

Impact of physical activity on quality of life in the elderly

Rina K. Kusumaratna

ABSTRACT

The rapid growth of the elderly population is having an impact on the maintenance of a healthy mental and physical state. The aim of this study was to assess the correlation of physical activity and quality of life in the elderly. The participants in this study were 21 male and 80 female elderly persons (66.4 ± 6.3 years, mean \pm SD) recruited from the community in 2 subdistricts in South Jakarta. Data were collected on the quality of life (QOL) using the WHOQOL-BREF questionnaire that contains 26 items, 24 of them making up the 4 domains of physical health, psychological health, social relationships, and environment. The Short Form (SF) International Physical Activity Questionnaire (IPAQ) was used to measure the habitual practice of physical activities of the elderly. Subjects were separated into groups with low ($n = 25$), moderate ($n = 37$) and high activity level ($n = 39$), according to their position on the physical activity scale. The QOL scores in all four domains were significantly higher ($p < 0.05$) in the group reporting a higher level of physical activity. After adjustment for age, the more active group had higher values in all four QOL domains as follows: physical health ($p = 0.027$), psychological health ($p = 0.000$), social relationships ($p = 0.005$), and environment ($p = 0.000$). Healthy older adults who had higher physical activity had higher QOL scores than those who were physically less active. Therefore, incorporating more physical activity into the lifestyles of sedentary or minimally active elderly persons may improve their QOL.

Keywords : Physical activity, quality of life, elderly

Department of Community Medicine, Medical Faculty, Trisakti University

Correspondence

dr. Rina K. Kusumaratna, M. Kes
Department of Community Medicine, Medical Faculty, Trisakti University
Jl. Kyai Tapa 260 - Grogol
Jakarta 11440
Telp 021-5672731 ext.2504
Email :
rkusumaratna@yahoo.com

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INTRODUCTION

Age-associated changes in humans are having an impact on physiological ageing and pathophysiological processes. Increased life expectancy is associated with an increase in multiple chronic conditions that could translate

into functional disability and need for assistance in daily life activities. The longer life span could lead to declining health conditions, reduced mobility, depression, isolation and loneliness. The determinants important to the health and functioning of the elderly are demographic, social and environmental factors, including

physical activity and dietary habits. Over the past 15 years there has been growing evidence for the positive effect of exercise interventions on motor impairments⁽¹⁾ and selected mobility functions^(2,3) in older home-dwelling people. Thus, exercise interventions should also improve perceived functioning and well-being, while regular physical activity could support and increase one's capability to ward off potential age-related diseases. For example, regular exercise could reduce the risk of bone fractures and influence the functioning of the cardiovascular system. Physical activity was also shown to be effective in the prevention of type-2 diabetes.⁽⁴⁾ At present the sedentary lifestyle has become a common feature at any age, while ageing leads to reduced activity levels and to further decline in the physical activity option. Regular exercise training in elders can have a positive effect on muscle function and also contribute to the activities of daily living. It is a well known fact that strength training in older people improves balance and gait speed, enhances bone health and decreases many of the risk factors of an osteoporotic fracture.

Quality of life (QOL) is a measure of how well people live.⁽⁵⁾ In gerontology, research on QOL has been used as an umbrella term to describe a number of outcomes believed to be of importance in the lives of elderly people.⁽⁶⁾ The World Health Organization Quality of Life Group (WHOQOL Group) has developed an instrument to evaluate Quality of Life (WHOQOL-BREF) with 24 questions that evaluate quality of life in different domains: physical health, psychological health, social relationships, and environment.⁽⁷⁾ The WHOQOL-BREF assessment was developed as a short version of the WHOQOL-100 for use in situations in which time is restricted or the burden on the respondent must be minimized, and in large epidemiologic studies and clinical trials.⁽⁸⁾

A positive correlation has been reported between the degree of physical activity and Health Related Quality of Life (HRQoL) in old age.⁽⁹⁾ Results are inconclusive as to whether HRQoL varies with the type of exercise undertaken.⁽¹⁰⁾ The aim of this study was to assess the correlation between physical activity and quality of life in the elderly.

METHODS

Research design

A cross-sectional study was performed from January to May 2006.

Subjects

Participants in this study comprised a total of 101 subjects (eighty females and twenty-one males) ≥ 60 years of age, who were active members of senior citizens associations in 7 sub-districts of the Tebet area in South Jakarta. Subjects had to meet the following criteria : i) be in apparent health, ii) be well nourished, iii) be able to communicate, and iv) be able to give a written informed consent. Excluded from the study were persons who had been using a walking aid (crutches, cane, or wheelchair) or who were unable to perform physical activity for medical reasons.

The collected demographic data included gender, age, marital status, educational level, and household income level. In addition, physical activity, quality of life, and body mass index variables were collected.

MEASUREMENTS

Physical activity

The Short Form (SF) International Physical Activity Questionnaire (IPAQ) was used to measure the habitual practice of physical activities of the elderly.^(11,12) The SF IPAQ was designed for use in surveillance studies, in which

time is limited, and consists of 7 items for estimating the time spent in performing physical activities (moderate to vigorous) and in inactivity (sitting). The SF IPAQ form assesses physical activity undertaken across a comprehensive set of domains, including leisure time physical activity, domestic activities, work-related and transport-related physical activity, and sedentary behavior (sitting). Data obtained by either short or long IPAQ forms can be reported as categorical or as continuous scores. Categorical scores are expressed as low, moderate or high levels of physical activity, while continuous scores are given as metabolic equivalent-minutes (MET-minutes) per week. Participants indicated the number of times in the past seven days which they spent in walking, and in performing moderate and vigorous activities, and also the average amount of time spent per day in aforementioned activities. The questionnaire took approximately 10 minutes to complete and a trained research assistant was present to help the participants. Computation of the total score required summation of the duration in minutes and frequency in days per week of walking, moderate-intensity and vigorous-intensity activities. Physical activity (PA) data obtained from SF IPAQ were used for computing MET-minutes per week, calculated as the MET intensity multiplied by the duration (in minutes) of each activity over the seven day period. The following MET values and formulae for computation of MET-minutes were taken from the IPAQ validity and reliability study:⁽¹²⁾ (i) walking MET-minutes/week = 3.3 * walking minutes * walking days; (ii) moderate MET-minutes/week = 4.0 * moderate-intensity activity minutes * moderate-intensity days; (iii) vigorous MET-minutes/week = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days.

Individuals are considered to be highly active if they perform vigorous PA on a

minimum of three days accumulating to at least 1,500 MET-min/week, or seven days of any combination of walking, moderate or vigorous PA accumulating to a total of at least 1,500 MET-min/week. The PA-status (low, moderate, and high activity level) was defined according to the IPAQ scoring protocol.⁽¹³⁾ The categories were adjusted to the recommendations of the Centers for Disease Control (CDC).⁽¹⁴⁾

Quality of life

Quality of life was measured using the WHOQOL-BREF assessment, which is a self-reported questionnaire that contains 26 items, where each item represents 1 facet. The facets are defined as those aspects of life that are considered to have contributed to a person's QOL. Among those 26 items, 24 of them make up the 4 domains of physical health (7 items), psychological health (6 items), social relationships (3 items), and environment (8 items), whereas the other 2 items measure overall QOL and general health.⁽⁸⁾ The version of the WHOQOL-BREF assessment has been validated by Salim et al.⁽¹⁵⁾ was first summarized to a 4-domain construct (physical health, psychological health, social relationships, environment) according to the guidelines for the WHOQOL-BREF.⁽¹⁶⁾ Scores were calculated by taking the mean score for all items included in each domain and multiplying by a factor of 4. The score for each domain therefore ranged from 4 to 20, with a higher score indicating a better QOL.

Body mass index

Body weight was measured to the nearest 0.1 kg using a platform model electronic weighing scale (SECA 770 Alpha, Hamburg, Germany), with the subject wearing a minimum of clothing. Height was measured to the nearest 0.1 cm with a microtoise, with the subject standing as straight as possible with the back

against the wall. Body mass index (BMI) was calculated as the weight (kg) divided by the square of the height (m). For Asian populations, BMI is classified into the following categories: underweight (<18.5 kg/m²), normal (18.5–22.9 kg/m²), overweight (23.0–27.5 kg/m²), and obese (≥ 27.6 kg/m²).⁽¹⁷⁾

Statistical analysis

Data were entered to SPSS format using version 15.0. Chi-square tests were performed on categorical variables to determine differences between males and females in the physical activity and BMI category. Independent t-test was used to compare the age difference between males and females, while analysis of covariance was performed to determine whether differences in QOL measurements between the low, moderate and high level groups persisted after adjusting for age. Statistical significance was set at $P < 0.05$. Measurements are reported as mean \pm standard deviation (SD).

Ethical clearance

The study protocol and related documents were approved by the Ethical Committee of the Medical Faculty of Trisakti University.

RESULTS

The participants were 101 elderly persons (80 female and 21 male) aged 60 to 85 years. (Table 1). The subjects were on average 66.4 ± 6.3 years old, 61 (60.4%) were married, 73 (82%) had at least a 6-year education, 35 were of normal weight (34.7 %), while 44 (43.6 %) were overweight.

The mean values for physical health, psychological health, social relationships and environment were 13.7 ± 2.4 , 14.6 ± 2.6 , 13.6 ± 2.7 , and 13.3 ± 2.4 , respectively. The calculated physical activity values based on

Table 1. Characteristics of participants

Characteristics	Mean \pm SD	n (%)
Age (years)	66.4 ± 6.3	
Gender		
Female		80 (79.2)
Male		21 (20.8)
Marital status		
Single		2 (2)
Married		61 (60.4)
Widowed		38 (35.7)
Educational background		
< 6 yr		28 (27.7)
6 yr		28 (27.7)
9 yr		8 (7.9)
12 yr		24 (23.8)
>12 yr		13 (13)
BMI (kg/m ²)	23.3 ± 3.9	
Undernutrition		10 (9.9)
Normal		35 (34.7)
Overweight		44 (43.6)
Obese		12 (11.9)
Quality of life		
Physical health	13.7 ± 2.4	
Psychological health	14.6 ± 2.6	
Social relationships	13.6 ± 2.7	
Environment	13.3 ± 2.4	

MET categories are shown in Table 2. Each participant could select more than one exercise which they had been doing in the last 7 days. In the category of light physical activity, most of the elderly reported to have been walking in the morning for 30 minutes, for a total of 5 times weekly. In the moderate activity category, most had a preference for cycling, conducted once weekly for 15 to 30 minutes. In the category of vigorous physical activity, the majority conducted fitness exercises (*senam jantung sehat*) at the health center two times a week, with a 30 minute duration, for the purpose of promoting cardio-respiratory fitness.

Analysis yielded a statistically significant difference between males and females in age ($p=0.000$), but not in physical activity category ($p=0.108$). (Table 3)

After adjusting for age (Table 4), the following four domains of QOL remained higher in the vigorous activity group: physical domain ($p = 0.027$), psychological domain ($p = 0.000$), social relationship domain ($p = 0.005$) and

environment domain ($p = 0.000$). On average the QOL as measured in the physical health, psychological health, social relationships, and environmental domains increased significantly with the level of physical activity.

Table 2. Physical activity categories, frequency and duration

Physical activity	*n (%)	Freq/week	Duration (min)
Light	25(24.8)		30 (46.5%)
Household			
Gardening			
Walking		5x (19.8%)	
Moderate	37 (36.6)		15 & 30 (2.9%)
Swimming			
Bicycling		1x (4.9%)	
Vigorous	39 (38.6)		30 (40.5%)
Jogging			
Yoga			
Weight lifting			
Fitness (<i>senam jantung sehat</i>)		2x (30.7%)	

Note: combined activities per person

Table 3. Physical activity category and age by gender

	Gender		P
	Male (n = 21)	Female (n = 80)	
Physical activity [†]			0.108
Light	8 (32.0 %)	17 (68.0 %)	
Moderate	8 (21.6 %)	29 (78.4 %)	
Vigorous	5 (12.8 %)	34 (87.2 %)	
Body mass index			0.468
Undernutrition	2 (20%)	8 (80.0%)	
Normal weight	6 (17.1%)	29 (82.9%)	
Overweight	12 (27.3%)	32 (72.7%)	
Obese	1 (8.3%)	11 (91.7%)	
Age (yr) [‡]	70.6 (6.8)	65.4 (5.8)	0.000

[†]Number (%); [‡]Mean (SD)

Table 4. Adjusted quality of life values in subjects with low, moderate and high levels of physical activity. Values are expressed as mean and SE

Quality of life	Physical activity			P
	Low (n=25)	Moderate (n=37)	High (n=39)	
Physical health	23.1 (0.8)	23.1 (0.6)	25.3 (0.6)	0.027
Psychological health	19.8 (0.7)	20.5 (0.6)	24.3 (0.5)	0.000
Social relationship	9.7 (0.4)	9.6 (0.3)	10.9 (0.3)	0.005
Environment	24.6 (0.7)	25.0 (0.6)	28.3 (0.6)	0.000

Table 5. Multiple comparisons of physical, psychological, social relationship, and environment domains between physical activity groups in the elderly

	Group of activity (A)	Group of activity (B)	Mean difference (A – B)	P
Physical health	High	Low	2.567	0.039
		Moderate	2.406	0.029
Psychological health	High	Low	4.639	0.000
		Moderate	3.485	0.000
Social relationship	High	Low	1.411	0.015
		Moderate	1.430	0.005
Environment	High	Low	3.982	0.000
		Moderate	3.462	0.000

The Tukey HSD multiple comparisons showed that the scores for the physical, psychological, social relationship, and environment domains were significantly higher in the high activity group, when compared to the low activity group ($p = 0.039$; $p = 0.000$; $p = 0.015$; $p = 0.000$) and the moderate activity group ($p = 0.029$; $p = 0.000$; $p = 0.005$; $p = 0.000$) (Table 5).

DISCUSSION

The findings of our study suggest an increased quality of life in those elderly who had reported higher physical activity levels. The QOL scores in all four domains were significantly higher ($p < 0.05$) in the high physical activity group. Several studies have shown that organized vigorous physical activity can benefit QOL in healthy populations⁽¹⁸⁻²⁰⁾ An active lifestyle preserves physical function in older adults,⁽²⁰⁾ which may possibly contribute to higher levels of QOL scores in domains related to physical health. The present study supports this notion, as the group having higher physical activity levels had greater values in all QOL domains (i.e., physical health, psychological health, social relationship and environment) compared with their more sedentary counterparts. After adjusting for age, the more

active group had higher values in the following four QOL domains: physical health ($p = 0.029$), psychological health ($p = 0.000$), social relationship ($p = 0.005$), and environment ($p = 0.000$). This suggests that the QOL domains are positively associated with physical activity, independent of the age of the elderly.

Increased longevity is always associated with an increase in multiple chronic conditions and subsequently could deteriorate into functional disability and need for assistance. Health and functioning of the elderly is influenced by many factors, comprising demographic, social and environmental factors, including physical activity and dietary intake. For maintenance of their health and independence, the elderly commonly attempt to explore health information and behavioral changes, thus an important aspect of self-care behavior involves physical activity and diet, which contributes to the health and quality of life of the elderly. This is the reason for conducting programs for the elderly at the health center, where most of the activities consist in supplying health information related to chronic diseases, performing physical examinations, cardiac fitness training (*senam jantung sehat*) and also exercises for osteoporosis prevention.

The present study shows significant differences in frequency and duration of each

exercise category of physical activity. The greatest frequency in the vigorous activity category was 1-2 times per week of 30 minutes duration, in the moderate category once a week for 15-30 minutes, and in the light category 5 times per week for 15 minutes. Exercise has a positive impact on muscle function and could support the activities of daily living, including daily self-care. Most of the participants were women, thus they generally have to perform some household work and daily self-care, especially if they do not have a caregiver or are not living with their children.

Periodical participation in moderate physical activity could delay functional decline and the onset of chronic diseases in the healthy elderly and limit their effects in those who are already chronically ill. Active living also enhances mental health and promotes social contacts, while among the economic benefits of being active could be a reduction in medical costs and demands for health services. Our findings have implications from a public health perspective, especially for health programs for the elderly, which are conducted at the health center as the vanguard of the health referral system at community level. Policies and programs on ageing should be addressed to improving quality of life and health status through conduction of regular physical activity programs that have beneficial effects in preventing chronic and age-associated diseases that might be a burden to the elderly.

The main limitation of this study is the utilization of a cross-sectional design, which does not allow for a true causal relationship to be established. Although physical activity may affect QOL, alternatively it is also possible that QOL has an impact on physical activity. Self-reported physical activity is subject to reporting bias and physical activity questionnaires do not accurately quantify activity-related energy expenditure. The development of an appropriate

correction factor, which could be applied to questionnaires such as the IPAQ, would overcome systematic bias and provide a more reliable and valid measure of energy expenditure estimation. At the population level the IPAQ has the potential to standardize physical activity measurement. Used in conjunction with above-mentioned correction factor the IPAQ would be of great value for international comparison and estimating the burden of disease associated with physical inactivity.⁽²²⁾

CONCLUSION

Higher physical activity associated with increased of QOL scores in all domains independent of the age of the elderly.

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