

Metabolic syndrome prevalence in postmenopausal and perimenopausal women – A cross-sectional study.

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Abstract

Background

Metabolic syndrome is influenced by factors such as weight gain, abdominal fat, high blood pressure, insulin resistance, and abnormal lipid and glucose levels. Additionally, lifestyle changes during menopause, including reduced physical activity and poor diet, contribute to its development.

Objectives- The main purpose of conducting this study is to compile the body of research on the prevalence of MetS in women who are perimenopausal or postmenopausal, emphasizing the risk factors and contributing variables.

Materials and Methods

The Maharaja Krushna Chandra Gajapati (MKCG) Medical College and Hospital in Berhampur, Odisha, India, was the site of this Observational study, which was carried out between May 2023 and October 2024 (one year and five months). After determining their eligibility based on the selection criteria, 200 women in the 40–60 age range—100 perimenopausal and 100 postmenopausal—were enlisted for the study. Participants have to be between the ages of 40 and 60 to be eligible.

Results

The results show a high prevalence of metabolic syndrome (MetS) among middle-aged women in the study. MetS prevalence was 89.2% in postmenopausal women and 76.5% in perimenopausal women. The overall prevalence of MetS in the population was 83.0%. These findings highlight a greater metabolic risk after menopause and the need for preventive health strategies in this age group.

Conclusion

The menopausal transition significantly impacts women's health, with 47% of perimenopausal women aged 40-49 and 45.5% of postmenopausal women over 50. Postmenopausal women had higher mean diastolic and systolic blood pressure, fasting blood sugar, and levels of triglyceride, as well as a greater prevalence of diabetes (25.0% vs. 7.0%) and hypertension (24.5% vs. 19.0%).

Recommendation

Regular health screenings and lifestyle modifications are recommended for middle-aged women to reduce the risk of metabolic syndrome.

Keywords: Premenopausal women, Postmenopausal women, Metabolic syndrome, Menopause

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Introduction

Factors that are responsible for metabolic syndrome (MetS) include an increase in body weight, which mainly affects abdominal adipose tissues, high blood pressure, resistance to insulin, abnormal profile of lipids, and an increase in glucose levels in blood [1, 2]. Along with cardiovascular risk, type 2 diabetes mellitus is linked to the MetS, a worldwide epidemic that has substantial socioeconomic costs [3]. Racial cut-offs were proposed, and the International Diabetes Federation (IDF) released additional criteria for identifying MetS, including abdominal obesity. For the diagnosis of MetS, the IDF criteria typically involve obesity in the centre with two or more of the following factors such as levels to be 150 mg/dL of triglycerides; levels of HDL cholesterol to be less than 50 mg/dL or medication for both; blood pressure within limits of 130/85 mmHg or medication for prior hypertension; and fasting glucose to be around 100 mg/dL or high blood sugar [2]. The circumference of the waist can be used to categorize abdominal obesity, with 80 cm serving as the suggested cut-off point for women [2, 4].

Age, gender, lifestyle, and hormonal fluctuations affect the prevalence of MetS. Because estrogen has a protective role in metabolic health, women who are perimenopausal or postmenopausal are especially susceptible to developing MetS. Because of the changes that can be hormonal and metabolic that take place during this time, postmenopausal women have an almost 50% higher annual incidence of cardiovascular illnesses [5, 6]. Furthermore, postmenopausal status is associated with the fat mass of the body and a lower density of bone mineral (BMD), strength, and mass of muscles [3, 7]. The menopause phase is characterized by changes in lifestyle, such as decreased physical activity and lower nutritional quality. These alterations may have detrimental effects on physical health, jeopardize it, and increase the risk of developing a number of chronic diseases [8, 9]. Obesity and menopause have therefore emerged as significant risk factors for the diagnosis of MetS.

Premenopausal women, when compared to men, are more likely to have MetS [10]. But after menopause, this tendency flips, and women are much more likely than males to get MetS [11].

Women will experience post menopause for almost 1/3 of their lives as life expectancy rises. Both the individual woman and the entire society depend on her being in good health as she ages. One of the main contributing reasons to the development of MetS in postmenopausal women, according to studies, is an estrogen shortage [12, 13].

Decreased levels of estrogen can increase the risk of resistance of insulin resistance after menopause, making the menopausal transition and postmenopausal state a vulnerable time. The purpose of conducting the study is to compile the body of research on the prevalence of MetS in women who are perimenopausal or postmenopausal, emphasizing the risk factors and contributing variables.

Methodology

Study Design

The Maharaja Krushna Chandra Gajapati (MKCG) Medical College and Hospital in Berhampur, Odisha, India, was the site of this cross-sectional study. The study was carried out between May 2023 and October 2024, or for a total of one year and five months.

Study Setting

The study was conducted at Maharaja Krushna Chandra Gajapati (MKCG) Medical College and Hospital in Berhampur, Odisha, India — a 1,082-bedded, tertiary care, teaching hospital that provides specialized health services to a large population from southern Odisha and adjoining areas.

Study Population

After determining their eligibility based on the selection criteria, 200 women in the 40–60 age range—100 perimenopausal and 100 postmenopausal—were enlisted for the study. Participants have to be between the ages of 40 and 60 to be eligible. Women using hormone replacement therapy (HRT), those with hypertension secondarily, and those with a history of drunkenness and smoking were not considered as part of this study. The sample size was determined based on the prevalence of metabolic abnormalities in perimenopausal and postmenopausal women, allowing for 80% power and a 5% margin of error.

Efforts to Reduce Bias

To minimize selection bias, participants were consecutively recruited from the gynecology department based on predefined criteria. To control information bias, a standardized questionnaire and data collection form were used by trained health care workers who were blinded to the study's hypotheses.

Data Collection

Before recruitment for this study, all women provided written informed consent after meeting the inclusion criteria. A detailed history was taken, including age, body mass index (BMI), lifestyle factors, and obstetrics and gynecologic profile. The following laboratory profiles were measured after an overnight fast to assess metabolic abnormalities: Fasting Blood Sugar (mg/dL), Hemoglobin A1c (HbA1c% %), High-Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL), Total Cholesterol, and Triglycerides. Both perimenopausal and postmenopausal women had their metabolic syndrome further assessed.

Statistical Analysis

The quantitative data were displayed as either n (%) or mean $\pm$ standard deviation (SD). Chi-square test and unpaired t-test were used to compare the data for further statistical analysis. At the value of less than 0.05, p was considered statistically significant. The analysis was performed using SPSS 24.0.

Ethical consideration

The study was approved by the Ethics Committee of MKCG Medical College and Hospital.

Results

A total of 200 women (age 40–60 years) were assessed for eligibility at Maharaja Krushna Chandra Gajapati (MKCG) Medical College and Hospital, Berhampur, Odisha, India. All 200 were found to be eligible based on the inclusion criteria and were subsequently enrolled in the study. Among them, 98 were perimenopausal and 102 were postmenopausal. All participants completed the study without any dropouts or losses to follow-up.

Table 1 represents characteristics among perimenopausal and postmenopausal women. It shows that perimenopause, which is composed of women who are having irregular menstrual cycles, is most common in women aged 40-49 years (47%), with a sharp decline after 50, while post menopause increases significantly beyond 50 years (45.5%). The transition to menopause typically occurs around 45-50 years, aligning with global patterns. The association between menopause status and age groups is highly statistically significant, with a p-value <0.001 , emphasizing the need for age-specific healthcare interventions. With a p-value less than 0.05, it was determined that additional parameters, including BMI, circumference of the waist, waist-hip ratio, systolic and diastolic blood pressure, fasting blood sugar, HbA1c, and triglycerides, were statistically significant.

Table 1. Characteristics among perimenopausal and postmenopausal women

Characteristics	Peri-menopausal (n=98)	Post-menopausal (n=102)	p-value
Age Groups			
Less than 50 years	94 (95.9%)	11 (10.8%)	<0.001
More than 50 years	04 (4.08%)	91 (89.2%)	
Residence			
Urban	34 (17%)	28 (14%)	0.26
Rural	64 (32%)	74 (37%)	
BMI (kg/m ²)	23.20 ± 2.14	23.80 ± 2.11	0.04
Waist Circumference (in cms)	92.87 ± 7.06	95.50 ± 7.15	0.01
Waist-hip Ratio	0.97 ± 0.19	1.10 ± 0.23	<0.001
Systolic Blood Pressure (mmHg)	123.61 ± 16.25	131.39 ± 18.53	0.002
Diastolic Blood Pressure (mmHg)	76.80 ± 11.61	81.98 ± 11.89	0.002
Fasting Blood Sugar (mg/dL)	106.14 ± 17.84	121.67 ± 27.00	<0.001
HbA1c (%)	5.55 ± 0.53	6.20 ± 0.97	<0.001
HDL (mg/dL)	49.00 ± 6.17	47.80 ± 5.83	0.16

LDL (mg/dL)	124.09 ± 26.99	127.53 ± 20.16	0.30
Total Cholesterol (mg/dL)	193.45 ± 23.28	199.16 ± 21.61	0.07
Triglycerides (mg/dL)	167.43 ± 31.08	181.11 ± 36.26	0.005

Mean±SD was used to display the data

P-value was considered significant at less than 0.05

Table 2 indicates that MetS is more prevalent among postmenopausal women (89.2%) compared to women who are perimenopausal (76.5%). The overall prevalence in the study population is 83.0%, suggesting a high burden of MetS among middle-aged women.

The prevalence of MetS among perimenopausal and postmenopausal women can be calculated as follows:
 Perimenopausal prevalence = $(75/98) \times 100 = 76.5\%$
 Postmenopausal prevalence = $(91/102) \times 100 = 89.2\%$
 Overall prevalence = $(166/200) \times 100 = 83.0\%$

Table 2. Prevalence of Metabolic Syndrome Among Perimenopausal and Postmenopausal Women

Metabolic Syndrome	Peri-menopausal	Post-menopausal
Absent	23 (11.5%)	11 (5.5%)
Present	75 (37.5%)	91 (45.5%)

Data was presented as n (%)

Discussion

The findings of this study provide a comprehensive understanding of the health challenges faced by women during the menopausal transition, particularly in the context of metabolic and cardiovascular risks.

According to our study, perimenopause—a condition in which women experience irregular menstrual cycles—occurs most frequently in women between the ages of 40 and 49 (47%), and it significantly decreases beyond the age of 50. On the other hand, post menopause becomes much more prevalent after the age of 50 (45.5%). This pattern is consistent with findings made worldwide, which show that the menopausal transition usually happens between the ages of 45 and 50 [14].

80.5% of the population leads an inactive lifestyle, according to this survey, which also found that sedentary lifestyles are highly prevalent among postmenopausal (41.5%) and perimenopausal (39.0%) women. The fact that there is no statistically significant association between sedentary behavior and menopausal status ($p = 0.751$) indicates that physical inactivity is common regardless of menopausal status [15]. 56% of postmenopausal women said they had never exercised, according to Kaur et al., suggesting that physical inactivity is very common in this group [16].

There is an urgent need for public health measures to encourage active lifestyles among women in this age group,

given the well-established advantages of physical activity on both mental and physical health.

Our study's results indicate that postmenopausal women may be more susceptible to diabetes and cardiovascular illnesses due to their higher risk of hypertension and impaired glucose metabolism. In addition to increased sugar intakes and lower sleep quality, another author, Davis et al., stated that women have higher fasting glucose, HbA1c, and inflammatory indicators than premenopausal women. These findings may have contributed to unfavorable metabolic profiles [17].

With rates of 76.5% in perimenopausal women and 89.2% in postmenopausal women, at 83.0% overall, our study reveals a very high prevalence of MetS in middle-aged women. The substantial rise in the prevalence of MetS after menopause highlights the possible effects of aging, hormonal fluctuations, and related metabolic changes on women's health.

Generalizability

The results may apply to middle-aged women in similar hospital settings in India.

Conclusion

The menopausal transition significantly impacts women's health, with 47% of perimenopausal women aged 40-49

and 45.5% of postmenopausal women over 50. Postmenopausal women showed higher prevalence of hypertension (24.5% vs. 19.0%) and diabetes (25.0% vs. 7.0%), along with elevated mean systolic and diastolic blood pressure, fasting blood sugar, and triglyceride levels. Metabolic syndrome prevalence was 76.5% in perimenopausal and 89.2% in postmenopausal women, with 80.5% leading sedentary lifestyles. These findings emphasize the need for age-specific interventions, proactive screening, and lifestyle modifications to improve health outcomes during menopause.

Limitations

A single center with a modest population was the subject of the investigation. A multicentric approach is required for robust data gathering on clinical features and related outcomes.

Recommendations

Further, future studies can be done to acknowledge the prevalence of various metabolic syndromes in peri and post-menopausal women in different regions to conquer generalizability.

List of Abbreviations

MetS- Metabolic Syndrome
IR- Insulin Resistance
BMI- Body Mass Index
HbA1c- Glycated Hemoglobin
IDF- International Diabetes Federation
WC- Waist Circumference
BMD- Bone mineral density
HRT- Hormone Replacement Therapy
MKCG- Maharaja Krushna Chandra Gajapati

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The study received no external funding and was self-funded by the authors.

Conflict of interest

The authors declare no conflict of interest in this study.

Author contribution

All authors contributed equally to the study's conceptualization, data collection, analysis, and manuscript preparation.

Author biography: All authors are professors and practitioners at MKCG Medical College with extensive experience in obstetrics and gynecology.

Data availability

The data underlying this study's findings are available from the corresponding author upon reasonable request.

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