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Prevalence of cognitive impairment and related risk factors in community-dwelling elderly in Kayseri, Turkey

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Background/aim: The increased rate of elderly individuals in the general population leads to functional decline because of cognitive impairment (CImp). We aimed to detect the prevalence of CImp and related risk factors in community-dwelling elders living in an urban area (Kayseri, Turkey).

Materials and methods: This is a cross-sectional, population-based study conducted in a sample of 900 community-dwelling elders aged 60 years and older. Cognitive status and depressive symptoms were assessed by standardized Mini Mental State Examination (MMSE) and the Geriatric Depression Scale (GDS), respectively.

Results: The mean age of the participants was 71.6 ± 0.18 years, of whom 47.9% were female. Prevalences of CImp and depressive symptoms were 26.1% and 24.9%, respectively. Female sex, illiteracy, low income, increased age, being a housewife, being a nonsmoker, being depressive, being single, and having more than four children were significantly related with CImp based on univariate logistic regression analysis. However, in multivariate logistic regression analysis, it was found that being illiterate, being depressive, and having an increased number of children were determinants of CImp in the elderly. Self-reported chronic diseases were not detected as risk factors for CImp.

Conclusion: Increasing socioeconomic status and education levels and preventing depression should be accepted as primary protective measures for CImp.

Key words: Cognitive impairment, elderly, community-dwelling, risk factors

1. Introduction

Increasing numbers of elderly individuals have become a significant public health concern, primarily because of increased cognitive impairment (CImp) leading to several problems specific for this age group (1). The burden of CImp is correlated with increased age (2). Prevalence of cognitive dysfunction rises with age, affecting 20% of those aged 65 years and 45% of those aged 90 years and older, with a doubling of prevalence every 5 years (3,4). CImp is not only a significant problem for mental but also for physical deficiency of the elderly, negatively impacting factors such as nutrition and self-care (5).

The prevalence of cognitive dysfunction is expected to rise dramatically in developing countries relative to high-income countries as life expectancy increases (6,7). Thus, the World Health Organization described CImp as being the third leading cause of burden of disease by 2030 (4,6,8). Consequently, CImp both interacts with a decrease in the quality and variety of daily activities and leads to increased mortality risk (1,9,10). To prevent the development of CImp or to decrease its developing rate, its recognition by primary care providers is crucial. Anticipatory guidance of primary health care workers would decrease the financial burden of the disease and access to community resources for prevention (11). Since the transition period from normal to impaired cognition is vague, elders and their caregivers should be informed and get prepared for future precautions in terms of physical and mental disability (12).

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The Mini Mental State Examination (MMSE) is the most frequently used test to screen for cognitive status (13). For more than 35 years since its first usage, the test has provided reliable and valid information about CImp (14).

We consider that CImp would cause mental and physical dysfunction, which would have significant effects on morbidity and mortality of the elderly. The rationale of this study is therefore determining both the frequency of and the risk factors related with CImp in ambulatory elders. This information would be a reliable basis for preventive measures of community-based interventions to decrease CImp-related burdens.

This study was designed to reveal CImp frequency and related factors in elders living in an urban area (Kayseri, Turkey). Probable findings would be very useful to implement according preventive measures.

2. Materials and methods

2.1. Study design, setting, participants, and sample size

The Kayseri Elderly Health Study (KEHES) is a cross-sectional study that was performed between August 2013 and December 2013 in Kayseri, where 89,303 elderly individuals were living. The sample size of the study was planned as 1/100 of elders living in Kayseri, where more than 1,200,000 people live in total. Our inclusion criteria were all community-dwelling elders aged 60 years or older who were able to reach Family Health Centers (Turkish abbreviation: ASM). All community-dwelling elders were invited to ASM by their family physicians according to adjustment for sex and age group (60–64, 65–74, 75–84, and >85 years). Additionally, a study sample was chosen from each ASM in the urban area, where 88% of Kayseri's population lives, and adjusted for the proportion of population living in that particular area. Individuals who had severe deficiency of hearing or eye sight, had severe problems with communication, or were unable to reach a ASM were not included in the sample.

2.2. Data collection and instruments

Face-to-face interviews were performed by the researchers. Baseline demographic data including age, sex, marital status, smoking status, income level, and education status were obtained from these interviews. Major chronic diseases (hypertension, diabetes mellitus, coronary heart disease, cerebrovascular disease, renal failure, and hyperlipidemia) were noted according to patients' self-reports.

CImp was measured using the MMSE, which is widely used to assess cognitive status with five different sections (orientation, memory, attention and calculation, recall, and language). It is regarded as a practical test for daily medical practices and a very convenient tool to screen cognitive function in the elderly (14). A maximum score of 30 can be obtained from the above stated domains. CImp was defined as the score of less than 24/30 in illiterate people and 25/30 in literate people, respectively (15,16). Education status was recorded as the last graduated school; those who did not graduate from primary school (5 years), whether literate or illiterate, were grouped under 'no schooling'. A lower score is correlated with the level of CImp.

The Geriatric Depression Scale (GDS) is the Turkish version of Yesavage et al.'s scale, which consists of 30 items. Each item can be responded to with "Yes/No". A score equal to or higher than 14 indicates increased depression risk (17,18).

Ethical approval was received from the institutional review board of Erciyes University. All participants gave consent; for participants with severe CImp, informed consent was obtained from a proxy.

2.3. Statistical analysis

Comparisons between cognitive statuses (MMSE scores) were performed with the chi-square test (categorical variables). Univariate and multiple binary logistic regression analyses were conducted to evaluate the associations of MMSE with participants' characteristics. Two-tailed P-values of <0.05 were considered statistically significant.

3. Results

A total of 967 elderly individuals were recruited, but 67 whose proxies refused to participate or who met other exclusion criteria were excluded. The mean age of participants was 71.6 ± 0.18 years, of whom 47.9% were female and 68.1% were married; they had 4.26 ± 0.7 siblings. Rates of moderate income, smoking, being retired, and being illiterate were 49.9%, 25.5%, 51.1%, and 34.8%, respectively.

Rates of chronic diseases were as follows: hypertension, 58.2%; diabetes mellitus, 23.6%; coronary heart disease, 14.9%; hyperlipidemia, 12.2%; cerebrovascular disease, 2.0%; and renal failure, 1.7%.

We detected the CImp rate as 26.1% and the rate of depressive symptoms as 24.9%, respectively, with the MMSE and GDS.

The mean score of the MMSE was 26.21 ± 3.40. Sex-specific mean MMSE scores for each age group are shown in the Figure. The relationships between CImp and female sex, illiteracy, low income, age older than 75 years, being a housewife, being a nonsmoker, being depressive, being single, and having more than four children were statistically significant ($P < 0.001$) (Table 1). For self-reported chronic diseases, there were no relationships with CImp ($P > 0.05$).

In univariate logistic regression analysis, it was found that female sex, increased age, being illiterate, being single, having low income, being depressive, and having an increased number of children were determinants of CImp

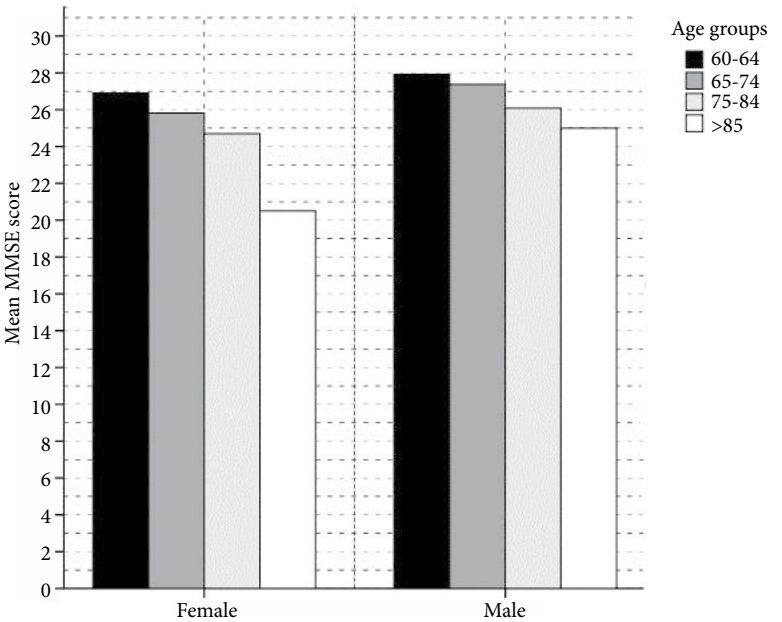

Figure. Sex-specific mean MMSE scores for each age group.

in the elderly. The highest odds ratio among the above independent risk factors was for increased age, where the odds ratio was more than 3 for those older than 75 years. However, in multivariate logistic regression analysis, it was found that being illiterate, being depressive, and having an increased number of children were determinants of CImp in the elderly (Table 2). Self-reported chronic diseases were not risk factors for CImp in logistic regression analysis.

4. Discussion

This study was designed to detect the level of CImp in community-dwelling ambulatory elderly individuals and to analyze the independent risk factors that may lead to CImp. Our limitations in generalizing our results may lie in excluding community-dwelling nonambulatory elderly individuals and excluding the elderly living in rural areas. However, this study was conducted in a metropolitan city that receives a great deal of immigration from other parts of the country. Additionally, 1/100 and stratified sampling from the elderly population provides reliable information about the cognitive status of the elderly.

In comparison of our data to local (17%–33.0%) and international (5.1%–35.9%) studies, we found that our CImp frequency (26.1%) was similar to the upper bound prevalence of local and international data (19–24). The wide range of CImp prevalence both in local and international studies may be related to the characteristics of study samples and local parameters, such as geographic location and socioeconomic status (25). Since the distribution of income in the general population is similar within our sample (Table 1), our results can be extended to the broader Turkish population. Depressive symptoms increase the rate of CImp by 33.0% as calculated from the odds of depressive state on cognitive status (Table 2). Furthermore, the loss of loved ones may be a significant determinant for depression (26). Coincidence of depressive symptoms and CImp impair both cognitive and physical functions more than CImp alone, so interventions for both of these conditions should be implemented as soon as CImp is detected (27).

Mean MMSE score was 26.2, which is similar to those of other studies (USA: 26.8 (28), Japan: 26.2 (29), Korea: 25.43 (1), Brazil: 21.9 (30), China: 25.92 (31), UK: 18.3% (3)). In other Turkish studies, mean MMSE scores were detected to be slightly lower than ours (Kars: 22.05 (21), Kocaeli: 25.15 (32)). This difference may be influenced by geographical and socioeconomic characteristics. Although mean MMSE score was found to be 26.2 and the frequency of CImp was 26.1% in comparison of the distribution of CImp between certain age groups, the odds ratio of CImp after 75 years was higher than that between 60 and 64 years (Table 2). CImp risk increases with age and it is more prevalent in females compared with males (1,19,20,25,33–35). Our results confirm this finding from other studies, and although the rate of CImp in females is similar, prevalence of CImp in our study is higher than other studies in both sexes (males: 20.6%, females: 31.5%). Declines in mean MMSE scores for certain age groups were more prominent in females in our study, which is consistent with the literature (25,29).

Table 1. Comparison of demographic and clinical characteristics with cognitive status.

Demographic and clinical characteristics		Cognitive status (MMSE)		P
		Normal, n (%)	Impairment, n (%)	
Sex	Female	311 (68.5)	143 (31.5)	<0.001
	Male	354 (79.4)	92 (20.6)	
Age groups (years)	60–64	29 (85.3)	5 (14.7)	0.001
	65–74	464 (77.1)	138 (22.9)	
	75–84	161 (65.7)	84 (34.3)	
	>85	11 (57.9)	8 (42.1)	
Education	Illiterate	177 (56.9)	134 (43.1)	0.001
	Literate	135 (86.5)	21 (13.5)	
	Schooling, ≥5 years	353 (81.5)	80 (18.5)	
Income	Good	149 (78.0)	42 (22.0)	0.009
	Moderate	338 (76.1)	106 (23.9)	
	Low	169 (66.8)	84 (33.2)	
Marital status	Married	481 (78.6)	131 (21.4)	0.001
	Single	184 (63.9)	104 (36.1)	
Profession	Housewife	282 (68.1)	132 (31.9)	0.001
	Retired	345 (79.1)	91 (20.9)	
Smoking status	Yes	182 (79.1)	48 (20.9)	0.008
	No	416 (70.6)	173 (29.4)	
	Quit smoking	66 (82.5)	14 (17.5)	
Number of siblings	0	26 (81.2)	6 (18.8)	0.014
	1–3	252 (79.0)	67 (21.0)	
	4+	387 (70.5)	162 (29.5)	
Depressive symptoms (GDS >14)		134 (60.1)	89 (39.9)	0.001

Table 2. The odds ratio (OR) and 95% confidence intervals (CIs) of risk factors influencing cognitive status.

Demographic and clinical characteristics		Univariate binary logistic regression		Multivariate binary logistic regression	
		OR	95.0% CI	OR	95.0% CI
Sex	Male	1			
	Female	1.77	1.31–2.40	-	-
Age groups	60–64	1			
	65–74	1.73	0.66–4.54		
	75–84	3.03	1.13–8.10	-	-
	>85	4.22	1.13–15.72		
Education	Illiterate	1		1	
	Literate	0.21	0.12–0.34	0.21	0.12–0.35
	Schooling, ≥5 years	0.30	0.22–0.42	0.41	0.28–0.58
Marital status	Married	1			
	Single	2.08	1.53–2.83	-	-
Income	Good	1			
	Moderate	1.11	0.74–1.67	-	-
	Low	1.76	1.15–2.71		
Number of children		1.16	1.08–1.25	1.12	1.04–1.21
Depressive symptoms	Yes	1		1	
	No	0.41	0.30–0.57	0.51	0.36–0.72

It is known that smoking is a risk factor for CImp among elderly people (36). Our results, however, showed that smoking was protective against CImp. This contradiction may be the result of the low smoking frequency in elderly housewives. In addition, the cross-sectional character of our study is a limitation whereby we cannot find a significant relationship between smoking and CImp. A contribution of our study is the significance of increased number of children with increased risk of CImp. We cannot explain this finding within the context of the current literature.

The relationship between chronic diseases and CImp is controversial in the literature. Our data revealed that there is no relationship between self-reported chronic diseases (hypertension, diabetes mellitus, coronary heart disease, cerebrovascular disease, renal failure, and hyperlipidemia) and CImp. However, this finding may be the result of underestimating of self-reports. Finally, the odds revealed by multivariate regression for being illiterate, being depressive, and having an increased number of children were found as the primary outcomes of our study. Our thought is that these characteristics can all be considered as main components of socioeconomic status. On the other hand, higher education level may lead to decreased number of children and decreased depressive symptoms. Increased education level may then be proposed as the primary protective measure.

In conclusion, we consider that low socioeconomic status, low education level, and being depressive are major determinants of CImp, and it is hard to discriminate which of these characteristics are related to CImp in community-dwelling elders. We propose that these determinants should be regarded as main topics to implement preventive measures in early elderly stages. Our study or similar others may provide a reliable framework for much more comprehensive national studies.

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