

Dietary Intake, Physical Activity and Body Mass Index among Postmenopausal Women

Chaya Ranasinghe, Pallavi G. Shettigar, Meenakshi Garg

Department of Allied Hospitality Studies, Manipal University, Manipal, Karnataka, India

ABSTRACT

Context: Nutrition plays a vital role in the quality of life in postmenopausal women. **Aim:** The aim is to determine the dietary intake, physical activity, and assess the body mass index (BMI) among postmenopausal women. **Settings and Design:** A community-based sample survey. **Materials and Methods:** The present study included 140 postmenopausal women (40–70 years) from Udupi, Manipal areas of Karnataka. The study was carried out between July and December 2013. Sociodemographic data were collected using a questionnaire. Anthropometric data included height, weight, waist, and hip circumference. Dietary intake was determined using 24 h dietary recall. Physical activity information was collected. **Statistical Analysis Used:** Data were analyzed using SPSS version 16 software. Paired *t*-test was performed to determine the dietary adequacy. **Results:** Obesity was 42.1% among the study participants. Increased WHR and waist circumference were 82.1% and 77.1%. Mean daily intake of calcium and saturated fatty acids were significantly higher than recommended dietary allowance (RDA) ($P < 0.001$). Mean intake of energy, protein, carbohydrate, mono and poly unsaturated fatty acid, fiber and sodium were significantly lower than RDA ($P < 0.001$). Average daily intake of cereals, pulses, roots and tubers, meat and products, fats and oils, green leafy, and other vegetables were significantly ($P < 0.001$) lower than RDA. Intake of fruits, milk and milk products, and sugar was significantly higher ($P < 0.001$) than RDA. Only 37.1% of women performed moderate or active exercises regularly. **Conclusions:** Even though, nutrient and food group deficiencies were observed among postmenopausal women physical inactivity and effects of menopausal transition instigate increased BMI imposing a need to educate on nutrition and physical activity.

KEYWORDS: *Dietary habits, exercise, food groups, food intake, nutritional status, postmenopausal women, quality of diet*

INTRODUCTION

Menopause is a stage of women's life when reproductive capacity ceases.^[1] India has a large population, with 43 million postmenopausal women and it is projected to be 103 million by 2026.^[2] The average age of menopause is 47.5 years. Postmenopausal status is associated with higher prevalence of obesity.^[3,4] Women in the midlife face many challenges, such as hormonal changes, increased weight gain, loss of bone and muscle mass, and digestive issues.^[4] Evidence support that increasing number of women are suffering from one or

more chronic disease associated risk factors following the ending of their menstrual cycles.^[2] Diet and food intake have a pivotal role in maintaining human health. Unhealthy diet, obesity, and nutritional deficiencies may lead to various disorders.^[3] A better understanding of the factors that contribute to chronic diseases including diabetes is vital.^[4-7] There is a need to focus on the

Address for correspondence: Chaya Ranasinghe, Department of Allied Hospitality Studies, WGSMA, Manipal University, Manipal - 576 104, Karnataka, India. E-mail: chayaranasinghe@ymail.com

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effects of optimal nutrition on the health and wellbeing of women during menopause. It is evident that good nutrition and optimizing the intake of specific nutrients, together with lifestyle changes can improve maintaining a healthy menopause.^[6] According to modern lifestyle associated with easy access to food, lack of exercise, sedentary lifestyles, calorie dense foods, and excessive television viewing contribute to the development of noncommunicable diseases.^[8] It observed that health of the postmenopausal women and overall well-being during the climacteric period is highly related to general good health and a healthy lifestyle including a balanced diet, nonsmoking habits, and regular physical exercise, a positive attitude toward aging and menopause.^[9,10] Different lifestyle practices, particularly diet may delay the appearance of risk factors in this population group.^[11] For menopause management, it is recommended that lifestyle changes as a primary modality of care including adequate exercise, diet-rich in phytoestrogens, calcium, fiber, and low in fat, especially saturated fats.^[2] Dietary calcium intake and physical activity have a major impact on the bone health in postmenopausal women. Physical activity is defined as any bodily movement produced by skeletal a muscle that requires energy expenditure.^[12] There are studies indicating that physical activity during menopause reduces the menopausal symptoms such as anxiety stress and depression.^[13] Increasing menopausal population and the prevalence of comorbid conditions there is a rising need to understand about the South East Asian postmenopausal community.^[14] Studies assessing macro- and micro-nutrient intake among Indian postmenopausal women is scarce; hence, this study aimed at determining the dietary intake, physical activity, and the body mass index (BMI) among the postmenopausal women.

MATERIALS AND METHODS

A community-based sample survey was carried out among 140 postmenopausal women between 40 and 70 years of age in Udupi and Maniplal areas of the State of Karnataka.

Study period

- July to December, 2013.

Inclusion criteria

- Age >40 years
- Women who had their last menstrual period before 12 months
- Postmenopausal women who have delivered a child beyond 24 weeks of gestation.

Exclusion criteria

- Nullipara women
- Perimenopausal women
- Women following a special diet.

Subjects were randomly selected. The Medical Ethics Committee of the Kasturba Hospital approved this study, and each study participant signed a written consent form.

A structured questionnaire was used to collect sociodemographic and physical activity level data. A dietary recall for 24 – h was used to obtain dietary information. Anthropometric data included (BMI = weight/height²), waist circumference (WC), and waist to hip ratio (WHR). Weight was taken using a digital scale, recorded to the accuracy of 0.1 kg. Participants were wearing lightweight clothing and without shoes. BMI was interpreted according to the World Health Organization (2012) recommendations. Waist circumference was measured with an inelastic tape at the midpoint between the iliac crest and the lower border of the last floating rib at the end of a normal expiration. Waist circumference was considered high when waist circumference >80 cm.^[8] Statistical analyses were performed using statistical package for social sciences (SPSS) version 16 for Windows (SPSS Inc., Chicago, IL, USA), nutritional values were analyzed using Dietsoft software. Descriptive data were presented as percentages and frequencies for categorical variables and mean and the standard deviation was used for a continuous variable to interpret data. Chi-square and paired *t*-test were performed to determine the adequacy of macro nutrient, micro nutrient, and the food group intake, statistical significance was determined at $P < 0.001$.

RESULTS

The main characteristics of the study group are shown in Table 1. Among the women studied (40–70 years) of age majority (30.1%) were between 51 and 60 years of age. The mean age at menopause among the postmenopausal women was is 49.9 ± 3.9 . About 44% of women were married and 36.9% had attended school. The dietary assessment of the study participants based on basic practices at home is given in Table 2. There were 62.7% nonvegetarians and 32.9% vegetarians. Table 3 shows the mean weight and BMI of the postmenopausal women were 60.6 ± 9.50 Kg and 24.59 ± 3.7 Kg/m², respectively. Level of physical activity among the postmenopausal women is given in Table 3. In this study, 77.1% of women had increased waist circumference. WHR observations show that 82.1% of the postmenopausal women were at risk of obesity. According to BMI 57.9% women belonged to the normal BMI category.

Table 4 shows the association between physical activity level and BMI categories, increased number (50.9%) of postmenopausal women who were leading a sedentary lifestyle and belonged to the grade II obese category. More postmenopausal women (58.8%) who practised light activity belonged to the normal BMI category.

Table 1: General characteristics of the study population

Parameters	Frequency, n (%)
Age	
40-50	22 (8.8)
51-60	75 (30.1)
61-70	43 (17.3)
Marital status	
Single	2 (0.8)
Married	111 (44.6)
Widowed	27 (10.8)
Socio economic status (Kuppuswamy scale-2012)	
Upper	62 (44.3)
Upper middle	43 (30.7)
Lower middle	19 (13.6)
Upper lower	16 (11.4)
Lower	0
Educational status	
Illiterate	8 (3.2)
School educated	92 (36.9)
Graduate	31 (12.4)
Postgraduate	9 (3.6)
Occupation status	
Working	39 (15.7)
Retired	10 (4)
Housewife	91 (36.5)

Table 2: Dietary habits among the study population

Parameters	Categories	Frequency, n (%)
Food habit	Vegetarian	46 (32.9)
	Nonvegetarian	94 (67.1)
Eating out	Everyday	2 (1.4)
	2-4 times a week	8 (5.7)
	Once a week	32 (22.9)
	Once a month	21 (15)
	Rarely	76 (54.3)
Coconut usage	Yes	140 (100)
Type of oil	Vegetable oil	54 (38.6)
	Coconut oil	67 (47.9)
	Combination of oils	19 (13.6)
Fruits usage	Everyday	53 (38.4)
	2-5 times a week	36 (26.1)
	Once a week	33 (23.9)
	Rarely	16 (11.6)
Type of milk	Full fat (without mixing water)	3 (2.1)
	Nonfat	2 (1.4)
	Low fat (mixing water)	135 (96.4)
Tea/coffee consumption	Tea	126 (90)
	Coffee	9 (6.4)
	Tea and coffee	5 (3.6)

The mean daily energy intake among the study participants was 1506.9 ± 242.6 kcal/day. Table 5 shows the carbohydrate, protein, and fat intake

is 231.8 ± 34.2 g/day, 48.9 ± 8.9 g/day, and 42.7 ± 11.0 g/day, respectively. Mean intake of mono unsaturated fatty acid (MUFA) 1.159 ± 0.64 g/day, poly unsaturated fatty acid (PUFA) 0.29 ± 0.15 g/day, saturated fatty acid (SFA), 13.03 ± 0.64 g/day, fiber 12.2 ± 6.18 g/day, calcium 741 ± 189.8 mg/day, and sodium 368 ± 109.4 mg/day. Mean intake of calcium and SFAs were within the recommended dietary allowance (RDA) in our population. Energy, protein, carbohydrate, fat, fiber, sodium, PUFAs, and MUFAs intake were significantly lower ($P < 0.001$) than the suggested intake. The mean daily intake of total SFAs and calcium were significantly higher ($P < 0.001$) than the RDA for Indian postmenopausal women.

Table 6 shows the mean intake of different food group among the study population. The study observed that intake of cereals, pulses, green leafy vegetables, other vegetables, roots, and tubers, were significantly inadequate ($P < 0.001$), whereas milk and milk products, fruits, and sugar and jaggery were significantly ($P < 0.001$) adequate. The different types of physical activities assessed in the study are walking, sitting, standing, running/playing, out- and in-door activities, and sleeping as given in Table 7. Table 8 explains the association between socioeconomic status and the macro nutrient adequacy among the research participants. Energy 64.2%, carbohydrate 45%, protein 65.7%, and fat 7.5% of the women were consuming marginally adequately among the all socioeconomic groups.

DISCUSSION

The mean age at menopause among the postmenopausal women was 49.9 which similar to the mean age at menopause for Indian women.^[15,16] Dietary practices and physical activity levels have a potential to affects a person's quality of life. Studies focussing on current dietary intake among Indian postmenopausal women are scarce. Inadequate nutrient intake and poor levels of physical activity level may impose a risk for affecting the health. The present study aimed to understand the dietary intakes, physical activity level among postmenopausal women and its relationship to BMI. The study observed 42.1% of postmenopausal women in the obese category. Even though poor nutrition is observed among the study population lack of physical activity and effects of menopausal transition may be the leading cause for the increased BMI.^[17,18] A large study carried out by^[19] also stated that the accumulation of fat during menopause is more concentrated in the abdomen. Considering waist circumference and WHR, study participants were at increased risk of being obese.^[20,21] have reported similar results when waist and

Table 3: Anthropometric measurements among the study population

Parameters	Category	Frequency, n (%)
BMI	Normal	81 (57.9)
	Grade I obesity	42 (30)
	Grade II obesity	17 (12.1)
WHR	At risk for obesity	115 (82.1)
	Normal	25 (17.9)
WC	Normal	32 (22.9)
	High	108 (77.1)
Physical activity level	Light activity	51 (36.4)
	Active lifestyle	1 (0.7)
	Sedentary lifestyle	88 (62.8)

BMI: Body mass index, WHR: Waist hip ratio, WC: Waist circumference

Table 4: Association between physical activity level and body mass index

Physical activity level	Normal	Grade I obesity	BMI classification Grade II obesity	χ^2	P
Light activity	30	18	3	4.12 (NS)	0.390
Active lifestyle	1	0	0		
Sedentary lifestyle	50	24	14		

Significance at 1%. NS: Not significant, BMI: Body mass index

Table 5: Macro and micro nutrient intake among the study population

Nutrient	Mean	RDA	t	P
Energy (kcal)	1506.9±242.69	1788.6±104.11	-13.002*	<0.000
Carbohydrate (g)	231.82±34.26	290.65±16.91	-18.166*	<0.000
Protein (g)	48.91±8.90	67.07±3.90	-22.075*	<0.000
Fat (g)	42.72±11.02	89.43±5.20	-47.892*	<0.000
MUFA (g)	1.15±0.64	1.21±0.07	-1.091 (NS)	<0.277
PUFA (g)	0.29±0.15	0.81±0.04	-37.489*	<0.000
TSF (g)	13.03±6.95	0.81±0.04	20.78*	<0.000
Calcium (mg)	741.02±189.80	600±0	8.791*	<0.000
Sodium (mg)	368.25±109.44	3000±0	-284.51*	<0.000
Total fiber (g)	12.23±6.18	25.04±1.45	-23.867*	<0.000

*Significance at 1%. NS: Not significant, MUFA: Mono unsaturated fatty acid, PUFA: Poly unsaturated fatty acid, TSF: Total saturated fatty acids, RDA: Recommended dietary allowance

hip measurements have been assessed in conjunction with BMI. Increased anthropometric measurements could put the postmenopausal women at risk for many disease conditions including breast cancer.^[22] Increased waist circumference and WHR may be explained by sedentary lifestyle, faulty dietary practices which cause increased accumulation of abdominal fat, decreased basal metabolic rate with age and decreased energy

expenditure which has also been studied among 402 postmenopausal women in Mysore, Karnataka.^[18] Menopausal transition brings about anomalies in total body composition characterized by an increased body fat mass and central adiposity.^[18] The different types of physical activities assessed in the study are walking, sitting, standing, running/playing, out- and in-door activities, and sleeping. Majority of the women did not engage in outdoor activities. Based on physical activity level data 62.4% postmenopausal women were leading a sedentary life style^[23] reported similar results, increased waist circumference and WHR which may lead a pathway to variety of health concerns like diabetes^[20] and increasing the risk for the cardiovascular disease.^[18,24] Moderate physical activity, including brisk walking, may be beneficial for the improvement of the quality of life.^[25] Interventions to increase physical activity should be recommended to prevent increases in adiposity. A randomised clinical study carried out by^[26] showed that increased waist circumference and weight gain during menopause could be reduced with long-term physical activity and dietary intervention.

The RDAs for the postmenopausal women were compared with the current dietary intake and gaps in the macro- and micro-nutrient intake were observed. The RDAs energy 1788.6 ± 104.11 kcal, carbohydrate 290.65 ± 16.91 g, Protein 67.07 ± 3.90 g, fat 89.43 ± 5.20 g, PUFA 1.21 ± 0.07 g, MUFA 0.81 ± 0.04 g, Total saturated fat (TSF) 0.81 ± 0.04 g, calcium 600 ± 0 mg, sodium 3000 ± 0 mg, and total fiber 25.04 ± 1.45 g. Only saturated fat intake and calcium were significantly adequate. In a study by^[27] with 106 postmenopausal women in Tamil Nadu dietary calcium intake was significantly higher. Some studies have shown poor dietary intake among postmenopausal women.^[23] The mean intake of protein was 48 g/day, and similar results were also reported by another study.^[23] When compared the macro nutrient adequacies amongst all socioeconomic groups majority of the women were consuming a marginally adequate amounts of the macro nutrients carbohydrate, energy proteins, and fats. It was observed that fats were consumed in excess among all the socioeconomic groups, which indicates that the postmenopausal women were following faulty dietary habits. The recommended food group intake is as follows; cereals 270 g, pulses 60 g, meat and fish 100 g, milk and milk products 300 ml, roots and tubers 200 g, green leafy vegetables 100 g, other vegetables 200 g, fruits 100 g, fats and oils 20 g, sugar 25 g. All food groups' intakes were inadequate when compared except for milk and milk products, sugars, and fruits which were significantly higher than the RDA.

Similar studies have shown that increased intake of fruits improves the bone mineral density.^[28-32] Decreased intake

Table 6: Food group intake among the study population

Food group	Mean	RDA	t	P
Cereals (g)	203.50	270	-24.82*	<0.000
Pulses (g)	21.76	60	-31.67*	<0.000
Meat and fish (g)	34.25	100	-12.35	<0.000
Milk and milk products (ml)	477.02	300	13.964*	<0.000
Roots and tubers t (g)	103.41	200	-26.68*	<0.000
Green leafy vegetables (g)	35.06	100	-19.941*	<0.000
Other vegetables (g)	39.74	200	-70.058*	<0.000
Fruits (g)	104.17	100	0.869 (NS)	<0.386
Sugar (g)	39.65	20	5.324*	<0.000
Fats and oils (g)	14.70	25	-15.938*	<0.000

*Significance at 1%. NS: Not significant, RDA: Recommended dietary allowance

Table 7: Different physical activities among postmenopausal women

Activity	Average time spent (h)
Sitting	6.7±1.7
Standing	3.5±1.1
Walking	1.7±0.8
Running/playing	0
Outdoor activities	0.2±0.4
Indoor activities	3.7±1.4
Sleeping	8.1±1.4

of green leafy vegetables and other vegetables among postmenopausal women in the Thiruvananthapuram district similar to the current study results.^[23,30] High intake of fruits and vegetables prolongs the reproductive lifespan because of the presence of antioxidants in fruits and vegetables that counteract the adverse effects of reactive oxygen species on the number and quality of ovarian follicles. The intake of tea among the study participant was 90% and regular tea consumption delays the age at menopause probably due to the antioxidant and nonsteroidal estrogenic effects of flavonoids that counteract the degenerative processes.^[31] The study showed lower levels of PUFA intake, where a high intake of polyunsaturated fats accelerates age at menopause, whereas total fat and saturated fat intake has no effect on menopause.^[31] This study recommends education and interventions on healthy eating, healthy life style including physical activity is necessary to promote and improve healthy ageing. The following study limitations are important when considering the reported findings. The small sample size due to convenience sampling restricts in generalizing the findings Even though the study collected dietary information by 24 h recall for 3 days, the estimations and recall may be faulty. The study is relevant with the current scenario among postmenopausal women as growing numbers are observed in the postmenopausal community. Nutrition

Table 8: Association between socio economic status and macro nutrient adequacy

	Inadequate	Adequate	Marginally adequate	Excess	χ^2	P
Energy adequacy						
Upper class (I)	12	42	0	8	14.521 (NS)	0.105
Upper middle class (II)	14	27	1	1		
Lower middle class (III)	6	12	1	0		
Upper lower class (IV)	7	9	0	0		
Lower class (V)	0	0	0	0		
Carbohydrate adequacy						
Upper class (I)	0	27	32	3	7.63 (NS)	0.571
Upper middle class (II)	1	17	25	0		
Lower middle class (III)	0	10	9	0		
Upper lower class (IV)	0	9	7	0		
Lower class (V)	0	0	0	0		
Protein adequacy						
Upper class (I)	4	37	18	2	6.29 (NS)	0.710
Upper middle class (II)	1	32	10	0		
Lower middle class (III)	0	13	6	0		
Upper lower class (IV)	1	10	4	1		
Lower class (V)	0	0	0	0		
Fat adequacy						
Upper class (I)	3	2	16	40	34.45*	0.000
Upper middle class (II)	2	1	24	16		
Lower middle class (III)	1	2	6	10		
Upper lower class (IV)	0		6	4		
Lower class (V)	0	0	0	0		

*Significance at 1%. NS: Not significant

and physical active have a major impact on the health and the well-being of the postmenopausal women. Measures need to be taken for the prevention of chronic disease.

CONCLUSIONS

The study highlights the poor intake of energy, carbohydrate, protein, monounsaturated fat, polyunsaturated fat, sodium and fiber, only calcium and saturated fat intakes were meeting the RDA for postmenopausal women. Based on the observed results among the postmenopausal women in Udipi and Manipal areas of Karnataka, all food group intakes were inadequate except milk and milk products, fruits, and sugars. Majority of the postmenopausal women had a normal BMI. Postmenopausal women were leading a sedentary life style according to physical activity level assessment.

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Conflicts of interest

There are no conflicts of interest.

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