ORIGINAL ARTICLE

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The Relationship Between Daily Living Activities and Cognitive Function in the Elderly: Cross-Sectional Study

ABSTRACT

Objective: This study aimed to describe the relationship between activities of daily living and cognitive function community-dwelling elderly in an urban area.

Methods: 872 Participants were randomly selected who aged ≥65 years living in Kayseri, Turkey, patients were registered with Family Health Centers. We used the Standardized Mini-Mental State Examination (SMMSE) to assess participants' cognitive function, the Katz Index of Independence in Activities of Daily Living (ADL) to assess activities of daily living, the Instrumental Activities of Daily Living (IADL) scale to assess instrumental activities of daily living, and a questionnaire to assess sociodemographic characteristics.

Results: Participants' mean age was 71.9±5.5 years. The overall prevalence of IADL dependency was 17.6%; dependency was significantly higher in women than in men (by 5.5%). The prevalence of ADL dependency was 0.6%, and there was no sex difference. SMMSE and IADL scores decreased as age increased, whereas the ADL score did not change.

Conclusions: Increased age is a fundamental component of cognitive impairment and limitation in activities of daily living. Community-dwelling adults aged ≥65 years with cognitive impairment should receive early evaluation for IADL dependency. In addition, a daily living activity scale that takes into account social, cultural and gender characteristics may be useful in early detection of dependence.

Keywords: Activities of Daily Living, Cognitive Function, Aging, Dependency

Yaşlılarda Günlük Yaşam Aktiviteleri ve Bilişsel Fonksiyon İlişkisi: Kesitsel Çalışma

ÖZET

Amaç: Bu çalışmanın amacı, 65 yaş ve üstü bireylerde günlük yaşam aktiviteleri ile bilişsel fonksiyonlar arasındaki ilişkiyi belirlemektir.

Gereç ve Yöntem: Kayseri ilinde yaşayan, Aile Sağlığı Merkezlerine (ASM) kayıtlı olan 65 yaş ve üzeri 872 birey rastgele seçildi. Bilişsel fonksiyon değerlendirmesi için SMMT (Standardize Mini Mental Test), temel günlük yaşam aktiviteleri için Katz Günlük Yaşam Aktiviteleri Ölçeği (GYA), enstrümental günlük yaşam aktiviteleri için Lawton Günlük Yaşam Aktiviteleri Ölçeği (EGYA) ve sosyodemografik özellikler anketi uygulandı.

Bulgular: Çalışma grubunun yaş ortalaması 71,9±5,5'di. EGYA puanlarına göre bağımlılık prevalansı %17,6 olup kadınlarda erkeklere göre %5,5 yüksek saptandı ve istatistiksel olarak anlamlıydı. GYA puanlarına göre bağımlılık prevalansı %0,6 olup cinsiyetler arası anlamlı fark saptanmadı. SMMT ve EGYA puanlarının yaş arttıkça azalma gösterdiği, ancak GYA puanında değişme olmadığı saptandı.

Sonuç: Bilişsel bozukluk ve günlük yaşam aktivitelerinde kısıtlılığın temel bileşeni ileri yaş olduğundan toplumdaki 65 yaş ve üzeri yaşlılarda bilişsel fonksiyon bozukluğu tespit edilenler EGYA ile erken dönemde bağımlılık açısından değerlendirilmelidir. Ayrıca sosyal, kültürel ve cinsiyet özelliklerini göz önüne alan bir günlük yaşam aktiviteleri ölçeği bağımlılığın erken teşhisinde faydalı olabilir.

Anahtar Kelimeler: Günlük Yaşam Aktiviteleri, Bilişsel Fonksiyon, Yaşlılık, Bağımlılık

INTRODUCTION

In the 21st century, the increasing population of elderly is a significant demographic issue worldwide. Advances in medicine, science, and technology as well as declining birth rates have created a predisposition for the aging of communities. The need for healthcare increases at this age group as the general population becomes older. Cognitive impairment and dementia are important public health issues in communities where the proportion of the elderly population has increased (1). Worldwide, dementia is found in 2–8 people per 100 people aged ≥60 years (1). Dementia represents a chronic and progressive impairment in cognition and social behaviors and causes limitations in routine activities of daily living (2). In addition to problems for family members and caregivers, dementia also carries a significant social and economic burden (3). Several cognitive scales are helpful in identifying patients at risk for dementia, and the Standardized Mini-Mental State Examination (SMMSE) is widely used (3).

As a result of aging, activities of daily living are limited in elderly by losses in functional capacity and abilities, resulting in dependency over time. A previous report found that 21% of individuals aged ≥65 years experienced dependency in maintaining activities of daily living and instrumental activities of daily living in European communities, which increased to 29% among those aged ≥75 years (4). In a local study that was done in Central Anatolia daily activity in elderly is inversely proportional with increased age and decreased educational level (5). Although dependency in activities of daily living is not a treatable condition, its progression can be slowed and its negative impact on life can be decreased (4).

In recent years, perspectives on old age are not restricted to respect or protection of elderly, as healthy aging is addressed frequently and supportive studies are striking. Primary goals from care of elderly include delaying dependency in activities of daily living and rehabilitation.

We aimed to determine the prevalence of cognitive impairment and its influences on activities of daily living and instrumental activities of daily living in community-dwelling elderly in urban areas of Kayseri province, Turkey.

MATERIAL AND METHODS

The data used in current study were drawn from the Kayseri Elderly Health Study (KEHES)(6,7). This is a cross-sectional study conducted in Kayseri province. The elderly were randomly selected according to age and sex and stratified into on three age groups (65–74 years, 75–84 years, and ≥85 years). Family practitioners at family healthcare centers (FHCs) conducted telephone interviews with their registered populations between August 2013 and December 2013 to invite elderly to participate in the study. The KEHES planned to recruit 1/100th of the population aged ≥65 years in Kayseri province (869 individuals recruited in total) (8). The study was approved by the Ethics Committee of Erciyes University (No: 2013/441), and administrative approval was provided by the Turkish Public Health Organization.

This research included elderly aged ≥65 years who had resided in Kayseri for at least 5 years. The KEHES aims to recruit the %1 of elderly (≥65 years) living in this area. In this population ambulatory elderly who are able to live on their own and participate social activities; community-dwelling elderly were recruited as our sample size. The sample size were stratified both for gender and age groups also (65-74, 75-84, ≥85) and elderly were invited randomly according to this stratification. Elderly who declined to participate, who had severe physical or mental disorders (e.g., malignancy, severe hearing loss, severe vision loss, and severe communication disorders), and those with incomplete data for the questionnaire or scales were excluded.

The study was conducted at 21 FHCs in the urban areas of Kayseri province. FHCs were selected based on socioeconomic characteristics and the proportion of elderly served by that center. All participants provided informed consent before participating in the study. Participants completed a questionnaire covering sociodemographic characteristics (age, education, occupation, marital status, number/sex and survival status of children, person/persons living together, income level, smoking, and alcohol consumption). In addition, participants completed the Katz Index of Dependence in Activities of Daily Living (ADL) and the Lawton Instrumental Activities of Daily Living Scale (IADL) to assess functional status, and the SMMSE (with or without training) to assess cognitive function. These three tests were applied in the same order consequently to all subjects. The questionnaire and tests were administered via face-to-face interviews. Interviews were conducted by six trained interviewers, including academics and research assistants.

The SMMSE is a simple scale developed by Folstein et al. (1975) to assess cognitive function(9). It consists of five domains with 11 items, including orientation, memory, attention and calculation, recall, and language. The total score is 30 points. The test is influenced by educational level. A Turkish standardization study found that the threshold value of 23/24 points (23 for illiterate and 24 for literate people) had high sensitivity (91%) and specificity (95%) in the diagnosis of mild dementia (10). In our study, illiteracy defined as individuals with a formal education of <5 years. A SMMSE score ≤24 in illiterate individuals and a SMMSE score ≤25 points in literate individuals indicated cognitive impairment.

The ADL scale was developed by Katz et al.in 1963 (11). The validity and reliability of ADL scale was shown by Arik et al. (12). The index comprises statements on specific domains, including bathing, dressing, continence, transfer, toileting, and feeding. Items are rated as follows: 3 = an individual can perform activities of daily living independently; 2 = activities of daily living performed with assistance; 1 = unable to perform activities of daily living. The Katz ADL scale defines 0–6 points as dependent; 7–12 points, semi-dependent; and 13–18 points, independent In our study, an ADL score <12 points was defined as dependent.

The IADL scale was developed by Lawton and Brody (1969) in USA (13). The validity and reliability of IADL scale was shown by Tozlu et al. (14). The IADL scale consists of statements on eight domains: telephoning, shopping, preparing food, housekeeping, doing laundry, using transportation, handling medications, and handling finances. Items are rated as follows: 3 = an individual can perform instrumental activities of daily living independently; 2 = performed with assistance; and 1 = unable to perform instrumental activities of daily living. Dependent is defined as 0–8 points, semi-dependent as 9–16 points, and independent as 17–24 points. In our study, an IADL score ≤16 points were defined as dependent.

Statistical Analysis: Data were analyzed with 'R 2.14.0 program' (www.r-project.org). The descriptive characteristics; gender, age group, years of education, income level, current employment status, marital status, number of children, living with, smoking status, alcohol consumption were expressed as frequency. To determine whether cognitive impairment is related to independency (independency versus semi-dependency and dependency) we used a chi-square test. Independent two sample student t test was used to compare the differences between the scores of SMME, IADL, and ADL between gender for each age group. The age groups (65-74, 75-84 and ≥85 years) comparison for each test (SMME, IADL, and ADL scores) were done with one-way analysis of variance (ANOVA). The Tukey test was used for multiple comparisons. Pearson's correlation coefficient was used to assess the direction and strength of relationships between numerical variables (age, years of education, number of children, SMMSE, IADL, and ADL).).

RESULTS

The study recruited 872 elderly, including 417 women (47.8%) and 455 men (52.2%). The mean age was 71.9±5.5 years: 71.6±5.3 years for women and 72.2±5.6 for men.

Approximately one-third of the study population was illiterate, half reported a moderate income level, and approximately half were housewives. Two-thirds of participants were married and had four or more children, and only 14% were living alone. Approximately a quarter of participants were smokers, but the majority (96.4%) did not consume alcohol (Table 1).

Table 1. Sociodemographic characteristicsof the community-dwelling elderly

Variables*		n	%
Gender (n=872)	**Female**	417	47.8
	Male	455	52.2
Age(year) (n=872)	**65-74**	607	69.6
	75-84	246	28.2
	≥85	19	0.02
Years of education (n=872)	**Illiterate**	303	34.7
	Literate	152	17.4
	1-8 years	338	38.8
	>8 years	79	9.1
Income level (n=854)	**High**	181	21.2
	Medium	430	50.4
	Low	243	28.5
Current employment status (n=817)	**Retired**	425	52.0
	Housewife	392	48.0
Marital status (n=866)	**Married/cohabiting**	586	67.7
	Others	280	32.3
Number of children (n=866)	**No**	32	3.7
	1-3	304	35.1
	4+	530	61.2
Living with (n=857)	**Alone**	120	14.0
	With anyone	737	86.0
Smoking status (n=865)	**Yes**	223	25.8
	No	566	65.4
	Ex-smoker	76	8.8
Alcohol consumption (n=730)	**Yes**	24	3.3
	No	704	96.4
	Quit drinking	2	0.3

*For each variable missing values were omitted / Illiterate: Neither writer nor reader

The mean SMMSE score was 25.4±3.7 for women and 26.8±3.0 for men.The mean IADL scores were significantly higher in men than women. However, there were no significant gender differences in ADL scores (Table 2A).

Table 2A. According to age groups SMMSE, IADL and ADL distribution in male and female elderly

Variables	Age groups (year)					
	65-74 (years)		75-84 (years)		≥ 85 (years)	
	Male	Female	Male	Female	Male	Female
SMMSE	27.3±2.7	25.8±3.5	26.0±3.1	24.7±3.7	25.0±5.1	20.4±7.0
p	<0.001		0.003		0.144	
IADL	19.5±2.3	18.9±2.9	18.5±3.4	17.2±3.9	17.2±4.7	12.3±4.6
p	0.008		0.007		0.040	
ADL	17.9±0.4	17.9±0.5	17.7±0.9	17.8±0.9	17.3±2.3	17.9±0.4
p	0.475		0.557		0.503	

SMMSE: Standardized Mini-Mental State Examination; IADL: Instrumental Activities of Daily Living; ADL: Activities of Daily Living; p<0.05

We found statistically significant difference between each age group for SMMSE, IADL and ADL in female and male. SMME and IADL score were detected to decrease as getting older. In according to Tukey multiple comparisons there was a significant difference between 65-74 years old and 75-84 years old age groups for ADL scores in female and between 65-74 years old and ≥ 85 years old age groups for ADL scores in male (p<0.05). In male, there was a significant difference between 65-74 years old elderly and 75-84 years old, ≥85 years old elderly in SMMSE and IADL scores. There was a significant difference among age groups for SMMSE and IADL scores in female (Table 2B).

Table 2B. Comparison of SMMSE, IADL and ADL scores according to age groups for each gender separately in elderly

	Age groups (year)			
Variables	**65-74 (years)**	**75-84 (years)**	**≥ 85 (years)**	***p***
SMMSE				
Male	27.3±2.7	26.0±3.1	25.0±5.1	<0.001
Female	25.8±4.2	24.7±3.7	20.4±7.0	<0.001
IADL				
Male	19.5±2.3	18.5±3.4	17.2±4.7	<0.001
Female	19.0±2.9	17.2±3.9	12.3±4.6	<0.001
ADL				
Male	17.9±0.4	17.7±0.9	17.3±2.3	0.001
Female	17.9±0.5	17.8±0.9	17.9±0.4	0.041

SMMSE: Standardized Mini-Mental State Examination; IADL: Instrumental Activities of Daily Living; ADL: Activities of Daily Living; p<0.05

The dependency rate for IADL was 17.6% (dependency, 1.6%; semi-dependency, 16.0%), whereas the independency rate was 82.4%. Based on IADL scores, 90% of dependent individuals, 40% of semi-dependent individuals, and 20% of independent individuals had cognitive impairment. These differences were significant. Based on ADL scores, cognitive impairment was detected in all dependent individuals (0.6%) and around 25% of independent individuals, and the difference was significant. Table 3 presents results of correlation analyses performed to assess relationships between demographic and clinical characteristics analysis.

Table 3. Correlation analysis between demographic and clinical characteristics

Variables		**IADL**	**SMMSE**	**ADL**	**Age**	**Years of education**	**Number of children**
IADL	r	1	0,432***	0,406***	-0,261***	0,311***	-0.150***
SMMSE	r		1	0,214***	-0,238***	0,430***	-0.210***
ADL	r			1	-0,112*	0,075***	-0.04
Age	r				1	-0,155***	0.100**
Years of education	r					1	-0.260***
Number of children	r						1

SMMSE: Standardized Mini-Mental State Examination; IADL: Instrumental Activities of Daily Living; ADL: Activities of Daily Living; *:p<0.05; **:p<0.01; ***:p<0.001

DISCUSSION

Dementia is a clinical syndrome that precludes individuals' independent living by causing progressive cognitive impairment. The prevalence of dementia and cognitive disorders has increased worldwide due to the increase in elderly (16). In our study, the prevalence of cognitive impairment was 26.6% (SMMSE). However, a study conducted in the Middle Anatolian region found a prevalence of cognitive impairment of 20.4%. This difference may be due to a lower mean age compared with our study sample (16).

In our study population, the mean SMMSE score was as 26.2±3.4. In a study conducted in Kars province, the mean SMMSE was 22.05±7.46, and 68% of participants had a SMMSE score <25 points. This might be due to a lower literacy rate, social isolation resulting from the climate, cultural differences, words that were unknown/disused by the elderly of Kars, and a higher proportion of women (62.7%) in that study sample (17). In a study on elderly aged ≥65 years in Istanbul, the mean SMMSE was 23.76±4.41. The relatively low score in İstanbul study may be related with the higher proportion of female participants (77%) when compared with ours(18).

In old age, activities of daily living may be negatively affected by losses in functionality. In our study, prevalence of ADL dependency was 0.6% whereas prevalence of IADL dependency and semi-dependency was 17.6%. However, higher

prevalence has been suggested in the literature (4,19,20). Our finding might be explained by the selection of the study sample from elderly who were able to visit a FHC and by variations in sociodemographic, geographic, and cultural characteristics.

Consistent with the literature, we found that the prevalence of both IADL and ADL dependency were higher in elderly with cognitive impairment (21). A study with patients with mild cognitive impairment found lower IADL scores, higher losses of ability, and more Alzheimer's development when compared with normal controls (22). Our finding that the prevalence of ADL dependency was 97.8% in cognitive impairment might result from the fact that ADL scores decrease when severe cognitive impairment is present.

When the relationship between age and activities of daily living was assessed, we found that the group aged 65–74 years achieved greater independence in activities of daily living than did those in more advanced age groups (23,24). Advanced age is the most important risk factor for dependency. We found that the prevalence of ADL and IADL dependency increased with advancing age in both sexes. Previous studies reported that dependency could be improved at an earlier age by timely measures and recommendations to implement preventive measures at an early period of old age (25).

Consistent with the literature, we found no significant difference in the prevalence of ADL dependency between each gender; however, prevalence of IADL dependency by was higher among women compared with men (4,19,23). IADL involves some assessments such as handling finances and telephoning. In this regard, higher education level and responsibilities in shopping or financial issues assigned to men might have contributed to our results. Being limited to the house by assigned social role and higher rates of chronic illnesses due to longer life expectancy may result in greater loss of physical abilities and more dependency in performing activities of daily living in women.

The limitations of our study include failure to represent rural populations, and the inability to assess elderly who were bedridden or had severe disorders or other disabilities. In addition, the fact that completion of the questionnaire lasted 1.5 hours might have affected the performance of elderly by overstraining participants. In application of subsequent scales like we did (ADL, IADL and SMMSE), to prevent systematic errors (tiredness/habituation) unbalanced application order of tests in our study is the methodological limitation of our study. The completion time was long because the KEHES study had many goals in addition to the assessment of cognitive functions and activities of daily living in community-dwelling elderly.

Higher rates of cognitive impairment occurred when the degree of dependency increased according to IADL and ADL scores. However, there are elderly who are independent despite the presence of cognitive impairment. Therefore, it may be possible to implement protective measures, enhance medico social services, and reach the goal of healthy aging by continued assessment of individuals aged ≥65 years for cognitive impairment and IADL dependency.

Kayseri is an urban area that receives intensive migration so that the generalization of the findings is likely to be increased if the research is transformed into a broader and more representative research to be carried out in the future.

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