Memory and Cognitive Function of Older Adults according to Subjective Memory Decline, Depression

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Abstract

Objectives: The present study was to examine the differences in objective memory and cognitive function between groups by classifying the groups according memory decline and depression. Methods/Statistical Analysis: One hundred and five subjects of older adult group who agreed to participate in this study were selected. One-on-one interviews were conducted using a questionnaire on subjective memory decline, depression and objective memory by researchers. Data were analyzing with ANOVA and post-hoc test with the SPSS 22. Findings: The subjects were divided into 4 groups based on the presence absence of subjective memory decline and depression. The group with subjective memory decline and depression had statistically significantly lower scores in immediate recall, delayed recall and verbal fluency than the normal group. The group with depression only had a significantly higher mean for verbal fluency than the group with both subjective memory decline and depression. The normal group had a significantly higher mean for delayed recall than the group with both subjective memory decline and depression. There was no difference between the groups in the total MMSE-K1 score measuring the relatively-generalized cognitive function and MMSE-K1 recall measuring among MMSE-K1 sub-areas. In the presence of subjective memory decline, it is important to consider depression. If depression is involved in subjective memory decline, there were notable differences in the subjective memory compared with normal persons. Improvements/Applications: In this study, only depression was considered among emotional problems and although there are many reports indicating that anxiety may affect memory, the association between anxiety and memory was not considered.

Keywords: Aged, Cognitive Function, Depression, Memory, Neuropsychiatry Inventory

1. Introduction

An understanding of subjective memory decline is important in clinical and research perspective. Subjective memory decline in older adults is a major risk factor for cognitive function impairment. It is often ambiguous for older adults themselves to be aware of the changes in their memory and cognitive function as aging progresses. It takes time to recognize one’s subjective feeling that memory is beginning to deteriorate. In some cases, there are feelings of denial that their memory may not be impaired. Moreover, it requires a lot of time and observation for an observer to recognize changes in a subject’s memory and cognitive function. Changes in memory and cognitive function should not be overlooked or considered as subjective feeling.

Generally, being expressed as ‘having a poor memory’ may also be interpreted to mean possible impairments of
other functions, including depression, cognitive function changes and language disorder. In individuals who visited a clinic with subjective memory impairment, there were more cases of depression than cognitive problem and they also complain of memory decline as a symptom of depression. Association between subjective memory decline and depression has been found in many studies. It is considered meaningful to compare the differences in objective memory in subjects with subjective memory decline and depression, referring to the previous studies. Whereas studies with patients without dementia show that the complains of memory decline are not related to objective memory and generalized cognitive function. Relation between subjective memory decline and cognitive impairment and depression remain controversial.

We conducted this study to examine the differences in objective memory and cognitive function between groups by classifying the groups according to memory decline and depression.

The terms that are used to classify memory include episodic memory and semantic memory. Episodic memory defines a set of an individual’s past experiences and semantic memory defines the facts, laws and principles encountered in everyday life. The two types of memory are strongly connected to each other in daily life and are repeatedly associated. Subjects with episodic memory impairment may complain of having difficulty when checking memory using a word list because their learning and efficient recall have deteriorated. Semantic memory impairment indicates that an individual has difficulty in telling the names of things such as animals and plants or interpreting the meanings of words. Memory is typically associated with specific brain regions such as the hippocampus, frontal lobe and temporal lobe, but there is a more persuasive explanation that brain structures are organically connected to each other to be expressed.

Studies of subjective memory decline, objective memory and cognitive function tend to show inconsistent results. The reasons for this have been attributed to the consistently used simple question methods on subjective memory, varying of the subjects and study methods and unclear definition of subjective memory decline and diagnostic methods. Considering these challenges, questions on subjective memory were diversified, specific memory-related episodes were heard during interviews and a standardized subjective memory decline criteria was applied in this study.

### 2. Proposed Work

The subjects of this study were older adults who visited the A region community health. One-on-one interviews were conducted using a questionnaire on subjective memory decline, depression and objective memory and 105 subjects responded to the survey.

The questionnaires consisted of items to examine the general characteristics, subjective memory, depression and objective memory. A survey of the subjects’ subjective memory was conducted using the Prescreening Korean Dementia Screening Questionnaires (KDSQ-P) with five questions related to memory. Each item was allocated 2 points for the answer 'often', 1 point for 'sometimes', 0 point for 'not at all'. The survey consisted of a maximum score of 10 points. If an individual scored more than 4 points, the individual was judged selected to undergo a dementia screening.

For depression scale, the Geriatric Depression Scale Short Form Korea Version, (GDSSFK), which was adapted for Koreans, was used. This tool consisted of a short form with 15 ‘Yes’ or ‘No’ type questions that made depression measurement easy in older adults. Out of 15 questions, positive answers to 11 questions and negative answers to four questions were considered as being depressive. A total of 15 points was a maximum score and a higher score indicated severe depression. Out of 0–15 points, a score of less than 5 points, 6–9 points and more than 10 points were classified as normal, moderate depressive symptoms and depression, respectively. In this study, a score of more than 6 points was considered as having depressive symptoms.

A tool for measuring objective memory and cognitive function was a questionnaire consisting of the word memorization: Immediate recall, word memorization: Delayed recall and verbal fluency and Korea Mini-Mental State Examination (MMSE-K1). Word memorization: Immediate recall, delayed recall and verbal fluency were based on the Cognition Scale for Older Adults. While an individual was presented with 10 picture cards, he/she was instructed to say the names of the pictures on the cards and then to recall what they saw. The 10 sheets of picture cards depicted ‘corn’, ‘hat’, ‘snowman’, ‘balloon’, ‘bag’, ‘hands’, ‘squid’, ‘stairs’, ‘toothbrush’ and ‘telephone’. Immediate recall was conducted repeatedly three times. The number of
words that were named by the subjects at immediate recall conducted three times was used in the analysis. Delayed recall was conducted 20 minutes after immediate recall. The number of words that were named by the subjects was used in the analysis. For verbal fluency, subjects were instructed to tell as many names as possible of animals and the crops in rice paddy and dry field for 1 minute each. The number of names recited by the subjects was used in the analysis. The MMSE-K1 evaluated time disorientation with 5 questions (year, month, day, week, season), place disorientation with 5 questions (country name, current location, floor, city-province, what the current place is for), memory ability with 3 questions (memorizing three words), concentrations with 5 questions (5-times subsequently subtracting 7 from 100), memory recall with 3 questions (recalling the previously-memorized three words), language function with 8 questions (naming, verbal repetition, executing commands, reading, writing) and visuospatial ability with 1 item (drawing from two pentagons). A total of 30 points was the maximum score.

The statistical analysis was performed using SPSS 22. The demographic characteristics of the subjects were described using frequency and descriptive statistics. The significance of objective memory and cognitive function between the groups according to the subjective memory decline and depression was analyzed using ANOVA. The objective memory showing mean differences between the groups were tested through Post Hoc.

The demographic characteristics of the subjects are presented in Table 1. In the age distribution, the most common age group was 71–75 years of age, accounting for 42.9%, with the mean age of 75.63 years. Women accounted for 82.9% and the most common period of educational attainment was 1–6 years, accounting for 51.4%. The mean K-MMSE-K1 was 24.59 and the most common disease in subjects was hypertension, accounting for 58.1% of all subjects.

The subjects were divided into 4 groups based on the presence or absence of subjective memory decline and depression. Subjects with depression and subjective memory decline were 27 (25.7%), with subjective memory alone were 15 (14.3%), with depression alone were 18 (17.1%) and without subjective memory decline or depression were 45 (42.9%). This paper proposed an improved decision tree algorithm for prediction of drop-out student.

Table 1. Demographic characteristics of subjects

| Characteristic          | Categories | n   | (%)  |
|-------------------------|------------|-----|------|
| Age (years)             | ≥70        | 16  | (15.2) |
|                         | 71–75      | 45  | (42.9) |
|                         | 76–80      | 20  | (19.0) |
|                         | 81–85      | 17  | (16.2) |
|                         | ≥86        | 7   | (6.7)  |
| M±SD                    |            | 75.63±6.32 |
| Gender                  | Male       | 18  | (17.1) |
|                         | Female     | 87  | (82.9) |
| Education level (years) | None       | 26  | (24.8) |
|                         | 1–6        | 54  | (51.4) |
|                         | 7–9        | 19  | (18.1) |
|                         | ≥12        | 6   | (5.7)  |
| M±SD                    |            | 4.76±3.67 |
| MMSE-K1†                | M±SD       | 24.59±3.95 |
| Disease                 | Hypertension | 61 | (58.1) |
|                         | Diabetes mellitus | 28 | (26.7) |
|                         | Heart disease | 10 | (9.52) |
|                         | Hyperlipidemia | 6  | (5.71) |
| Subjective complain     | Memory decline and depression | 27 | (25.7) |
|                         | Memory decline only | 15 | (14.3) |
|                         | Depression only | 18 | (17.1) |
|                         | None       | 45  | (42.9) |

Table 2 shows the results objective memory according to subjective memory decline and depression. The group with subjective memory decline and depression had statistically significantly lower scores in immediate recall, delayed recall and verbal fluency than the normal group (p = .001, p<.001, p = .004). As it can be seen from a report that depressive disorder increased the risk of subjective memory decline more than 7 times, these two symptoms are related to objective memory and showed distinct differences compared with the normal group.

The group with subjective memory decline only was found to have statistically significantly lower scores in delayed recall than that of the normal group (p = .043). These findings are consistent with a previous study showing that when comparing between a group having
subjective memory impairment and general older adults, there was no immediate recall defect, whereas there were defects in delayed recall test³.

The verbal fluency scores in the group with subjective memory decline and depression were found to be statistically significantly lower than that in the group with depression only ($p = .005$). These findings suggest that there may be a strong association between subjective memory decline and depression. 

Kwon and Ahn reported that cognitive function correlated significantly verbal function in elderly patients with cognitive impairment¹⁶.

There was no difference between the groups in the total MMSE-K1 score measuring the relatively-generalized cognitive function. These findings are consistent with a previous study showing that the subjective memory decline may not be accompanied by objective cognitive function impairment⁴. In addition, it is considered useful to measure memory with a memory test of more than medium length rather than a simple memory test.

### 3. Conclusion

Differences were found in the immediate recall, delayed recall and verbal fluency in our study examining the objective memory decline in subjects with subjective memory decline or depression. The association between subjective memory decline and objective memory function was strongest in subjects with depression. These findings support the results of this previous study revealing that if an individual complains of subjective memory decline in dementia early screening, an addition of depression screening test can be a way to increase the efficiency of dementia early screening and prediction of dementia in South Korea.

There was no difference between the groups in the total MMSE-K1 score measuring the relatively-generalized cognitive function. These findings are showing that the subjective memory decline may not be accompanied by objective cognitive function impairment. Many studies have revealed that it is difficult to recognize the reliability subjective self-assessment of older adults for their memory and cognitive function. Older adults with a relatively normal cognitive function may complain of memory impairment when their cognitive function is impaired, but older adults with cognitive function impairment may not be aware of their impaired cognitive state. Therefore, it is considered proper to measure memory and cognitive function with objective scales and then diagnoses the presence and absence of practical problems rather than to generalize the definition of subjective memory or cognitive function in older adults or to assess the related reliability. As memory problems are very subjective, it is considered that only subjective scales can achieve related generalization or reliability.

Table 2. Group means, standard deviations and results of Fisher’s Least Significant Difference (LSD) tests

| Measure       | (1) SMD and DEP | (2) SMD only | (3) DEP only | (4) None  | Fisher’s LSD test | $p$   |
|---------------|-----------------|--------------|--------------|-----------|------------------|------|
| Immediate recall | 12.74±3.47       | 15.07±5.48  | 14.72±5.29  | 16.89±5.89 | (1) < (4)        | .001 |
| Delayed recall  | 3.19±1.59        | 3.93±1.94   | 4.28±1.93   | 5.24±2.52 | (1) < (4)        | <.001|
|                | (2) < (4)        |             |             |           |                  | .043 |
| Verbal fluency  | 14.81±5.74       | 17.00±6.22  | 20.83±9.50  | 19.80±6.60 | (1) < (4)        | .004 |
|                |                 |             |             |           | (1) < (3)        | .005 |

Note: SMD = Subjective Memory Decline, DEP = Depression
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