

Factors affecting daily instrumental activities of the elderly

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Background/aim: In order to determine elderly people's capabilities in daily activities, we evaluated the factors that may affect their daily instrumental activities.

Materials and methods: We performed an observational, analytical, and cross-sectional study on 101 patients above 60 years of age in 2008 and 2009. We applied the Lawton Instrumental Activity of Daily Living (IADL) scale, the Standardized Mini-Mental State Examination (SMMSE), and the Geriatric Depression Scale (GDS) during one-on-one interviews with the patients. Demographic data and disability levels were also recorded. These data were used to evaluate the possible effects of factors on the IADL scale.

Results: Statistical analyses indicated that total scores of instrumental activities are affected negatively by increased age, female sex, and literacy ($P < 0.001$, $P = 0.005$, and $P = 0.021$), whereas scores are affected positively by educational level ($P = 0.047$).

Conclusion: Our findings suggest that increased age, sex, literacy, and education levels influence elderly people's daily instrumental activities. Daily functional activities and factors influencing these activities should be determined in order to increase elderly people's quality of life and independence. It is important to evaluate elderly people's capabilities in daily activities.

Key words: Elderly, physical activity, self-care, activities of daily living

1. Introduction

Observing one's functional capacity has become a very important field of study in determining the health of the elderly. Aging can be described as losing some functional capacities over the course of time. As a result, the health and quality of life among elderly people may be determined by measuring their daily functional capacity. The functional capacity concept may be understood as a person's basic life activities, instrumental activities, and their advanced activities as well. Basic activities include a person's ordinary daily living activities such as bowel and bladder functions, toilet use, feeding, dressing, mobility, etc. Instrumental activities are daily functional activities that require the use of an instrument, such as the ability to use the telephone, to go shopping, to prepare food, to maintain a clean house, to do the laundry, to use a mode

of transportation, and to manage one's own medications and finances. Advanced activities indicate functions such as maintaining a profession, taking part in social activities, and travelling. While basic daily life activities are important for an elderly person to stay alive, the instrumental life activities are necessary for a person's social cohesion. For this reason, the various factors that may lessen the functional capacity of elderly people have attracted many researchers (1–4). Some studies have determined that the sex, old age, illiteracy, and low levels of sociocultural involvement causes a decrease in one's instrumental activity capabilities (5–7). Other studies have found that chronic diseases, such as chronic obstructive pulmonary disease (COPD), painful osteoarthritis, depression, and hypertension, and low scores from mini-mental tests increase a person's dependency (8–19).

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In this study we aimed to evaluate the possible impact of factors including chronic diseases, drug usage, literacy, education levels, and other psychosocial factors on elderly persons' instrumental activities.

2. Materials and methods

This was an observational, analytical, and cross-sectional study, which was performed on elderly people over the age of 60 who had been admitted as outpatients to the family medicine clinic of a medical faculty in Ankara, Turkey between January 2008 and 2009 as part of a university project on developing elderly health. We obtained approval from the local ethics committee of the medical faculty for this study. A data acquisition form based on the Lawton Instrumental Activity of Daily Living (IADL) scale was filled out by a medical doctor or nurse, during one-on-one interviews with all the patients who agreed to participate in the study during the study period. Patients who refused to participate in the study or who were not able to cooperate were excluded. The data acquisition form was prepared according to IADL factors and parameters affecting each factor in this scale. Factors affecting daily instrumental activities were evaluated under 8 headings. These headings were the ability to recognize numbers, vision or hearing problems, dementia, psychiatric problems, physical disabilities, and others (unable to travel or unable to go shopping alone, etc.). The IADL scale was applied to all participants, and their dependency levels and the risk factors affecting these levels were determined. Findings were recorded on the data acquisition form by the nurse or the medical doctor. Detailed medical history and examination findings were also recorded. For medical history, factors supposed to affect daily instrumental activities, including sex, age, education level, number of persons in household, physical disabilities, emotional status, cognitive functions, visual and hearing problems, chronic diseases, previous diagnoses, and medications were evaluated. Patients with hearing problems were referred to the ENT department for audiometry and the removal of cerumen after Weber and Rinne tests. Emotional status and cognitive functions of the participants were evaluated by the Geriatric Depression Scale (GDS) and the Standardized Mini-Mental Examination (SMMSE), respectively.

The IADLs (modified form) consist of 8 questions about one's ability to use a telephone, to get to places beyond walking distance, to go shopping, to prepare meals, to do housework, to do laundry, to take medicine, and to manage money.

In our evaluation, we used the following point scale: if a person does any of the activities mentioned in Lawton's scale independently by himself/herself, then 3 points were given; if this person does this activity with

help from someone, then 2 points were given; and if this person cannot conduct this activity at all, then 1 point was given. These scales have been widely used in Turkey and internationally, and their reliability and validity were evaluated (1,2).

We applied a modified version of IADLs for subjects and determined their dependency for each activity, as well as probable risk factors.

We evaluated the emotional situation of the subjects using the GDS. This scale has valuation based on responses given to 30 short sentence questions with yes or no answers. The break-even point is 13/14. The responses above this value are significant in terms of documenting depression among the elderly (4,23,24).

We evaluated cognitive functions of the subjects with the SMMSE. This test consists of 2 forms: one for educated people and one for those with little schooling. The SMMSE evaluates cognitive functions in 5 different categories, including orientation (10 points), registry (3 points), focus and calculation (5 points), recall (3 points), and language (9 points). The total test score is 30. Those persons scoring 24 points or below should be further evaluated for dementia and other cognitive disorders (4,23,24).

Statistical analyses were performed using SPSS 13.0 for Windows (SPSS Inc., Chicago, IL, USA). The demographic features of the subjects were evaluated by descriptive methods. We used a factorial ANOVA test for evaluating the effects of possible factors on the IADL scale. We further evaluated significant results using a chi-square test, Spearman's correlation, and, in independent test groups, the Mann-Whitney U test. We considered statistical significance at $P < 0.05$.

3. Results

Sociodemographic features of the participants are given in Table 1. The number of participating subjects was 101 (32 men and 69 women). The mean age of all participants was 67.8 ± 6 years. The number of households included was 2.6 ± 1.44 (mean \pm SD), and subjects' duration of education was 3.3 ± 3.6 (mean \pm SD) years. Of the people who took part in this study, 69 were literate, 6 of them were disabled, and 57 of them had been taking 2 or more drugs (Table 1).

Information on the chronic illnesses of the participants is given in Table 2. Twenty-one of the patients had ischemic heart disease, 11 had painful arthritis, 16 had cognitive problems, 32 had depression, 6 had cerebrovascular disease, 12 had COPD, 24 had diabetes mellitus, and 66 had hypertension. When we looked at the first 3 most common chronic illnesses in order by sex, we found that 62.3% of the women had hypertension, 42.0% had depression, and 24.6% had diabetes mellitus. However, 71.9% of men had hypertension, 31.3% had ischemic heart disease, and 21.9% had diabetes mellitus (Table 2).

Table 1. Demographic features of the study participants.

Parameter	Men		Women		All		P
	n	Mean ± SD / (%)	n	Mean ± SD / (%)	n	Mean ± SD / (%)	
Age (years)	32	69.4 ± 6.9	69	67.0 ± 5.5	101	67.8 ± 6.0	NS
Household (no.)	32	2.6 ± 1.2	69	2.6 ± 1.6	101	2.6 ± 1.4	NS
Education duration (years)	32	5.6 ± 4.0	69	2.2 ± 2.8	101	3.3 ± 3.6	<0.001
Literate	29	(90.6)	40	(58.0)	69	(68.3)	<0.001
Illiterate	3	(9.4)	29	(42.0)	32	(31.7)	
Disabled	0	(0.0)	6	(8.7)	6	(5.9)	NS
Not disabled	32	(100.0)	63	(91.3)	95	(94.1)	
Multiple drug usage	21	(65.6)	36	(52.2)	57	(56.4)	NS

Table 2. Chronic illnesses of the participants.

	Men		Women		All		P
	n	%	n	%	n	%	
IHD	10	31.3	11	15.9	21	20.8	NS
OA (painful)	3	9.4	8	11.6	11	10.9	NS
Cognitive problems	2	6.3	17	24.6	19	18.8	0.028
Depression	3	9.4	29	42.0	32	31.7	0.001
CVD	2	6.3	4	5.8	6	5.9	NS
COPD	4	12.5	8	11.6	12	11.9	NS
DM	7	21.9	17	24.6	24	23.8	NS
HT	23	71.9	43	62.3	66	65.3	NS

IHD: Ischemic heart disease, OA: osteoarthritis, CVD: cerebrovascular disease, COPD: chronic obstructive pulmonary disease, DM: diabetes mellitus, HT: hypertension.

We first applied factorial ANOVA to see the combined effects of the factors that may affect the IADL categories. The summary of the comparison of the factors evaluated by IADLs is given in Table 3.

We observed a significant impact of age and literacy on one's ability to use a telephone in the factorial ANOVA analysis (Table 3). We observed a negative correlation between Lawton's telephone usage score and the age in correlation analysis ($r = -0.316$; $n = 101$; $P = 0.001$). Factor scores of literate people ($n = 69$) were statistically higher than for those people with minimal education ($n = 32$) in independent group analysis (2.83 ± 0.54 and 2.19 ± 0.96 , respectively; $P < 0.001$).

We observed significant effects of sex, age, literacy, hypertension, years of education, and total SMMSE scores

on one's ability to get to places that are out of walking distance in factorial ANOVA analysis (Table 3). We intended to compare groups using independent group analyses. Factor scores of literate people ($n = 69$) were statistically higher than those with minimal education ($n = 32$) (2.62 ± 0.77 and 2.13 ± 0.91 , respectively). Factor scores of men ($n = 32$) were statistically higher than scores for women ($n = 69$) (2.84 ± 0.51 and 2.29 ± 0.90 , respectively). Factor scores of people with hypertension ($n = 66$) were statistically higher than for those without hypertension ($n = 35$) (2.55 ± 0.78 and 2.31 ± 0.93 , respectively). P-values in dual comparisons were not significant alone; however, multifactorial analyses show statistical significance when considered together with other factors. Furthermore, we observed a negative correlation between Lawton's factor

Table 3. Comparison of factors evaluated by the Lawton IADL scale.

Factors	Ability												Total scores							
	Use of telephone		Travel		Shopping		Meal preparation		Housework		Personal care		Laundry		Money management		Taking medicine			
	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P		
Sex	2.586	NS	8.350	0.005	6.543	0.012	1.603	NS	1.836	NS	1.580	NS	1.599	NS	4.053	0.047	2.083	NS	8.326	0.005
Literacy	12.474	<0.001	4.006	0.049	2.432	NS	0.023	NS	0.037	NS	0.940	NS	1.915	NS	2.027	NS	0.061	NS	5.503	0.021
Disabled	0.233	NS	0.373	NS	3.682	NS	2.596	NS	22.765	<0.001	5.593	0.020	0.030	NS	0.278	NS	0.213	NS	2.328	NS
Eye impairment	3.540	NS	3.238	NS	0.385	NS	0.778	NS	0.214	NS	1.311	NS	0.889	NS	0.160	NS	0.851	NS	0.276	NS
Hearing	0.971	NS	3.352	NS	0.236	NS	0.166	NS	0.062	NS	0.203	NS	0.595	NS	0.006	NS	0.654	NS	1.309	NS
Drugs	0.188	NS	1.499	NS	1.361	NS	0.688	NS	0.644	NS	2.039	NS	2.169	NS	0.021	NS	1.582	NS	2.199	NS
OA (painful)	0.097	NS	3.123	NS	0.792	NS	4.040	0.048	1.341	NS	1.051	NS	0.042	NS	0.072	NS	0.860	NS	2.315	NS
IHD	0.922	NS	0.002	NS	0.000	NS	4.04	NS	0.198	NS	1.473	NS	1.365	NS	0.075	NS	0.859	NS	0.405	NS
CVD	0.417	NS	0.296	NS	1.470	NS	0.160	NS	1.288	NS	0.514	NS	0.350	NS	0.201	NS	0.670	NS	0.219	NS
COPD	0.341	NS	0.396	NS	4.701	0.033	0.387	NS	1.415	NS	1.010	NS	1.216	NS	0.881	NS	0.812	NS	0.040	NS
DM	0.060	NS	0.000	NS	0.432	NS	2.009	NS	2.661	NS	2.410	NS	0.952	NS	0.538	NS	0.338	NS	0.469	NS
HT	0.993	NS	7.216	0.009	1.124	NS	0.132	NS	0.033	NS	0.561	NS	1.066	NS	1.571	NS	0.047	NS	1.827	NS
Age	12.125	<0.001	14.881	<0.001	9.394	0.003	1.462	NS	3.134	NS	4.000	0.049	8.773	0.004	7.158	0.009	5.752	0.019	18.616	<0.001
Household size	3.545	NS	0.629	NS	0.063	NS	1.231	NS	0.250	NS	1.116	NS	0.176	NS	0.021	NS	0.357	NS	0.156	NS
Average education	1.941	NS	5.856	0.018	3.574	NS	0.167	NS	0.281	NS	0.664	NS	1.491	NS	0.575	NS	0.277	NS	4.068	0.047
SMMSE total score	0.513	NS	9.466	0.003	0.985	NS	0.023	NS	0.060	NS	0.023	NS	0.203	NS	0.374	NS	0.552	NS	1.432	NS
Depression score	0.558	NS	1.034	NS	0.020	NS	2.502	NS	1.191	NS	1.450	NS	0.264	NS	0.870	NS	0.025	NS	0.165	NS
R-squared	0.395		0.468		0.351		0.183		0.335		0.221		0.193		0.194		0.161		0.408	
Adjusted R-squared	0.271		0.219		0.219		0.015		0.198		0.061		0.027		0.029		-0.011		0.287	

IHD: Ischemic heart disease, OA: osteoarthritis, CVD: cerebrovascular disease, COPD: chronic obstructive pulmonary disease, DM: diabetes mellitus, HT: hypertension, SMMSE: Standardized Mini-Mental State Examination.

scores and age ($r = -0.325$; $n = 101$; $P < 0.001$). We also observed positive correlations between Lawton's factor scores and education duration scores ($r = 0.334$; $n = 101$; $P = 0.018$). Similarly, education duration had a positive impact on SMMSE scores ($r = 0.327$; $n = 101$; $P = 0.003$), as well.

We also observed significant effects of sex, age, and COPD on one's ability to go shopping in the factorial ANOVA analysis (Table 3). Factor scores of men ($n = 32$) were statistically higher than scores for women ($n = 69$) (2.94 ± 0.35 and 2.61 ± 0.75 , respectively; $P = 0.012$). Factor scores of people with COPD ($n = 12$) were statistically lower than those without COPD ($n = 89$) (2.25 ± 0.96 and 2.78 ± 0.59 , respectively; $P = 0.033$). We observed a negative correlation between the ability to go shopping and age ($r = -0.357$; $n = 101$; $P = 0.003$) in the correlation analysis.

We also observed a significant impact of osteoarthritis on one's ability to prepare meals in factorial ANOVA (Table 3). Factor scores of people with osteoarthritis ($n = 11$) were statistically lower than those without osteoarthritis ($n = 90$) (2.82 ± 0.6 and 2.99 ± 0.1 , respectively) in independent group analysis.

Having a disability significantly affected one's ability to do housework in factorial ANOVA (Table 3). In dual comparisons, this score in the Lawton analysis was lower for those with disabilities ($n = 6$) than for those without any disability ($n = 95$) (2.33 ± 0.81 and 2.97 ± 0.23 , respectively; $P < 0.001$).

There were also significant effects of disability and age on one's ability to do handy work in factorial ANOVA analysis (Table 3). In dual comparisons, the scores for ability to do handy work for those with a disability ($n = 6$) were lower than those without a disability ($n = 95$) (2.67 ± 0.81 and 2.97 ± 0.23 , respectively; $P = 0.020$). We observed a negative correlation between scores for the ability to go shopping and age ($r = -0.220$; $n = 101$; $P = 0.049$) in the correlation analysis. Furthermore, we observed significant effects of age on the ability to do laundry in factorial ANOVA (Table 3). We observed a negative correlation between scores for one's ability to go shopping and age ($r = -0.245$; $n = 101$; $P = 0.004$) in correlation analysis.

We also observed significant effects of sex and age on the factor measuring one's ability to manage money (Table 3). Factor scores of men ($n = 32$) were statistically higher than scores for women ($n = 69$) (3 ± 0 and 2.86 ± 0.52 , respectively). We observed a negative correlation between scores assessing the ability to manage money and age ($r = -0.259$; $n = 101$; $P = 0.009$) in the correlation analysis. Finally, we observed a significant influence of age on one's ability to take medicine (Table 3).

Generally, there were significant effects of sex, literacy, age, and education on Lawton's total score in the factorial

ANOVA (Table 3). Total factor scores for men ($n = 32$) were statistically higher than scores for women ($n = 69$) (26.6 ± 1.24 and 24.9 ± 3.4 , respectively; $P = 0.005$). Total factor scores for those who were literate ($n = 69$) were statistically higher than scores for those with minimal education ($n = 32$) (26 ± 2.6 and 24.2 ± 3.4 , respectively; $P = 0.021$). We observed a negative correlation between the total score and age ($r = -0.384$; $n = 101$; $P < 0.001$) and a positive correlation between the total score and education duration ($r = 0.245$; $n = 101$; $P = 0.047$) in the correlation analysis.

4. Discussion

Previous studies in this area have stated some significant links between elderly persons' daily instrumental activities and age, sex, education years, literacy, and SMMSE scores. In accordance with these previous studies, we also determined that elderly people may become more dependent on additional assistance at advanced ages for some instrumental activities (5–10).

We further found that low SMMSE scores were related to a decrease in some factor scores, indicating that the person may become more dependent. In previous studies, it was demonstrated that those factors affecting SMMSE scores, like literacy and old age, also negatively affected Lawton's scores. In a study by Aydın et al., it was demonstrated that dementia negatively affects the IADLs (25). In our study, we have also found that a lack of literacy negatively affected some scores (11).

Beland and Zunzunegui found a significant relationship between a low level of education and the ability to go shopping in their study (11). However, in our study, the level of one's education had no effect on the mentioned factor.

Our finding that hypertension, as one of the chronic illnesses, had a positive effect on one's ability to get to the places that are out of walking distance differs from other similar studies. In study conducted by Aydın et al. (25), hypertension was determined to be an independent determinant for instrumental daily activities. In another study conducted in England, it was stated that untreated hypertension in elderly patients was related to worsening in cognitive changes (26), leading elderly patients to become more dependent. We evaluated this contradicting result and speculated about the reason behind this finding. The high scores in patients with hypertension may be due to an increased need to go out and visit a local GP more often for prescriptions, for frequent health check-ups, and to keep the patients' illness under control, all of which may have a positive effect on the patient's mental condition when excluding the possible effect of the SMMSE in statistical analysis. For this reason, the negative results in previous studies may conflict with some other factors, both

independent factors and complications of uncontrolled hypertension.

Another finding in our study was that one of the chronic diseases (COPD) had a negative effect alone on one's ability to go shopping. A study performed in Singapore supports our findings and suggests that COPD has a negative effect on IADL functions (27). Another study by Yardımcı (8) stated that increased age and chronic disease had negative effects on this activity. In Berberoğlu et al.'s study (10), women with chronic disease were more dependent. In Beland and Zunzunegui's study (11), old age, female sex, and low levels of education were found to have a meaningful impact on this activity. Although there are similar findings in other studies, our study is important because COPD was found to be significant by analyzing these things together with other independent factors. We speculate that this finding may be due to the possibility of patients' exposure to particles in the open air (when shopping) and in some shopping places. In this case, elderly people may be advised to do their shopping in less crowded, less hectic places as a preventive measure. They may also wear a mask for protection from pollen during certain seasonal periods (16).

In our study there was a significant relationship between the ability to prepare meals and painful arthritis. In previous studies, it was found that sex and chronic diseases had a negative effect on one's ability to prepare meals (9–11). We consider the effect of osteoarthritis on this factor to be important because the frequency of this condition increases with age for the elderly. However, in

our study, we did not find any significant effects of sex alone on this factor.

The limitations of our study include the small sample size, which may not totally reflect the social, economic, or cultural identity of Turkey's elderly population. Further studies need to be conducted in this field. However, our findings are important for lending some useful insights in this context.

Another limitation of our study is the lack of a control group to compare the effects of current chronic diseases of the participants on instrumental activities. In future studies, including control groups will help evaluate the effects of chronic diseases on such activities.

The routine use of IADLs would be immensely beneficial in the adaptation of the elderly to this difficult period in life. This evaluation would be especially important for illiterate patients, patients with COPD, patients with arthritis, and elderly women. It would be very helpful for both the patient and the physician to consider that higher scale results are related to higher dependency in the elderly period. Furthermore, results may be useful in determining rehabilitation programs, increasing the quality of life among elderly people, and establishing institutions or organizations that may develop positive health policies.

In conclusion, our findings suggest that increased age, female sex, lower SMMSE scores, painful arthritis, and COPD had negative effects on IADL factors. On the other hand, being male, having hypertension, having had an education, and being literate had positive effects.

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