

Relation between WHO and IDF Criteria of the Metabolic Syndrome in Postmenopausal Females of Punjab

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Abstract

The present study aims to determine the prevalence of metabolic syndrome and to evaluate the relation between two diagnostic criteria of the metabolic syndrome. The present cross-sectional study was conducted on 275 postmenopausal women living in the urban areas of Ludhiana District, Punjab. Waist Circumference, hip circumference, body weight, height and blood pressure were measured from each participant. The venous blood samples were also taken from each woman for measuring lipid profile and fasting blood glucose level. The subjects were classified as having metabolic syndrome (MetS) or not by using the criteria of World Health Organization (WHO) and International Diabetes Federation (IDF). According to WHO and IDF criteria, the total prevalence of metabolic syndrome among the females of the present study was 30.91% and 90.55% respectively. Hypertension was observed to be the most common component of the syndrome according to WHO while high density lipoprotein was the rarest found component of the syndrome based on both criteria of the syndrome. Poor relation was found between IDF and WHO criteria of the metabolic syndrome. It can be concluded that the postmenopausal status is associated with an increased risk of metabolic syndrome. The poor relation between the two different metabolic syndrome guidelines indicated that they did not agree with each other

Keyword: Metabolic syndrome, World Health Organization, International Diabetes Federation, Prevalence, Menopause.

1.INTRODUCTION

Metabolic syndrome is defined by a collection of various physiological, biochemical, clinical and metabolic factors that directly increases the risk of cardiovascular disease, type 2 diabetes mellitus, and all cause mortality. Insulin resistance, visceral adiposity, atherogenic dyslipidemia, endothelial dysfunction, genetic susceptibility, elevated blood pressure, hypercoagulable state and chronic stress are the various factors which constitute metabolic syndrome [1]. The Metabolic Syndrome (MS) is a major, widely prevalent and escalating public health challenge in both developed and developing countries [2,3,4,5]. Many studies from developed countries have reported that metabolic syndrome and cardiovascular diseases are more common in postmenopausal women when compared with premenopausal women, which may be related to hormonal changes during menopausal transition. There is a paucity of studies on metabolic syndrome and menopausal status in the developing countries especially in India using different definitions [6-12].

According to another study Menopause is one of the critical periods of a woman's life during which weight gain is favored and obesity prevalence is the highest across lifespan. Epidemiological data suggest that weight gain during the menopausal transition is due to aging, decreased leisure-time physical activity, and hormonal changes. Aging and reduced physical activity were associated to a gradual decrease of Fat-Free Mass with consequent reduction on Resting Metabolic Rate and increased body fat. Furthermore the decline of endogenous estrogens induces the increase of visceral adiposity as estrogen deficiency plays an important role as a determinant of metabolic syndrome in

postmenopausal women which makes these females susceptible to cardiovascular diseases. Estrogen has protective effects on the cardiovascular system due to which there is an increase in the prevalence of cardiovascular diseases in the postmenopausal women [13]. Metabolic syndrome is a complex of various co-morbidities viz. impaired glucose tolerance, raised blood pressure and deranged lipid profile. The concurrent presence of this constellation of symptoms predisposes an individual to cardiovascular complication. In India, the prevalence of the syndrome ranges from 40% to 47.4% as per the various regional epidemiological studies. It is estimated that about 20–25 per cent of the world's population have the metabolic syndrome and are three times more likely to die from heart attack or stroke compared with people without the syndrome [14-18]. According to CDC data published in 2017, about 30.2 million adults aged 18 years or older or 12.2% of USA adults had type 2 diabetes mellitus. One quarter of these people (23.8%) was not aware of having diabetes. Incidence of type 2 diabetes mellitus increased with age, reaching a high of 25.2% among US seniors (65 years or older). Prevalence of prediabetes or Metabolic syndrome was about three times more. One third of US adults have metabolic syndrome [19].

2. MATERIAL AND METHODS

The present study was conducted on 275 postmenopausal women living in the urban areas of Ludhiana District in Punjab. Postmenopausal women were considered to have metabolic syndrome if they had high fasting blood glucose along with two or more of the following remaining factors of the WHO criteria [20]: implanted into the content and not provided independently. The following is an illustration which creators may discover valuable. [3]

<ul style="list-style-type: none"> • Adiposity: • Body mass index ≥ 30 kg/m² Waist hip ratio > 0.85
<ul style="list-style-type: none"> • Dyslipidemia: • Triglyceride ≥ 150 mg/dl High density lipoprotein < 39 mg/dl
<ul style="list-style-type: none"> • Raised Blood Pressure: $\geq 140/90$ mmHg or medication
<ul style="list-style-type: none"> • Impaired glucose regulation (dysglycemia) previously diagnosed type 2 diabetes

Further, IDF has indicated that central obesity (population specific greater waist circumference) is a main contributing factor for the syndrome. [21] In addition, if a subject has obesity with two of the four components, it is said to be diagnosed with metabolic syndrome. The other components of the metabolic syndrome are impaired fasting blood glucose (≥ 100 mg/dl) or type 2 diabetes, triglyceride (≥ 150 mg/dl), low HDL-C (< 50 mg/dl in women, < 40 mg/dl in men) and blood pressure ($\geq 130/85$ mmHg).

Participants were measured for body weight, height, waist circumference, hip circumference, blood pressure with the written informed consent. Waist Hip Ratio (WHR) and Body Mass Index (BMI) were then calculated from these parameters. All the anthropometric measurements were taken with the standard techniques given by Lohman et al. [22] Blood Pressure was measured twice from the right hand side of the participant in a sitting position, and the average blood pressure was documented in the Performa sheets. The venous blood samples were also taken from each woman for measuring lipid profile and fasting blood glucose level. Descriptive data was reported in the form of percentage. The agreement rate was evaluated between the two different MetS guidelines (WHO and IDF) by kappa statistics. The agreement rate was categorized into five groups: poor ($k \leq 0.20$), fair ($k = 0.21 - 0.40$), moderate ($k = 0.41 - 0.60$), substantial ($k = 0.61 - 0.80$) and very good ($k > 0.80$). [22]

3. RESULTS

A total of 275 postmenopausal women were included in the study. According to WHO and IDF criteria [20,21], the total prevalence of metabolic syndrome among the

females of the present study was 30.91% and 90.55% respectively. The percentages of postmenopausal women with body mass index ≥ 30 kg/m², with waist hip ratio ≥ 0.85 , with systolic blood pressure ≥ 140 mmHg and with diastolic blood pressure ≥ 90 mmHg were 49.07%, 38.89%, 57.87% and 65.74% respectively based on the WHO criteria of the metabolic syndrome.[20] The percentages of participants with unusual values of biochemical components were 52.32% (triglyceride ≥ 150 mg/dl), 6.48% (high density lipoprotein < 39 mg/dl) and 43.06% (fasting blood glucose ≥ 110 mg/dl) respectively.

The percentages of the women with waist circumference ≥ 80 cm, with systolic blood pressure ≥ 130 mmHg, with diastolic blood pressure ≥ 85 mmHg and with unusual values of high density lipoprotein < 50 mg/dl and fasting blood glucose ≥ 100 mg/dl were 92.36%, 93.09%, 90.91%, 48.73% and 55.27% respectively based on the IDF criteria of the metabolic syndrome.[22] The percentages of postmenopausal women with each component of the metabolic syndrome based on both the criteria of the syndrome had shown in Table 1 & 2.[20,21]

Table 1: Prevalence of metabolic syndrome and the components of metabolic syndrome according to WHO criteria [13]

Parameters	Prevalence
Metabolic syndrome (fasting blood glucose + at least two factors)	30.91%
Body mass index ≥ 30 kg/m ²	49.07%
Waist hip ratio ≥ 0.85	38.89%
Systolic Blood Pressure (SBP ≥ 140 mmHg)	57.87%
Diastolic Blood Pressure (DBP ≥ 90 mmHg)	65.74%
Triglyceride (TG ≥ 150 mg/dl)	52.32%
High Density Lipoprotein (HDL < 39 mg/dl)	6.48%
Fasting Blood Glucose (FBG ≥ 110 mg/dl)	43.06%

Table 2: Prevalence of metabolic syndrome and the components of metabolic syndrome according to IDF criteria [21]

Parameters	Prevalence
Metabolic syndrome (central obesity + at least two factors)	90.55%
Waist Circumference (WC ≥ 80 cm)	92.36%
Systolic Blood Pressure (SBP ≥ 130 mmHg)	93.09%
Diastolic Blood Pressure (DBP ≥ 85 mmHg)	90.91%
Triglyceride (TG ≥ 150 mg/dl)	52.32%
High Density Lipoprotein (HDL < 50 mg/dl)	48.73%
Fasting Blood Glucose (FBG ≥ 100 mg/dl)	55.27%

Hypertension was observed to be the most common component of the syndrome according to WHO[13] while high density lipoprotein was the rarest found component of the syndrome based on both the criteria of the syndrome[20,21]. In the present study, poor agreement rate was found between WHO and IDF criteria of the metabolic syndrome. The poor agreement rate between these two different metabolic syndrome guidelines indicated that they did not agree with each other.

Table 3: Rate of agreement between the WHO and IDF criteria of the metabolic syndrome [20, 21,23]

Criteria	WHO (+)	WHO (-)	Total	k
MetS IDF (+)	82	167	249	0.06
IDF (-)	3	23	26	
Total	85	190	275	

4. DISCUSSION

According to WHO and IDF criteria [20, 21], the overall prevalence of metabolic syndrome among the females of the present study was 30.91% and 90.55% respectively. The frequency of metabolic syndrome

based on IDF diagnostic criteria in the women of Himachal Pradesh (India) was 63.6%.[24] The overall prevalence of the syndrome was 54.3% in the highly urbanized Union Territory, Chandigarh, located in Northern India[25].A similar trend of the metabolic syndrome was found in the urban Sikh females of Amritsar, Punjab[26].

Poor relation was found between IDF and WHO criteria of the metabolic syndrome which indicated that they disagree with each other. [20, 21, 23] The disagreement between these criteria was due to the obligatory nature of central obesity for IDF whereas WHO criteria put more focus on insulin resistance. Some studies reported that the prevalence of metabolic syndrome nearer to our results but there were some other studies which show disagreement with the present study. The difference in the prevalence of metabolic syndrome in different studies can be due to different investigation criteria, socioeconomic, genetic and environmental differences.

5. CONCLUSION

The metabolic syndrome is a complex path physiologic state that originates primarily from an imbalance of calorie intake and energy expenditure but also affected by genetic makeup of individual, predominance of sedentary lifestyle over physical activity and other factors like quality and composition of food and composition of gut microbes. It can be concluded from the present study that the postmenopausal status is associated with an increased risk of metabolic syndrome. Findings about high prevalence of central obesity and blood pressure among postmenopausal women with metabolic syndrome indicate a need to treat metabolic syndrome in these women. Metabolic syndrome has become a significant health problem in contemporary world and all efforts should be made to create local awareness, early diagnosis and prevention. This can decrease the burden on limited health resources, prevent complications such as type 2 diabetes mellitus, cardiovascular diseases, and reduce morbidity and early mortality among women. Women, in their childbearing age, should also be advised to balance energy intake and expenditure in order to reduce the alarming rate of the syndrome incidence. Moreover, exercise and consumption of low caloric foods will improve plasma lipid concentrations by raising their HDL cholesterol concentrations, decrease

triglycerides concentrations or both. Furthermore, physical activity is linked with lowered blood pressure, improved glucose intolerance, insulin sensitivity and lowered risk of type 2 diabetes .Therefore, it is important to have more efforts for lipid screening and educational programs to improve women's knowledge about a healthy lifestyle to reduce chances of metabolic syndrome.

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