

Loneliness in Elderly Patients with Mild Cognitive Impairment: A Pilot Study

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Background and Purpose Loneliness is a significant concern among the elderly, particularly in societies with rapidly growing aging populations. While loneliness may influence neuropsychological function, the exact nature of the association between loneliness and neuropsychological function is poorly understood.

Methods We evaluated 50 elderly patients with mild cognitive impairment (MCI) and 33 without cognitive dysfunction with respect to demographics, clinical characteristics, cognitive and functional performance, depression scale, and loneliness scale. The associations between loneliness and neuropsychological assessments were evaluated.

Results Although loneliness was not associated with cognitive or functional performance, it was correlated with depression in elderly patients. For elderly patients with MCI, depressive symptoms were reported more frequently in individuals with a high degree of loneliness ($p < 0.05$).

Conclusions Neither cognitive performance nor functional performance is associated with loneliness; however, loneliness is associated with depressive symptoms in elderly patients with MCI.

Key Words loneliness, depression, mild cognitive impairment, neuropsychological function.

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INTRODUCTION

Loneliness is a complex and usually unpleasant emotional response to isolation, which typically includes anxiety about a lack of connection or communication with other beings. It is a significant concern among the elderly, particularly in societies with rapidly growing aging populations.¹

Insight into the relevant psychosocial and biological factors that may detrimentally influence neuropsychological function is important to prevent a decrease in quality of life and to improve the overall health status in the elderly.¹⁻³ However, previous studies of loneliness and neuropsychological function have yielded apparently conflicting results, showing an

increased risk of neuropsychological dysfunction in some analyses but not in others.¹⁻⁷

Therefore, we performed a pilot study to investigate whether loneliness is associated with neuropsychological function and depression in elderly Koreans.

METHODS

Participants

This study was a retrospective evaluation of participants who visited a memory clinic at a university hospital in the Republic of Korea between August 2016 and July 2017 and were referred for neuropsychological testing. A total of 83 participants were recruited, including 50 with mild cognitive impairment (MCI) and 33 with normal cognition (CN). A consensus diagnosis was determined using standardized clinical criteria for MCI.⁸ MCI subtypes were not analyzed in this study. CN individuals did not meet the criteria for MCI⁸ or dementia,⁹

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but were recruited and assessed as patients with cognitive dysfunction.

All participants were evaluated on the basis of their medical history, physical and neurological examinations, laboratory tests, brain imaging scans, and a neuropsychological battery. Consensus diagnoses by a geriatric physician and a neuropsychologist were used to determine each subject's clinical status. The exclusion criteria included preexisting conditions that might affect participants' performance on cognitive measures, such as intellectual disability, drug or substance abuse, and severe psychiatric illness. Patients with dementia were also excluded due to unreliable or unavailable self-reported data. This study was approved by the local Institutional Review Board (AS16157).

Assessment of loneliness

To assess loneliness, the revised UCLA Loneliness Scale (UCLA) was used.¹⁰ The UCLA Scale is a self-reporting questionnaire measuring a general degree of satisfaction with social relationships and is the most commonly used self-reported loneliness instrument by both researchers and clinicians. This study is based on the Korean version of the UCLA.¹¹ It is a 20-item survey that is measured on a 4-point scale (1=never, 2=rarely, 3=sometimes, and 4=always). The lowest total score is 20 and the highest total score is 80; a high score indicates greater levels of loneliness. The scale has adequate internal consistency and test-retest reliability and has been shown to yield reliable and consistent results with Korean individuals.^{10,11}

Assessment of neuropsychological function

The neuropsychological battery was used with the Korean version of the assessment packet developed by the Consortium to Establish a Registry for Alzheimer's Disease.¹² In this study, the neuropsychological assessments included the Mini-Mental Status Examination (MMSE),¹³ the Montreal Cognitive Assessment (MoCA),¹⁴ the Seoul-Instrumental Activities of Daily Living (IADL),¹⁵ the Clinical Dementia Rating (CDR) Scale,¹⁶ and the Geriatric Depression Scale (GDpS).¹⁷

Assessment of other covariates

Demographic (age and gender) and educational (years) data were collected from participants and informants. The presence of hypertension and diabetes were confirmed based on the participant's reports of diagnosis or treatment-related medications.

Data analysis

The CDR scale Sum of Boxes (CDR-SB) score was obtained by summing each of the domain box scores, with scores ranging from 0 to 18.¹⁶ Participants were grouped ac-

ording to the UCLA scores as in a previous study.¹⁸ A score of 20–34 indicated a low degree, 35–49 suggested a moderate degree, 50–64 revealed a moderately high degree, and 65–80 confirmed a high degree of loneliness. To facilitate the interpretation of loneliness in this study, the moderately high ($n=15$) and high ($n=3$) groups were combined into one group (high group).

Data are expressed as medians (interquartile ranges) for continuous variables and as frequencies (%) for categorical variables. A nonparametric statistic was used to evaluate differences between groups because the Shapiro-Wilk W test showed that data deviated from the standard normal distribution. The Mann-Whitney and Kruskal-Wallis tests were used to compare the means in pairs of groups and multiple groups, respectively. If the Kruskal-Wallis test result was significant, the two-tailed Mann-Whitney U test with Bonferroni's correction was used to assess the paired difference between groups. Differences in frequency patterns of categorical variables were examined with χ^2 tests. Correlations between the UCLA score and the scores of other neuropsychological assessments were analyzed by calculating Spearman's correlation coefficients. Analyses were performed using SPSS for Windows, version 20.0 (IBM Corp., Armonk, NY, USA). Statistical tests were two-tailed with $\alpha < 0.05$.

RESULTS

The clinical characteristics of the study participants are presented in Table 1. The study population was 55.46% female, had a median age of 70 (62–76) years, and a median education of 8 (4–12) years. The median MMSE score of the participants was 27 (25–29), with median scores of 23 (20–26) on the MoCA, 2 (1–5) on the IADL, 1.00 (0.00–1.00) on the CDR-SB, and 7 (4–11) on the GDpS. As expected, the scores of the MMSE, MoCA, IADL, and CDR-SB differed between the CN and MCI groups.

According to the degree of loneliness, cognitive status (CN vs. MCI) ($\chi^2=1.409$, $p=0.494$), age ($H(2)=2.395$, $p=0.302$), gender ($\chi^2=4.944$, $p=0.084$), education ($H(2)=2.070$, $p=0.355$), hypertension ($\chi^2=2.720$, $p=0.257$), and diabetes ($\chi^2=0.093$, $p=0.403$) were not significantly different among the participants. In the neuropsychological assessments, the MMSE ($\chi^2=0.018$, $p=0.991$), MoCA ($\chi^2=1.001$, $p=0.606$), IADL ($\chi^2=0.304$, $p=0.859$), and CDR-SB ($\chi^2=0.322$, $p=0.851$) scores were also not different. However, the GDpS ($\chi^2=13.494$, $p=0.001$) scores varied significantly according to the degree of loneliness. In addition, significant correlations were found between the UCLA scores and the GDpS scores ($Rho=0.471$, $p < 0.001$), but not between the UCLA scores and the other

Table 1. Clinical characteristics in subjects with and without MCI

Characteristics	MCI (n=50)	Controls (n=33)	p value
Demographics			
Age, median (IQR)	71.5 (62–77)	69 (59–75.5)	0.290
Gender, female (%)	26 (52.0)	20 (60.6)	0.503
Education, median (IQR)	8 (3–12)	9 (6–12)	0.445
Co-morbidity (%)			
Hypertension	33 (66.0)	22 (66.7)	1.000
Diabetes mellitus	9 (18.0)	7 (21.2)	0.780
Neuropsychological evaluation			
MMSE	27 (24–28)	28 (26.25–29)	<0.001
MoCA	21 (17–25)	26 (22.25–28)	<0.001
IADL	2 (1–7)	1 (1–4)	0.003
CDR-SB	1 (1–1.5)	0 (0–0.5)	<0.001
GDpS	8 (4–12)	7 (3–9.75)	0.097
UCLA	42 (34–53)	36 (30.25–41.25)	0.109

Values are presented as medians (IQRs) or frequencies (%) as appropriate.

CDR-SB: Clinical Dementia Rating scale Sum of Boxes, GDpS: geriatric depression scale, IADL: Seoul-Instrument Activities of Daily Living, IQR: interquartile range, MCI: mild cognitive impairment, MMSE: Mini-Mental State Examination, MoCA: Montreal Cognitive Assessment, UCLA: Korean version of the revised UCLA loneliness scale.

neuropsychological assessments (all, $p > 0.05$).

CN participants did not show significantly different GDpS scores according to the degree of loneliness ($H(2) = 2.657$, $p = 0.265$). However, participants with MCI showed significantly varying GDpS scores according to the degree of loneliness ($H(2) = 11.001$, $p = 0.004$). Specifically, participants with MCI and a high degree of loneliness had higher GDpS scores than participants with MCI with low ($z = -3.346$, $p < 0.001$) or moderate ($z = -2.900$, $p = 0.003$) degrees of loneliness in the post-hoc analysis (Fig. 1).

DISCUSSION

This study demonstrated that participants with MCI and a high degree of loneliness had higher depression scores than those with MCI, who had low-to-moderate loneliness. However, loneliness was not associated with other neuropsychological assessments.

Loneliness has been reportedly associated with lower levels of cognition and with more rapid cognitive decline.^{4,5} However, null results have also been reported.^{6,7} We found no correlation between loneliness and cognitive function in this study. Previous studies demonstrated that loneliness may increase the risk of dementia through a mechanism involving the hypothalamus-pituitary-adrenal axis or inflammation without Alzheimer's pathology or cerebral infarction.^{1,4} The

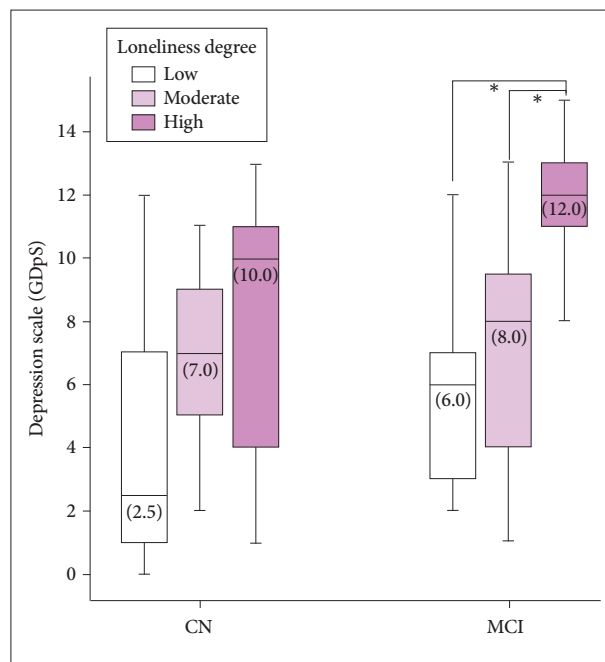


Fig. 1. Depression scale of CN and MCI in loneliness. Depression scale in loneliness was presented as median with parentheses. * $p < 0.05$ after Bonferroni's correction. CN: cognitive normal, GDpS: geriatric depression scale, MCI: mild cognitive impairment.

relationship between loneliness and cognitive function should be further investigated using rigorously designed studies with longitudinal data collection.

Loneliness is an independent risk factor for depression in the elderly^{19,20} as well as in the general population.²¹ Moreover, depression is frequently associated with cognitive impairment, and depressive disorders increase the risk of persistent and mild cognitive dysfunction and dementia.²²

We identified an association between loneliness and depression among participants with MCI in this study. We hypothesize that loneliness may be correlated with depression, at least in patients with cognitive dysfunction.

This study has certain limitations. First, this study was preliminary and conducted with a small number of participants. The results cannot be generalized to the entire population of elderly people. Second, this study could not identify all the relevant factors, which may be associated with loneliness, depression, or cognitive function.

In conclusion, although this study is preliminary, it suggested that loneliness is associated with depressive symptoms in elderly patients with MCI.

Conflicts of Interest

The authors have no financial conflicts of interest.

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