Study of Cardiovascular Factors, Quality of Life and Body Composition in Physically Active and Sedentary Women

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Objectives: The purpose of this study was to investigate cardiovascular factors, quality of life (physical health, psychological health, social relationships and the living environment health) and body composition in physically active and sedentary elderly women.

Methods: In this quasi-experimental, applied research, the study population included 724 elderly women aged 65-75 years old at a day rehabilitation center affiliated to the Welfare Organization of Shiraz. A total of 173 women assigned to two groups [active (n: 75) and sedentary (n: 98)] participated voluntarily in this study. Inclusion criteria were regular participation in the sports program of the center for at least three years for the active group and lack of performing exercise of any type for sedentary group. Quality of life was investigated through the WHO Quality of Life Questionnaire, body mass index (BMI) calculated by the formula body weight (kg) divided by the square of the body height (m), and homocysteine level by hematologic measurements. Data were analyzed using independent t-test and Pearson correlation coefficient. The significance level (P) was considered <0.05.

Results: There was a significant difference in the values of physical health (Ps<0.001), psychological health (Ps<0.001), social relationships (Ps<0.001), life environment health (Ps<0.001), quality of life (Ps<0.001), homocysteine level (Ps<0.001) and BMI (P=0.001) between the two groups. Homocysteine level and BMI were significantly, inversely correlated with quality of life in active women (P=0.05), but homocysteine level and BMI were insignificantly and inversely correlated with quality of life in sedentary women (P>0.05).

Keywords: Quality of life, body mass index, homocysteine, elderly

Introduction

The needs of old age represent one of the most important social issues of the current century, which can increase the longevity of human and therefore the elderly population, as one of the good achievements of the century [1]. Hence, one of the major issues in the world population is aging and its consequences. Currently, Iran is also experiencing the age transitional structure from youth to aging [1]. Although the aging process in a community is considered to be a positive outcome of development, it will become a major challenge if no appropriate planning for monitoring the elderly's health is done [1]. Medically, aging refers to the ages over 65 (in developing countries over the age of 60) years [4]. In 2006, the United Nations estimated the total number of elderly people to be 700 million that is projected to double in the next 40 years, while 52% of the total elderly population live in Asian countries and 40% in advanced countries [5]. Common disabilities in the elderly are due to a variety of factors, one of the most important of which is physical inactivity [6]. Schnabel et al. in a study in Britain found people with a sedentary lifestyle, who spend most of their everyday lives inactive, or engage in activities that are done mainly in sedentary positions or consume low energy (such as watching TV), had more risk factors for cardiovascular disease and other diseases such as diabetes regardless of the level of physical activity and physical fitness [1]. Cardiovascular disease is an important cause of mortality and morbidity in the elderly and imposes a significant financial burden on health care systems [8]. As the age increases, physiological changes in body composition occur, including increased body mass index (BMI) and waist to hip ratio (WHR) [8], cardiovascular system changes such as high systolic and diastolic blood pressure [9]. Changes in physical functioning and body metabolism such as insulin resistance, dyslipidemia and lipid oxidation, impaired concentrations of low-density lipoprotein (LDL) and high density lipoprotein (HDL) [8,10], mental stress, and
decline in the quality of life [1], alterations in inflammatory and coagulation factors, as well as increased levels of homocysteine [12]. Serum homocysteine level is one of the most important predictors of cardiovascular disease with increasing age. Many factors, such as genetic mutations, changes in the endocrine system of the body, obesity and environmental factors, can contribute to the development of hypercholesterolemia [19]. The relationship between total homocysteine levels and atherosclerosis is even stronger than the association between atherosclerosis and cholesterol, so reducing homocysteine levels reduces heart attacks and myocardial infarction. Increased homocysteine level is independently associated with the risk of developing cardiovascular disease, and hyperhomocysteinemia leads to venous thrombosis, and several cardiovascular problems [12, 14]. In addition, hyperhomocysteinemia can play a role as an independent risk factor in the development of other diseases, such as Alzheimer's disease and cognitive impairments, in the aging. These factors can have a highly adverse effect on the quality of life of the elderly [15, 16]. Because with increasing age, physical dysfunction is exacerbated and its adverse effect on the ability to maintain independence increases the need for help. Loss of muscle mass also leads to reduced muscle strength and functioning, accompanied by a decline in quality of life [17]. Exercise is one of the ways to prevent disorders in old age, such as cardiovascular disease, by improving physical fitness and reducing mental and psychological disorders. Exercise and physical activity delay aging. Elderly people who exercise are more healthy and have more vitality. Participation in exercise programs also increases tendency to live an independent life and assume social responsibilities of health require awareness of the state of body composition and the many people, especially elderly women. Promotion and maintenance of body composition in physically active and sedentary elderly women. [22]. One of the most important tools for assessing body composition is BMI. BMI is widely used to evaluate overweight and obesity. However, the relationship between BMI and BFP in body mass is influenced by age, gender and ethnicity. People across the world are classified into normal weight, overweight and obesity according to BMI. Compared with the methods to calculate BFP, BMI is less expensive and more convenient and can easily serve the health-related goals of the aging population [24]. Unfortunately, most developing countries in the world have not yet understood the economic and health-related complexities of the aging, and with increasing the number of elderly people, their problems have also grown so that no suitable and accessible solutions have yet been achieved for them [25]. The major difference between developing countries and developed countries is that developed countries are fully prepared to face the challenges of an increasing number of elderly people, while most developing countries are even unaware of the phenomenon and the associated health, social and economic consequences [1]. Given the above-mentioned, the importance of planning for understanding the quality of life of this subpopulation of the community, this study comparatively investigated cardiovascular factors, quality of life and body composition in physically active and sedentary elderly women.

Materials and methods

The study population of this descriptive-comparative (causal-prospective) study consisted of 724 women aged 65-75 years at a day rehabilitation affiliated to the Welfare Organization of Shiraz. Study participants were selected from the study population if they volunteered to participate in the study after a call-out in the center. Inclusion criteria were regular and continuous participation in the sports program of the center for at least three years for physically active elderly and lack of participating in the exercise program and any other regular sports program (for less than 20 min/week) for sedentary group. The sports program includes three days of various sports activities (tensile exercises and morning exercise programs, walking, motor skills enhancement, cardiorespiratory endurance activities, balance and movement exercises, water workouts). Study participants were informed that they could withdraw from the study if they did not wish to fill out the questionnaire. In order to do this research, the Study participants who volunteered to participate in the study were enrolled after undergoing several screening stages. Then, a consent form was distributed among them, and with the researcher’s guidance and a doctor’s assistance, they filled out a checklists of medical history and physical activity readiness so that underlying information could be collected. After completing the medical history checklist and assigning a checklist to each participant, the initial assessment including medical records review, physical examinations, and hematologic profile review was performed People with a blood pressure over 160/90 mmHg and a triglyceride level over 400 mg%, as well as diabetes, liver disease, cardiovascular disease, severe osteoporosis and arthrosis, renal disease, or medical problems and orthopedic disorders were excluded. Selected Study participants did not take any medication that could affect homocysteine levels, such as hypoglycemic drugs including statin, antiepileptic drugs, and estrogen-like hormones. They were not also smokers. In a secondary assessment of the elderly, they participated in a cumulative exercise test using treadmill. Individuals with abnormal cardiovascular responses were excluded. Samples (n: 173) were selected from the study population in the day rehabilitation center of Shiraz. The Study participants were divided into two groups: active (n: 75) and samples (n: 98). After selecting the samples, the study participants
and the purpose of the study, the procedure and the applications were explained for them (Table 1).

The instruments used in this research were a demographic information checklist, and the questionnaire World Health Organization Quality of Life (WHOQOL). This information was collected by the original researcher. The questionnaire (WHOQOL) is a 26-item instrument consisting of four domains: Physical health (7 items), psychological health (6 items), social relationships (3 items), and environmental health (8 items) and rated on a 5-point Likert scale (1-5).

BMI was also calculated by the formula body weight (kg) divided by the square of the body height (m). Then, 5 ml of blood was taken from each participant. After blood sampling, the test tube was kept as fixed until the blood clotted. The serum was then isolated at room temperature using centrifugation and stored at -70°C (158°F). Homocysteine level was measured by ELISA using a homocysteine laboratory kit (Germany). Data analysis was performed using the SPSS version 18. The normal distribution of data was investigated by the Kolmogorov-Smirnov test. The independent t-test was used to compare the quality of life, BMI and homocysteine levels between the two groups. Pearson correlation coefficient was also used to compare the quality of life, BMI and homocysteine by the Kolmogorov-Smirnov test. The independent t-test was

Table 1
The demographic characteristics of participants.

| Group Variable | Active M(± SD) | Sedentary M(± SD) | p-value |
|----------------|---------------|------------------|---------|
| Age (year)     | 68/23 (± 7/2) | 75/43 (± 5/5)    | 0.08    |
| Height (cm)    | 161/35 (± 9/1) | 158/74 (± 7/4)  | 0.39    |
| Weight (kg)    | 65/87 (± 7/9) | 73/93 (± 10/3)   | 0.06    |

Table 2
Comparison of the mean values of variables between physically active and sedentary elderly women.

| Group Variable | Active M(±SD) | Sedentary M(±SD) | Significance level |
|----------------|---------------|------------------|-------------------|
| Physical health | 14/23 (± 7/2) | 10/15 (± 6/7)    | 0.001             |
| Psychological health | 15/45 (± 9/1) | 10/45 (± 8/1)    | 0.001             |
| Social relationships | 14/59 (± 6/2) | 8/20 (± 8/5)     | 0.001             |
| Living environment health | 14/11 (± 25/1) | 10/45 (± 15/3)   | 0.001             |
| Quality of life and general health | 8/79 (± 14/3) | 6/24 (± 16/8)    | 0.001             |
| Body mass index | 26/27 (± 10/3) | 28/82 (± 11/7)   | 0.001             |
| Homocysteine   | 15/40 (± 11/3) | 19/68 (± 14/4)   | 0.001             |

The comparison between the two groups is presented in Table 2. The results of this study showed that there was a significant difference between homocysteine (P=0.001), physical health (P=0.001), psychological health (P=0.001), social relationships (P=0.001) living environment health (P=0.001), quality of life (P=0.001) and BMI (P=0.031) between the two groups. There was also a significant, negative correlation between BMI and quality of life subscales in active group, that is, by decreasing the BMI, the quality of life in active elderly women improved. There was also a negative, insignificant correlation between BMI and quality of life subscales in sedentary group. This suggests that with reducing the BMI, the lifestyle in these individuals also improves yet insignificantly. There was a positive, significant correlation between homocysteine and BMI in active group and positive, insignificant correlation between the two variables in sedentary group (Table 3).

Discussion

The present study was conducted to compare the quality of life and BMI between physically active and sedentary elderly women. The results of the study showed that active elderly women had higher physical health than sedentary elderly women. The results of this study were consistent with Sadrollahi et al., Giuli et al. and Ghasemzadeh et al. (2013), which showed that decreased BMI could promote all subscales of quality of life [3,26,27], but not consistent with the findings of Fabrie et al. and Trif et al. [28,29]. One of the issues that could contribute substantially to improving the quality of life of the elderly is regular and continuous physical activity. Regular physical activity and acceptable physical fitness can promote health and help prevent or treat illnesses. Regular physical activity and acceptable physical fitness not only prevent diseases, but also promote the quality of life and health. Having a physically fit body helps one feel well and enjoy life more [30]. Participating in regular physical activities may promote physical fitness and help prevent or treat illnesses in older women. The results of the study showed elderly women had higher levels of psychological health than elderly women with comparatively lower physical activity. The results of our study were consistent with the studies of Jelly et al. and Loffi et al. [10,12], but not consistent with the studies of Trif et al. and Bart et al. [28,29]. In recent years, psychology and psychotherapy have drawn much attention. One of the approaches psychologists offer to prevent and treat psychological problems is physical activity as it assists in mental health and improving quality of life. According to research findings, there is a close association between exercise and improvement of mental conditions and mental disorders. Given the participation of active elderly women in exercises and the existence of a close association between exercise and improvement of mental conditions
and mental disorders, these participants attained better scores on the psychological health subscale [14]. The active participation of older women in exercises is likely to have reduced mental stress, and these people are more likely to have a better quality of life than their sedentary peers. The results of our research showed active elderly women had higher social relationships than elderly women with comparatively lower physical activity. The results of this study were consistent with the studies of Kendall et al. and Khazri et al. [10,18] but were not consistent with the study of Azin et al. [18].

Aging has unique physical, mental and social characteristics. It seems that elderly people, on the one hand, should be given attention and support for their age, declined functional ability and, on the other hand, because they are the most vulnerable subpopulation in society, and their needs in terms of physical, social and mental health should be taken into account. Several studies have shown physical activity accelerates socialization [17]. Given that numerous studies have proven physical activity accelerates socialization, and that the participation of physically active elderly women in physical activity programs and communication with peers is likely to be higher than that in sedentary elderly women, they are less likely to feel alone and secluded than sedentary elderly women, therefore, they will have better social relationships and quality of life than sedentary elderly women [19,22]. The results of the current study indicated physically active elderly women had a higher living environment health than sedentary elderly women. The results of this study were consistent with the studies of Jelly et al. and Lotfi et al. [31,32] but inconsistent with the results of Ghasemzadeh et al. and Fabrie et al. [28,38]. It is essential to adopt appropriate policies to improve the physical, mental and social status of the elderly. It is important, from health perspective, to direct attention to the life and physical activity of the elderly and the health of their living environment [19]. Daily activities ensure some of self-care responsibilities. Physical activity in the elderly helps them move and independently maintain their health, but physical inactivity can increase their need for caregivers and aids. Once the status of the elderly’s motor activity is examined, their critical aspects of movement restrictions will be known [19]. Regarding the participation of elderly women in physical activity, they are likely to make more attempts, take more steps, and be more independent in order to maintain their health than sedentary elderly women, and therefore they will have a better life environment and better quality of life than comparatively less physically active women [40]. The results of our study showed active elderly women had a higher quality of life than sedentary elderly women. The results of this study were consistent with the studies of Herman et al. Bergamen et al. and Ghaseminejad et al. [6,21,45], but were in disagreement with the results of Fabrie et al. [28]. Quality of life has a broad concept and includes dimensions of life. The development of any chronic disease has a great impact on the quality of life of people, especially the elderly. The most important issue that affects the physical and mental needs of the elderly is how to care for them [46]. Many studies have shown elderly people who live alone are more predisposed to developing physical and mental diseases [19].

Because of the participation of elderly women in physical activity programs, these people are more likely to do daily routines easily and to have higher levels of general health, and therefore have a better quality of life than comparatively less physically active elderly women. The results of the current study showed active elderly women had lower BMI than sedentary elderly women. The results of this study were consistent with the studies of Kendall et al. and Khazri et al. [17,20], but not consistent with Andreas et al. [46]. The body composition is important from health and social perspectives, including its relationship to physical fitness. Although the body composition is largely dependent on genetic factors, environmental factors, diet and exercise can also influence the levels of adipose and muscle mass [41]. BMI increases with age. In general, the measurement of body composition is one of the valid methods for assessing the health and well-being of individuals, so that many scholars have emphasized the relationship between physical fitness and well-being [10,34], because of the participation of active elderly women in physical activity program, exercise might preserve the net mass, reduce fat storage and stimulate protein synthesis in them, and therefore they are likely to have a lower BMI than elderly women with low physical activity. The results of this study showed homocysteine level was significantly lower in physically active elderly women than in elderly women with low physical activity. There was also a significant and positive correlation between homocysteine levels and BMI in physically active and sedentary elderly women. Although the main mechanism for the association of obesity with hypercholesterolemia is not known, some studies have highlighted the role of underlying factors. Obesity, and particularly abdominal obesity, have a positive correlation with insulin resistance, and the lack of insulin function in the body can increase homocysteine production [14,39]. Exercise increases beta-adrenergic receptor density on the cell surface of the adipose tissue and consequently their susceptibility to the lipolysis process. It seems that the main trigger of this process is the distribution of catecholamines and the reduction of insulin due to aerobic activity and increased lipid oxidation that can reduce the homocysteine level [14]. Studies have shown there is a positive correlation between BMI and low plasma concentrations of folate that can increase the development of hypercholesterolemia [12]. The results of this study are consistent with the cohort study of Park et al. which showed there was a positive and significant correlation between BMI and homocysteine [13]. Regular exercise reduces the plasma level of homocysteine and therefore helps prevent cardiovascular disease. This factor may help reduce homocysteine in several ways, including improving the body composition, increasing the intestinal absorption of vitamins, and increasing the activity of the enzymes involved [13,15,16]. Because the aging period is one of the most sensitive stages of human life that can easily be affected by various factors and damaged, it is necessary to pay attention to and planning for the quality of life of this subpopulation of the community. Since aging is growing rapidly in our society, physical activity and exercise, which are one of the most efficient and accessible means that can promote the physical and mental health of the elderly population, should be taken into account and planned for.

Conclusion

According to the results of our study, it can be concluded that physical activity can improve cardiovascular factors such as homocysteine, quality of life, and BMI in the elderly; thus, to improve the quality of life and BMI in the elderly, they are recommended to participate in physical activity programs. Among the limitations of this study we can mention lack of control over the nutrition, consumed by participants, which could have affected their calorie intake and BMI.

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