

# A Comparison of Cognitive Functions and Nutritional Status in Nursing Home Residents and Community-Dwelling Elderly

## ABSTRACT

**Objective:** This descriptive and comparative study was conducted to determine the cognitive functions and nutritional status of nursing-home-residing and community-dwelling elderly.

**Methods:** The study was carried out with a total of 204 elderly people who were community dwelling (n = 104) and nursing home residents (n = 100). Data were collected with the Mini Nutritional Assessment (MNA) and standardized with the Mini Mental State Examination (MMSE).

**Results:** Mean age of the nursing home residents and community-dwelling elderly people was 77.4 (SD = 6.7) years and 76.5 (SD = 7.4) years, respectively. Mean MMSE score was significantly different between nursing home residents (18.5 [SD = 4.5]) and community-dwelling elderly (22.1 [SD = 4.7]) ( $P < .05$ ). Mean MNA score of nursing home residents (23.0 [SD = 3.7]) and community-dwelling elderly (24.6 [SD = 3.1]) was significantly different ( $P < .05$ ).

**Conclusion:** Nursing home residents were at risk of malnutrition and cognitive impairment. Precautions for the protection of the residents for maintaining nutritional status and cognitive functions were recommended.

**Keywords:** Cognitive functions, nutritional status, elderly

## Introduction

Old age is a risky period in which nutritional problems and malnutrition (MN) are common.<sup>1</sup> MN causes several negative consequences on the health status of the elderly.<sup>2</sup> Nutritional disorders in old age are closely related to various geriatric syndromes, including cognitive impairment (CI).<sup>3</sup> A number of studies have shown that changes in nutrition and MN are associated with CI in the elderly population.<sup>3-7</sup> MN and CI significantly increase in old age.<sup>8</sup> There are studies investigating the relationship between nutritional status and CI in the elderly population. However, there is limited research about the effect of nutritional status on cognitive function that compares community-dwelling and institutionalized older adults.

The elderly population in Turkey is predicted to increase to 10.2% in 2023 and 16.3% in 2040; it was 9.1% in 2019.<sup>9</sup> In parallel with the increase in the elderly population, the studies on health status of elderly people are also on the rise. Although elderly people tend to live with their family and children in our country, there has been an increase in the number of elderly people living in nursing homes recently because of the change of family type into a nuclear family. We consider that living conditions in community or nursing homes may make a difference in biological, psychological, and social health status of the elderly people, which may lead to differences in nutritional and cognitive status in the different living environments of older adults.

## Methods

This descriptive and comparative study was conducted to determine the cognitive functions and nutritional status of nursing home residents and community-dwelling elderly.



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### Study Design and Sample Size

This study was carried out with elderly people aged 65 years and older who were living in a nursing home located in the city center and with community-dwelling older adults who had applied to Family Healthcare Centers for any reason in Kayseri, Turkey. The nursing home, with a capacity of 200 persons, hosted 153 elderly people. Elderly people who met the nursing home admission criteria, who understood and were able to communicate to answer the questions, and who were informed about the study and gave verbal consent, were recruited to the study. Elderly residents, 59 males and 41 females ( $n = 100$ ), who met the inclusion criteria were interviewed within the nursing home. By taking into account the number and criteria of nursing home residents, 58 male and 46 female community-dwelling elderly ( $n = 104$ ), who also gave verbal consent, were recruited to the study, for a total of 204 elderly people.

### Data Collection

Data were collected with a questionnaire form including questions about sociodemographic characteristics, Mini Nutritional Assessment (MNA), and standardized Mini Mental State Examination (MMSE) by a face-to-face interview.

**Sociodemographic Information Form:** The form included questions about age, gender, education status, marital status, income level, number of children, and having a chronic condition.

**Standardized Mini Mental State Examination (MMSE):** MMSE was used to assess cognitive function.<sup>10</sup> The total score from MMSE, which was applied separately for the literate and illiterate elderly people, is 30. CI was defined as a score of  $< 24$  in illiterate people and  $< 25$  in literate elderly people.<sup>10,11</sup>

**Mini Nutritional Assessment (MNA):** MNA was used to determine the nutritional status of the elderly. This tool consisted of 18 questions, including anthropometric measurements (body weight, height, mid-upper arm circumference, and calf circumference), living conditions, taking prescribed drugs, food consumption, and subjective assessment of health. An MNA score  $> 23.50$  shows normal nutritional status, a score between 17.00 and 23.50 shows a risk of MN (MNR), and a score  $< 17.00$  shows MN in the elderly person.<sup>12</sup>

**Anthropometric Measurements:** Body weight, height, waist circumference (WC), hip circumference, mid-upper arm circumference, and calf circumference were measured by the researchers according to proper methods. Body mass index (BMI,  $\text{kg}/\text{m}^2$ ) was calculated.<sup>13</sup>

### Ethical Considerations

Ethical approval was received from the Institutional Review Board of Erciyes University (2015/228). Before the data collection process, participants were informed about the aim of the study and verbal consent was obtained from each participant.

### MAIN POINTS

- Cognitive impairment and nutritional risk were significantly higher in nursing home residents compared to community-dwelling elderly.*
- Gender was an important risk factor for cognitive impairment; no female residents had normal cognitive function.*
- A well-established individual-based nutritional care for nursing home residents and educational activities may provide better nutritional status and support cognitive functions.*

### Statistical Analysis

Data were analyzed with Statistical Package for Social Sciences version 20.0 (IBM Corp.; Armonk, NY, USA). Normal distribution of the data was checked with the Kolmogorov-Smirnov test. Independent samples *t*-test was used for comparison of the mean values, and chi-square test was used to compare categorical variables.  $P < .05$  was set as statistically significant.

### Results

The demographic characteristics of the participants are summarized in Table 1. Among 204 participants, the mean age of the nursing home residents was 77.4 ( $SD = 6.7$ ) years, 59.0% were male and 50.0% were illiterate. The mean body weight, BMI, and WC of the residents were 71.1 ( $SD = 12.5$ ) kg, 27.8 ( $SD = 4.7$ )  $\text{kg}/\text{m}^2$ , and 100.1 ( $SD = 11.2$ ) cm, respectively. The mean age of the community-dwelling elderly was 76.5 ( $SD = 7.4$ ) years, 55.8% were male and 47.1% were illiterate. The mean body weight, BMI, and WC of the community-dwelling elderly were 74.0 ( $SD = 13.2$ ) kg ( $P = .107$ ), 28.4 ( $SD = 5.7$ )  $\text{kg}/\text{m}^2$  ( $P = .407$ ), and 98.9 ( $SD = 14.2$ ) cm ( $P = .498$ ), respectively ( $P > .05$ ) (Table 1).

Mean scores of MMSE and MNA according to place of living are presented in Table 2. Mean MMSE score was significantly different between nursing home residents (18.5 [ $SD = 4.5$ ]) and community-dwelling elderly (22.1 [ $SD = 4.7$ ]) ( $P = .000$ ). More than half of the nursing home residents with CI (55.6%) ( $P = .000$ ) and community-dwelling elderly with CI (50.7%) ( $P = .010$ ) were illiterate ( $P < .05$ ). Marital status did not affect the CI of the nursing home residents ( $P = .837$ ), whereas it was determined that 75.7% ( $n = 37$ ) of the community-dwelling elderly with normal cognitive functions were married

**Table 1. Descriptive Characteristics of the Elderly Subjects**

Descriptive variables	Nursing home residents ( $n = 100$ )	Community-dwelling ( $n = 104$ )	P
Gender: male	59 (59.0)	58 (55.8)	.641
Education status (illiterate)	50 (50.0)	49 (47.1)	.399
Marital status: single	88 (88.0)	42 (40.4)	.000
Regular income: yes	75 (75.0)	87 (83.7)	.126
Chronic disease: yes	80 (80.0)	85 (81.7)	.753
Using drug: yes	82 (82.0)	83 (79.8)	.691
Age (mean [ $SD$ ], year)	77.4 (6.7)	76.6 (7.4)	.403
Body weight (mean [ $SD$ ], kg)	71.1 (2.5)	74.0 (13.2)	.107
BMI (mean [ $SD$ ], $\text{kg}/\text{m}^2$ )	27.8 (4.8)	28.4 (5.7)	.407
Waist circumference (mean [ $SD$ ], cm)	100.1 (11.2)	98.9 (14.2)	.498

Abbreviations: BMI, body mass index; SD, standard deviation.

**Table 2. A Comparison of Cognitive Functions and Nutritional Status in Nursing Home Residents and Community-Dwelling Elderly**

Scale	Nursing home residents	Community-dwelling	t	P
	Mean ( $SD$ )	Mean ( $SD$ )		
MMSE	18.5 (4.5)	22.1 (4.7)	-5.64	.000
MNA	23.0 (3.7)	24.6 (3.1)	-3.32	.000

Abbreviations: MMSE, Mini Mental State Examination; MNA, Mini Nutritional Assessment; SD, standard deviation.

( $P = .013$ ). There was no statistically significant difference between cognitive functions and age, getting regular income, taking medicine, or having a chronic condition in the nursing home residents ( $n = 100$ ) and community-dwelling elderly people ( $n = 104$ ). Among nursing home residents who had CI ( $n = 90$ ), 54.4% were males, whereas no female residents had normal cognitive functions ( $P = .05$ ).

Mean MNA score of nursing home residents and community-dwelling elderly was 23.0 ( $SD = 3.7$ ) and 24.6 ( $SD = 3.1$ ), respectively ( $P = .000$ ) (Table 2). It was found that 72.4% of the community-dwelling elderly with MN and MNR ( $n = 29$ ) were aged 75 years and older ( $P = .003$ ). Age was not a significant variable for MNR in the nursing home residents ( $P = .157$ ). Of the community-dwelling elderly people with MN and MNR, 65.5% were illiterate ( $P = .05$ ). Education status did not significantly affect nutritional status among nursing home residents ( $P = .215$ ). Of the nursing home residents with MN and MNR ( $n = 48$ ), 89.6% had chronic diseases and 93.8% took medicines regularly ( $P = .021$ ), whereas these variables did not affect the nutritional status of community-dwelling elderly people ( $P = 0.062$ ). There was no statistically significant relationship between nutritional status and marital status and regular income of the nursing home residents and community-dwelling elderly people.

## Discussion

In this study, aiming at determining the nutritional status and cognitive functions of nursing home residents and community-dwelling elderly, it was found that CI, MN, and MNR were higher in nursing home residents than in community-dwelling elderly ( $P = .000$ , Table 2). Several studies in different elderly populations (community-dwelling or nursing home-residing) around Turkey and in other countries that investigate CI prevalence or cognitive functions have shown that CI is significantly higher in institutionalized elderly people.<sup>14-16</sup> This is similar in our study, which shows that living in a nursing home creates a risk for CI. In a study comparing the nutritional status of nursing home residents and community-dwelling elderly people, MN ratio was found to be higher in the institutionalized elderly.<sup>17</sup> This result is similar to our finding that living in a nursing home creates a risk for MN in older age. Borowiak et al<sup>18</sup> have reported that MNA and MMSE scores of institutionalized elderly were lower than that of the community-dwelling elderly people.

Cognitive functions of male and female institutionalized elderly were found to be impaired, whereas no female resident had normal cognitive function ( $P = .005$ ), which shows that female residents may have a higher risk of CI. In addition, the MMSE score of male and female community-dwelling elderly was significantly higher than that of nursing home residents. In this context, gender was found to be an important risk factor for CI and living in an institution creates a risk for CI in both male and female elderly people. There is no national research showing such a risk in Turkey; however, local studies and international research have demonstrated that being a woman is one of the sociodemographic risk factors for CI.<sup>19,20</sup>

Low education status is another risk factor for CI. In this study, the education status of women was significantly lower than that of men ( $P = .000$ ), which may explain this result. The lower education status of women compared with men may indicate the need to focus on gender in terms of CI in our country. The proportion of illiterate men in 2012 in Turkey was 1.4%, whereas it was 7.0% in women. The pro-

portion of illiterate women in Turkey rose up to 18.2% in the eastern parts.<sup>21</sup> Therefore, increasing the education status of women in Turkey may be a CI protective application. More than half of the participants with impaired cognitive functions in both settings were illiterate.

Marital status had no effect on cognitive functions of the nursing home residents ( $P > .05$ ). This may have resulted from the fact that the majority of residents in the nursing home (88.0%) were single (Table 1). In contrast, most of the community-dwelling elderly people with normal cognitive functions were married ( $P = .013$ ). Håkansson et al<sup>22</sup> have found that living with a partner might imply cognitive and social challenges that have a protective effect against CI later in life, consistent with the brain reserve hypothesis.

El Zoghbi et al<sup>23</sup> reported that income level of the elderly did not influence cognitive functions. Similarly, in our study, getting regular income did not significantly affect cognitive functions of nursing home residents and community-dwelling elderly people.

Progressing age is known to have a negative impact on cognitive function.<sup>14,23,24</sup> In this study, age was not found to have an impact on cognitive function. The results of the studies investigating relationship between chronic diseases and CI are controversial. In this study, having a chronic disease and taking medicines had no effect on cognitive functions ( $P > .05$ ).

Male residents had significantly lower MNA scores than male community-dwelling elderly people ( $P < .05$ ), whereas it was not different in females ( $P > .05$ ), although a number of studies have shown that women have a higher risk of MN.<sup>5,25</sup> Kvamme et al<sup>26</sup> have found higher rates of MN in elderly males, similar to this study.

It was determined that MN and/or MNR increased as age significantly increased in the community-dwelling elderly, whereas age was not a significant determinant for MNR in the nursing home residents. More than half of the community-dwelling elderly with MN/MNR were illiterate ( $P = .05$ ), whereas education status did not affect MN/MNR in the nursing home residents ( $P = .215$ ). It was suggested in the study by Agarwalla et al<sup>27</sup> that progressing age and low education status increased MNR.

The majority of the nursing home residents with MN/MNR had chronic disease and took regular medicines. In contrast, community-dwelling elderly people with chronic diseases and on regular medicines did not have MN/MNR, which may show possibly better nutritional intake of community-dwelling elderly people. These findings may also indicate a problem with medical nutrition therapy and nutritional care of elderly residents in the nursing home.

Improving nutritional services and giving well-established individual-based nutritional care to nursing home residents may provide better nutritional status, whereas cognitive functions may be supported with educational activities. Community-dwelling elderly people should be monitored by the primary healthcare professionals to protect the nutritional and cognitive status.

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**Ethics Committee Approval:** Ethics committee approval was received for this study from the Ethics Committee of Erciyes University (Approval Number: 2015/228).

**Informed Consent:** Informed consent was obtained from the patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

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**Conflict of Interest:** The authors have no conflict of interest to declare.

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