Anxiety, Depression and Cognitive Function of Community-Dwelling Elderly in South Korea

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Abstract
The purpose of this study was to investigate the relationship among anxiety, depression and cognitive function of elderly. Participants of this study were 271 community-dwelling elderly in Chungnam, South Korea. The level of anxiety, depression and cognitive function were measured by the Hospital Anxiety and Depression Scale (HADS) and Korean version of Mini Mental State Examination (MMSE-K). The mean scores of anxiety, depression and cognitive function were 12.55, 13.57 and 26.47 respectively. The level of anxiety was significantly different by gender (F=4.597, p=.033) and age (F=3.951, p=.020). The level of depression was significantly different by educational status (F=2.433, p=.048) and physical activity (F=10.006, p<.001). And cognitive function showed statistical difference by educational status (F=4.170, p=.003) and physical activity (F=3.495, p=.032). Anxiety showed significant relationships with depression (r=.590, p<.001). And depression had significant correlation with cognitive function (r=-.127, p=.036). According to the results of this study, cognitive function is related with mental health like as depression. Thus healthcare providers including community health nurses should consider mental health to maintain cognitive function of community-dwelling elderly.

Keywords: Anxiety, Cognitive Function, Depression

1. Introduction
The speed of the population aging in South Korea is expected to be one of the fastest in the world. Along with rapid population ageing, the health and mental health of elderly people are becoming a social concern. Recently dementia appears to be one of the major mental health problems among elderly Koreans. The prevalence of dementia in Korea was about 421,000 (8.4% of the elderly over 65-years old) in 2008 and the estimation of prevalence is expected about 794,000 (9.8%)⁶.

The prevalence rate of depression of the community-dwelling elderly is 15.8% on average, while the overall incidence of depression is 11.7–26.6 per 100 person-years⁸.

In South Korea, Sohn reported the prevalence of depression for elders was 14.8%¹².

And it is reported the depression was associated with an increased risk of Alzheimer's disease and cognitive decline⁴ and severe anxiety is associated with worse cognition¹. The individuals with higher levels of anxiety tend to have a higher incidence of depression in comparison to individuals in the normal population⁵. In the literature, it is suggested that depression and anxiety should be considered concurrently when studying non-clinical populations¹³, since these tend to be associated with one another, individuals who are diagnosed with anxiety tend to develop depressive states¹⁴.

Therefore the purpose of this study is to identify the level of anxiety, depression and cognitive function of elderly and to investigate the relationship among anxiety, depression and cognitive function of community-dwelling elderly in South Korea.

2. Methodology
2.1 Participants and Procedures
The participants of this study were 271 community-dwelling elderly in Chungnam, South Korea. Data were

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collected using a self-reported questionnaire including demographic and physical and mental health related questions from May, 2012 to June, 2012. Participants were assured of anonymity and confidentiality and informed consent was obtained from each subject.

2.2 Study Design
The cross-sectional descriptive design was used to examine relationships anxiety, depression and cognitive function of community-dwelling elderly in South Korea.

2.3 Measures
The level of anxiety and depression were measured by The Hospital Anxiety and Depression Scale (HADS). HADS is a 14-item self-report screening scale that was developed to indicate the possible presence of anxiety and depressive states in the setting of a medical out-patient clinic. HADS consists of 7-items for anxiety (HADS-A) and 7 for depression (HADS-D), each with a 4-point scale to describe symptoms severity from 0 to 3. The anxiety sub-score is measured by adding seven items and the depression sub-score is calculated by adding the remaining seven items. Higher scores indicate higher depression and anxiety. The optimal cutoff point is said to be ≥8 for the identification of suspicious cases and ≥11 for safe cases on both sub-scales.

In this study, HADS for Koreans was used. HADS-K showed Cronbach’s alpha .89 for anxiety and .86 for depression. The cutoff point 8 showed a sensitivity .78 and a specificity of .82 for anxiety, .89 and .82 for depression.

The level of cognitive function was measured by Korean version of Mini Mental State Examination (MMSE-K). The instrument was developed to assess cognitive function in older Koreans and scores were adjusted to consider educational level as suggested by Park et al. It consists of 30 questions on temporal orientation, spatial orientation, memory registration, attention and calculation, recall, language skills and visuospatial construction ability. Based on a 30-point scale, 1 or 0 point is given for each activity depending on its fulfillment. Participants with a score ≤24 were defined as cognitively impaired.

2.4 Statistical Analysis
Data collected were statistically analyzed using the SPSS18.0. Data were analyzed by t-test and ANOVA to test differences of the level of anxiety, depression and cognitive function by demographic characteristics. And correlation analysis was used to study statistical relationships among the study variables.

Raw data from the survey on national nutrition levels conducted every three years by the Korea Center for Disease Control, notably the data. National Health and Nutrition Examination Survey (KNHANES) was conducted in accordance with the approval gained from the Research Ethics Committee of the Center for Disease Control.

3. Findings
3.1 General Characteristics
Of the participants, 54.6% were female and the mean age was 65.93±8.93. About 48% of the participants reported their educational status as high school or above. About 56% lived with one’s husband or wife (Table 1).

3.2 Anxiety, Depression and Cognitive Function
The mean score of anxiety, depression and cognitive function were 12.55±4.13, 13.57±3.68 and 26.47±2.36 respectively. About 66% of the participants were in anxiety group and 79% was in depression group. Eight point five percentage of the participants reported cognitive decline (Table 2). The level of anxiety was significantly different by gender (t=4.597, p=.033) and age (F=3.951, p=.020). The participants who aged under 65 was more anxious than who aged 65 to 74 years old. The level of depression was significantly different by educational status (F=2.433, p=.048) and physical activity (F=10.006, p<.001). In post hoc test, there was no significant difference in sub-groups of educational status. But participants who did physical activities regularly reported lower level of depression than who did physical activities barely and occasionally. And cognitive function showed statistical difference by educational status (F=3.495, p=.032). In Scheffe test, participants who did not take any education course showed lower level of cognitive function than other groups (Table 3).

3.3 The Relationships among Anxiety, Depression, and Cognitive function
The level of anxiety showed significant correlation with the level of depression (r=-.90, p<.001). And depression had significantly negative relationship with cognitive function (r=-.127, p=.036) (Table 4).
4. Conclusion

In this study, the mean of anxiety and depression were 12.55±4.13 and 13.57±3.68 respectively. About 66% of the participants were in anxiety group and 79% was in depression group. Compared with previous study\(^8,12\), it is very high incidence in anxiety and depression. The prevalence of depressive symptoms is higher than the prevalence of major depressive disorder. About 15%, and sometimes as high as 33% prevalence of depressive symptoms has been reported in Korea community studies\(^2\). In contrast, the prevalence of depressive disorders (e.g. major depressive disorder or dysthymia diagnosed according to DSM-III or DSM-IV) was about 10%. This gap can also be seen in studies from other countries\(^3\). Also Teixeira et al.\(^14\) reported a strong relationship between depression and anxiety. Thus results of this study showed very high incidence of mental illness in rural area of Korea. Therefore it is important to manage mental health of elderly in rural area of Korea.

About 9% of the participants reported cognitive decline. The prevalence of dementia among the elderly population has been reported to range from 3.6% to 11.9% in Western countries, 4.8% to 7.2% in Japan and the prevalence of overall dementia in Korea ranged from 6.3% to 13.0%\(^3\). The report about early sixties of rural Korean community, overall prevalence of cognitive impairment was 17.4%, that of depression was 26.0% and that of comorbidity was 7.1%\(^10\). And in that study, MMSE-K score was related to depression. Higher MMSE-K scores were significantly associated with decreased depression. In our study, cognitive decline was about 9%, but level of anxiety and depression was high. For preventing cognitive impairment, healthcare providers have to concern about managing methods of decreasing level of anxiety and depression in elderly.

The level of anxiety was significantly different by gender and age. The level of depression was significantly different by educational status and physical activity. In post hoc test, participants who did physical activities regularly reported lower level of depression than who did physical activities barely and occasionally. And cognitive function showed statistical difference by educational status and physical activity. In Scheffe test, participants who did not take any education course showed lower level of cognitive function than other groups. In our results, by the level of physical activities there were significant differences in anxiety, depression and cognitive function. Thus

### Table 1. General Characteristics of the Participants

| Category                  | n(%)     | M±SD     |
|---------------------------|----------|----------|
| Gender                    |          |          |
| Male                      | 123(45.4)| I.       |
| Female                    | 148(54.6)| II.      |
| Age                       |          | 65.93±8.93|
| <65                       | 118(43.6)| III.     |
| 65-74                     | 108(39.8)| IV.      |
| >75                       | 45(16.6) | V.       |
| Education status          |          |          |
| None                      | 9(3.3)   | VI.      |
| Elementary school         | 64(23.6) | VII.     |
| Middle school             | 69(25.5) | VIII.    |
| High school               | 85(31.4) | IX.      |
| > College                 | 44(16.1) | X.       |
| Economic status (1000won) |          |          |
| <100                      | 77(28.4) | XI.      |
| 100-199                   | 68(25.1) | XII.     |
| 200-299                   | 35(12.9) | XIII.    |
| >300                      | 48(17.7) | XIV.     |
| Physical activity         |          |          |
| Not respond               | 42(15.9) | XV.      |
| Barely                    | 50(18.5) | XVI.     |
| Occasionally              | 121(44.6)| XVII.    |
| Regularly                 | 100(36.9)| XVIII.   |
| Smoking                   |          |          |
| Nonsmoker                 | 202(74.5)| XIX.     |
| Current smoker            | 21(7.8)  | XX.      |
| Past smoker               | 48(17.7) | XXI.     |
| Alcohol drinking          |          |          |
| None                      | 152(56.1)| XXII.    |
| Occasionally              | 88(32.4) | XXIII.   |
| Regularly                 | 21(7.8)  | XXIV.    |
| Daily                     | 10(3.7)  | XXV.     |
| Living arrangement        |          |          |
| Alone                     | 40(14.8) | XXVI.    |
| With spouse               | 152(56.1)| XXVII.   |
| With offspring            | 75(27.7) | XXVIII.  |
| etc.                      | 4(1.4)   | XXIX.    |

### Table 2. Anxiety, Depression and Cognitive function of the Participants

| Variables | n(%)      | M±SD     |
|-----------|-----------|----------|
| HADS-A    | Normal    | 20(7.4)  | 12.55±4.13|
|           | Suspicious| 72(26.5) |          |
|           | Anxiety   | 179(66.1)|          |
| HADS-D    | Normal    | 4(1.5)   | 13.57±3.68|
|           | Suspicious| 53(19.5) |          |
|           | Depression| 214(79.0)|          |
| MMSE-K    | Normal    | 248(91.5)| 26.47±2.36|
|           | Cognitive impairment| 23(8.5)    |
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Indian Journal of Science and Technology
Vol 8 (18) | August 2015 | www.indjst.org

depression had significantly negative relationship with cognitive function. Cognitive function is important factor to maintain independence and quality of life in late life time. Therefore healthcare providers including community health nurses should consider mental health to maintain cognitive function of community-dwelling elderly.

5. References

1. Bierman EJM, Comijs HC, Rijmen F, Jonker C, Beekman ATF. Anxiety symptoms and cognitive performance in later life: Results from the longitudinal aging study Amsterdam. Aging and Mental Health. 2008 Jul; 12(4); 517–23.

2. Cho MJ, Nam JJ, Suh GH. Prevalence of symptoms of depression in a nationwide sample of Korean adults. Psychiatry Research 1998 Dec; 81(3); 341–52.

Table 3. The Differences of Anxiety, Depression, and Cognitive Function by General Characteristics

| Categories       | Anxiety                  | Depression                | Cognitive Function |
|------------------|--------------------------|---------------------------|--------------------|
|                  | M±SD                     | t or F / p                | M±SD              | t or F / p | M±SD       | t or F / p |
| Gender           |                          |                          |                    |            |            |            |
| Male             | 11.96±4.10               | 4.597(.033)              | 13.37±3.73         | .676(.142) | 26.28±2.23 | 1.499(.222)|
| Female           | 13.04±4.09               |                          | 13.74±3.63         |            | 26.63±2.45 |
| Age†             |                          |                          |                    |            |            |            |
| <65‡             | 13.34±4.08               | 3.951(.020)              | 13.47±3.63         | 2.524(.082) | 26.75±1.98 | 2.231(.109)|
| 65-74‡           | 11.92±4.01               | a>b                      | 13.23±3.59         |            | 26.41±2.46 |
| >75‡             | 11.97±4.25               |                          | 14.66±3.87         |            | 25.89±2.87 |
| Education status†|                          |                          |                    |            |            |            |
| None             | 12.66±3.87               | .947(.437)               | 14.77±3.41         |            | 24.00±2.39 |
| Elementary school| 12.70±4.69               |                          | 13.81±3.45         |            | 26.02±2.87 |
| Middle school    | 12.72±4.22               | .676(.142)               | 14.13±4.09         |            | 26.71±2.05 |
| High school      | 12.85±3.96               | .898(.422)               | 13.56±3.44         |            | 26.56±2.05 |
| > College        | 11.45±3.39               |                          | 12.13±3.54         |            | 27.07±2.12 |
| Economic status  |                          |                          |                    |            |            |            |
| (1000won)        |                          |                          |                    |            |            |            |
| <100             | 13.33±4.75               | .968(.409)               | 14.24±3.82         | .2108(.100)| 26.30±2.23 |
| 100-199          | 12.47±3.86               | a>b                      | 12.91±3.40         |            | 26.50±2.25 |
| 200-299          | 12.51±3.27               |                          | 13.62±3.50         |            | 26.89±2.22 |
| >300             | 12.16±3.99               | .327(.722)               | 12.93±3.58         |            | 26.94±1.77 |
| Physical activity|                          |                          |                    |            |            |            |
| Barely‡          | 12.76±4.64               | .677(.509)               | 14.34±3.98         | 10.006(<.001)| 26.64±2.53 |
| Occasionally§    | 12.68±4.29               | a,b,c,d                  | 14.30±3.70         |            | 26.50±2.25 |
| Regularly§       | 12.29±3.83               |                          | 12.31±3.13         |            | 26.66±2.06 |
| Smoking          |                          |                          |                    |            |            |            |
| Nonsmoker        | 12.69±4.08               | 1.338(.264)              | 13.43±3.65         |            | 26.53±2.33 |
| Past smoker      | 11.70±3.93               | .677(.509)               | 13.89±3.69         |            | 26.44±2.38 |
| Current smoker   | 13.14±4.87               | .561(.641)               | 14.23±3.92         |            | 25.90±2.54 |
| Alcohol drinking |                          |                          |                    |            |            |            |
| None             | 12.43±4.15               | .590(<.001)              | 13.51±3.79         |            | 26.24±2.63 |
| Occasionally     | 12.78±4.09               | .898(.422)               | 13.71±3.64         |            | 26.75±1.69 |
| Regularly        | 11.90±3.46               | .561(.641)               | 12.76±2.27         |            | 27.29±1.87 |
| Daily            | 13.70±4.12               | a,b,c,d                  | 15.00±4.52         |            | 25.70±3.23 |

Table 4. Relationship among the level of Anxiety, Depression and Cognitive Function

| Variables | Anxiety | Depression | Cognitive Function |
|-----------|---------|------------|--------------------|
| Anxiety   | 1       | .590(<.001)| -.088 (.149)       |
| Depression| XXX     | 1          | -.127 (.036)       |
| Cognitive function | XXXI | XXXII     | 1                  |

†Scheffe test

regular physical exercise can be a good method of managing mental health. The previous study has supported the result of this study. The physical activity is associated with lower levels of depression and anxiety.

In our study, the level of anxiety showed significant positive relationship with the level of depression. And depression had significantly negative relationship with cognitive function. Cognitive function is important factor to maintain independency and quality of life in late life time. Therefore healthcare providers including community health nurses should consider mental health to maintain cognitive function of community-dwelling elderly.

5. References

1. Bierman EJM, Comijs HC, Rijmen F, Jonker C, Beekman ATF. Anxiety symptoms and cognitive performance in later life: Results from the longitudinal aging study Amsterdam. Aging and Mental Health. 2008 Jul; 12(4); 517–23.

2. Cho MJ, Nam JJ, Suh GH. Prevalence of symptoms of depression in a nationwide sample of Korean adults. Psychiatry Research 1998 Dec; 81(3); 341–52.
3. Cho MJ, Lee JY, Kim BS, Lee HW, Sohn JH. Prevalence of the major mental disorders among the Korean elderly. The Journal of Korean Medical Sciences. 2011 Jan; 26(1):1–10.

4. Geerlings MI, et al. Depression and risk of cognitive decline and Alzheimer’s disease: Results of two prospective community-based studies in The Netherlands. The British Journal of Psychiatry. 2000; 176: 568–75.

5. McLean P, Woody S. Anxiety disorders in adults. New York: Oxford University Press; 2001.

6. Ministry of Health and Welfare and Seoul National University Hospital. Nationwide Study on the Prevalence of Dementia in Korean Elderly. Korea; 2008.

7. Oh SM, Min KJ, Park DB. A study on the standardization of the Hospital Anxiety and Depressed scale for Koreans. Journal of Korean Neuropsychiatric Association. 1999 Mar; 31(2):289–96.

8. Panza F, Frisardi V, Carpurso C, et al. Late-life depression, mild cognitive impairment, and dementia: possible continuum? American Journal of Geriatric Psychiatry. 2010 Feb; 18(2):98–116.

9. Park JH, Park YN, Ko HJ. Modification of the mini-mental state examination for use with the elderly in a non-western society. PART II: Cutoff points and their diagnostic validities. International Journal of Geriatric Psychiatry. 1991 Dec; 6(12):875–82.

10. Park B, Park J, Jun JK. Cognitive impairment, depression, comorbidity of the two and associated factors among the early sixties in a rural Korean community. PLoS ONE; 8(11):e79460. 2013 Nov. DOI:10.1371/journal.pone.0079460.

11. Park J, Kwon Y. Modification of the mini-mental state examination for use in the elderly in a non-western society. PART 1. Development of Korean version of mini-mental state examination. International Journal of Geriatric Psychiatry. 1990 Nov/Dec; 5(6):381–7.

12. Sohn JN. Factors influencing depressive symptoms in community dwelling older people. Journal of Korean Academy of Psychiatric and Mental Health. 2013 Jun; 22(2):107–16.

13. Stewart RE, Chambless DL. Cognitive–behavioral therapy for adult anxiety disorders in clinical practice: A meta-analysis of effectiveness studies. Journal of Consulting and Clinical Psychology. 2009 Aug; 77(4):595–606.

14. Teixeira CM, Vasconcelos-Raposo J, Fernandes HM, Brustad RJ. Physical activity, depression and anxiety among the elderly. Social Indicators Research. 2013; 113(1):307–18.

15. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr R 1983 Jun; 67(6):361–70.