

Study on Dietary Intake and Body Mass Index among Pubertal and Post-Menopausal Women: A Comparative Study

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Abstract

Background: Puberty and Menopause demarcate the beginning and the end of the female reproductive life cycle and are two major transitions in a woman's life. Despite underlying biological parallels, previous research suggests a weak or non-existent relationship between these reproductive life events.

Aim and Objectives: Study to compare body mass index and dietary intake between pubertal and post-menopausal age.

Material and Method: A Cross Sectional Study, conducted on 100 patients, attended a tertiary care centre, Guntur Medical College, Guntur, in period of one year, in the Age group of 8 – 10 Years and Age >45 years, after following inclusion and exclusion criteria and approved by institutional ethical committee.

Results: We have found that there was significant difference in the mean age, height and weight between the groups also we have observed mean body mass index between the groups was statistically significant. Dietary intervention between the group was statistically significant and it was found more in post-menopausal group compared to pre pubertal group.

Conclusion: Body weight, and body mass index among pubertal group was at normal level while among post-menopausal group weight was more and most of the women found obese, and these excess weight was observed because of wrong dietary habits and it's all because of sedentary life style according to physical activity level assessment.

Keywords: Puberty, Menopause, Dietary intervention, Body Mass Index etc.

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Introduction

Puberty in girls is manifested by development of secondary sexual characteristics that begins almost three years prior to menarche. Onset of puberty is modestly correlated with age at menarche [1]. It has been suggested that age at menarche (AAM) is influenced by geographical location, differs by race, age and ethnicity and may be under the

influence of genetic factors.[2] Other factors such as nutritional conditions, and secular trends have been proven to influence the physiological range in age at the onset of puberty [1,2]. Different studies have reported a relationship between body mass index (BMI) and timing of pubertal onset in girls [3,4,5]. Secular trend in breast development as early as 3 years, 5 years,

and 7 years of age is reported [6,7,8] and menarche at an earlier age, as early as 8 years. [9] A growth spurt with increased BMI, 2 years prior to puberty is reported [10].

Menopause is a stage of women's life when reproductive capacity ceases.[11] India has a large population, with 43 million postmenopausal women and it is projected to be 103 million by 2026. [12] The average age of menopause is 47.5 years. Postmenopausal status is associated with higher prevalence of obesity. [13,14] Women in the midlife face many challenges, such as hormonal changes, increased weight gain, loss of bone and muscle mass, and digestive issues. [14]

We find many studies of body mass index and dietary intake among pubertal age and post-menopausal separately, but we don't have any comparative study of effect on body mass index and dietary intake between pubertal age and post-menopausal age. Thus keeping this into consideration we undertaken this study to compare body mass index and dietary intake between pubertal and post-menopausal age.

Material and Method

Study Design: A Cross Sectional Study

Study Place: A tertiary care centre, Guntur Medical College, Guntur

Study Duration: Period of One Year

Sample Size: 100 patients (50 each divided into Pubertal age and post-menopausal age)

Inclusion Criteria:

- Age group of 8 – 10 Years and Age >45 years
- Girls with no menstrual cycle and women who had their last menstrual period before 12 months.
- Postmenopausal women

Exclusion Criteria:

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

- History of hyperthyroidism, diabetes mellitus, renal or liver disease, rheumatoid arthritis, alcohol consumption and smoking.
- Women who have taken any drug known to affect bone metabolism.
- Women with any systemic and metabolic disease.

Ethical Approval: Study was approved by institutional ethical committee, Guntur Medical College, Guntur

Method

After getting ethical approval from committee data were collected with the help of, a structured questionnaire, sociodemographic and physical activity level data were collected. 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.

Statistical Analysis: Collected data were entered in the Microsoft Excel 2016, for further statistical analysis. Quantitative data were expressed in the terms of mean and standard deviation. Mean difference of study parameters between the groups were compared with the help of unpaired t-test. P-value<0.05 were consider as statistically significant at 5% level of significance. Statistical Software SPSS version 25 was used for statistical Analysis.

Results and Observation

In this cross sectional study we have

included 100 study subjects divided into pubertal age and post-menopausal age. Demographic profile of study population given in the bellow table.

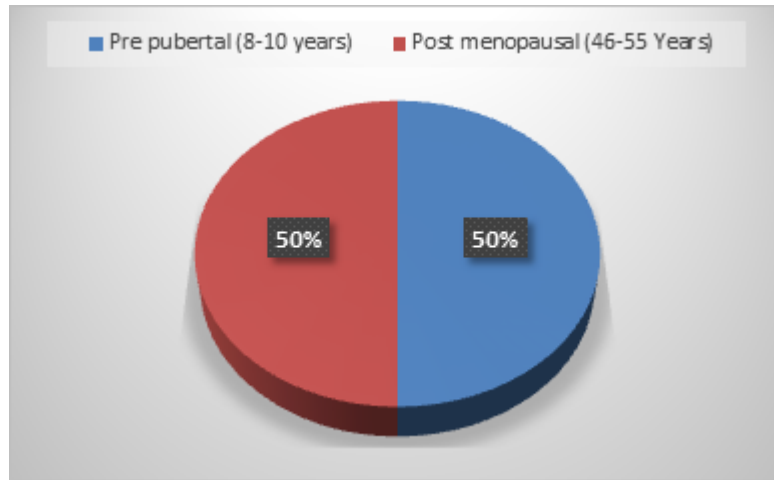


Figure 1: Distribution of Study Population

Table 1: Demographic Distribution of study population

Parameters	Pre pubertal (8-10 years)	Post-menopausal (46-55 Years)	t-value	P-value
Age (Years)	8.433±0.67	49.33±2.27	122.18	<0.001
Height (Meters)	1.22±0.06	1.58±0.050	32.59	<0.001
Weight (Kg)	24.4±2.98	64.46±6.81	38.1	<0.001

*p-value<0.05, statistically significant at 5% level of significance

Table 2: Mean Distribution of body mass index study population

BMI	Pre pubertal (8-10 years)	Post-menopausal (46-55 Years)	t-value	P-value
Mean	15.786	25.748	21.43	<0.001
SD	1.521	2.881		

*p-value<0.05, statistically significant at 5% level of significance

We have found that there was significant difference in the mean age, height and weight between the groups also we have

observed mean body mass index between the groups was statistically significant. Shown in table 1 and table 2.

Table 3: Mean Distribution of diet(K.cal/Day) study population

Diet K.Cal/Day	Pre pubertal (8-10 years)	Post-menopausal (46-55 Years)	t-value	P-value
Mean	1824.43	2728.5	16.4*	<0.001
SD	195.561	336.972		

*p-value<0.05, statistically significant at 5% level of significance

We have observed dietary intervention between the group was statistically significant and it was found more in post-menopausal group compared to pre pubertal group.

Table 4: Mean Distribution of diet (K. Cal/Day) study population

Physical Activity (Min/ Day)	Pre pubertal (8-10 years)	Post-menopausal (46-55 Years)	t-value	P-value
Mean	46.83	42.352	1.34	0.18
SD	11.40	14.26		

*p-value<0.05, statistically significant at 5% level of significance

Table 4 showed mean distribution of physical activity between the groups and it was found statistically not significant between the groups

Discussion

Puberty is a process, that evolves slowly and actually begins many years before the first physical signs or biochemical changes are observed. Sufficient evidences suggest that a certain degree of body fat is compulsory before sexual maturation may proceed. The main etiological factors leading to early onset of puberty are obesity and environmental chemicals. The changing level of calories in the body, intake of food, ratio of lean mass to fat mass, or amount of fat stores may affect the hormonal secretion from hypothalamus. All these factors may be exerting a permissive action in initiation of puberty. But at other side Increased anthropometric measurements could put the postmenopausal women at risk for many disease conditions including breast cancer. [15] 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. [16] Menopausal transition brings about anomalies in total body composition characterized by an increased body fat mass and central adiposity. [16]

BMI is an indicator of total body fat of the person. Body fat is not measured by BMI directly but BMI correlates to actual measurement of body fat. BMI can be easily calculated and is non expensive method. So it is substitute for direct measures of body fat [17]. Many studies

strongly support the hypothesis, that higher childhood BMI is responsible for early occurrence of puberty.

The present study aimed to understand the dietary intakes, physical activity level among postmenopausal women and pubertal girls and its relationship to BMI. In our study we have undertaken total 100 subjects divided into two groups, each 50 in pubertal group and postmenopausal group. In the present study we have observed that, there was statistically significant difference in weight and height was observed between the groups, height and weight was more in postmenopausal group compared to pubertal group (P-value<0.01), this difference in these anthropometric variable is definite, considering age difference between the groups. Pubertal age is growing age, and in our study weight and height of this group were normal but in post-menopausal group taken height in to consideration found to be more, in this group mean weight of menopausal group was 64.46Kg, which was not appropriate with height. Also in our study we have observed that mean body mass index in pubertal age was normal, but that of in post-menopausal group it was $25.748 \pm 2.88 \text{ kg/m}^2$, which comes in obesity. The reason for gaining weight and body mass in our study found was diet intake/day, we have observed mean calory intake among post-menopausal women 2728.5 ± 336.972 kilo cal/day which was more than normal intake of body needs (normal = 2200k.cal/day). But in pubertal age it was in normal level in calory intake (normal = 1600-2000k.cal/day). In post-menopausal group to burn extra calory need more physical activity, but we have found that duration of physical activity like walking, engage in outdoor activities etc was less

compared to pubertal group (42.35 ± 14.26 Vs 46.83 ± 11.40 min/day)

Our finding nearly equal to study conducted by Ranasinghe, et al [18] they also found mean weight among postmenopausal women was 60.6 ± 9.50 Kg, and mean body mass index was 24.59 ± 3.7 Kg/m², increased number (50.9%) of postmenopausal women who were leading a sedentary lifestyle and belonged to the grade II obese category, and those who were engaged in light to moderate activity had normal BMI level. They also found that, 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 and they suggested moderate physical activity, including brisk walking, may be beneficial for the improvement of the quality of life.

A randomised clinical study carried out by Eliassen AH et al [19] showed that increased waist circumference and weight gain during menopause could be reduced with long-term physical activity and dietary intervention which leads to increase in BMI.

In our study 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. One more study conducted by Hooda R et al. [20] mean body mass index among post-menopausal women was 25.65 ± 4.28 kgm² which was equal to our study. During menopause the risk of developing obesity increases. Hormonal changes that occur in the menopausal period may contribute to higher accumulation of the adipose tissue, particularly within the abdominal cavity [21]. An increase in body fat results from decreased production of estradiol (E₂) and body energy requirement which varies with age [22].

The research by Kroemeke *et al.*, which evaluated physical activity and body

composition among 79 healthy postmenopausal women, emphasized that a correct BMI was observed only in the group of women with a significantly high level of physical activity, which meant going more than 12 500 steps a day. Additionally, the research revealed statistically significantly lower values of BMI, WHR, body fat and visceral body fat in the group of women with the highest level of physical activity as compared with the other groups [23].

There were several limitation of our study, we have not differentiated between different BMI categories, type of physical activity performed, occupational status among post-menopausal women were not taken into the consideration, and also type of food they are having daily, and other social problems we didn't consider in the study. [24]

Conclusion

From overall observation and discussed with other studies we can conclude that, body weight, and body mass index among pubertal group was at normal level while among post-menopausal group weight was more and most of the women found obese, and these excess weight was observed because of wrong dietary habits and its all because of sedentary life style according to physical activity level assessment.

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