

Correlation Between Body Mass Index (BMI) and Fasting Glucose in Post-menopausal Women

Padma Priya¹, Fathima Lathif², Vijaya Raghavan³

Abstract

Menopausal stage is marked by weight gain and abnormal glucose metabolism leading to metabolic syndrome susceptibility. The incidence of obesity in post-menopausal women tends to increase due to lack of activity; higher dietary intake and the effect of decreased oestrogen lead to alteration in insulin sensitivity. The present study was done on the correlation between Body Mass Index (BMI) and fasting glucose in post-menopausal women. Forty-six healthy post-menopausal women were selected by purposive non-probability sampling technique. Study was conducted in a selected village, Bangalore. Body weight, height and 12 hours fasting blood glucose were measured. Data gathered were analysed and interpreted using both descriptive and inferential statistics. The study results showed a significant positive correlation between BMI and fasting glucose ($r=0.300$, $p<0.05$) in post-menopausal women. Additionally, a significant association was found between BMI and years spent in menopause ($\chi^2 = 13.071$ $p=0.0045$) and while it had no significant association with other variables and there was no significant association between fasting glucose and selected baseline variables.

Menopause is a naturally occurring process in a woman's life. Post-menopause is defined as the cessation of menstrual cycles for 12 consecutive months and that marks the end of ovarian follicular activity and inadequate oestrogen production. The decreased oestrogen in menopause creates many health problems: increased risk of cardiovascular disease, diabetes, and obesity. The incidence of obesity in post-menopausal women tends to increase due to the lack of activity, changes in dietary habits and oestrogen deficiency. Menopausal women undergo changes in body composition with the accumulation of fat in the thighs, hips, abdomen and buttocks. Changes in body composition alter insulin sensitivity. The presence of metabolic syndrome in menopause can be predicted using anthropometric characteristics and blood glucose. Body Mass Index is a more reliable predictor of diabetes and cardiovascular risk factors. The present study sought to find the correlation between BMI and fasting glucose in post-menopausal women.

Objectives

Objectives of the study were to:

1. Assess the Body Mass Index and fasting glucose in post-menopausal women
2. Find the relationships between BMI and fasting glucose in post-menopausal women.
3. Find the association between BMI, fasting glucose and selected demographic variables of post-menopausal women.

Methodology

Study adopted a descriptive research with correlation design to determine the relationship between body mass index and fasting glucose in post-menopausal women. It was carried out in a selected village, Bangalore. A semi structured interview schedule was used to identify the post-menopausal women. Forty-six post-menopausal women who met the inclusion criteria were selected by purposive sampling technique. Demographic data was obtained with the help of a questionnaire. Institutional ethical clearance was obtained and verbal consent was taken from each participant. The study was delimited to women who had hypertension, diabetes and other medical illness. Body weight and height were measured using the standard techniques by standard equipment and 12 hours fasting glucose were checked using blood glucose meter. BMI parameters were then calculated using the standard equation that is $BMI (kg/m^2) = \text{Weight (kg)} / \text{height (m}^2\text{)}$ Statistical analyses

The authors are: 1. PhD (Nursing) Scholar, Saveetha University, Chennai; 2. Principal, Columbia Asia College of Nursing, Bangalore; and 3. Director of Nursing Research, Saveetha University, Chennai.

Table 1: Relationship between Body Mass Index and fasting glucose of post-menopausal women (N=46)

Variables	Mean $\pm$ SD	Coefficient correlation ('r' value)	P value
Body mass index	25.01 $\pm$ 6.059	0.300	.043*
Fasting blood glucose	98.34 $\pm$ 7.033		

*Correlation is significant at the 0.05 level (2-tailed)

were undertaken using the Statistical Package for Social Science (SPSS) 16.0 version.

Results

Subject characteristics: Maximum number of women i.e. 34 out of 46 (40.90%) were in the age of 40-53 years and all 46 women (100%) were married. Majority of women 39 (77.27%) were Hindu. With regard to parity status, majority of subjects, 21 (45.45%) had two children. Majority of women i.e. 21(45.45%) of them had primary education. As for occupation, majority of women i.e. 44 out of 46 were housewives and 30 (83.33%) women were living in joint family in which 29 of them had family monthly income of Rs. 10001 and above. With regards to dietary life style majority of women i.e. 30 out of 46 (72.72%) were taking mixed diet and all women (100%) had habit of drinking coffee and tea. Majority of women i.e. 26 (50%) had habits of tobacco chewing. Regarding BMI, six out of 46 were underweight, 24 women had normal weight, seven of them were over weight and remaining nine of them were obese. With regards to

Table 2: Chi square through Yates correction values showing association between Body Mass Index and selected demographic variables (N=46)

S.No	Demographic variables	df	Chi-square value (Yates correction)	Level of significance
1.	Age	6	2.881	NS
2.	Religion	6	6.864	NS
3.	Parity status	6	5.596	NS
4.	Education	6	5.574	NS
5.	Occupation	3	6.612	NS
6.	Type of family	3	3.896	NS
7.	Years spend in menopause	3	13.071	S
8.	Dietary pattern	3	2.216	NS

NS: No significance S: Significance

Table 3: Chi square/ Yates correction values showing association between fasting glucose and selected demographic variables (N=46)

S.No	Demographic Variables	df	Chi-square value / Yates correction	Level of significance
1.	Age	2	0.118	NS
2.	Religion	2	0.25 ^A	NS
3.	Parity status	2	0.514	NS
4.	Education	2	1.69 ^A	NS
5.	Occupation	1	0.523 ^A	NS
6.	Type of family	1	0.383	NS
7.	Years spend in menopause	1	0.138 ^A	NS
8.	Dietary pattern	1	1.533	NS

^A Yates chi-square correction, NS: No significance

blood glucose, majority of women 26 (56.52%) were in the range of 91-100 mg/dl, 13 (28.26%) of them in 101-110 mg/dl, five of them (10.86%) had 80-90 mg/dl and only two of them (4.34%) had 111-120 mg/dl.

Table 1 shows a significant weak positive correlation ($r=0.300$, $p<0.05$) between Body Mass Index and fasting glucose in post-menopausal women. But the correlation between BMI and fasting glucose levels was very low.

Tables 2 and 3 show that there was a significant association between BMI and years spent in menopause ($\chi^2=13.071$, $p=0.0045$) and no significant association with other demographic variables. There was no significant association between fasting glucose and selected demographic variables.

Discussion

The results of the present study indicate a significant positive correlation between BMI and fasting glucose in post-menopausal women. These findings are congruent with those of Netjasov SA et al (2013) who found a significant positive correlation between BMI and glucose in menopause. Since menopause leads to the development of central adiposity, a more atherogenic lipid profile and increased incidence of metabolic syndrome independent of age and other factors. Another study by Syaefudin Ali Akhmad (2012) also revealed that a significant strong correlation was found between BMI and blood sugar in menopausal women. The present study shows that there was a significant association BMI and years spent in menopause. Ankita, Kumar A, and Prasad S (2015) reported that menopause is usually associated with weight gain. With each year in menopause, prevalence of obesity and metabolic syndrome will be raised.

Recommendations

1. A similar study can be conducted on a large sample
2. Correlation study can be conducted between BMI, fasting glucose and menopausal symptoms
3. Interventional study can be carried to evaluate effects of soya/ soya milk intake on blood glucose, body weight and reduction of menopausal symptoms.

Conclusion

Gaining weight is related to fasting glucose and higher incidence of metabolic abnormalities in the menopause. Unfortunately majority of women are not aware of the changes brought about by menopause. Menopause changes may modify general health status and subsequent quality of life of women. Health professionals should create awareness among meno-

pausal women about reasons for increasing body weight, changes in blood glucose level, and risk for the development of metabolic syndrome. Therefore early screening with early intervention crucial for reducing metabolic risk factors. Improving dietary soya intake, proper dietary management, regular exercises, and life style modifications are necessary to manage menopausal symptoms and other related health problems.

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