Progress in Nutrition 2021; Vol. 23, N. 1: e2021016 DOI: 10.23751/pn.v23i1.9074

Original Article

Evaluation of Physical Activity Levels and Anthropometric Measurements in Turkish Adults

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Abstract. *Background:* The aim of this study is to determine the relationship between physical activity levels and antropometric measurements of Turkish adults. Materials and *Method:* The data were obtained via interviews with a questionnaire from 3453 subjects, who were chosen with simple random sampling among adults. Their anthropometric measurements were taken. Physical activities done in previous week were evaluated via International Physical Activity Questionnaire (IPAQ). The statistical analyses were made in SPSS 16.0 package program. *Results:* 47.5% (n=1639) of the participants were female and 52.5% (n=1814) were male.71.1 % (n=2476) of male subjects were high school and below graduates and 28.3% (n=977) of them were university and higher graduates. Vigorous, moderate and walking IPAQ total scores of all group were 3465.91 met-min/week, 960.66 met-min/week, 758.81 met-min/week respectively. %18.1 (n=626) of the participants were doing vigorous,%27.3 (n=944) of them were doing *Conclusion:* Gender, age, BMI (weight) and socioeconomic status have effects on physical activity level of Turkish adults.

Keywords: physical activity, anthropometric measurements, BMI, body mass index

Introduction

Lifestyle is a key factor in the development and management of chronic diseases in particular, diet and physical activity are suggested to be their critical components. Many studies are took in consideration the worldwide decline of physical activities and the increase of obesity and other disease risks. As an important health-related behavior in daily life, physical activity has a major health benefit related to reducing the risks of lots of disease such as cancer, coronary heart disease, stroke, diabetes, hypertension, depression etc. Physical activity is a key determinant of energy balance and weight control. Nevertheless, the World Health Organization (WHO) has consistently reported that one in three adults worldwide is not sufficiently active. A new study showed that 31% of adults are physically inactive, with proportions of physical inactivity ranging from 17% in Southeast Asia to 43% in the United States and Eastern Mediterranean. Average weekly physical activity felt by 32% between 1991 and 2006, among Chinese adults (1,2).

Beneficial impact of activities on health is related to the duration and volume of the physical activity (3). The aim of this study is to determine physical activity levels according to gender, age, marital and working status, BMI and education level in Turkish people. We also hope to make contribution to the literature with such a big data from Turkey which would give ideas for new projects.

Materials and Method

This study was carried out on adults aged between 18 to 65, in Afyonkarahisar, in Turkey, which is a

cosmopolitan city located in a geographical region that receives and delivers emigrants. The questionnaire was filled in via interviews with subjects. Socio demographic features (age, gender, education levels, marital and working status), physical activity levels and smoking status were recorded; weight, height, waist circumference, hip circumference were measured, BMI and waist/hip ratio calculated. Waist and hip circumference was measured with rigid tape measure, and weight was measured with standard bascule (Tanita Bascule). Body Mass Index (BMI) was gained by dividing a subject's weight in kilograms (kg) by the square of his or her height in meters (m) [BMI=Weight (kg)/Height (m)^2].

To determine physical activity levels, a Turkish adaptation of the International Physical Activity Questionnaire (IPAQ) was utilized. In studies carried out on different societies, IPAQ has been shown to be reliable and valid. Research has been done on its reliability and validity in Turkey, too (4-6). With the questionnaire, subjects were questioned for the previous 7 days' physical activity. They were questioned for vigorous physical activity duration (football, basketball, aerobics, fast cycling, weightlifting, carrying load, etc.), moderate physical activity duration (carrying light load, moderate cycling, folk dance, dance, bowling, table tennis, etc.), daily walking and sitting duration (min). The criteria were set for the physical activities as in the IPAQ; they were done as at least for 10 min in one time (7,8).

The data were analyzed with SPSS 16.0 package program (SPSS Inc., Chicago, IL, USA). The conformity of the data to the normal distribution was checked with the Kolmogorov Smirnov Test. For the analyses, Mann-Whitney U and Chi-Square were applied. Results were stated as mean ± standard deviation and mean rank. $p<0.05$ was accepted statistically significant.

Results

This study was carried out on 3453 subjects; 47.5% (n=1639) of them were female and 52.5% (n=1814) of them were male. Demographic characteristics of the subjects are given in Table 1.

Vigorous, moderate and walking IPAQ total scores of the subjects were 3465,91 met-min/week, 960,66 met-min/week, 758,81 met-min/week respectively. 18.1% (n=626) of the participants were doing vigorous, 27.3% (n=944) of them were doing moderate physical activity and 90.6% (n=3127) of the participants were preferred walking.

Table 1. Demographic characteristics of the study group

		n	(%)
Gender	Female	1639	(47.5)
	Male	1814	(52.5)
Age (year)	18-40	2305	(66.8)
	≥41	1148	(33.2)
BMI (kg/m^2)	24.99≤	1604	(46.5)
	25 -30	1219	(35.3)
	≥30	630	(18.2)
Education Status	High School and lower	2476	(71.7)
	University and higher	977	(28.3)
Marital Status	Married	2101	(60.8)
	Single	1352	(39.2)
Working Status	Not Working	1113	(32.2)
	Working	2340	(67.8)

In Table 2, 3 and 4, subjects' answers to the questions about the IPAQ and their weekly vigorous and moderate physical activity and their daily walking and sitting frequencies were shown.

Frequencies of the subjects who do moderate and vigorous physical activities were 27.3% (n=944) and 18.1% (n=626), respectively. In the study, men and single people preferred vigorious, moderate physical activity and daily walking more than women and married groups ($p<0.05$). Activity frequencies varied according to gender ($p<0.05$). Male subjects did vigorous and moderate physical activities and daily walking more than females ($p<0.05$).

While 3.8% (n=94) of lower educated subjects did 4-6 time/per week vigorous physical activities, only 1.8% (n=17) of the higher educated subjects did vigorous physical activities ($p<0.05$). The rate of the subjects who walk at least 10 min/day was 90.6% (n=3127). Vigorious and moderate physical activity frequencies were found more in low educated people than higher educated group.

Table 2. The relationship between self-reported vigorous physical activity frequency and demographic characteristics

	Vigorous Physical Activity Frequency				
	1-3 time/per week n %	**4-6 time/per week n %**	**Every day n %**	**None n %**	**p**
Gender					
Female	118 (7.2)	22 (1.3)	35 (2.1)	1455 (89.3)	<0.05
Male	273 (15.2)	89 (5.0)	60 (3.3)	1372 (76.5)	
Age					
18-40	328 (14.4)	90 (3.9)	60 (2.6)	1805 (79.1)	<0.05
41 and over	63 (5.5)	21 (1.8)	35 (3.1)	1022 (89.6)	
Marital Status					
Married	178 (8.6)	64 (3.1)	67 (3.2)	1770 (85.1)	
Single	201 (17.4)	45 (3.9)	23 (2.0)	884 (76.7)	<0.05
Widow	12 (6.2)	2 (1.0)	5 (2.6)	173 (90.1)	
Education Level					
High school and lower	242 (9.9)	94 (3.8)	84 (3.4)	2034 (82.9)	<0.05
University and higher	149 (15.4)	17 (1.8)	11 (1.1)	793 (81.8)	
Working Status					
Not working	74 (6.7)	15 (1.4)	39 (3.5)	980 (88.4)	<0.05
Working	317 (13.7)	96 (4.1)	56 (2.4)	1847 (79.7)	
BMI (kg/m²) (Male)					
≤24.99	148 (18.5)	45 (5.6)	29 (3.6)	578 (72.2)	
25 -30	111 (15.4)	40 (5.6)	20 (2.8)	549 (76.2)	<0.05
≥30	14 (5.1)	4 (1.5)	11 (4.0)	245 (89.4)	
BMI (kg/m²) (Female)					
≤24.99	65 (8.3)	14 (1.8)	14 (1.8)	693 (88.2)	
25 -30	38 (7.7)	4 (0.8)	10 (2.0)	439 (89.4)	0.113
≥30	15 (4.2)	12 (1.1)	11 (3.1)	323 (91.5)	

Table 3. The relationship between self-reported moderate physical activity frequency using the International Physical Activity Questionnaire and demographic characteristics

	Moderate Physical Activity Frequency				
	1-3 time/per week n %	4-6 time/per week n %	Every day n %	None n %	P
Gender					
Male	339 (18.9)	81 (4.5)	87 (4.8)	1289 (71.8)	<0.05
Female	339 (20.8)	44 (2.7)	30 (1.8)	1220 (74.7)	
Age					
18-40	507 (22.2)	82 (3.6)	78 (3.4)	1620 (70.8)	<0.05
41 and over	171 (15.0)	43 (3.8)	39 (3.4)	889 (77.8)	

	Moderate Physical Activity Frequency				
	1-3 time/per week n %	4-6 time/per week n %	Every day n %	None n %	P
Marital Status					
Married	178 (8.6)	64 (3.1)	67 (3.2)	1771 (85.1)	
Single	201 (17.4)	45 (3.9)	23 (2.0)	884 (76.7)	<0.05
Widow	12 (6.2)	2 (10)	5 (2.6)	173 (90.1)	
Education Level					
Highschool and lower	459 (18.7)	97 (3.9)	103 (4.2)	1797 (73.2)	<0.05
University and higher	219 (22.5)	28 (2.9)	14 (1.4)	712 (73.2)	
Working Status					
Not working	74 (6.7)	15 (1.4)	39 (3.5)	980 (88.4)	0.007
Working	317 (13.7)	96 (4.1)	56 (2.4)	1847 (79.7)	
BMI (kg/m²) (Male)					
≤24.99	196 (24.4)	39 (4.9)	37 (4.6)	530 (66.1)	
25 -30	114 (15.8)	32 (4.4)	31 (4.3)	544 (75.5)	<0.05
≥30	29 (10.6)	10 (3.7)	19 (7.0)	215 (78.8)	
BMI (kg/m²) (Female)					
≤24.99	171 (21.7)	20 (2.5)	17 (2.2)	580 (73.6)	
25 -30	102 (20.8)	12 (2.4)	3 (0.6)	374 (72.2)	0.201
≥30	66 (18.6)	12 (3.4)	10 (2.8)	266 (75.1)	

Table 4. The relationship between self-reported walking frequency and demographic characteristics

	Walking Frequency				
	1-3 /week n %	**4-6 /week n %**	**Every day n %**	**None n %**	**p**
Gender					
Male	237 (13.1)	390 (21.5)	1019 (56.2)	168 (9.3)	<0.05
Female	330 (20.1)	355 (21.7)	796 (48.6)	158 (9.6)	
Age					
18-40	343 (14.9)	502 (21.8)	1293 (56.1)	167 (7.2)	<0.05
41 and over	224 (19.5)	243 (21.2)	522 (45.5)	159 (13.9)	
Marital Status					
Married	392 (18.7)	428 (20.4)	1057 (50.4)	224 (10.7)	
Single	129 (11.1)	268 (23.1)	693 (59.7)	70 (6.0)	<0.05
Widow	46 (24.0)	49 (25.5)	65 (33.9)	32 (16.7)	

	Walking Frequency				
	1-3 /week n %	4-6 /week n %	Every day n %	None n %	p
Education Level					
High school and lower	409 (16.5)	514 (20.8)	1324 (53.5)	229 (9.2)	0.214
University and higher	158 (16.2)	231 (23.6)	491 (50.3)	97 (9.9)	
Working Status					
Not working	246 (22.1)	210 (18.9)	532 (47.8)	125 (11.2)	<0.05
Working	321 (13.7)	535 (22.9)	1283 (54.8)	201 (8.6)	
BMI (kg/m²) (Male)					
≤24.99	73 (9.0)	169 (20.9)	509(62.8)	59 (7.3)	
25 -30	96 (13.2)	162 (22.3)	398 (54.7)	72 (9.9)	<0.05
≥30	68 (24.6)	59 (21.4)	112 (40.6)	37 (13.4)	
BMI (kg/m²) (Female)					
≤24.99	125 (15.7)	182 (22.9)	422 (53.1)	65 (8.2)	
25 -30	131 (26.7)	106 (21.6)	206 (42.0)	48 (9.8)	<0.05
≥30	74 (20.9)	67 (18.9)	168 (47.5)	45 (12.7)	

Table 4 shows the relationship between walking frequency and socio demographic characteristics of individuals. When gender was considered, it was seen that females preferred 1-3 times/week, males preferred everyday walking. Workers preferred walking daily, doing moderate and vigorous physical activity on 4-6 days of the week more than not-working individuals ($p<0.05$). The level of education was not a criterion for walking, people of all levels of education generally preferred walking every day ($p=0.214$). Individuals with high BMI were walking less frequently ($p<0.05$). It was determined that 41 years and older age group walked less frequently than 40 and younger age group ($p<0.05$).

The duration of physical activity of males were significantly higher than females ($p<0.05$). Those with BMI 25-30 kg/m² were doing longer periods of physical activity and while BMI value increased walking time decreased. In Table 5, the relationship between demographic characteristics and physical activity duration using the IPAQ were shown.

According to anthropometric measurements, BMI was lower in working individuals than non-working individuals ($p<0.05$). The waist/hip ratios of the workers were higher ($p<0.05$). BMI and waist/hip ratios were higher in participants with low educational level ($p<0.05$). Married and widows' BMI and waist/hip ratio were found to be higher than single ($p<0.05$). When the anthropometric measurements of the individuals in the study group were evaluated according to gender (Table 6), the mean waist circumference, waist/height and waist/hip values of the females were 83.5 cm, 0.5 and 0.8 and the males were 90.1 cm, 0.5 and 0.9 respectively.

Discussion

Today, rapid increase of urbanization, less physical activity, socio-economic and cultural problems changed the form of people's health problems. In this study, physical activity levels and anthropometric

Table 5. The relationship between demographic characteristics and physical activity durations using the International Physical Activity Questionnaire

	Physical activity duration (min/week) Mean Rank	Watching TV (min/week) Mean Rank	Walking (min/week) Mean Rank	Sitting (min/week) Mean Rank
Gender				
Female	349.1	1675.4	1386.5	1476.0
Male	448.2	1691.7	1647.7	1429.7
p	<0.05	0.620	<0.05	0.134
Age				
18-40	428.5	1699.5	1568.7	1422.2
41 and over	356.9	1652.6	1428.2	1509.5
p	<0.05	0.181	<0.05	0.008
Marital Status				
Married	380.7	1635.8	1492.5	1410.5
Single	447.4	1735.8	1614.3	1492.6
Widow	352.8	1902.9	1281.5	1669.0
p	<0.05	<0.05	<0.05	<0.05
Education Level				
High school and lower	396.0	1637.4	1509.8	1383.5
University and higher				
p	435.2	1799.9	1561.5	1625.9
	0.19	<0.05	0.137	<0.05
Working Status				
Not working	344.2	1679.7	1390.9	1468.7
Working	431.1	1686.0	1585.8	1443.1
p	<0.05	0.859	<0.05	0.438
BMI (kg/m2) (Male)				
≤24.99	253.1	871.3	861.9	728.3
25 -30	265.0	907.6	777.2	770.8
≥30	245.9	901.6	707.5	864.9
p	0.611	0.349	<0.05	<0.05
BMI (kg/m2) (Female)				
≤24.99	165.3	810.2	747.6	695.6
25 -30	157.3	834.6	709.1	678.2
≥30	108.7	699.8	668.7	667.3
p	<0.05	<0.05	0.016	0.548

Table 6. Age and anthropometric measurements of the study subjects

General Characteristics	Male (n:1835)	Female (n:1655)	
	±SD	±SD*	p
Age (years)	36.1±13.2	35.2±12.7	
Anthropometric Measurements			
Weight (kg)	78.5±11.4	68.1±13.2	
Height (cm)	174.4±7.0	162.7±7.1	
BMI (kg/m^2)	25.9±3.9	25.9±5.6	0.969
Waist circumference (cm)	90.1±12.5	83.5±14.6	
Hip circumference (cm)	100.8±9.5	103.1±11.9	
Waist/hip ratio	0.9±0.1	0.8±0.1	<0.05
Waist/Height ratio	0.5±0.1	0.5±0.1	0.428

*SD: Standard Deviation

measurements of Turkish adults in a wide population were evaluated and we found that only 23.9% of the people do regular exercise that most of them was men. Also low educated, younger age group and singles preferred doing exercises more than the other groups.

The researches worldwide and in our country show that males have a higher physical activity level than females. In spite of the proved benefits of physical activity, 60% of the adults in the USA (United States of America) do not do regular physical activities. Burton and Turrell determined that inactivity level of the female was higher than the male in Australia (71% and 65%, respectively) (9,10). Similarly, in another study from England, it was stated that the inactivity prevalence of males were lower than that of the females (11). Leslie et. al. found out that, among 2729 students in Australia, 47% of the female students and 32% of the male students were physically inactive (12). Haase et. al. showed, in their study carried out on university students from 23 different countries, that the male were physically more active (13). On the other hand, Von Bothmer et. al., in their study carried out on 479 university students in Sweden, evaluated physical activity levels, health habits and motivation, and could not found a significant difference in the physical activity habits of the male and female (14). Nishida et. al. stated that women in Japan have recently been very interested in their weight; and therefore, they expressed they do physical activity (15). In this study, physical activity durations were calculated as 448.2 min/week for the male and 349.1 min/week for the female, and it was seen that the male do physical activities more than females. Moreover, the relation was statistically significant ($p<0.05$), and it was compatible with most of the results of other similar studies. It can be thought that many factors like social life, social gender, traditional structure and different duties given to women, can explain why women make less physical activity.

Worldwide obesity has more than doubled since 1980 and most of the world's population now live in countries where overweight and obesity kills more people than underweight (16). Again worldwide, it is seen that several socio-cultural dynamics, differences among genders and physical inactivity affect putting on weight (17). When the Turkey Nutrition and Health Survey (TNHS)-2010 data examined, the rates of being obese (BMI≥30 kg/m^2) and being overweight/slightly overweight (BMI=25.0-29.9 kg/m^2) were 20.5% and 39.1%, respectively, for the male; and they were 41.0% and 29.7%, respectively, for the female in Turkey. In total, the rate of being obese among adults was 30.3% and the rate of being slightly overweight was 34.6% (18). In the Turkey Obesity and Hypertension Survey (TOHTA), where at least 25000 people

were studied, obesity incidence rate for people at the age of 20 and over was 35.4% for the female and it was announced that this rate was 1.8 times higher than that for the male (19). In this study, average BMI values were calculated to be 25.9±3.9 kg/m^2 for the male and 25.9±5.6 kg/m^2 for the female. Many women, irrespective of demographic characteristics or income, are vulnerable to becoming overweight or obese because of limited resources for physical activity, healthy food choices, work commitments, hormonal factors, pregnancy and family demands (20).

Zanovecet. al. stated that, in the formulas they developed to predict body fat percentage, it is possible to get more accurate and certain results with the use of weekly total physical activity duration (MET-hour) other than BMI, gender and race (21). Wells et. al. showed that there is a relation between BMI, obesity, hypertension and a decrease in sleep duration and an increase in watching TV (22). Koçak et. al. determined that there is a statistically significant difference in the IPAQ points of the elderly related to BMI (9). In this study, physical inactivity is evaluated with sitting duration which was determined to be 1429.7 min/week for the male subjects and 1476 min/week for the female subjects. When we compared BMI and physical activity duration, we observed that walking duration decreases ($p<0.05$) and sitting duration increases ($p=0.073$) as BMI value increases. BMI can be affected with many factors such as; age, gender, nutrition, working status and genetics. Also walking duration can be accepted as another factor for BMI.

According to the results of 2013 Turkey Demographic and Health Survey (TDHS), a great majority of the population went to school, 49% of males and 36% of females completed at least the secondary school. The rate of people who were at least graduates of a high school was 29% for males and 21% for females (23). When the BMI averages were evaluated relative to the education level according to the data of TNHS-2010, it was seen that BMI values of the female decrease when the education level increases, but no significant difference is observed for the male. Among the female, BMI value of the illiterate was 31.0 kg/m^2 while it decreases to 25.3 kg/m^2 for high school or higher education graduates (18). According to our study, subjects with a higher or lower education level were determined to do approximately equal duration of physical activity. It can be stated that education level only have a significant effect on vigarious and moderate physical activity frequencies and that obesity may increase with the increase of physical inactivity. We can explain this result with the physical workload of the low educated people.

Santos et. al., in their study carried out on 7330 adults in Portugal, stated that the distribution of the facilities, access to the targets, social environment and aesthetic appearance affect the physical activity levels and programs aiming to increase the physical activity levels should consider these environmental factors (24). While some studies claims that rapid urbanization, technological advancement and economic development increase physical inactivity and thus, physical inactivity prevalence is high in developed countries, some other studies states that there is a positive relation between high socioeconomic status and physical activity level and that with the increase of socioeconomic status, access to safer and more aesthetic and different sports centers increases (12). Baretta et al. applied the short form IPAQ on 597 adults in Joaçaba region in Santa Catarina in Brazil and found that the physical inactivity level was low and claimed that this may help improve appropriate public health policies to increase regular physical activity (25). As we performed our study in an underdeveloped city of Turkey the low physical activity levels would be related with less number of sports centers, lower level of education, traditional impact and having no public physical activity policy. Considering the physical activity levels of different groups such as children, elderly, workers from different businesses, people who live in the country or in different geographical regions, housewives, etc. separately and improving community health care programs and policies for specific groups will help to increase the physical activity levels and also prevent obesity, metabolic syndrome, diabetes and other chronical diseases.

So physical activity levels may be affected by factors such as gender, age, socioeconomic status, education, biological and psychological elements (25). For this reason, easy access to appropriate facilities is important in terms of physical activity. In our study, walking has a significant part in total physical activity

duration as it is the most convenient and the most economical physical activity. Then again, vigorous physical activity frequency is more in males than the females. The reason may be the opportunities of males do vigorous physical activities like football and basketball more and they have an easier access to these activities. These results show that environmental factors affect the physical activity level. Therefore efforts (education, facilities, financial support, etc.) done towards increasing physical activity levels may be leading for the guides of countries.

Conclusion

Gender, age, BMI (weight) and socioeconomic status have effects on physical activity level of Turkish adults. To increase the physical activity levels new projects are needed. Also social areas for physical activities should be increased and especially young people should be encouraged to do sports at early ages.

* The study results were presented as an oral presentation during International Science and Technology Conference (ISTEC) in July 03-05, 2019.

Conflicts of Interest: The authors declare no potential conflicts of interests.

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