's t test was used to compare age between the two groups. Other variables (number of years of education, number of ongoing medical conditions under treatment, number of oral medications, MMSE-J, FIM, and EMC) were analyzed using the Mann-Whitney U test. For the self-assessed EMC scores, besides the total scores, scores for the 13 subitems (rated on a four-point scale from 0 to 3) were also examined using the Mann-Whitney U test. Furthermore, effect sizes (φ) were calculated to compare the total EMC score and individual items in both groups. Following Cohen's [17] 17 criteria, effect size values were interpreted as follows: 0.1–0.29, small; 0.3–0.49, medium; and ≥0.5, large. Statistical Package for the Social Sciences (SPSS version 21.0, IBM Corporation, Armonk, USA) was used for the statistical analysis, and statistical significance was set at $p < 0.05$.

Table 2. Characteristics of the participants

	Total (*n* = 30)	Presence of anxiety about dementia group (*n* = 12)	Absence of anxiety about dementia group (*n* = 18)	*p* value
Male/female ratio	16/14	5/7	11/7	0.296
Age, years	86.2±6.0	86.2±6.0	86.2±6.2	0.981
Education, years	5 (3–6)	4 (3–6)	5 (3–5.75)	0.762
Comorbidities, *n*	2 (1–3.25)	2 (1–3)	2 (1–3.75)	0.659
Types of oral medicines, *n*	4 (2.75–7.25)	4 (2.75–7.25)	4 (3–6.75)	0.949
MMSE-J, points	22 (18.5–24.25)	22 (19.25–23.5)	21 (19–24)	0.915
FIM total score, points	83 (56.75–104.75)	83.5 (55–104.5)	83 (58.75–101.25)	0.899
EMC score (OT assessment)	8 (4–14.75)	10 (5.5–17.25)	7.5 (4.25–11)	0.408
EMC score (self-assessment)	7.5 (3.75–12.50)	12 (7.75–15.5)	5 (3–9)	0.006*

Sex was compared using Fisher's exact test (number of persons). Age was compared using a two-sample *t* test (mean value ± standard deviation). Other items were compared using the Mann-Whitney's *U* test (median [first quartile – third quartile]). MMSE-J, Mini-Mental State Examination Japanese version; FIM, functional independence measure; EMC, Everyday Memory Checklist. *$p < 0.01$.

Results

Characteristics of the Participants

Participants comprised 16 males and 14 females (average age, 86.2 ± 6.0 years; average MMSE-J score, 20.8 ± 4.8; Table 2). Among them, 12 participants (40.0%) reported anxiety about developing dementia. In terms of ongoing medical conditions under treatment, 26 participants had internal medicine-related conditions, 10 had orthopedic conditions, 3 had neurological conditions, and 2 had lower limb ulcer and disuse syndrome, with multiple responses allowed. In terms of mobility, two participants were able to walk independently, nine could walk with the assistance of aids, such as canes or walkers, and 19 used wheelchairs for mobility. In the comparison between the two groups divided according to the presence of anxiety about developing dementia, there were no significant differences in terms of sex, age, years of education, number of ongoing medical conditions, number of medications, MMSE-J score, or total FIM score.

Differences in SMI between the Two Groups according to the Presence of Anxiety about Developing Dementia

The group with anxiety had significantly higher self-assessed EMC scores than those without ($p = 0.006$, φ = −0.50). However, there were no significant differences in terms of the EMC scores in both groups when assessed by the OT.

In the 13 subitems of the self-assessed EMC scores, significant differences between the two groups were observed in four subitems: "Do they forget things he/she was told yes-

terday or a few days ago and have to be reminded of them?" ($p = 0.036$, φ = −0.38), "Do they forget when something happened, for instance, whether it was yesterday or last week?" ($p = 0.002$, φ = −0.58), "Do they forget important details of what he/she had done the day before?" ($p = 0.009$, φ = −0.48), "Do they forget what he/she was originally doing after becoming distracted by something else?" ($p = 0.000$, φ = −0.67). However, no significant differences were observed in the remaining nine subitems (Table 3).

Discussion

Out of the 30 participants, 12 individuals (40%) responded with "rarely," "sometimes," or "always" to the question "How much anxiety do you feel about the possibility of developing dementia in the future?" and were classified into the presence of anxiety group. Despite being older individuals with cognitive decline, as indicated by an average MMSE-J score of 22 points (18.5–24.25), less than half of the participants had anxiety about developing dementia. In one of our previous studies, which considered participants as healthy older individuals, 73.6% reported anxiety about developing dementia [13]. In this study, the lower prevalence of anxiety about developing dementia than that in a previous study [13] may be attributed to differences in the living environment of the older participants. In the previous study, participants were living at home, while the current study focused on older individuals residing in long-term care health facilities. Living in a long-term care health

Table 3. Between-group comparison of difference in terms of subjective cognitive impairment

	Total (n = 30)	Presence of anxiety about dementia group (n = 12)	Absence of anxiety about dementia group (n = 18)	p value	Effect size, φ
Impaired memory according to the EMC total score (present/absent)	7.5 (3.75–12.50)	12 (7.75–15.5)	5 (3–9)	0.006**	−0.50
Impaired memory according to the EMC subitem scores (present/absent)					
EMC1	1 (0–1)	1 (1–2)	1 (0–1)	0.036*	−0.38
EMC2	0 (0–1)	1 (0–1)	0 (0–0)	0.052	−0.36
EMC3	0 (0–0.25)	0 (0–1)	0 (0–0)	0.063	−0.34
EMC4	1 (1–1.25)	1.5 (1–2)	1 (0–1)	0.002**	−0.58
EMC5	0 (0–1)	0.5 (0–1)	0 (0–0.75)	0.183	−0.24
EMC6	1 (0–1)	1 (0–1)	0 (0–1)	0.129	−0.28
EMC7	0 (0–1)	1 (0–1.25)	0 (0–0)	0.009**	−0.48
EMC8	1 (1–2)	1.5 (1–2)	1 (1–2)	0.270	−0.20
EMC9	1 (0–1)	1 (0–2)	0.5 (0–1)	0.096	−0.30
EMC10	0 (0–1)	0 (0–1)	0.5 (0–1)	0.330	−0.18
EMC11	0 (0–1)	0.5 (0–1)	0 (0–1)	0.450	−0.14
EMC12	0 (0–1)	0 (0–1)	0 (0–0.75)	0.359	−0.17
EMC13	0.5 (0–1)	1 (1–1)	0 (0–0)	0.000**	−0.67

Mann-Whitney's U test (median [first quartile – third quartile]). Individuals with anxiety about dementia were aware of cognitive impairment in more scenes than those without anxiety about dementia (p = 0.006, φ = −0.50). *p < 0.05. **p < 0.01.

facility provides a supportive environment with professional assistance, distinct from the experience of living at home. Additionally, sharing daily life with other residents may contribute to a sense of security, as individuals observe and experience the sufficient care available even in the event of developing dementia. These factors may have reduced anxiety about developing dementia. However, the reasons for the lower prevalence of anxiety about developing dementia among older residents than among those living at home need further investigation.

Despite no significant differences in terms of MMSE-J scores and objective EMC assessment by the OT between the two groups classified according to the presence of anxiety about developing dementia, the group with anxiety about dementia exhibited significantly higher self-assessed EMC scores than the group without anxiety, which indicated that although objective cognitive declined and objective everyday memory impairment was similar between the two groups, individuals with anxiety about developing dementia perceived their SMI as more severe than those without anxiety.

Anxiety is a sensation that something undesirable might happen, and it is a common emotion experienced by everyone. However, the experience of anxiety varies widely among individuals, and many people suffer from anxiety disorders where anxiety disrupts their daily lives. Additionally, dementia has become a familiar condition for the Japanese, evoking a fear of losing understanding about oneself or one's family. Dementia instills a different kind of anxiety compared to other conditions, such as stroke, heart disease, or cancer. Considering these general characteristics of anxiety and dementia, individuals with anxiety about developing dementia may subjectively underestimate their memory function compared to those without anxiety. Considering that individuals with SMI accompanied by anxiety or worry about their own condition are at a higher risk of transitioning to dementia than those without anxiety [12], it is crucial to assess both anxiety about developing dementia and SMI in older individuals with declining cognitive function, as targeted in this study. For individuals with anxiety, especially those with severe SMI, it is important to provide guidance to prevent undue anxiety, considering the results of objective cognitive function and objective everyday memory impairment assessments.

According to Tanaka et al. [18], anxiety may be strongly related to self-focus, which refers to directing attention to oneself. Increased awareness of one's thoughts, emotions, and behaviors due to heightened self-focus may influence anxiety. When individuals are aware of memory impairment, those who pay more attention to themselves and perceive subjective symptoms more severely experience anxiety about developing dementia than those who do not. Conversely, even with awareness of memory impairment, individuals with lower self-focus may not develop anxiety about dementia onset. Since this study did not assess self-focus, further investigation is needed to understand how the degree of self-focus may impact anxiety about developing dementia.

In the 13 subitems of the self-assessed EMC, individuals with anxiety about developing dementia experienced significantly higher frequencies in four subitems than those without anxiety: "Do they forget things he/she was told yesterday or a few days ago and have to be reminded of them?," "Do they forget when something happened, for instance, whether it was yesterday or last week?," "Do they forget important details of what they had done the day before?," and "Do they forget what he/she was originally doing after becoming distracted by something else?" Moreover, the effect sizes (φ) for these subitems were relatively high, with values of 0.38, 0.58, 0.48, and 0.67, respectively. The reasons for the extraction of these four subitems are not definitively clear based solely on the results of this study. Therefore, in the future, we would like to investigate further by increasing the sample size.

Strengths and Limitations

This study had some limitations. First, the number of cases was small. Gpower software was used as a post hoc test to confirm whether the sample size was appropriate and to determine the appropriate power for the study. On setting an effect size of 1 and entering the sample sizes of the two groups (12 and 18 participants), the power of the study was 0.715, which was lower than 0.80. Thus, a small sample size is a limitation of this study. This study was conducted at a time when new admissions were restricted for a long period in the healthcare facility where the study was undertaken owing to the COVID-19 outbreak. Therefore, the number of new admissions was lower than that in normal periods, making it impossible to increase the sample size. Second, since this study was a cross-sectional study, the causal relationship could not be determined. Longitudinal research investigating the causal relationship between anxiety about developing dementia and SMI is needed.

Conclusion

In our study, the group with anxiety about dementia onset perceived their SMI to be significantly more severe than those without such anxiety. This finding suggests that caregivers should provide care for older adults with the understanding that care recipients who are worried about developing dementia may have serious SMI. However, to confirm this finding, longitudinal research with a larger number of participants should be conducted.

Data Availability Statement

The data that support the findings of this study are available upon request from the corresponding author. The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of research participants but are available from N.S. upon reasonable request.

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