

Physical Activity and Food Frequency in Postmenopausal Women: A Cross-Sectional Study

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ABSTRACT

Background & aim: Women spend more than a third of their lives in menopause, and paying attention to their health is one of the most important health issues. The present study was performed to determine the physical activity and food frequency in postmenopausal women.

Methods: This cross-sectional study was conducted on 600 postmenopausal women who referred to health centers of Urmia, Iran in 2019. Sampling was performed as multi-stage randomization. To collect data, international physical activity and food frequency questionnaire were used.

Results: The mean age of postmenopausal women was 56.64 ± 3.19 years and 93% of them had a body mass index higher than normal. Also, 75% of postmenopausal women had moderate daily physical activity and the average daily physical activity in this group of women was 202.57 ± 135.13 MET. Among the types of physical activities, sports activities had the lowest and working at home had the highest energy consumption. The mean total daily energy intake in postmenopausal women was 3739.80 ± 1251.40 calories, and the consumption of fats, sweets, bread and cereals was more than the standard recommended intake. They had the consumption of dairy products and vegetables less than the need of the body.

Conclusion: Postmenopausal women do less daily exercise and use more high-calorie food groups, and their daily energy intake is more than the standard recommended intake.

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Introduction

Menopause is a normal physiological event occurring in the middle of women's lives and includes the permanent cessation of menstrual cycles following the loss of ovarian follicular function (1). The mean age of menopause in European countries is 51.3 years (2), in America is 52.5 years (3), in Latin America is 48.3 years (4) and in Asian countries is 51.09 years (5). Menopausal age is influenced by physical activity, education level, hormonal

contraception, smoking and alcohol consumption (6). Women during menopause experience vasomotor, physical and physiological problems that affect their quality of life (7).

Due to hormonal changes during the transition to menopause, there may be adverse changes in several metabolic health indicators such as increased blood glucose, abdominal fat accumulation, and unhealthy changes in serum

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lipids. In addition, increased levels of inflammatory markers and loss of muscle mass related to menopause have an additional negative impact on metabolic health. Therefore, in postmenopausal women, the incidence of metabolic syndrome and cardiovascular diseases is not unexpected (8-10). Also, due to hormonal changes, bone density decreases in postmenopausal women and osteoporosis is prone to occur (11).

One of the factors that can moderate the side effects caused by hormonal changes in menopausal women is appropriate physical activity and healthy eating habits; all menopausal women can correct these two issues, which lead to an increase in life expectancy and improving the quality of life (12). Physical activity is defined as any bodily movement produced by skeletal muscles that increase energy expenditure and improve physical fitness (13). Physical activity (PA) has been widely suggested to improve metabolic risks and cardiovascular health. A review of literature shows that physical activity reduces total body and visceral fat mass and improves insulin sensitivity, also prevents dyslipidemia and reduces systolic and diastolic blood pressure (14-16). Regular physical activity, including resistance exercises, aerobic exercises and stretching exercises, prevents osteoporosis by maintaining the cartilage tissue and bones to strengthen, reducing mental disorders and maintaining a suitable weight and preventing gradual weight gain (17, 18). The Royal College of Obstetricians and Gynecologists in 2018 announced that lifestyle changes such as regular aerobic exercise along with reducing caffeine and alcohol consumption will reduce hot flashes and night sweats in menopausal women and reduce vasomotor symptoms in these women. It has a positive effect on physical fitness and physical performance of this group of women (19-21).

According to the guidelines of the World Health Organization, adults should weekly perform at least 150 minutes of moderate-intensity physical activity or at least 75 minutes of high-intensity physical activity, or an equivalent combination of moderate-to-high intensity physical activity (22). Previous studies have shown a decrease in daily energy expenditure in

postmenopausal women due to change to a sedentary lifestyle in this group of women (23, 24). In the study of Dąbrowska et al. (2019), 60% of postmenopausal women had high physical activity, which was directly related to the length of their free time (25). In study done by Jalili et al. (2014) in Ahvaz, Iran, which was conducted to determine the physical activity and its relationship with the severity of menopausal symptoms, most menopausal women (43%) had moderate physical activity (26).

Menopause is accompanied by an increase in visceral and abdominal fat in women, which is associated with an increase in metabolic and cardiovascular diseases. It is important to pay attention to a healthy lifestyle in postmenopausal women to adjust these risk factors. One of the aspects of a healthy lifestyle, in addition to appropriate physical activity, is healthy food frequency (27). Food frequency is defined as the frequency of consumption of foods and drinks during a period of time; based on the results of research, a healthy diet, such as proper intake of protein, vegetables and micronutrients, has an effective role in the health and improving the performance of menopausal women (28, 29). So that the results of the study by Bischoff-Ferrari et al. (2007) showed that adequate intake of calcium in postmenopausal women increases bone density and prevents osteoporosis (30). The results of study by Ko et al. (2020) showed that increasing the consumption of fruits and vegetables and decreasing the consumption of lipids are associated with reducing the risk of cardiovascular diseases in postmenopausal women (31). The results of the study by Hejazi et al. (2009) in Iran also showed a relationship between the type of food intake and osteoporosis; only 7.2% of women with osteoporosis had adequate calcium intake and 1.3% of them had adequate vitamin D intake (32).

The increase in the menopausal population and the prevalence of related diseases, there is a growing need to perceive the menopausal society. Considering the modern lifestyle, which is accompanied by easy access to food, inactivity, consumption of high-calorie foods and obesity, which plays a role in causing non-communicable diseases, it is important to pay

attention to people's lifestyle (33). Studies have shown that the health of menopausal women and their well-being during this period is strongly related to general health and a healthy lifestyle, including a balanced diet and regular physical activity. Also, for the management of menopause, it is recommended that lifestyle be changed as a primary care method including adequate exercise, a diet rich in phytoestrogen, calcium, fiber and low fat, especially saturated fat (34). Therefore, since women spend more than one third of their lives in menopause, and maintaining and improving their health is one of the important goals of health care services of the countries, and considering the importance of physical activity and proper diet in improving the performance and health of menopausal women, paying attention to these two categories is of great importance. Since physical activity and diet are influenced by the social and economic factors (35, 36) and no study was found to evaluate physical activity and food frequency in postmenopausal women of Urmia, so the present study was performed to measure the physical activity and food frequency in postmenopausal women referring to urban and rural health centers of Urmia, Iran in 2019.

Materials and Methods

This cross-sectional study was conducted on 600 postmenopausal women who referred to urban and rural health centers in Urmia, Iran. The Inclusion criteria were: consent to enter the study, Iranian, age 50-65 years, at least two years passed from the last menstruation, the ability to read and write, no Alzheimer's disease and severe depression, no underlying disease, no disease which is incompatible with physical activity. Failure to complete the questionnaires led to exclusion from the study.

The researcher-made demographic questionnaire, International Physical Activity Questionnaire (IPAQ) and Food Frequency Questionnaire (FFQ) were used to collect data. The demographic information questionnaire included questions related to age, marital status, education, employment status, economic status, number of children, height and weight. International Physical Activity Questionnaire contains questions which measure a person's physical activity status and categorizes physical activity into three groups: weak, moderate and

intense. This questionnaire has been used by the World Health Organization to measure the physical activity and has been used in various studies in the country, and its validity and reliability were checked by Hazavehei et al., and its Cronbach's alpha was 0.92 (37). This questionnaire measures physical activity in the last seven days and the intensity of the activities in the last seven days is determined according to the final score. The intensity of energy expenditure for all of the activities during the past 7 days was calculated according to IPAQ instructions; if the total energy calculated during the week is less than 600 Met.Min/Week, the intensity of physical activity is in the weak category, if the total calculated energy during the week is 600 to 3000 Met.Min/Week, the intensity of the activity of the relevant questionnaire is moderate and if more than 3000 Met.Min/Week, the intensity of the activity of the relevant questionnaire is severe (37).

Food Frequency Questionnaire (FFQ) contains finite list of foods and beverages with response categories to indicate usual frequency of consumption over the time period queried. Different studies in the country have evaluated the food frequency. Its validity and reliability were evaluated in the study by Ebrahimi and colleagues, and the correlation coefficients for most food groups in the food frequency questionnaire (FFQ) was obtained to be above 80% ranging 0.59-0.97 (38).

The sample size was calculated according to a similar study conducted by Ghorbani et al. in 2016 and the total sample size was 600 subjects (39). In the present research, multi-stage random sampling was done in such a way that the list of urban and rural health centers of Urmia city was prepared and then five centers from urban health centers and five centers from rural health centers were randomly selected from the centers of the north, south, east, west and center of the city. Then, the researcher referred to the health centers and extracted the list of menopausal women from the family file. Sampling was done randomly by draw according to the ratio of the population of menopausal women covered by each center.

To collect data, the objectives of the research were explained to the postmenopausal women, and then they were invited to participate in the

study. The menopausal women referred to the health centers and completed the informed consent form; they were interviewed and completed the relevant questionnaires.

To determine the body mass index: weight with minimum clothing and without shoes was measured using a digital scale with an accuracy of 100 grams and was recorded. The height was measured with an accuracy of 1 cm with a tape meter while standing next to the wall and without shoes while the shoulders were in normal conditions. Body mass index was calculated by dividing weight (kg) to the square of height (m²) and women with BMI \geq 30 were considered as obese, BMI= 25-29.9 as overweight and BMI= 18.5-24.9 as normal. To evaluate food intake by completing the questionnaire, the two-day food memory method was used by the questioners. For this purpose, the queried food items were placed together in a food group and the unit amount was extracted for each type of food depending on its type. So that the household quantities of food items that were reported based on household measuring cups and spoons were converted to grams and then to units by the relevant expert. Finally, the daily energy intake from different food groups for each person was extracted along with the consumption of macronutrients, and the total daily energy intake was calculated by determining the calorie content of each unit of food groups. The mean intake of macronutrients and food groups was compared with the recommendations of Estimated Average Requirement (EAR) and Dietary Reference Intake (DRI).

Data were analyzed by SPSS19 software and descriptive and analytical statistics tests such as mean and standard deviation. The multiple linear regression model using the backward method was used to assess the effect of independent variables on the physical activity score. At first, the assumption of independence of the residuals was checked and confirmed using the Durbin-Watson test (Durbin-Watson= 2.54).

The research was approved by the Ethics Committee of Urmia University of Medical Sciences with Ethics Code of IR.UMSU.REC.1397.437.

Results

The mean age of postmenopausal women was 56.64 ± 3.19 years and their mean age at menopause was 49.41 ± 2.28 years. Most of the women had primary education and were housewives, and 93% had a body mass index higher than normal (Table 1).

Table 1. Demographic characteristics of the postmenopausal women

Variable	N (%)
Education	
Elementary	282(47)
Secondary	134(22)
High school and diploma	70(11.66)
College	114(19)
Economic status	
More than enough	11(1.8)
Enough	404(67)
Less than enough	185(30.83)
Smoking	
Yes	8(1.4)
No	592(98.6)
Job	
Employed	131(21.83)
Household	469(78.71)
BMI (kg/m²)	
Normal	37(6.2)
Overweight	195(32.5)
Obese	368(61.33)

Data analysis showed that 15.8% of postmenopausal women had weak daily physical activity, 75.8% had moderate physical activity and 9.2% of them had severe physical activity. The mean total daily physical activity in the postmenopausal women was 202.57 ± 135.13 MET, and the mean daily sports activity (7.14 ± 3.26) was the lowest among the types of physical activities. In the field of daily work, mean physical activity was (40.14 ± 13.56), in the field of travel (73.28 ± 26.28) and in the field of work at home or garden (81.85 ± 36.49).

Multiple linear regression model was used to investigate the effect of independent variables on physical activity score. At first, the variables of age, BMI, education, economic status, job, number of children and underlying disease were entered into the model as independent variables. The results obtained from the final model showed that job had a significant direct relationship ($\beta=1214.61$, $P=0.003$) and age had a significant inverse relationship ($\beta=-25.42$, $P=0.03$) with the physical activity score. No

significant relationship was observed between other variables and physical activity score ($P>0.05$). The determination coefficient was

calculated for this model. The results showed that this model explains 44% of the response variable changes.

Table 2. Daily requirement and daily intake of total energy and macronutrients in the postmenopausal women

Variable	Daily intake Mean±SD	Daily requirement Mean±SD	P-value
Protein (gr/day)	143.24 ± 55.72	76.13 ± 15.33	0.0001
Carbohydrates (gr/day)	505 ± 177.43	304.54 ± 61.35	0.0001
Fat (gr/day)	162.5 ± 58.32	56.39 ± 36.11	0.0001
Total energy (day/kcal)	3739.80 ± 1251.40	2030.3 ± 409.03	0.0001

*T-test

The evaluation of food intake based on the food frequency questionnaire showed that there is a significant difference in energy and macronutrient intake compared to their requirement. In the studied population, the mean daily energy intake compared to the daily requirement showed a difference of 1760 kcal per day. Carbohydrate, protein and fat received were 201, 67 and 106 grams higher than their requirement, respectively. This amount of intake energy and nutrients can theoretically cause overweight equivalent to 5 to 6 kg per month (Table 2).

Since the calculated energy requirement for the total studied population was estimated to be 2030 Kcal, to provide a healthy nutritional plan to supply the mentioned amount of energy, people should averagely consume 3 units of milk and dairy products, 5 units of vegetables, 4 units of fruits, 2 units of sweets, 9 units of bread and cereals group, 4 units of meat group and 7 units of fat group. Their currently mean intake from the mentioned groups except for dairy and vegetables group is higher. The mean energy intake obtained in the mentioned population was 3739 kcal from different food groups (Table 3).

Table 3. The current intake of food groups and the standard requirement of food groups based on the daily calorie requirement in the postmenopausal women

Food groups	The standard requirement to receive 2030 kcal (unit)	The standard requirement to receive 3739 kcal (unit)	Current intake (unit)
Dairy	3	5	2.65
Vegetables	5	9	4.23
Fruits	4	7	4.23
Sweets	2	3	5.86
Bread and cereals	9	17	25.51
Meat and substitutes	4	7	5.56
Fats	7	13	8.86

Discussion

Performing physical activity and proper nutrition are very effective factors in the health of menopausal women, and women who perform adequate physical activity during menopause have a higher health status (40). Therefore, the present study was conducted to determine the level of physical activity and food frequency in postmenopausal women

referring to urban and rural health centers in Urmia city. Data analysis in the present study showed that among the types of physical activities based on the International Physical Activity Questionnaire, working at home or in the garden had the highest mean and sports activity had the lowest mean in menopausal women. Most postmenopausal women performed moderate physical activity and only

9% of them had severe physical activity per week. Also, the women's employment had a direct relationship with the level of weekly physical activity, and increasing age had an inverse relationship with the level of physical activity.

The results of the study in Kerman showed that Iranian postmenopausal women do not have adequate physical activity and the level of sports activities is low in this group (40). In the study of Pahlevanzade (2014), 65% of postmenopausal women had high body mass and half of postmenopausal women had weak physical activity, and a significant and inverse relationship was observed between the level of physical activity and age (41). The results of a cross-sectional study in 2014 on postmenopausal women in China showed that 58% of postmenopausal women had weak physical activity and 28% had moderate physical activity (42). The results of the mentioned studies are consistent with the findings of the present study.

In the study of Moradpour et al. (2020), the mean daily energy expenditure as a result of physical activities in postmenopausal women was 970 MET, and the lowest mean physical activity was in the field of travel, and the mean daily physical activity was calculated as 200 MET in the field of sports. The mean total physical activity and mean energy expenditure due to exercise is higher in the mentioned research than the current research (43). In the study of Dąbrowska and colleagues (2019), the highest level of physical activity of postmenopausal women was in the area of doing sports activities in their leisure time and the lowest level of physical activity was in the area of doing housework and working in the garden, which is not consistent with the results of the present study (25). The reason for the inconsistent results can be related to the health status, education level, lifestyle and mean age of menopausal women, as well as the level of awareness of this group of women regarding the benefits of physical activity and exercise, because these factors are influential factors in the physical activity and exercise in postmenopausal women (44).

The results of the present study showed that daily energy intake in postmenopausal women

is more than their daily requirement, also the daily intake from the group of macronutrients is more than their body needs, so that the most source of energy supply in this group of women was from carbohydrates and the least from proteins. In the study conducted in India aimed to determine the level of physical activity and food frequency in postmenopausal women, data analysis showed that only 37% of postmenopausal women had moderate or severe daily physical activity and their daily fat intake is more than the recommended amount, and the intake of vegetables and dairy products is less than the recommended amount (45). Their results regarding food consumption are in line with the current research and regarding the physical activity are not in line with the present study, which can be due to the difference in the health status and awareness of the studied menopausal women regarding the benefits of physical activity.

The results of the studies have shown that due to physiological changes due to aging, the need for protein in the diet increases because skeletal muscles lose their capacity to activate protein synthesis in response to anabolic stimuli which is probably due to insulin resistance (46, 47). More protein intake (1.2 grams per kilogram of body weight) is associated with a 32% reduction in the risk of weakness and better physical performance in women (48). Also, the results of the study by Silva et al. (2017) showed that increasing protein intake and decreasing fat consumption in postmenopausal women is associated with a higher muscle-skeletal mass index (49). The results of a trial study also showed that the decrease in fat consumption and increase in protein consumption in postmenopausal women was accompanied by a decrease in visceral body fat during 1-3-year follow-up (50). The results of a review study also showed that low-fat and balanced carbohydrate diets are associated with improved body function in postmenopausal women (51).

The menopausal women in the current study consumed less dairy products and vegetables than the standard needs of body. However, the amount of consumption of other food groups such as sweets, bread and cereals, meat and oil in these women was more than the amount

needed. Adequate consumption of dairy products during menopause is necessary to maintain bone density, so that in several studies, the importance of proper consumption of dairy products and calcium intake of this food group has been shown to prevent osteoporosis and fractures in postmenopausal women (30). In the study of Lim et al. (2015), reducing the consumption of food groups containing sugar and oil and to prevent osteoporosis in this group of women, adequate calcium intake and foods containing calcium, such as dairy products and fruits and vegetables, which help calcium absorption, has been emphasized to prevent heart and metabolic diseases in postmenopausal women (52). The results of a review study showed that the high consumption of fats, sweets and high-calorie diet is a major risk factor in the development of cardiovascular diseases in postmenopausal women, so low-calorie diets rich in fruits and vegetables should be strongly considered to reduce the level of triglycerides and LDL cholesterol in postmenopausal women (51).

In the present study, 93% of postmenopausal women had a high body mass index and 61% of them were obese. Weight gain is caused by high-calorie diet and no physical activity (53). The low level of physical activity in postmenopausal women and the lack of exercise and inappropriate and high-calorie diet are factors causing obesity and increasing the body index in this group of women (54). So that in the present study, the lowest amount of physical activity was performed by postmenopausal women in the field of sports activities. Also, the amount of daily calorie intake in this group of women was more than their body needs and they had the most calories intake was from carbohydrates and fats. The consumption of high-calorie foods such as fats, bread, cereals and sweets in the studied postmenopausal women was more than their daily needs, which could be the cause of increase in body mass index in this group of women. The results of the studies show that the body fat increases with age, especially in women; while, fat-free mass decreases, which is associated with an increase in the possibility of cardiovascular and metabolic diseases, which is largely related to a decrease in physical activity due to age and improper diet (55,56).

One of the strengths of the present study was sampling from urban and rural health centers in Urmia city and also the large sample size. One of the limitations of the study was no calculation of micronutrients in the diet of postmenopausal women.

Conclusion

According to the results of the present study, the mean sports activity in postmenopausal women was the lowest among all types of physical activities. In these women, daily energy intake was more than the standard requirement of their body, and they mostly used food groups including fats, bread, grains, and sweets, so that the intake of dairy products and vegetables was less than the needed amount. Most of the menopausal women in the present study were overweight or obese, which is not unexpected considering the amount of energy received and the consumption of high-calorie food groups. Therefore, it is recommended that health care providers in health-treatment centers consider the necessary training to promote physical activities, diet modification and weight loss in this group of women.

Considering the results of the present study and the importance of a healthy lifestyle in postmenopausal women, it is suggested to use the approaches of informing and also creating suitable places for physical activity in order to promote physical activity in this group of women. It is also important to train the benefits of sports activities and the amount of consumption of various food groups and the effect of these foods on the health of these women in health centers by health care workers. It is suggested that interventional studies be conducted to provide information and education related to physical activity and healthy diets in postmenopausal women. In future studies, the consumption of micronutrients should also be determined in this group of women.

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Conflicts of interest

Authors declared no conflicts of interest.

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