Elderly Health Journal 2015; 1(2): 84-90.
Shahid Sadoughi University of Medical Sciences, Yazd, Iran
Journal Website : http://ehj.ssu.ac.ir

Original Article

Relationship of Physical Activity Facilitators and Body Mass Index in Kashan Elderly

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A B S T R A C T

Article history
Received 16 Aug 2015
Accepted 22 Nov 2015

Introduction: There are many factors that affect the level of physical activity and body mass index of the elderly. The current study aimed to assess the relationship of physical activity facilitators and body mass index of Kashan elderly.

Methods: The cross-sectional study sampled 400 elderly older than 60 referred to 10 healthcare centers in Kashan, 2014, via multistage quota method. Participations were tested under demographic characters, body mass index(BMI) level, and exercise benefits part of exercise benefits and barrier scale (persian version) for measurig physical activity facilitators. Data were analyzed in SPSS software, descriptive statistic, Spearman correlation test, Chi-Square and Ordinal regression.

Results: Of the participations73.6% were overweight or obese. Median and interquartile range of physical activity facilitators was 75 and 33 respectively. The most prominent physical activity facilitators was" physical activity increases my physical ability, (83.2%). There was a significantly inverse relationship between physical activity facilitators score and BMI of participants ($r = -0.233$, $p = 0.001$). Ordinal regression evealed that mostly predictor of BMI among physical activity facilitators was "physical activity improves the quality of my work " (OR = 8.683, o = 0.001).

Conclusion: Results identified physical activity facilitators directly is related to improve physical circumstances of the elderly people. Surly poviding physical activity facilitators through educational and interventional programs may improve the health status of aging population.

Keywords: Body Mass Index, Aging, Physical Activity Facilitators

Citation: Khalili Z, Sadrollahi A, Khatir Ahmadi M, Mossadegh N. Relationship of physical activity facilitators and body mass index in Kashan elderly. Elderly Health Journal. 2015; 1(2): 84-90.

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[DOR: 20.1001.1.24236179.2015.1.2.4.9]

Introduction

The elderly receive medical services more than any other age group (1). Among the growing disorders the elderly worldwide is the change in weight and body mass index (BMI). This disorder causes severe dysfunctions through the change of personal, social, psychological and physical characteristics. Abnormal BMI and excessive weight constitute the main factor in cardiovascular diseases, diabetes, osteoporosis and cancers (2). The changed BMI and weight may reduce physical mobility and increase the risk of brain stroke, hypertension and malnutrition disorders. As people grow older, BMI increases and fatness occurs (3). One of the indexes of healthy life is normal weight and BMI according to age (4). This normality is influenced by many factors including the type and amount of physical activities. Physical activity leads

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to the increased BMI. In fact physical activity reduces body weight and BMI through consumption of accumulated fat in the body and extra calorie obtained from foods (5). Research on BMI in different groups of the elderly indicates that 20-30% of this age group suffer from obesity (6). Tookuni et al. also found that excessive body weight is associated with low physical activity (7).

Previous studies have enumerated various factors as facilitator of physical activity among this age group. motivation of physical activity and promotion of sport centers, improvement of physical health, entertainment and visiting friends, improvement of equipment for physical exercise, safety of neighborhoods and establishment of special places for exercise may improve physical activity level among the elderly (8-15). Therefore, Identification of the physical activity facilitators enables to make a coordination between the environment and special conditions of the elderly and to improve their physical activity level and BMI, helps to make a more comprehensive plan for modification of behavioral patterns and life styles in line with the reduction of immobility-caused diseases and saving medical costs. The present paper aims to investigate the relationship between physical activity facilitators and BMI among the elderly in the city of Kashan, Iran.

Methods

Procedures

The participants consisted of 400 aging people 60 year-old and above living in the city of Kashan with medical file in 10 healthcare centers of Kashan. Multistage quota sampling method was used for selection of participants. Based on the previous studies and estimation of undesirable BMI in 87% of the old people with confidence level of 95% ($Z = 1.96$, $d = 0.05$, $q = 0.87$, $p = 0.13$) (16), and based on Cochran's formula, the required sample size was estimated at 261 people. People with, age of more than 60, Iranian nationality, absence of mental diseases (psychosis), full consciousness in the time of study, ability to communicate and answer to questions in Persian, and resident of Kashan were eligible to enter in the study.

Ten healthcare centers were randomly selected, 2 for each region of the city, and the number of eligible subjects covered by each center was calculated. To each center, based on the population under coverage and gender, a quota was allocated. Afterward, we randomly selected subjects from medical files registered in each center, then, called them to explain the program and invite them to participate in the study. Selected participants completed the questionnaire under supervision of a trained interviewer and for those who were not able to write and read, assisted completion was assigned.

Weight and height of all participants were measured by a fellow researcher of the same gender. The weight was measured by a digital weight with 150 g error while the participant was standing without shoes and was motionless. The height was measured using a tape meter while the participant was standing without shoes and with foots touching each other.

Measures

The data was collected by a multipart questionnaire. The first part of the questionnaire deals with BMI. After measuring the weight and height, BMI was calculated by dividing the weight (kg) by height square (meter). Then the results were divided into 6 groups; those less than 18.5, 18.5-24.9, 25-29.9, 30-34.9, 35-39.9, and more than 39.9 cm/sqm that were classified as underweight, normal, overweight, obese, severe obese, and critical obese respectively (17).

The second part of the questionnaire deals with physical activity facilitators. In order to measure this we employed exercise benefits/barriers scale of Sechrist et al. which consisted of 43 items (18). We extracted 29 questions concerning the facilitating factors (benefits) of exercise from the validated Persian version of the scale. The instrument has a four-response, forced-choice Likert-type format with responses ranging from 4 (strongly agree) to 1 (strongly disagree). So the possible score for our scale was from 29 to 116. The questionnaire had no cut-off point, the higher the scores mean the individual perceived fewer problems for physical activity. The Cronbach's Alpha for the entire questionnaire, questions relating to exercise barriers, and exercise benefits reported 0.89, 0.95 and 0.94 respectively(18). Validity and reliability of the Persian version, was confirmed in a study by Aghamolaei et al. (17), However, to determine the reliability of our scale, we piloted the questionnaire on 30 aging people in the city of Kashan and a Cronbach's alpha of 0.85 approved its internal consistency .

Statistical analysis

Data were analyzed using SPSS software, and the median and interquartile index was obtained. To determine data normality, Kolmogorov-Smirinov test was applied. To determine the relationship between quantitative variables such as the mean score of physical activity facilitators and BMI, Spearman correlation test was carried out. Ordinal regression was used to investigate the predictive power of each physical activity facilitators for BMI. The significance level in all analyses was $p < 0.05$.

Ethical consideration

The study was approved by the Ethics Committee in Faculty of Medicine & Health Sciences at Kashan University of Medical Sciences under ref. 197 dated Apr. 18, 2014. Written and verbal consent of participants was obtained before participation and confidentiality was secured.

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Results

Most of the participants (59.2 %) were female. The mean age, height, weight and BMI of participants were 67.6 ± 6.8 years (60-90), 164.1 ± 7.30 cm, (140-192), 72.76 ± 9.08 kg (53-100), and 27.01 ± 3.15 kg/sqm (35.71-17.56) respectively. Majority of participants (72.8 %).were married and 28.5 % were illiterate. About thirty percent (29.8%) were economically dependent to others and 77.5 % could walk without any assistive device. Of participants 84.2% were living in villa houses. Seventy five percent had chronic diseases. Majority of participants (55.2%) tended to perform physical activity in the morning and 81.2% subjects reported no regular physical activity.

Table 1 shows the distribution of mean and SD of physical activity facilitator scores and BMI by Some demographic variables.

Table 2 shows the frequency of agreement (strongly agree + Agree) with physical activity facilitators and its distribution according to BMI categories in participants. Median, interquartile range (IQR) and mean score of physical activity facilitators were 75, 33 and 70.82 ± 18.27 (33-105) respectively. The median and IQR score was 85 and 29 in those with normal BMI, 76 and 34.75 in overweight participants, 70 and 9 in fat participants and 87 and 0 in severely fat participants. Table 2 also shows 83.2% of participants believed that having physical activity improve their physical ability, followed by 76.8% and 73.2% who confirmed reduction of fatigue and inaction feel respectively. About 70% approved physical activity leads to increase self-confidence and better control of body movements, improve mental health, keep independency and reduce feelings of stress.

From physical activity facilitators, mostly statistically significant predictors of BMI are improvement the quality of work (OR = 8.683, p = 0.000), decreasing feelings of stress (OR = 6.438, p = 0.002), improvement of mental health (OR = 5.672, p = 0.001), access to facilities (OR = 4.764, p = 0.001), and increasing physical ability (OR = 3.966, p = 0.001) respectively (Table 3).

Table 1. Mean of physical activity facilitators Score and BMI by some demographic variables

	Category	physical activity facilitators Score	BMI
Age	60-70	73.1 ± 18.1	27.2 ± 3.2
	71-80	64.6 ± 16.5	26.4 ± 3.02
	81-90	64.1 ± 19.52	27.7 ± 2.4
Gender	Men	63.4 ± 17.9	26.5 ± 2.8
	Female	73.1 ± 18.1	27.3 ± 3.3
Marital status	Married	74.6 ± 16.2	26.8 ± 2.9
	Single	60.6 ± 19.4	27.4 ± 3.6
Education	Illiterate	71 ± 17.5	27.6 ± 3.4
	Primary	68.3 ± 17.9	26.7 ± 2.8
	Above high school	79.6 ± 20.1	25.2 ± 2.5
Current job	active	66.4 ± 19.3	26.2 ± 2.8
	Non active	71.5 ± 18	27.4 ± 3.2
Dependency status	Independent	73.2 ± 17.8	27.04 ± 2.9
	Using mobility assistive device	68 ± 16.7	27.3 ± 3.8
	Disability	51.9 ± 13.5	26.1 ± 3.4
Living location	Apartment house	67.8 ± 21.8	27.3 ± 3.4
	Villa house	71.3 ± 17.4	26.9 ± 3.08
Chronic disease	Yes	70.9 ± 17.6	26.2 ± 2.8
	No	70.4 ± 20.2	27.4 ± 3.2

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Table 2. Frequency distribution of physical activity facilitators by body mass index level

Physical activity facilitators	F (%)	Body Mass Index Level				
		Less than 18.5	18.5-24.9	25-29.9	30-34.9	35-39.9
I enjoy exercise	231 (57.8%)	1 (0.4)	66 (28.6)	112 (48.5)	49 (21.2)	3 (1.3)
Decreases feelings of stress	283 (70.8)	1 (0.4)	77 (27.2)	135 (47.7)	67 (23.7)	3 (1.1)
Improves mental health	287 (71.8)	1 (0.3)	73 (25.4)	142 (49.5)	68 (23.7)	3 (1)
Proper facilities exist	255 (63.8)	1 (0.4)	88 (34.5)	118 (46.3)	45 (17.6)	3 (1.2)
I Access to facilities	196 (49)	1 (0.5)	71 (36.2)	83 (42.3)	39 (19.9)	2 (1)
Increases self confidence	280 (70)	1 (0.4)	86 (30.7)	126 (45)	65 (23.2)	3 (0.7)
Better control of body movements	285 (71.2)	1 (0.4)	78 (27.4)	159 (55.8)	45 (15.8)	2 (0.7)
Contact with friends	221 (55.2)	1 (0.5)	60 (27.1)	122 (55.2)	35 (15.8)	3 (1.4)
Keep from high blood pressure	236 (59)	1 (0.4)	72 (30.5)	112 (47.5)	49 (20.8)	2 (0.8)
Keep physical fitness	212 (53)	1 (0.5)	68 (32.1)	82 (38.7)	59 (27.8)	2 (0.9)
Improves cardiovascular function	208 (52)	1 (0.5)	70 (33.7)	93 (44.7)	42 (20.2)	2 (1)
Increases physical ability	333 (83.2)	1 (0.3)	93 (27.9)	172 (51.7)	65 (9.5)	2 (0.6)
Improves physical problem	201 (50.4)	1 (0.5)	74 (36.8)	103 (51.2)	20 (10)	3 (1.5)
I am aware of exercise facilities around me.	202 (50.5)	1 (0.5)	68 (33.7)	87 (43.1)	44 (21.8)	2 (1)
Increases life expectancy	194 (48.5)	1 (0.5)	73 (37.6)	99 (51)	18 (9.3)	3 (1.5)
Reduces fatigue feel	307 (76.8)	1 (0.3)	86 (28)	166 (54.1)	51 (16.6)	3 (1)
Visit new people	169 (42.2)	0	67 (39.6)	73 (43.2)	26 (15.4)	31 (1.8)
Our district is secure enough	174 (43.5)	1 (0.6)	68 (39.1)	83 (47.7)	19 (10.9)	3 (1.7)
Enough Support by governmental organizations	220 (55)	1 (0.5)	77 (35)	104 (47.3)	35 (15.9)	3 (1.4)
Entertains me	245 (61.2)	1 (0.4)	84 (34.3)	117 (47.8)	40 (16.3)	3(1.2)
Do not afraid of physical harm	241 (60.2)	1 (0.4)	71 (29.5)	128 (53.1)	38 (15.8)	3 (1.2)
I am interest in physical activity	234 (58.5)	1 (0.4)	76 (32.5)	112 (47.9)	42 (17.9)	3 (1.3)
Keep independency and reduce dependency	277 (70.3)	1 (0.4)	73 (26.4)	143 (51.6)	57 (20.6)	3 (1.1)
Increases my acceptance by other	225 (56.2)	1 (0.4)	70 (31.1)	110 (48.9)	41 (18.2)	3 (1.3)
improves the quality of my work	189 (47.2)	1 (0.5)	72 (38.1)	94 (49.7)	19 (10.1)	31 (1.6)
Reduces inaction feel	239 (73.2)	1 (0.3)	79 (27)	159 (54.3)	52 (17.7)	2 (0.7)

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Table 3. Ordinal regression results of physical activity facilitators in predicting BMI

Facility factors	R-square	Estimate	SE	Wald	p	OR	CI=0.95	
							Low	Up
I enjoy exercise	0.39	-0.549	0.382	2.061	0.151	1.728	-1.298	0.2
Decreases feelings of stress		-1.868	0.613	9.252	0.002	6.438	-3.065	-0.663
Improves mental health		-1.741	0.543	10.263	0.001	5.672	-2.806	0.676
Proper facilities exist		1.031	0.357	8.357	0.004	2.795	0.332	1.730
I Access to facilities		1.566	0.376	17.337	0.001	4.764	0.829	2.304
Increases self confidence		0.818	0.517	2.508	0.113	2.260	-1.83	0.194
Better control of body movements		0.617	0.304	4.116	0.042	1.849	0.021	1.214
Contact with friends		-0.027	0.341	0.006	0.936	1.027	.696	0.641
Keep from high blood pressure		-0.809	0.434	3.463	0.063	2.240	-1.66	0.043
Keep physical fitness		0.043	0.419	0.011	0.918	1.043	-0.778	0.864
Improves cardiovascular function		-0.415	0.411	1.016	0.313	1.512	1.221	0.392
Increases physical ability		1.588	0.382	17.304	0.001	3.966	0.84	2.335
Improves physical problem		0.18	0.423	0.182	0.67	1.196	-0.649	1.01
I am aware of exercise facilities around me.		0.03	0.354	0.007	0.933	1.030	-0.664	0.724
Increases life expectancy		0.871	0.399	4.758	0.029	2.382	0.088	1.654
Reduces fatigue feel		0.756	0.391	3.743	0.053	2.124	-0.01	1.521
Visit new people		-0.797	0.426	3.508	0.061	2.213	-1.631	0.037
Our district is secure enough		0.8111	0.377	4.619	0.032	2.244	0.071	1.551
Enough Support by governmental organizations		0.84	0.448	3.519	0.061	2.310	-0.038	1.718
Entertains me		0.393	0.389	1.018	0.313	9.039	0.37	1.156
Do not afraid of physical harm		0.027	0.413	0.004	0.947	1.027	-0.783	0.837
I am interest in physical activity		2.168	0.454	22.847	0.001	8.683	1.279	3.057
Keep independency and reduce dependency		-0.016	0.393	0.0002	0.967	1.016	-0.786	0.753
Increases my acceptance by other		0.814	0.372	4.787	0.029	2.251	-1.543	-0.085
Improves the quality of my work		-0.407	0.382	1.135	0.287	1.5	-1.157	0.342
Reduce inaction feel		0.751	0.405	3.437	0.064	2.114	-0.043	1.545

Discussion

The results indicated that there was a significant relationship between exercise facilitating factors and BMI among the elderly in the city of Kashan that is consistent with previous studies (19-21). Nelson et al. conducted a study on the elderly in the US and found that education on physical activity in work place had a positive impact on physical activity among the elderly that considerably correlated to BMI (22). Provision of these factors has a significant impact on health of the elderly. Hence, the enhancement of facilitating factors increases physical activity and subsequently improves BMI level among the elderly via alteration of catabolism of fat tissue that leads to reduction of total body fat (21).

The results indicated that 73.6% of the participants were overweight or fat, that is consistent to other studies. Koochek et al. conducted a study on Iranian old people residing in Sweden and found that the lack of program for physical activity in leisure times was a barrier to exercise and shifted BMI toward higher amounts (20). Such the barrier may also unearth at least one explanation for less frequent physical activity facilitators among our participants with higher BMI (23-26).

The results also indicated that increase of physical ability is the most important facilitator of physical activity. Consistent to this result, Simoes et al. reported that the improvement of activity of daily living, instrumental activity of daily living activities was an effective factor in physical activity which influenced BMI level (25). Koochek et al. also suggested that provision of physical activity program in leisure times could effectively reduce BMI (20). Likewise, Fuentes Bravo showed walking exercise keeps and increases body activity (27). Nelso et al. meanwhile, reported that improvement of work environment was an effective factor in BMI (22). Fatigue and inaction feel reduction, and improvement of mental health were other predictors of BMI among the elderly. Considering that exercise facilitators vary depending on individual, social, mental, biological, environmental and economic characteristics (10), the diversity in the results of different studies are acceptable. Moreover various biological and physical change in old age results greater such the diversity(4).

Ordinal regression result showed the power of physical activity facilitators in predicting BMI is lower than moderate (R-Square = 39.2%). Improvement the quality of work, decreasing feelings of stress, improvement of mental health, access to facilities and increasing physical ability were the mostly predictors of BMI in the elderly of Kashan city among which Improvement the quality of work was the most significant predictor (OR = 8.683). In aging,

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reduction of individual's ability, negatively affects the quality of all activities. Also, individuals have a wider variety of attitudes toward physical activity than younger counterparts depending on the value of physical activity in a specific society (15).

Conclusion

The study showed the relationship between physical activity facilitators and BMI of Kashan elderly. Mostly reported perceived physical activity facilitator is the effect of physical activity in physical ability, and other reported effects of physical activity among the elderly of Kashan were reduction of dependency, fatigue and inaction feel, stress and increase of control on body movements, self-confidence and mental health, which result in improvement in overall health of the elderly and then on BMI of Kashan elderly. So providing suitable equipment and educational programs for the elderly by health system could improve overall health status of the elderly in Kashan.

Study limitations and strengths

This study had some limitations; it was conducted within a short period of time. It was, therefore, difficult to investigate the actual causal relationship between exercise facilitators and BMI level. Also, memory and cognitive problem of some participants was a barrier to accumulate accurate data. This study also has some strength, first this is one of the rare community-based population studies available about the physical activity facilitators in the elderly. Second, it gives a concrete data about the type of activities that elderly usually engage. This study can provide essential information for future planning of physical activity improvement in the elderly.

Conflict of interest

The authors declare no conflict of interest in this study.

Acknowledgements

We really appreciate Kashan elderly, who participated in the study. We also thank Kashan University of medical Science for financial support of the study as a master degree dissertation (no. 9305).

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