

Metabolic Syndrome in Indian Population

***Dr. Bharti Sharma, **Divyam Patidar**

**Assistant Professor*

Department of Physical Education

Shaheed Mangal Pandey Government Girls PG College Meerut, U.P.

***Research Scholar*

Laxmibai National Institute of Physical Education Gwalior, M.P.

DOI:10.37648/ijrst.v13i04.007

¹Received: 12 August 2023; Accepted: 09 October 2023; Published: 27 December 2023

INTRODUCTION

Metabolic syndrome is a cluster of various metabolic risk factors that result mainly from an inactive lifestyle, and excess nutrition. Metabolic syndrome reflects the condition of an increase in blood pressure, dyslipidemia, and insulin resistance (1). The metabolic syndrome results in many chronic health diseases, it is associated with sleep apnea, cardiovascular diseases, and many other health issues in the Indian population. The metabolic syndrome affects approximately one-third of the urban population in India's major cities. (24)

Metabolic syndrome is a collection of metabolic risk factors that include abdominal obesity, dyslipidemia, low HDL-c levels, hypertension, and insulin resistance. (1) Metabolic syndrome (MS) affects approximately one-fourth of all adults (2) and is linked to cardiovascular disease (CVD) and early death (3) Insulin is also a key regulator of fat metabolism, reducing lipolysis enzyme activity and HDL metabolism activity, resulting in triglyceride (TG) clearance issues. In the early stages of diabetes, plasma insulin levels are extremely high, resulting in excessive fat synthesis in the body and endogenous high blood TC and TG. One of the factors that contribute to insulin resistance is an increase in fat and a decrease in muscle mass. Due to an extremely high plasma insulin level early in the development of diabetes, the body produces an excessive amount of fat, resulting in endogenously elevated blood TC and TG levels. (4)

Abdominal obesity is quite prevalent in South Asians, with females outnumbering males.[5] Metabolic syndrome leads to many health-related problems. Female metabolic syndrome is associated with PCOD and Agrawal S. et al (2010) concluded in their study that 79 percent prevalence of MS in obstructive sleep apnoea patients compared with 48 percent in the control group. There are many reasons of acquiring MS. So It is necessary to highlight key risk factor among Indian Population so that MS can be prevented.

Numerous national/international organizations have proposed various diagnostic criteria for defining metabolic syndrome. Most recent definition from the Joint Interim Statement [21] of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity and a Consensus Statement for Diagnosis of Obesity, Abdominal Obesity, and the Metabolic Syndrome for Asian Indians.[06]

The presence of any three of the following five conditions is essential, i.e.,

1. Increased waist circumference (males: ≥ 90 cm and for females: ≥ 80 cm),
2. Hypertriglyceridemia ≥ 150 mg/dl (1.7 mmol/l).
3. Low HDL (Males < 40 mg/dl (1 mmol/l) and for females < 50 mg/dl (1.3 mmol/l)
4. elevated blood pressure (systolic blood pressure) ≥ 130 mmHg and/or diastolic blood pressure ≥ 85 mmHg or drug treatment for hypertension), and

¹ How to cite the article: Sharma B., Patidar D.; December 2023; Metabolic Syndrome in Indian Population; *International Journal of Research in Science and Technology*, Vol 13, Issue 4, 52-55, DOI: <http://doi.org/10.37648/ijrst.v13i04.007>

5. elevated blood sugar (fasting blood sugar ≥ 100 mg/ dl (5.6 mmol/l) or drug treatment for diabetes mellitus).

PREVALENCE AND RISK FACTORS METABOLIC SYNDROME IN INDIAN POPULATION:-

Sugar consumption among Indians is increasing. Along with decreased physical activity, a rise in sugar consumption has greater metabolic implications. Indians already have more insulin resistance, hepatic steatosis, and dysglycemia than white Caucasians (22). Increase blood glucose levels stimulate insulin levels, and it is believed that indicates that hyperinsulinemia, in a feed-forward manner, is likely to contribute to metabolic dysfunction and the development of obesity.(20) Insulin resistance is frequently associated with increased ectopic fat storage; it also plays a critical role in decreased metabolic flexibility; higher insulin levels lead to fat accumulation; and Asian Indians have higher hyperinsulinemia or lower insulin sensitivity even when adiposity and some measures of abdominal obesity are matched to those of other ethnic groups, indicating de novo insulin resistance. (7) Other studies conclude that subclinical inflammation (high C-reactive protein levels) is linked to insulin resistance (8) High C-reactive protein levels have been reported in adult South Asians and Asian Indians (11),(12) This all gives Indians a proclivity for insulin resistance, abdominal adiposity and ectopic fat deposition, hyperglycemia, and lead metabolic syndrome. (21)

(Krishnamoorthy et al., 2020) analyzed data from 111 studies with 133,926 participants. The study found that the prevalence of MS among the adult population in India was 30%, it was also concluded that the prevalence of metabolic syndrome among people in urban areas was 32% which is higher than the prevalence of metabolic syndrome among tribal (28%) and rural areas (22%) and gender-wise comparison revealed that females have more prevalence of metabolic syndrome than males. (13)

Another study done by (Deedwania et al., 2014) on an Indian population for this study was 6198 subjects from eleven cities in India using cluster sampling. This study revealed that the occurrence of the metabolic syndrome using Asian-specific criteria in men is 33.3% and in women 40.4%. This study also informed that the occurrence of high blood pressure, impaired fasting glucose, and high triglycerides among females was 46.3%, 28 %, and 31.5 % respectively. While the occurrence of high blood pressure, impaired fasting glucose, and high triglycerides among males was 50.6%, 29.0%, and 41.2 respectively which is higher than in females but in the case of the prevalence of high waist circumference and low HDL cholesterol was more in females have been reported. Indian Women possess more chance of acquiring metabolic syndrome because of low HDL cholesterol levels. (14) Prasad, et al. (2012) studied an urban eastern Indian population and one of their conclusions was that significant gender differences with a higher prevalence of metabolic syndrome in females as compared to males (42.3% vs. 24.9%).

In another study on the South Indian urban population, Krishnaswamy reported mean HDL cholesterol levels of 36.6 11.8 mg/dl in urban men and 39.111.9 mg/dl in rural women. Krishnaswami S. also concluded that the average HDL cholesterol in men was 39.5 8 mg/dl and 39.0 9 mg/dl in women. This could be related to the Indian population's high prevalence of hypoalphalipoproteinemia. (15) search studies of association of HDL – Mets.

(Malhotra et al., 1998) Study in a rural north Indian population, 2964 participants aged 16 to 70 years were investigated. Insulin resistance was assessed in 68 newly diagnosed hypertension patients, 82 matched controls, and 58 family controls. Fasting and post-glucose load serum insulin levels were found to be strongly linked with hypertension. (16)

(Misra et al., 2002) In an urban north Indian slum, 532 participants (170 men, 362 women) were researched. Insulin resistance was found in 18.5 - 22.5% of the women studied. Insulin resistance was found to be associated with body fat, central obesity, hypertension, and hypercholesterolemia. (17)

(Ravikiran et al., 2010) conducted population-based cross-sectional survey in Chandigarh, 2225 subjects aged ≥ 20 years were studied, and the prevalence of metabolic syndrome was found to be 35.8%. (NCEP ATP III). According to the modified NCEP ATP III criteria, Females were more likely to have central obesity, while males were more likely to have high blood pressure. Growing age, female gender, sedentary lifestyle, and a family history of diabetes were all risk factors for Metabolic syndrome. (23)

Asian Indians are metabolically obese but not necessarily obese physically. People can have metabolic syndrome with gaining physical obesity. In a study by (Gupta et al., 2004) even with modified BMI cut-off values for South Asians/Asians, 33% of subjects did not have general obesity but still had metabolic syndrome. Furthermore, Asian Indians' levels of physical activity are declining, and the present study reveals 43% of the subjects with metabolic syndrome are physically inactive. The higher prevalence of metabolic syndrome in Asian Indians at a younger age is particularly concerning, as it implies that they will be exposed to atherosclerotic risk factors associated with metabolic syndrome for a longer period of time. (19)

DISCUSSION OF FINDINGS-

Metabolic is one of the major health problems in India. (Krishnamoorthy et al., 2020) the study found that the prevalence of MS among the adult population in India was 30%, Due to a sedentary lifestyle and excess intake of sugar, and inappropriate diet, there is an increase in the prevalence of metabolic syndrome. Asian Indians' levels of physical activity are declining, and (Gupta et al., 2004) study reveals that 43% of the subjects with metabolic syndrome are physically inactive. (19)

Insulin resistance is one of the major risk factors for developing the condition metabolic syndrome. (Misra et al., 2014) informed that Indians already have insulin resistance, hepatic steatosis, and dysglycemia than white Caucasians (22). A further inactive lifestyle increases fat deposition and decreases muscle mass. (Pradhan et al., 2003) revealed that subclinical inflammation (high C-reactive protein levels) is linked to insulin resistance. High C-reactive protein levels have been reported in adult South Asians and Asian Indians (11),(12)

Indian Women possess more chance of acquiring metabolic syndrome because of low HDL cholesterol levels. (14) Krishnaswami S. also concluded that the average HDL cholesterol in men was 39.5 8 mg/dl and 39.0 9 mg/dl in women. MetS incidence increased in tandem with the decline in HDL. Adults with low HDL levels were more likely to develop MetS over time. (25)

While it has been seen that obesity has a positive relation with metabolic syndrome but 33% of subjects did not have general obesity but still had metabolic syndrome. So, it is not necessary that those having less amount of obesity, are not suspected of metabolic syndrome, this conception may lead to avoiding taking care of their health if they are not obese.

After interpreting the outcome of various studies, the possible risk factor for metabolic syndrome among Indians is Low levels of HDL, High C-reactive protein, insulin resistance, consumption of sugar, and lack of physical activity. Especially in the case of females' central obesity is an alarming sign for MS. The lack of guidelines for various risk factors such as cholesterol, triglycerides, High-density lipoprotein (HDL-C), and systolic and diastolic blood pressure in Indians impede treatment. (18). Improving lifestyle, adopting physical activity as a daily routine and good diet with less sugar can be very helpful in preventing metabolic syndrome among the Indian population.

CONCLUSION

Metabolic syndrome is one of the major health problems among Indians, it is found that Indians have higher C – reactive protein, insulin resistance, lower levels of HDL, and excess Intake of sugar are the major cause of Metabolic syndrome.

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