

Associations between Life-Time Physical Activity Levels, Sedentary Time and Health Outcomes among Older Adults

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Abstract. *Study Objectives:* The aim of the study was to evaluate the associations between the participation levels of the elderly in physical activities through their lives, their sedentary time, and health outcomes. *Methods:* The data of the study were collected in 2017 with a questionnaire, in which 300 older adults were selected by convenience sampling method in Ankara, Turkey. The questionnaire consists of questions for determining the socio-demographic characteristics and health status of older adults, life-time physical activity indicators, and sedentary time. The research was evaluated with descriptive statistics, Chi-square analysis, Independent Samples t-test, and Pearson correlation coefficient. *Results:* 53.7% of the 300 older adults participating in the study were female and the average age was 67.74 ± 3.67 years. 58.3% of the participants were categorized as physically “active” currently or in two periods of their lives. The average sedentary time of participants was 5.7 hours for one day. According to Chi-square analysis, those who were younger, those with lower household income, those who evaluated their health status as good and who had no chronic diseases were physically more active ($p < 0.05$). Independent samples t-test results demonstrated that the quality of life scores of those who were physically active was higher in comparison to those who were inactive ($p < 0.05$). According to independent samples t-test, the average sedentary time of those who evaluated their health status as good and those with a chronic disease was found to be shorter. It was found that there was a negative moderately significant relationship between sedentary time and quality of life scores among older adults. *Conclusion:* In this study, it was concluded that life-time physical activity levels and sedentary time of older adults were an important indicator for their health outcomes.

Key words: Physical Activity, Sedentary Behavior, Older Adults, Life Time

Introduction

Physical activity is defined as any bodily movement which is produced by skeletal muscles and requires energy consumption (1). It is reported by the World Health Organization that every year approximately 3.2 million individuals lose their lives due to physical inactivity (2). Researches suggest that improvement in the physical activity level could prevent functional restrictions increasing with advanced age

and thus, more active and independent aging could be ensured (3). Increased physical activity in the older population is associated with decreased frequency of chronic diseases (4,5), decrease in cognitive impairment (6), improved physical health (7,8,9), improved mental health (6), decrease in mortality rates (7,9) and higher quality of life (10-13).

Although the symptoms of chronic diseases usually appear in older ages, the development of the diseases may have started in childhood period (14).

The cumulative energy consumption of an individual with physical activity throughout his/her life is thought to play a key role in determining the risk of the development of some chronic diseases in advanced ages (5,7). This view corroborates the importance of adopting and maintaining a physically active lifestyle at early ages (15). However, studies demonstrate that physical activity is reduced during adolescence, adulthood, and transition to old age (14-16). Although there are studies investigating the relationship between the physical activities in different periods of life and health outcomes in advanced ages in the international literature (6,8,9,11,16,17,18), studies in Turkey examining and aimed at increasing the physical activity levels of the elderly are in initial stages. A better understanding of the relationship between the physical activity levels in certain periods of life and health outcomes in the advanced ages will help determine the critical periods for interventions in terms of physical activity.

Although the benefits of physical activity for health are widely accepted, the sedentary lifestyle tends to be an increasingly common behavior and lifestyle in all age groups, particularly among the elderly (19). Sedentary behavior is defined as any type of activity that leads to an energy consumption equal to and below 1.5 MET (Metabolic Equivalent) level while the individual is awake, either in lying or sitting position (20-21), and 7 hours or more per day spent in this way is usually accepted to be extreme (22). In the systematic analyses conducted by Harvey et al. (2015) and Wullems et al. (2016), it was reported that the elderly spent approximately 8 hours per day by sitting, that this period constituted 65-80% of their awake time, and that this situation made them the most sedentary population group (23,24). Thus, when it is considered that especially reducing the sedentary time will play an active role in making the elderly more active, it is particularly important to examine the relationship between the sedentary time and health outcomes and how they are correlated.

On a global scale, the older population makes up the fastest-growing age group. The percentage of the elderly above 65 years old is expected to increase to 22% of the world population and reach 2 billion by 2056 (25). When the increase in the percentage of the elderly population is considered in relation to increased chronic diseases, the importance of physical

activity as a habit for protecting health comes to the fore. Particularly, the most important deficiency in the lifestyle habits of the Turkish elderly is lack of physical activity (11,26). The study aimed to evaluate the associations between the participation levels of the elderly in physical activities through their lives, their sedentary time, and health outcomes. The study is expected to serve as a multidisciplinary guide for health research at micro and macro levels and health and sports professionals who aim to improve the physical activity levels of the elderly.

Material and method

The study was planned as cross-sectional field research which aimed to assess the relationships between the participation levels of the elderly in physical activities through their lives, their sedentary time, and health outcomes.

This study was approved by the Baskent University Institutional Review Board and Ethics Committee (Project no: KA17/115) and supported by the Baskent University Research Fund.

Study sample

The population of the study was composed of a total of 87.067 individuals between the ages of 65-80 who resided in the Cankaya district of Ankara province, based on the 2017 data of the Turkish Statistics Institute. The sample group of the study was determined as 300 individuals with a 95% confidence level and 5% deviation. 300 individuals included in the study were chosen through a convenience sampling method, which is one of the improbable sampling methods. The inclusion criteria were determined as being between the ages of 65-80, residing in Cankaya district, living at home, having no physical and mental disability, and participating in the study on a voluntary basis.

Data collection

A questionnaire consisting of 3 sections was administered to the participants. In the first part of the

questionnaire, there were 7 questions related to demographic information and socio-economic status, while the second part included 15 questions aimed at determining general health status. The sedentary behavior of the participants was measured through the 16th question (How much time do you usually spend sitting or reclining on a typical day?) included in the Global Physical Activity Questionnaire which was developed by WHO and whose validity and reliability studies were performed. The quality of life of the participants was measured through the first question (How do you evaluate your general health condition?) of the Short Form-36, the Turkish validity and reliability studies of which were conducted, and Visual Analog Scale (between the scores of 0 and 100) was employed. The third part of the questionnaire included the “Lifelong Physical Activity Assessment Form” developed by the researchers on the basis of the literature review. In this part, the elderly evaluated their status of having performed any or some of the 22 physical activities during certain periods of their lives (youth, adulthood, late adulthood and old age) and how long and how many days a week and how many hours a day they practiced these, if any. According to the physical activity recommendations for different age groups offered by the World Health Organization (1), if the participants fulfilled the required physical activity recommendations for each age group, they were categorized as “active”, and if not, they were classified as “inactive.” Regarding the lifelong physical activity level, those who were categorized as “active” in at least two periods of their lives were accepted as “active”, and the others were labeled as “inactive.”

Statistical analysis

The data were analyzed using the PASW 18.0 package program (SPSS Inc., Chicago, 2009). While the dependent variables of the study were determined to be the presence of chronic disease, general health assessment and quality of life score, the independent variables were accepted as demographic characteristics, socio-economic status, health status indicators, sedentary time, and lifelong physical activity assessment. Kolmogorov-Smirnov test was employed to test whether the data were normally distributed.

The data were analyzed through descriptive statistics, Chi-square analysis, Independent Samples t-test, and Pearson correlation coefficient. Significance level was set at $p < 0.05$ for the evaluations.

Results

The mean age of the participants was 67.74 ± 3.67 years, and 76.3% were in the 65-74 age group. 53.7% of the participants were female, 56.3% were married, 54.3% had an educational level of high school and above, 37.3% were blue-collar workers, and 80% had an income level of lower than 5.331 Turkish Liras (Turkish poverty line as of 2017) (Table 1).

As seen in Table 2, 25% of the participants had normal Body Mass Indices (BMI). 35% of the elderly reported that they smoked, 74.7% stated that they had a chronic disease, 61% evaluated their health status as poor or moderate.

Table 1. The distribution of older adults by socio-demographic characteristics

Demographic characteristics	Frequency (n)	Percentage (%)
Age Group		
65-74 years	229	76,3
75-79 years	71	23,7
Gender		
Female	161	53,7
Male	139	46,3
Marital status		
Single	131	43,7
Married	169	56,3
Education		
Under high school	137	45,7
High school and above	163	54,3
Occupation		
House worker	107	35,7
White-collar	81	27
Blue-collar	112	37,3
Household income		
< 5.331 TL	240	80,0
≥ 5.331 TL	60	20,0

Table 2. The distribution of older adults by their health indicators

Health Indicators	Frequency (n)	Percentage (%)
BMI		
Normal	75	25,0
High	144	48,0
Obese	81	27,0
Chronic disease		
No	76	25,3
Yes	224	74,7
Self-rated health		
Poor	183	61,0
Good	117	39,0
Smoking		
Yes	105	35,0
No	195	65,0
Falling		
Yes	133	44,3
No	167	55,7
Fear of falling		
Yes	199	66,3
No	101	33,7

Table 3 summarizes the participants' status of doing lifelong physical activity. As can be seen in the table, 73% of the participants were active in their young ages, while this percentage fell down to 56.7% in early adulthood, to 29.3% in adulthood with a sharp decrease, 20% in late adulthood, and 14% in old ages. While those who were "active" throughout their lives constituted only 2.3% of the participants, 40.3% were physically "active" in a period of their lives. 58.3% of the participants were categorized as physically "active" currently or in two periods of their lives. The average sedentary time of the elderly was calculated as 5.7 hours.

Table 4 shows the factors related to the physical activity levels of the participants. According to Chi-square analysis, the participants in the 65-74 age group were physically more active compared to the ones over the age of 75 ($p < 0.05$). The number of physically active individuals was higher in the group of participants with lower household income. When the dependent variables of the study were analyzed, it was determined

Table 3. The distribution of older adults by their physical activity indicators

Physical activity indicators	Frequency (n)	Percentage (%)
Youth period (< 21 years)		
Inactive	81	27,0
Active	219	73,0
Early adulthood period (21-34 years)		
Inactive	130	43,3
Active	170	56,7
Adulthood period (35-50 years)		
Inactive	212	70,7
Active	88	29,3
Late adulthood period (51-64 years)		
Inactive	240	80,0
Active	60	20,0
Old age period (> 65 years)		
Inactive	258	86,0
Active	42	14,0
Lifelong time		
Never	4	1,3
One period	121	40,3
Two periods	104	34,7
Three periods	41	13,7
Four periods	23	7,7
All life	7	2,3
Lifetime Physical Activity Levels		
Inactive	125	41,7
Active	175	58,3
Daily Step Number (Mean \pm SD)	5.165 \pm 1.783 step	
Daily Sedentary time (Mean \pm SD)	5,70 \pm 2,50 hours	
Daily Sleeping time (Mean \pm SD)	7,51 \pm 1,28 hours	

that the share of those who were physically active was higher among those who evaluated their health status as good and who had no chronic diseases ($p < 0.05$). Independent pairs sample t-test results demonstrated that the quality of life scores of those who were physically active were higher in comparison to those who were inactive. As expected, the average sedentary time of those who were physically active was shorter ($p < 0.05$).

Table 4. The factors relating to the physical activity levels of older adults

	Inactive		Active		p
	n	%	n	%	
Age (year)					
65-74 years	87	%38	142	%62	0,015*
75-79 years	38	%53,5	33	%46,5	
Household income					
< 5.331 TL	94	%37,9	154	%62,1	0,003*
≥ 5.331 TL	31	%59,6	21	%40,4	
Self rated health					
Poor	78	%42,9	104	%57,1	0,045*
Good	47	%39,8	71	%60,2	
Chronic disease					
No	24	%31,6	52	%68,4	0,026*
Yes	101	%45,1	123	%54,9	
Quality of Life (Mean ± SD)	57,68 ± 16,27		61,60 ± 18,00		0,048*
Sedentary Time (Mean ± SD)	6,06 ± 2,66		5,44 ± 2,36		0,037*

* $p < 0.05$ **Table 5.** The factors relating to the sedentary behavior of older adults

Sedentary behavior	Sedentary Time	p
Self-rated health		
Poor	5,96 ± 2,64	0,027*
Good	5,30 ± 2,23	
Chronic disease		
No	4,88 ± 2,21	0,001*
Yes	5,98 ± 2,54	
Quality of Life (r)	-0,651	0,002*

* $p < 0.05$

As can be inferred from Table 5, the average sedentary time of those who evaluated their health status as good according to independent samples t-test was statistically significantly shorter ($p < 0.05$). Besides, the average sedentary time of those with a chronic disease was found to be shorter ($p < 0.05$). Pearson correlation coefficient calculated in order to determine the relationship between sedentary time and quality of life indicated a negative and moderately significant relation-

ship between these two factors ($r = -0,651$; $p < 0.05$); as the sedentary time shortens, quality of life score increases.

Discussion

In order to determine the relationships between lifelong physical activity level, sedentary time and health outcomes in the elderly, the physical activity and health indicators of 300 old individuals between the ages of 65-80 residing in Ankara who were chosen with convenience sampling method were analyzed in the study.

Three significant results related to health outcomes of active and inactive individuals in their old ages were contained in the study. First of all, while there were more individuals who stated that they were physically active in the earlier periods of their lives among the participants, the percentage of those who were currently physically active (14%) or who were physically active throughout their lives (7%) was quite low. Although no study was found in the national literature examining the regular physical activities of the elderly from the life course perspective, studies in the international literature have proven that extended physical activity brings more gains (6-10,14,18), that those who perform regular physical activity have a higher quality of life in old ages (11-13) and that they had shorter averages of hospital stay (19).

The second result obtained from the study is that the health outcomes of physically active old individuals are much better. National (11,26,29) and international (5,7,12,17,19,30) researches show that being physically active creates positive effects on health outcomes.

Finally, the results of the study revealed the importance of shortening the sedentary time in the elderly; sedentary time is negatively correlated with all health outcomes. Though no study evaluating the sedentary time was found among the studies conducted on the elderly in Turkey was come across, many studies in the world have proven the significance of the interventions made in terms of shortening the sedentary time (18,20,22,23,27,28,30).

The results of the study should be evaluated with its certain limitations. Firstly, the cross-sectional design of the study aimed to reveal only the relationships rather than casual relationships. Longitudinal studies are needed in order to assess the effect of extended physical activity on health outcomes. Secondly, since the sample of the study was selected through convenience sampling method, it would be misleading to generalize the results. Thirdly, the results of the study were based on the retrospective data obtained about previous periods of the participants' lives. Therefore, the fact that the old individuals may not accurately remember how many hours a week they did physical activity 40 years ago can affect the reliability of the data of the study. On the other hand, the results of a study conducted by Havari and Mazzonna (2015) revealed that the explanations made by the elderly about their childhood period could also be reliable (4). In the study, in order to make the questionnaire form shorter, quality of life was assessed through VAS. For future research, it could be more useful to employ a more comprehensive health-related quality of life scales such as WHOQOL-AGE or WHOQOL-OLD. In the study, only leisure time and in-house physical activity levels of the participants were measured. Their physical activity levels in terms of their occupation can be considered in future researches.

Conclusion

The results of the study showed that very few of the elderly participating in the study had lifelong physical activity habits, but that even extended physical activity positively affected health outcomes. There is no doubt that gaining physical activity habits in younger ages and maintaining those habits through life course perspective will result in better health indicators in older ages. There exist needs for both health specialists and sports experts to seriously intervene in terms of guiding the society in this issue through a multidisciplinary approach. On the other hand, the result that the old individuals who were active for a long time had the shorter sedentary time and that as sedentary time was shortened, the health outcomes improved brings along another area of intervention. Developing plans and programs by health and sports specialists aimed

at shortening the sedentary time in the elderly could provide benefits for public health.

Conflict of interest: The authors declare that there is no conflict of interest in this manuscript.

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