



## Evaluation of the Elderly Living in the Central Kirşehir Using Standardized Mini-Mental State Examination

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### Introduction

In the last century technological developments contribute positively to the living conditions, quality improvement in health care, higher levels of education, advances in public health and preventive medicine are the positive society of the effects of, has led to the extension of the average life expectancy. This increase in the older population causes an increase in the prevalence of age-related diseases. Dementia is one of those diseases and it is increasingly becoming a major health problem [1,2].

Dementia is one of the most important common public health problem, mostly seen in the elderly as a chronic and often progressive characterized with the reduction of memory and intellectual capacity and at least two of cognitive functions such as perception, memory, speech, calculation, orientation, judgment, abstract thinking and problem-solving malfunction [3,4].

In 2012, approximately 24.3 million people were affected by dementia worldwide. This number is expected to double every 20 years, reaching a total of 80 million people by 2040 [5].

Harvey, et al. [6] studied with health care workers in some areas of London and estimated that the prevalence of dementia at the age of 30-64 is 54.0 average in 100,000 and at the ages of 45-64 year average was estimated to be 98.1 in 100,000. In another study investigating the prevalence and risk factors of dementia in an elderly population with low socioeconomic status in İzmir, Keskinoglu, et al. [7] stated that 46 of 204 (22.9%) individuals were diagnosed with dementia.

In our country, there are no adequate studies to determine the prevalence of dementia. This study was con-

ducted to determine the prevalence of dementia in the center of Kirşehir using Standardized Mini-Mental State Examination.

### Methods

A cross-sectional study from December 2012 to May 2013 was conducted on 1386 elderly. The population of 65 years and over in Kirşehir is 10.139 according to data in 2011 from Kirşehir Provincial Directorate of Health. As the number of individuals in the universe is known, for the sample selection by using  $n = Nt^2 pq/d^2(N-1) + t^2 pq$  formula is found 1386 (95% confidence interval  $d = 0.05, p = 0.10, t = 1.96$ ). Kirşehir city center consists of 10 districts. To reach the estimated number of samples districts were stratified according to the elderly population, and the number of elderly were selected from each layer in proportion to the elderly population.

A questionnaire developed by researchers in accordance with the literature and Standardized Mini-Mental Test (MMSE/SMMSE) for literate and illiterate was used in this study. MMSE/SMMSE test is chosen in accordance with the educational status of the elderly as two different forms for educated and uneducated people. In this study those who have never educated in school or don't have a primary school diploma (educated less than

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5 years) are considered uneducated and those who have a diploma including primary or secondary school diploma (educated more than 5 years) are considered educated. It is based on the voluntary participation of the elderly in the study.

Older people who did not want to participate in work, which lost their hearing and had another neurological disorder, were not taken into the study.

In the questionnaire; sociodemographic characteristics such as gender, education status, marital status, income status, social security, occupation, drugs, alcohol, and smoking status, diagnosis of dementia, with individuals with dementia and family member/s with dementia were questioned.

MMSE/SMMSE was used for the first time in standard neuropsychiatric examination methods with the aim of evaluating quantitatively issued by Folstein, et al. [8] in 1975 MMSE/SMMSE is divided into five headings as orientation, registration memory, attention and numeracy, recall and language. It consists of 11 items and is assessed on a total of 30 points. The test is obtained from the maximum 30 points.

In the staging of dementia; 21-26 points indicate light dementia, 10-20 points indicate moderate dementia and less than 10 points indicate severe dementia. The validity and reliability of the MMSE have been studied by Güngen, et al. [9] for Turkey and it was found out that the Turkish standard version of MMSE/SMMSE has enough reliability (kappa value 0.92) as a screening test.

The cutoff score 23/24 was found to have the highest sensitivity (0.91), specificity (0.95), positive and negative predictive values (0.90 and 0.95) and kappa score (0.86). For an objective assessment, elderly individuals whose MMSE/SMMSE scores are below their cut off values will be directed to the psychiatric clinic with the doubt of dementia to reassess them at the level of specialist physician.

Ethics committee of Ahi Evran University has approved the conduction of this study. Consent of elders was obtained after necessary explanations were made to them before the study.

The data were collected by researchers and ten nurses trained by researchers using face-to-face interviews done in individuals' houses. The data collection process is valid for both elderly individuals who are literate and elderly individuals who are not literate. Data was evaluated with percentage, mean, Mann-Whitney, Kruskal-Wallis, and Tukey HSD analysis.

## Results

The distribution according to the socio-demographic

characteristics of 1386 elderly is in Table 1. 71.6% of the elderly are at the age of 65-74 and the mean age is  $71.83 \pm 6.72$ . 55.1% of elderly are females, 64% of them are married, 50.7% of them are literate, and 49.3% have no literacy. The majority (73.5%) of the non-literate people are women, while the rest (26.5%) are males.

53.2% are housewives, 31.3% are retired, 49.9% have balanced income and expenses, 88.5% have social insurance. 68.7% of the elderly were using drugs, 3.4% were using alcohol, 88.7% were smoking, and 16.2% had dementia in their family history.

There is a statistically high significant meaningful difference was found among individuals' MMSE/SMMSE total score and their genders, marital status, education status, income status, social security and disease diagnosis, drugs, alcohol, smoking status and family member/s with dementia ( $p < 0.001$ ). According to Tukey HSD analysis results, scale scores of the widow/divorced elderly ( $21.30 \pm 5.83$ ) is lower than married or single older people, so that the higher prevalence of dementia was observed according to MMSE/SMMSE. According to Bonferroni-corrected Mann-Whitney U analysis results, the group that created the difference is the widow/divorced elderly group ( $p < 0.0167$ ). As a result of the further statistical examination, the scores in MMSE/SMMSE of women, illiterates, widows/divorced ones and elderly with no income or social security were lower compared to other groups so that the risk of dementia was higher. 75.3% of elderly were diagnosed with the disease and 68.7% were using drugs. 84.1% of individuals don't drink alcohol and 62.5% found that the never-smokers and 16.2% have family member/s with dementia.

When MMSE/SMMSE average score and diagnosis of disease, drugs, alcohol and smoking, and family member/s with dementia, compared the difference between groups was statistically highly significant as was observed ( $p < 0.001$ ). It was observed that the prevalence of dementia in elderly who have a chronic disease, do not drink alcohol, smoke, have family member/s with dementia was higher than those in other groups of elderly when tested with MMSE/SMMSE.

According to MMSE/SMMSE, 33.3% of the elderly don't have dementia, 37.4% have light dementia, 27.4% have moderate dementia, 1.8% has severe dementia and a total of 66.6% have dementia. The mean MMSE/SMMSE scores of the elderly are  $23.11 \pm 5.39$  (Table 2).

## Discussion

In this study, the prevalence of dementia in women is found to be more than men when tested with MMSE/SMMSE. In many studies which examined the prevalence of dementia, it is determined that the female gender is a

**Table 1:** Comparisons of MMSE/SMMSE scores of socio-demographic characteristics in elderly.

Socio-Demographic characteristics	Frequency (%)	X ± SD	p
<b>Gender</b>			
Female	763 (55.1)	22.10 ± 5.53	MW-U = 1.774
Male	623 (44.9)	24.38 ± 4.85	<b>p = 0.000</b>
<b>Age</b>			
65-74 age	993 (71.6)	24.01 ± 4.85	KW = 86.51 <b>p = 0.000</b>
75-84 age	301 (21.7)	20.83 ± 5.86	
85-94 age	80 (5.8)	20.70 ± 6.14	
Over and 95 age	12 (0.9)	24.16 ± 4.68	
<b>Education status</b>			
Illiterate	683 (49.3)	21.90 ± 5.53	MW-U = 1.761
Literate	703 (50.7)	24.32 ± 4.90	<b>p = 0.000</b>
<b>Marital status</b>			
Married	887 (64.0)	24.08 ± 4.80	KW = 74.29 <b>p = 0.000</b>
Single	28 (2.0)	23.78 ± 5.84	
Widowed/Divorced	471 (34.0)	21.30 ± 5.83	
<b>Economic status</b>			
No income	231 (16.7)	21.46 ± 5.27	KW = 46.95 <b>p = 0.000</b>
Income > expenditure	292 (21.1)	22.62 ± 5.91	
Income = expenditure	691 (49.9)	23.55 ± 4.97	
Income < expenditure	172 (12.3)	24.51 ± 5.36	
<b>Health insurance</b>			
Yes	1227 (88.5)	23.53 ± 5.18	MW-U = 6.207
No	159 (11.5)	20.05 ± 5.69	<b>p = 0.000</b>
<b>Presence of dementia diagnosis</b>			
Yes	1044 (75.3)	22.72 ± 5.54	MW-U = 1.491 <b>p = 0.000</b>
No	342 (24.7)	24.38 ± 4.51	
<b>Use of drug</b>			
Yes	952 (68.7)	22.66 ± 5.52	MW-U = 1.749 <b>p = 0.000</b>
No	434 (31.3)	24.15 ± 4.82	
<b>Use of alcohol</b>			
Yes	47 (3.4)	25.25 ± 5.43	MW-U = 1.749 <b>p = 0.000</b>
No	1339 (96.6)	23.06 ± 5.37	
<b>Use of cigarette</b>			
Yes	1230 (88.7)	22.83 ± 5.47	MW-U = 7.089 <b>p = 0.000</b>
No	156 (11.3)	25.26 ± 4.07	
<b>Dementia of family history</b>			
Yes	225 (16.2)	21.63 ± 5.94	MW-U = 1.076 <b>p = 0.000</b>
No	1161 (83.8)	23.42 ± 5.18	

**Table 2:** MMSE/SMMSE scores of elderly and MMSE/SMMSE mean score.

Dementia	Frequency	%
No dementia (26 point and over)	462	33.3
Light dementia (21-26 point)	519	37.4
Moderate dementia (10-20 point)	380	27.4
Severe dementia (10 point and under)	25	1.8
MMSE/SMMSE mean score	23.11 ± 5.39	

risk factor for dementia [10,11]. Some hypotheses such as psychosocial, hormonal and environmental factors may explain the association between female gender and dementia [12]. Moreover it is also seen that women included in the study have lower educational levels than men. The most important risk factor for all types of dementia is age. That the prevalence of dementia increases with the

age has been determined in this study as in many others [10,11,13]. However the studies in the United States have not shown a difference or the difference has varied with age [14].

49.3% of the elderly in this study are illiterate, and the prevalence of dementia was determined to be higher than those in the literate group when tested with MMSE/SMMSE. This result indicates that low levels of education are associated with dementia as in the literature. Lack of education may lead to the fast and early development of memory loss. Education at an early age increases cognitive capacities by affecting neocortical synaptic density and is known to provide protection for dementia. The duration of education contributes to creating a stepping stone for subsequent intellectual input [11,15]. However, in some publications, it has been reported that some lifetime activities and capacity limitations in uneducated persons may be mistakenly perceived as dementia. Apart from basic education, it is known that the education and cognitive activities at later ages may be beneficial but the statistical proof cannot be done [16-19].

In this study, when tested with MMSE/SMMSE the prevalence of dementia of widowed/divorced elderly is higher than the other groups as in the study of Keskinoglu, et al. [12]. In this study, a high prevalence of dementia when tested with MMSE/SMMSE has been found in elderly with low-income as well as elderly without social security. Similar findings are noted in the results of one study [7]. In the study of Amuk, et al. [20], it was determined that dementia in women, in those older than 75, for those with low education levels and those without social security, with a history of smoking and alcohol use and consistently using is higher than other groups [20]. The findings of this study are also consistent with the literature mentioned.

In some studies [7,12,21] it was determined that the presence of chronic disease increases the risk of dementia and this finding is similar to the findings in this study. In this study, drug, alcohol and cigarette use was found to be correlated with dementia. As there are studies that state that the use of drug increases the risk of dementia when tested with MMSE/SMMSE, in this study dementia in individuals who use drugs was found to be higher than the other groups in this study [11,20,22,23]. Although Chen, et al. [24] indicates that alcohol poses a risk of dementia, Vincze, et al. [25] detected that alcohol consumption is a factor that protects individuals from dementia. In a study conducted in Australia, moderate alcohol consumption was reported to create a risk of dementia [26].

In this study, the prevalence of dementia when tested with MMSE/SMMSE in those who use alcohol was high-

er than those not. In this case, the relationship between alcohol consumption and dementia is not clear and therefore more detailed research is needed. The global prevalence of smoking in the population aged more than 15 years was 31.1% and 6.2% for men and women in 2012, respectively [27]. The relation between smoking and dementia has been investigated by various studies [28,29]. While it was specified that smoking doesn't have a protective or enhancing impact on dementia in a study conducted in England and Wales [30], studies of Vincze, et al. [25] highlighted that the smoking protects from dementia. Nevertheless, in several previous studies, smoking was found to be an important risk factor for prevalence of dementia [24-27]. In the current study, it was found that smoking has the risk of increasing dementia. In addition, a recent study on meta-analysis [31] on smoking and risk of AD and a meta-analysis on smoking and risk of all-cause dementia, Alzheimer's disease (AD) and vascular dementia (VaD) involved 9 and 13 studies, respectively [32].

There are studies in the literature indicating that genetic factors create a risk factor for dementia [10,11,13]. The prevalence of dementia was found to be higher than those without in this study as similar findings mentioned in the literature.

Prevalence of dementia, when tested with MMSE/SMMSE in this study (66.6% = light + medium + heavy), is similar to results (45%-81%) from previously reported studies conducted in nursing homes [20,33]. Ferri, et al. [34] reported that dementia was determined 3% in China, 2.4% in India and 1.6% in Africa. In this study, severe dementia of the elderly is similar to the results literature (1.8%).

The prevalence of dementia in this study is consistent with the literature when tested with MMSE/SMMSE. It can be seen that 37.4% of the elderly individuals have mild, 27.4% of them have moderate, 1.8% of n them have severe and 66.6% in total have the diagnosis of dementia suspicion. Also in this study, it has been identified that female gender, advanced age, low levels of education, widow/divorced, having low income and no social security, diagnosed disease, use of tobacco and medications, and family members with dementia increases the risk of dementia. The elderly population is increasing with each passing day all over the world as well as in Turkey. National health and social policies for the elderly are not enough in Turkey as in developed countries. Elderly often benefit from curative health services. Elderly should make more use of preventive health services, and dementia as a major public health problem that should be avoided as much as possible. So health personnel may plan intervention studies on risk groups. Besides elderly



individuals whose MMSE/SMMSE scores are below their cut off values have been directed to the psychiatric clinic with the doubt of dementia to reassess them at the level of specialist physician.

## Conflict of Interest Statement

Authors have not any conflict of interest.

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