



WAIST CIRCUMFERENCE AND ITS CORRELATION WITH METABOLIC SYNDROME IN WOMEN ATTENDING GYNAECOLOGY OPD IN A TERTIARY CARE CENTRE IN PONDICHERRY, INDIA

Nirmala Jaget Lakkawar*, Padma Alaganandam and S. Yasodha

Department of Obstetrics & Gynaecology Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), Bharath University, Pondicherry- 605009.

***Author for Correspondence: Dr. Nirmala Jaget Lakkawar**

Department of Obstetrics & Gynaecology Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), Bharath University, Pondicherry- 605009.

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ABSTRACT

Obesity and Metabolic syndrome are important risk factor for cardio-metabolic diseases, including diabetes, hypertension, dyslipidemia, and coronary heart disease (CHD). Several leading national and international institutions, including the World Health Organization (WHO) and the National Institutes of Health, have provided guidelines for classifying weight status based on Body Mass Index (BMI). The present study was carried out to identify the co-relation between waist circumference and other risk factors with metabolic syndrome and to ascertain their significance. This is a prospective observational study conducted in Out Patient Department (OPD) of a tertiary care centre with a study population of 200 patients attending OPD with any gynaecological problem having waist circumference > 80 cm. All the patients were between the ages 18-58 years. 21% of women belonged to high socioeconomic status and 44% and 35% belonged to middle and low socioeconomic status, respectively. Prevalence of metabolic syndrome was seen in 50.5% of women, which was directly proportional to the increased waist circumference. The study concluded that waist circumference is directly related to prevalence of metabolic syndrome, which is on increase due to sedentary life style. Such patients are also prone to cardio-vascular diseases and hormonal imbalance, specifically hypothyroidism.

KEY WORDS: waist circumference, metabolic syndrome, dyslipidemia, diabetes, women.

INTRODUCTION

Obesity is the most common nutritional disorder in the industrialized world. Over the past two decades, there has been a dramatic increase in the number of subjects with obesity. World-wide obesity the numbers of obese individuals have doubled since 1980. In 2008, more than 1.4 billion adults were overweight and out of those over 200 million men and 300 million women were obese.^[1]

Obesity is defined as BMI (Body Mass Index) of ≥ 30 kg/m², overweight with BMI between 25-29.9 kg/m², whereas the BMI between 18.5-24.9 kg/m² is considered, normal.^[2-3] Obesity is associated with various metabolic disorders like hypertension, coronary arterio-sclerosis, elevated cholesterol, type 2 diabetes, stroke, breast and endometrial cancers, etc.^[4]

Clustering many studies which use waist circumference as an index of central obesity suggest fat distribution is also an important determinant for risk factors. In the Insulin Resistance Atherosclerosis Study (IRAS), a large waist circumference was the key prediction of metabolic syndrome.^[5]

Definition of Metabolic syndrome vary and is defined according to different international bodies namely World Health Organisation (WHO), Third report of the National Cholesterol Education Programme expert panel on detection, evaluation and treatment of high blood cholesterol in adults (ATP III)^[6] and International Diabetes Federation (IDF).^[7]

In the present study, the worldwide criteria of IDF consensus was followed. According to new IDF guidelines, the metabolic syndrome defined as, waist circumference of ≥ 90 cm for male and for female ≥ 80 cm (Asian Indian). It is a prerequisite risk factor for the diagnosis of the syndrome in the new definition in addition to any two of the following four factors.

- Raised triglycerides (TG) levels ≥ 150 mg/dL or specific treatment for this lipid abnormality.
- Reduced HDL cholesterol < 40 mg/dL is made as <50mg/dL in females or specific treatment for this lipid abnormality.
- Raised blood pressure: systolic BP ≥ 130 or diastolic BP ≥ 85 mmHG or treatment of previously diagnosed hypertension.
- Raised Fasting Plasma Glucose (FPG) ≥ 100 mg/dL or previously diagnosed type 2 diabetes.

Although in India, various studies have taken cut off points for waist circumference as ≥ 102 cm for males and ≥ 85 cm for females but IDF strongly recommends that for epidemiological studies and wherever possible, for case detection, ethnic group specific cut point should be used for people of the same ethnic group wherever they reside. Hence in this study, 80 cm as cut off point for waist circumference in females was considered [7].

The IDF consensus group [7] has highlighted a number of the parameters that are also related to the metabolic syndrome, which should be included in research studies to help in determining the predictive power of these criteria for CVD and/or Diabetes Mellitus in different ethnic groups like

- a) Abnormal body fat distribution.
- b) General body fat distribution by DXA, central fat distribution by CT/MRI and adipose tissue biomarkers like leptin, adiponectin, liver fat content (MRS).
- c) Atherogenic dyslipidaemia with APOB and small LDL particles.
- d) Dysglycaemia with OGTT.
- e) Insulin resistance by fasting insulin, pro insulin levels, elevated free fatty acid during fasting and OGTT HOMA- IR.
- f) Vascular dysregulation by measuring endothelial dysfunction and microalbuminuria.
- g) Pro-inflammatory state by elevated C- reactive protein, TNF-alpha, IL-6 and decreased in adiponectin plasma levels.
- h) Prothrombotic state by measurement of fibrinolytic factors and clotting factors.
- i) Hormonal factors by assessing the function of pituitary-adrenal axis and once a diagnosis of metabolic syndrome is made, the further future management should be aggressive to reduce the complications by following interventions.

Primary interventions for the management includes:

- a) Moderate calorie restriction (to activate a 5-10 % loss of body weight).
- b) Change in dietary composition.
- c) Moderate increase in physical activities.

Secondary interventions include drug therapy for individuals in whom life style modification was not enough or who are considered to be at high risk for CVD.

With this backdrop, an observational study was conducted in Department of Obstetrics and Gynaecology, Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), Pondicherry, India to screen the obese women attending the gynaecological clinic based on BMI and waist circumference, investigate these patients for metabolic syndrome and correlate the waist circumference with metabolic syndrome.

MATERIAL AND METHODS

A prospective observational study was conducted from March, 2015 to November, 2015 in the gynaecological Out Patient Department (OPD) of Department of Obstetrics & Gynaecology at Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India. 200 patients were selected randomly who attended the OPD for various gynaecological disorders and had waist circumference of ≥ 80 cm.

INCLUSION CRITERIA: Patients with any gynaecological conditions with waist circumference of >80 cm.

EXCLUSION CRITERIA

- 1) Pregnant patients or within postpartum period.
- 2) A known case of thyroid, renal or adrenal disorders.
- 3) Patients with malignancies.
- 4) Patients on hormonal therapy.

A detailed history comprising of present complaints, personal, family, past, medical and surgical history, menstrual and obstetric history. In addition, life style pattern including food habit, physical exercise and physical examination including general and systemic examination conducted including measurement of blood pressure.

BMI and waist circumference measurement was determined and relevant investigations were performed to diagnose or rule out metabolic syndrome such as fasting blood sugar, fasting triglycerides and high density lipoprotein. Additional specialised investigations were done as and when required.

During the entire study period, utmost care was taken to maintain privacy and confidentiality. Ethical clearance was obtained from the Institutional Ethics committee prior to the start of the study. Data entry and statistical analysis was done using SPSS version 16. The data collected using the above mentioned measures were analyzed using frequencies and percentages. Chi square test was used for testing the significance of association at P value of ≤ 0.05 and ≤ 0.01 .

RESULTS

200 patients were selected randomly from the gynaecology OPD who attended the clinic for various disorder and having waist circumference of >80 cm. All the patients were between the ages 18-58 years of age. Significantly ($P \leq 0.01$) higher numbers of patients (28%) were recorded in age group 36-45 years (Table 1). About 21% of women belonged to high socioeconomic status as compared to 44% and 35% from middle and low socioeconomic status, respectively (Table 2). Waist circumference was proportionately higher with increase in age. Incidence of obesity which was seen with high BMI and waist circumference was higher in patients aged 30 years and above. Prevalence of obesity was more in parous women. Prevalence of metabolic syndrome was observed in significantly ($P \leq 0.01$) higher

number (50.5%) of women, which was directly proportional to the increased waist circumference (Table 3). Obesity was also observed in patients with high calorie consumption per day as well as less physical exercise as obtained by history. Out of 50.5% women who had metabolic disorders, 22% had positive family

history of obesity, diabetes mellitus in 18%, 15% had hypertension, 8% had hypertension as well as DM and 4% had family history of coronary artery disease. In addition, 10% of women who had metabolic syndrome showed PCOD also.

Table 1. Distribution of patients based on age of patients

Age of Patients	Number of Patients	Percentage	P value
18-25	28	14	≤0.01
26-35	38	19	
36-45	56	28	
46-55	42	21	
>56 years	36	18	

Table 2. Distribution of patients based on socioeconomic status of patients

Socioeconomic Status	Number of Patients	Percentage	P value
High	42	21	≤0.01
Middle	88	44	
Low	70	35	

Table 3. Distribution of patients according to waist circumference and its correlation with metabolic syndrome

Waist Circumference (In cm)	Number of patients	Percentage	Percentage of patients with Metabolic Syndrome	P value
Between 80-90	35	17.5	2% (5)	≤0.01
91-100	105	52.5	52% (49)	
101-110	28	14	66% (23)	
>111	32	16	78% (24)	

DISCUSSION

Though the pathogenesis of the metabolic syndrome and its components is complex, central obesity and insulin resistance are acknowledged as key causative factors^[7]. Over the years the metabolic syndrome was known earlier with various names like syndrome X, cardio-metabolic syndrome, cardiovascular dysmetabolic syndrome, Beer belly syndrome and Reaven's syndrome.

The IDF consensus group strongly advocates that by emphasising the importance of central adiposity with modification according to ethnic group should be adopted worldwide. This may prove convenient and useful to fellows in clinical practice and to various epidemiological as well as research studies. This approach may help in identification of patients at increased risk of developing CVD and type II diabetes mellitus so that better preventive measures can be taken like lifestyle modification as well as effective treatment of all the components of the syndrome^[7].

The exact prevalence of metabolic syndrome is difficult to obtain from different population in various countries because of limited data and lack of consensus. The prevalence of metabolic syndrome in the present study was higher (50.5 %) in comparison to earlier report (28 %) in Indore, India^[5], wherein the direct correlation of increase in central obesity (waist circumference) with the

increase prevalence of metabolic syndrome was established. The prevalence of metabolic syndrome in population of United States of America (USA) was observed to be 23.7 %. The same authors found the prevalence of metabolic syndrome to be 6.7 % in people aged <30 years and 42– 43% in participants aged 60-70 years. However, higher prevalence (57%) in women than men was reported in population from different ethnic group. The cut off of waist circumference for women is 88 cm as per ATP III and IDF^[8]. In a study conducted in Japan, the cut off for waist circumference for Japanese women was recommended to be 78 cm^[15].

In a study on polycystic ovary syndrome (PCOD), the metabolic syndrome was associated in 43% of cases of PCOD^[9]. However, in the present study prevalence of PCOD was observed in 10% of the cases.

Insulin resistance is thought to be an underlying feature of the metabolic syndrome^[10]. Genetic abnormalities, foetal malnutrition and visceral adiposity may play roles in the patho-physiology of insulin resistance and metabolic syndrome^[11]. Recent studies demonstrate that dietary modification and enhanced physical activity may delay and prevent the transition from impaired glucose tolerance to type II diabetes mellitus and provide relevant treatment paradigms for the patients with the metabolic syndrome^[12, 13, 14]. Proper management of the

individual abnormality of this syndrome can reduce the morbidity and mortality.

CONCLUSION

Persons with metabolic syndrome are at increased risk for developing diabetes mellitus type II and cardiovascular diseases as well as breast and endometrial cancer. The IDF and ATP III draw attention to the importance of metabolic syndrome and provide a working definition of this syndrome. Since the implication of the metabolic syndrome for health care are substantial, the present study sought to establish the prevalence of this condition in women.

The high prevalence of this condition may also have serious implication on health care costs. Hence, urgent need to develop comprehensive efforts directed at controlling the obesity epidemic and improving physical activity levels among the susceptible population.

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DISCLOSURE OF INTERESTS

The authors have no conflicts of interest to declare. All authors participated and approved the article for publication.

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