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Physical Activity Patterns in the Elderly Kashan Population

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Abstract

Background: Physical activity is an important component of health in old age that provides personal independence, physical ability, and quality of life.
Objectives: The current study aimed to evaluate physical activity and associated factors among the elderly population in Kashan, Iran.
Patients and Methods: This is a descriptive cross-sectional study. The sample was 400 elderly people (aged more than 60 years) living in Kashan, Iran in 2014. The subjects randomly selected via multi-stage cluster sampling from healthcare centers in three regions of Kashan. The sample size differed by gender and residence type. Each participant's demographic characteristics and level of physical activity were recorded in a questionnaire, and the data were analyzed by SPSS version 16. Descriptive statistics, chi-square tests, Pearson correlations, and ordinal regression were used in the data analysis. The significance level for all the tests was $P < 0.05$.
Results: 237 (59.2%) of the subjects were female. The average age of the study population was 67.6 ± 6.8 years. Their average physical activity energy consumption was 326.21 ± 364.84 according to the metabolic equivalent of hours per week. 20 subjects (5%) reported no physical activity. 320 (80%) and 59 (14.8%) subjects had low and moderate physical activity levels, respectively. Only 1 subject (0.2%) had extreme levels of physical activity. Men (n = 43, 26.4%) were more likely to be moderately or extremely physically active than women were (n = 17, 7.2%). There was a significant relationship between physical activity and sex ($P < 0.0001$), marital status ($P < 0.0001$), educational status ($P < 0.002$), current occupation ($P < 0.0001$), and personal independence ($P < 0.00001$). Of course, effective predictive variations included age ($P = 0.034$), gender ($P = 0.001$), marital status ($P = 0.033$), independent status ($P = 0$), and local environment ($P = 0.001$).
Conclusions: The study revealed low physical activity in the elderly population in Kashan. The pattern of physical activity in the elderly depends on their lifestyle. A promotion of active lifestyles should be a part of health care planning for the elderly.

Keywords: Physical Activity, Aging, Lifestyle

1. Background

Physical activity is one of the most effective behaviors in the prevention and control of a wide range of common diseases (1). This behavior has an important role in promoting a healthy lifestyle and in reducing mortality rates (2). The world health organization has identified physical activity as one of the important components of health, especially in the elderly (3). It estimated that annually, low physical activity lifestyles cause 1.9 million deaths and 19 million disabilities throughout the world. For example, statistics revealed that 10% - 16% of diabetes is a result of low physical activity, and a sedentary lifestyle has a close relationship with breast, colon, and rectal cancers (4). Physical activity in old age provides personal independence, physical ability, and quality of life, and plays a role in the prevention of specific diseases such as dementia and Alzheimer's (5, 6). This behavior is likewise effective in preventing and treating high blood pressure, cardiovascular diseases, arthritis, and osteoporosis (7). Moreover it has a direct correlation with depression and anxiety disorders in the elderly (8). Physical activity is also effective in reducing the risk of cerebral diseases and their complications, and it is recommended in rehabilitation programs targeting the elderly (9). Weight loss and controlling obesity, improving muscle strength, reducing cholesterol and harmful fats, and improving interpersonal communication and family relationships are other benefits of physical activity measured in different groups, especially in the elderly (3).

Aging is a biological and anatomical process that occurs over time (10). This process is accompanied by a gradual decline in the performance of and causes individual changes in social, economic, mental, and physical abilities

(11). Aging largely affects people's physical activity (12). The world health organization has reported that in 2008, 31% of individuals above the age of 15 years around the world have an insufficient level of activity. This activity is reduced with increasing age (13). According to a 2007 center for disease control and prevention study, only 14% of Americans aged 65-74 years and 7% of Americans over 75 years old had regular physical activity (14). A study in 2006 in Yazd showed that the physical activity level in urban populations was low and that 68.4% of the population over 60 years was physically inactive (15). Another study in Isfahan showed that only 13.7% of the elderly had adequate physical activity (16). Similarly, in Brazil only 13.7% of elderly were physically active and 80.7% had low physical activity or were inactive (17). In England, only 10% of men and 2% of women aged roughly 75 years and older were active at a moderate level of intensity (18).

Physical activity decreases with increasing age, which accelerates the process of aging (13). Physical activity is thus a crucial part of lifestyle programs in health care. Various factors are related to the level of activity in the elderly: social, cultural and climate conditions influence the patterns of physical activity in every region (19). Evaluation of physical activity in different regions can provide important data for health planners and experts interested in healthy aging.

2. Objectives

The current study aimed to determine the level of physical activity and associated factors among the elderly in Kashan, Iran in 2014.

3. Patients and Methods

3.1. Study Population and Sampling

In this cross-sectional study conducted in 2014, the physical activity in the elderly population and several related factors were studied. The study population included 400 people aged over 60 years who had health care records in health centers in Kashan. Kashan is a warm and dry city located on the edge of a great desert in the center of Iran, and the city has about 200,000 residents. According to a previous study and an estimation of 87% inactivity among the elderly (16), using a confidence level of 95% (d = 0.05, P = 0.87, z = 1.96) the sample size was calculated to be 261 according to the Cochran formula. It was increased to 1.5 fold due to cluster sampling, and finally 400 individuals were investigated (20). Inclusion criteria were age over 60 years, Iranian nationality, no history of recognized mental disorders (psychosis) or dementia, the ability to communicate and respond to questions, and residence in Kashan city at the time of the study.

After coordinating with the department of health and medical education and obtaining the necessary permissions, Kashan was divided into five regions (center, north, south, west, and east) based on a map. The three studied regions were selected randomly. All the health care centers in these areas participated in the study. In each health care center, the elderly were determined from family records, and the subjects were selected randomly based on the population covered by the center. The selected subjects were evaluated by telephone calls. If a subject did not meet the inclusion criteria or was reluctant to participate in the study, he or she was replaced by another subject randomly. If the questionnaire had some missing data, the researchers contacted the subject to complete the items. If this was not possible, a random replacement subject was added. Then the researchers went to the houses of the subjects, and after explaining the objectives of the study, the questionnaire was completed. For subjects who did not have the ability to read and write, the questionnaire completed through an interview.

3.2. Questionnaire

The first part of the questionnaire gathered demographic data on variables such as age, sex, education, marital status, occupational status, location, and income. The subject's mobility, chronic diseases, and history of participation in regular physical activity were also recorded. The Iranian version of the international physical activity questionnaire (IPAQ) was used for the second part of the questionnaire (21). It contained 24 items about different physical activities and the duration of these activities that the subject usually performed in a normal week.

The energy consumption of every subject was calculated according to the type of the activities and duration of the activities during a week, measured in minutes. The activities were divided into light (equivalent to 1.3 units of energy per minute), walking (equivalent to 3.3 units of energy per minute), moderate (equivalent to 4 units of energy per minute), and vigorous (equivalent to 8 units of energy per minute). The energy consumption of all the activities were summed to calculate the whole energy consumption in a week.

(The amount of energy consumed based on the type of activities $\times$ minutes $\times$ days) = The amount of energy consumed within a week

For example, a person who spends 30 minutes a day, 5 days a week, walking and on moderate or vigorous physical activities has a total energy consumption of 2,295 [$(8 \times 30 \times 5) + (3/3 \times 30 \times 5) + (4 \times 30 \times 5)$] unit energy per

week or metabolic equivalent rate (MET). The lowest possible score on the questionnaire is zero. The highest possible score would indicate non-stop vigorous physical activity for the entire week, which is not attainable, so the upper limit is wide and has been not defined.

There were four classes of physical activity. Lack of physical activity means reporting no activity during the week; moderate physical activity means having 600 - 1500 unit energy consumption per week; vigorous physical activity means having more than 1,500 unit energy consumption per week; and low physical activity comprises people who cannot be classified in the other groups (16, 22). The Iranian version of IPAQ is a standard questionnaire; the mean of CVI and CVR for this questionnaire have been reported as 0.85 and 0.77 respectively, and its Cronbach's Alpha coefficient as 0.7 (23). Its appropriateness for elderly populations was confirmed by 10 experts, and in a pilot study of 30 elderly people the Cronbach's Alpha was calculated as 0.83.

3.3. Ethical Considerations

The study proposal was approved by the research council of Kashan University of Medical Sciences on May 25, 2014, with an ethical approval code of 197. After receiving the necessary authorizations, oral and written consent was obtained from the participants. They were assured that the data would remain confidential and used for research purposes only. The participants were also given the unconditional and absolute right to withdraw from the study at any time. All the subjects received an explanation of the objectives of the study, and signed an informed consent form.

3.4. Data Analysis

The data was analyzed by SPSS version 16. The normality of the data set was analyzed by a Kolmogoro Smirnov test and a Q-Q normality plot. Since the variables of MET, age, and BMI were not normally distributed, non-parametric tests were used for data analysis. The relationship between age and MET was determined by a Spearman correlation test. The relationship between qualitative variables such as gender, marital status, education, physical activity level, and disease were evaluated with a chi-square test. Ordinal regression was used to determine the relationship between energy expenditure on activities and other variables; the reference category was gender. The significance level for all the tests was $P < 0.05$.

4. Results

Most participants were female (n = 237, 59.2%). The mean age of the study population was 67.6 $\pm$ 6.8 years (range 60-90 years, median = 65, Interquartile R (IQR) = 8). The majority of participants were married (n = 291, 72.8%). The 188 (28.5 %) subjects were illiterate. About half of the subjects (n = 199) reported that they worked as housekeepers, and 132 subjects (29.8%) were economically dependent on others. 310 individuals (77.5%) could walk without any assistive devices. 337 participants (84.2%) were living in villa houses, and 300 participants (75%) had chronic diseases. The majority of participants tended to perform physical activity in the morning (n = 221, 55.2%), but 325 (81.2%) subjects reported no regular physical activity.

The mean physical activity energy expenditure among the elderly of Kashan was 326.21 $\pm$ 364.84 MET/week (range 0 - 4899, median = 222, IQR = 366). 20 (5%) subjects reported no physical activity and 320 participants (80%) had low physical activity. 59 subjects (14.8%) had moderate physical activity and only 1 subject (0.2%) reported a vigorous physical activity level, which was removed from the data analysis. Figure 1 shows that all the subjects except one had less than 2000 MET of physical activity per week, and the distribution was higher for MET values less than 500 (Figure 1).

Most physical activities were related to personal affairs (n = 148, 37%). A minority of subjects used equipment for physical activity (n = 13, 3.2%) and 22 respondents engaged in sports (5.5%). Physical activity related to household tasks was more common in women (n = 69, 17.2%) than in men (n = 14, 3.5%), but men (n = 28, 7%) did more regular walking than women did (n = 22, 5.5%).

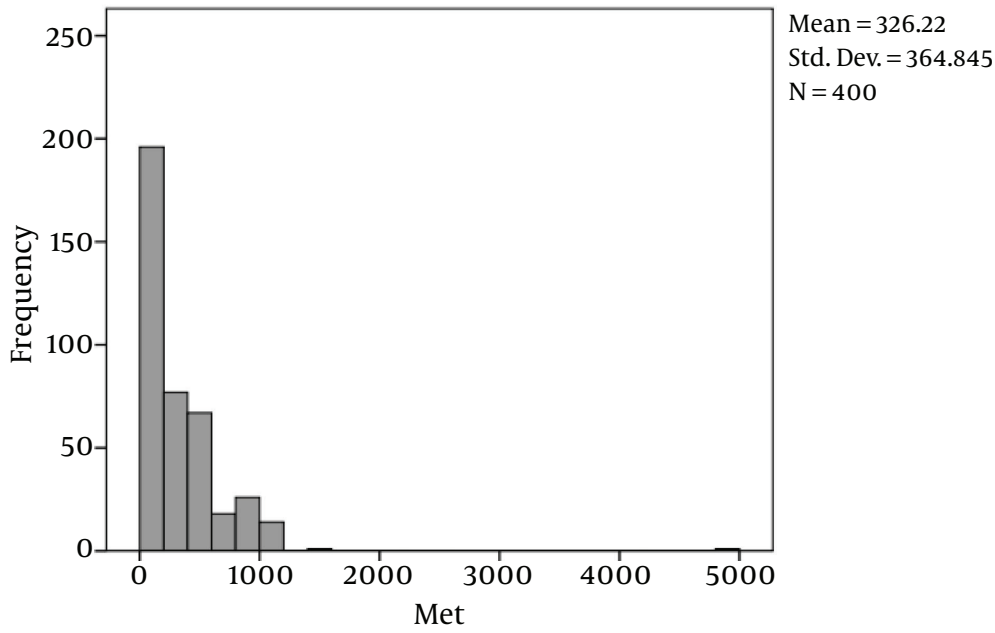
A chi-square test showed a significant relationship between physical activity level and gender ($P < 0.0001$), marital status ($P < 0.0001$), educational status ($P < 0.002$), current job ($P < 0.0001$), and independence status ($P < 0.00001$) (Table 1). A Spearman correlation test did not reveal a significant difference between age and level of physical activity ($P > 0.5$, $r = 0.01$), but average physical activity decreased with age (Table 1).

The ordinal regressions indicated that variation in age ((P vale [P], 0.034; 95% confidence interval [CI], -2.590 - -0.100), gender ($P < 0.001$, CI = -2.538 - -0.647), marital status ($P < 0.033$, CI = 0.78 - 1.811), independence status (P = 0.00, CI = 2.629-5.274), and residence type (P = 0.001, CI = 0.485 - 2.034) could significantly predict the energy expenditure rate (Table 2).

5. Discussion

The results indicated this age group. Aging can make physical activity difficult, and on the other hand inactivity can accelerate the process of aging. This non-productive cycle should be a concern that 85% of the elderly in Kashan

Figure 1. The Distribution of Metabolic Equivalent (MET) Values in the Elderly Population of Kashan



Mean = 326.22, SD = 364.845, N = 400.

had low or no physical activity. Dias-da-Costa, et al. (17) reported that 80.7% of Brazilian people had low physical activity. Motefaker et al. (15) also found that 13.7% of elderly respondents had good mobility and 86.3% reported inadequate physical activity. Similarly, in Yazd 65.7% of the elderly had low physical activity. In 2010 in Tehran, 53% of the elderly had a sedentary lifestyle (20). Some other studies also show a low level of physical activity in older populations (23, 24). Different environmental, cultural, and social factors can influence physical activity in the elderly. It seems that these factors produce some obstacles in different settings that limit the activity of in all societies (15).

In this study, there was a significant correlation between the level of physical activity and gender; women had lower physical activity. So ordinal regression analysis indicates that gender predicted variation in the energy expenditure rate that leads to increased physical activity. Low energy expenditure rates indicate lower physical activity among the elderly. Of course, other variables influencing the prediction include age, marital status, independent status, and residence type. Although the variation in age showed no significant relationship with physical activity level, a survey with ordinal regression indicated a significant relationship with the energy expenditure rate. Many other studies found that gender had a significant relationship with physical activity levels in elderly populations (15, 16, 20, 25-27). However, Wong et al. (28) reported that women were more active than men. The low physical activity among women in the current study may reflect the reality that women were more engaged in household activities. These activities are mostly considered low-level physical activities and are not sufficient for adequate energy expenditure in the elderly. On the other hand, men were more active in moderate activities.

Table 1. Physical Activity Status vs. Other variables Among the Elderly Population of Kashan

Demographic Factors	Moderate Activity, No. (%)	Low Activity, No. (%)	Lack of Activity, No. (%)	P Value
Age				0.251
60 - 70	41 (14.2)	12 (4.2)	12 (4.2)	r = 0.01
71 - 80	11 (14.3)	7 (9.1)	7 (9.1)	
81 - 90	7 (24.1)	1 (3.4)	1 (3.4)	
Gender				0.0001
Female	42 (25.8)	113 (69.3)	7 (4.3)	
Male	17 (7.2)	207 (87.3)	13 (5.5)	
Marital Status				0.0001
Married	48 (16.6)	241 (83.1)	1 (0.3)	
Single	11 (10.1)	79 (72.5)	19 (17.4)	
Education				0.002
Illiterate	14 (7.4)	161 (85.6)	12 (6.4)	
Primary	33 (19.5)	129 (76.3)	7 (4.1)	
Above high school	12 (27.9)	30 (69.8)	1 (2.3)	
Current Job				0.0001
Active	26 (48.1)	26 (48.1)	1 (1.9)	
Inactive	33 (9.5)	294 (85)	19 (5.5)	
Independence Status				0.0001
Independent	57 (18.4)	248 (80)	4 (1.3)	
Using mobility assistive device	0	58 (98.3)	1 (1.7)	
Disability	2 (6.5)	14 (45.2)	15 (48.4)	
Residence				0.102
Apartment house	15 (23.8)	45 (71.4)	3 (4.8)	
Villa house	44 (13.1)	275 (81.6)	17 (5)	
Chronic Disease				0.058
Yes	41 (13.7)	240 (80)	19 (6.3)	
No	18 (18.8)	80 (79.2)	1 (1)	
BMI				0.373
Under 25	18 (17.8)	82 (77.4)	5 (4.8)	
25 - 30	30 (13.9)	172 (79.6)	14 (6.5)	
Up 30	11 (14.1)	66 (84.6)	1 (1.3)	

Most physical activity in the older adults participating in this study related to personal affairs. Personal affairs are activities that people engage in for their whole lives. Based on detachment theory, elderly people have the tendency to practice the activities that are familiar to them (29). Therefore, individuals will naturally focus on their personal affairs activities. Although physical activity was less in older people, this relationship was not significant. Similar results can be seen in other studies (16, 26). Increasing age affects different abilities and causes a loss of muscle strength, which can result in inactivity (12).

The results of this study indicated a significant relationship between marital status and physical activity level. Duration of activity and active days in the week was higher among married subjects. Eshaghi et al. (16) and Motefaker et al. (15) found that elderly people in Estfahan and Yazd, respectively, who were living alone were more active. Garatachea et al. (24) reported that elderly people who live with

Table 2. Ordinal Regression of Variables Predicting the Amount of Energy Expended in Physical Activity Levels

Demographic Factors	2 Log Likelihood	Chi-Square	Pseudo R-Square	Estimate	SE	P Value	(95%) CI (low-up)
Age	282.376	126.749	Cox and Snell = 0.284				
60 - 70				-1.345	0.635	0.034	-2.590 - -0.100
71 - 80				-2.818	0.673	0.00	-4.138- -1.499
81 - 90				0	-	-	-
Gender							
Male				-1.592	0.482	0.001	-2.538 - -0.647
Female				0	-	-	-
Marital Status							
Married				0.944	0.442	0.033	0.78 - 1.811
Single				0	-	-	-
Education			Nagelkerke = 0.394				
Illiterate				-0.661	0.539	0.220	-1.717 - 0.395
Primary				0.085	0.490	0.863	-0.876 - 1.045
Above high school				0	-	-	-
Current Job							
Active				-0.797	0.428	0.063	-1.636 - 0.043
Inactive				0	-	-	-
Independence Status			McFadden = 0.262				
Independent				3.951	0.675	0.00	2.629 - 5.274
Using mobility assistive device				3.011	0.668	0.00	1.702 - 4.320
Disability				0	-	-	-
Residence							
Apartment house				1.260	0.395	0.001	0.485 - 2.034
Villa house				0	-	-	-
Chronic Disease							
Yes				-0.263	0.397	0.508	-1.041 - 0.516
No				0	-	-	-
BMI							
Under 25				-2.753	3.186	0.388	-3.492 - 8.997
25 - 30				-1.997	1.695	0.233	-5.277 - 1.284
Up 30				0	-	-	-

their spouse or children had lower physical activity. Married individuals had wider relationships compared to single people, which may increase their activities, although some studies question this assumption. The effect of family on physical activity needs further investigation.

Individuals with higher education levels were more active compared to illiterate persons. Some other studies reported the same results (15, 17, 26). Eshaghi et al. did not find a relationship between physical activity and educational status in the elderly of Isfahan (16). Salehi et al. (20) also indicated that there was no significant relationship between overall physical activity and education in Tehran, although the kinds of activities were different between individuals with different educations. Educational level can influence knowledge about physical activity and exercise, and also personal hobbies.

Overall, unemployed individuals had lower physical activity. Eshaghi et al. found that unemployed individu-

als were more physically active, as did Motefaker et al. (15, 16). In a study in Peru, Seclen-Palacin (30) found that physical activity was higher in unemployed individuals. People with active jobs have more social roles and responsibilities that can influence their physical activity.

Finally, people with chronic diseases had higher physical activity levels. Diseases can change individuals' attitudes toward health issues. When people suffer from diseases they try to change their lifestyles, and one of these changes might be increasing their physical activity levels.

5.1. Limitations and Contributions

The tool that we used in this study has some limitations. It has many items and relies on the memory of the elderly, which can increase the risk of under or over estimation of physical activities. We tried to overcome this problem by interviewing the patients. There are some items in the questionnaire that elderly people do not engage in very often. This may cause a floor effect in the questionnaire. As reported above, most of the subjects reported the lowest level of physical activity and even a total lack of physical activity. Despite these limitations, this study also makes some contributions. First, this is one of the few studies available about physical activity in a community-based population of the elderly. Second, it gives concrete and helpful data about the type of activities in which elderly people usually engage. This study can provide necessary information for future planning to encourage physical activity improvement among the elderly.

5.2. Conclusion

Sedentary lifestyles and a lack of physical activity are common problems in old age and can accelerate the changes related to aging. Many factors such as gender, marital status, current job, and education influence physical activity in old age. Considering these factors and conditions is essential when designing programs for physical activity among the elderly.

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Footnotes

Authors' Contribution: Ali Sadrollahi performed the data collection, literature review, and prepared the first draft of the manuscript. Masoumeh Hosseinian supervised the study, made critical revisions to the paper, and prepared the last revision of the manuscript. Negin Masoudi Alavi supervised the study and performed data analysis. Zahra Khalili helped in the process of sampling.

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