The Connections Between Body Composition Parameters And Circulating Biomarkers In Patients With Metabolic Syndrome

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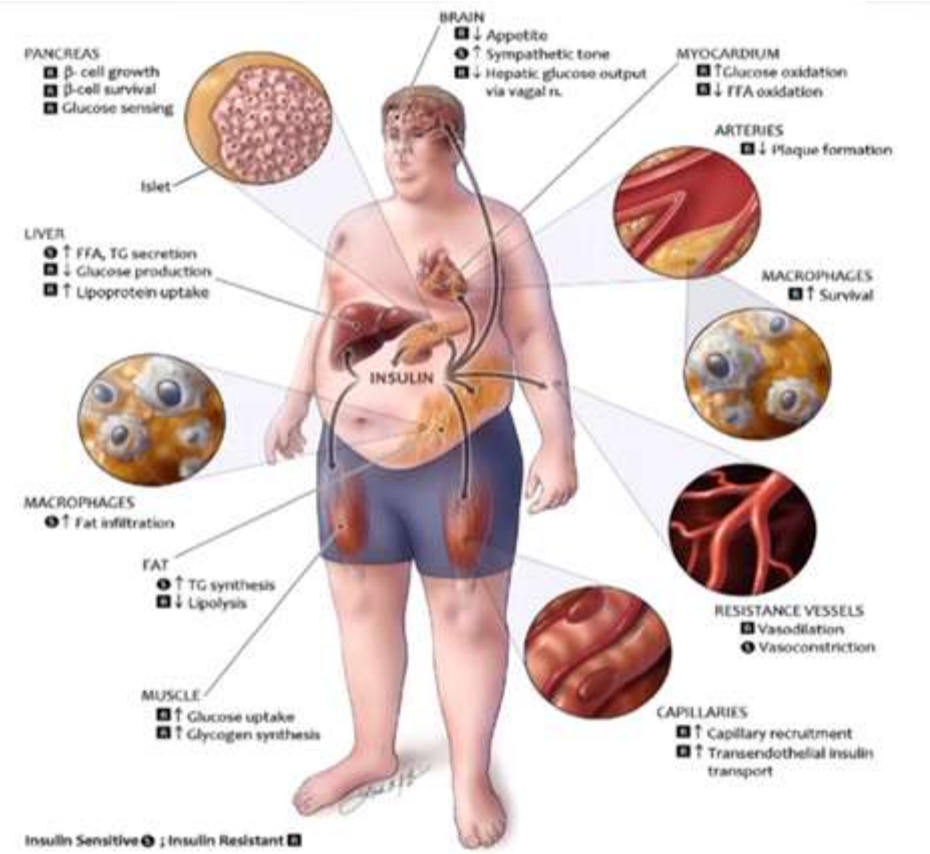
INTRODUCTION

Non-communicable diseases (NCDs) fall into two main categories. Diabetes mellitus, cancer, cardiovascular disease, and chronic respiratory disorders are the four primary disease categories that make up the first category. The second group includes rheumatoid arthritis, osteopenia/osteoporosis, hypertension, dyslipidemia, obesity, metabolic syndrome, cerebrovascular disease, degenerative disk disease, sarcopenia and frailty, depression, cognitive impairment, and neurodegenerative illness. NCDs are acknowledged as a significant obstacle to sustainable development in the 2030 Agenda for Sustainable Development. Premature deaths from non-communicable diseases in India also significantly contribute to this loss of productivity, according to the data that is currently available. India has the "highest loss in potentially productive years of life" of any nation in the world when it comes to fatalities from cardiovascular diseases alone.

According to NCEP ATP-III (2002), Grundy et al. (2005), and Alberti et al. (2005), metabolic syndrome is a grouping of any three conditions: elevated blood pressure, elevated blood sugar, extra body fat around the waist, and abnormal cholesterol or triglyceride levels. This raises the risk of cancer, heart disease, and stroke. According to Rajendran et al.'s study from 2021, metabolic syndrome is prevalent (72.6% according to modified ATP III) among outpatients who visit the tertiary care hospital's cardiology and diabetology outpatient department. According to a cross-sectional study, 16.7% of people in the Kancheepuram district's rural areas had metabolic syndrome (Selvaraj et al., 2019). A person does not necessarily have metabolic syndrome if they only have one of these disorders. Any of these disorders, however, can raise the chance of developing a significant illness, and this risk rises as the number of medical problems rises. Aggressive lifestyle modifications have also been shown to postpone or even stop the onset of significant health issues linked to metabolic syndrome. Thus, it is crucial to focus on primary prevention to lessen the epidemic state.

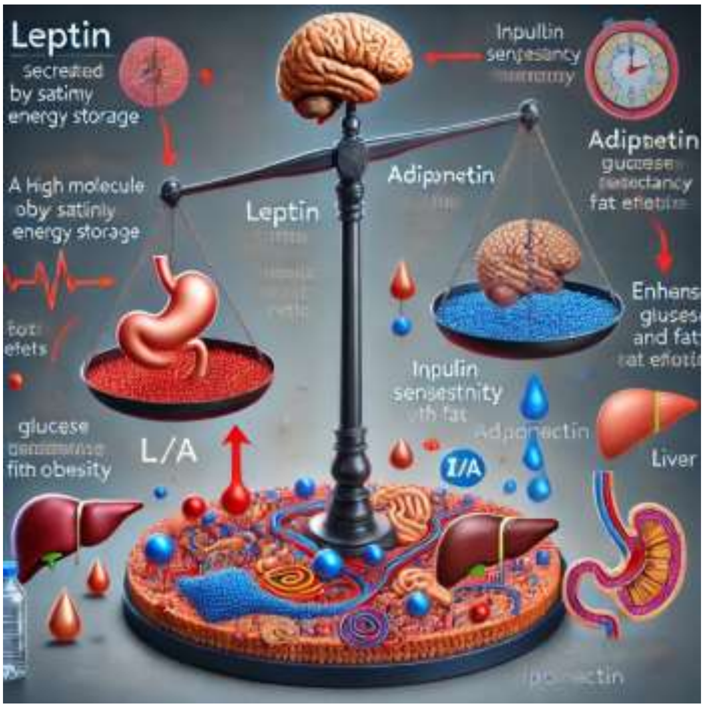
Physical inactivity and being overweight or obese are closely associated with metabolic syndrome. Additionally, it is associated with insulin resistance. The pancreas produces the hormone insulin, which facilitates the uptake of sugar by cells for use as fuel. Usually, the digestive system breaks down glucose from food. The body tries to regulate blood glucose levels by producing more and more insulin, but in individuals with insulin resistance, blood glucose levels rise because cells do not respond to insulin, and glucose cannot enter the cells as readily. The risk of metabolic syndrome can also be raised by lifestyle choices such as smoking, drinking alcohol, or using tobacco products. The prevalence of overweight and obesity is a serious issue for global health and the prevention of chronic diseases. Sedentary lifestyles have risen due to urbanisation, mechanical transportation, economic expansion, and industrialisation. Over the past three decades, the prevalence of obesity has doubled due to a nutritional shift toward processed foods and high-calorie diets. Due to the rising rate of obesity in the country, Indians are more likely to acquire metabolic syndrome. Changes in lifestyle, such as eating a healthy, balanced diet, exercising frequently, and decreasing weight if required, are typically part of treating and managing metabolic syndrome.



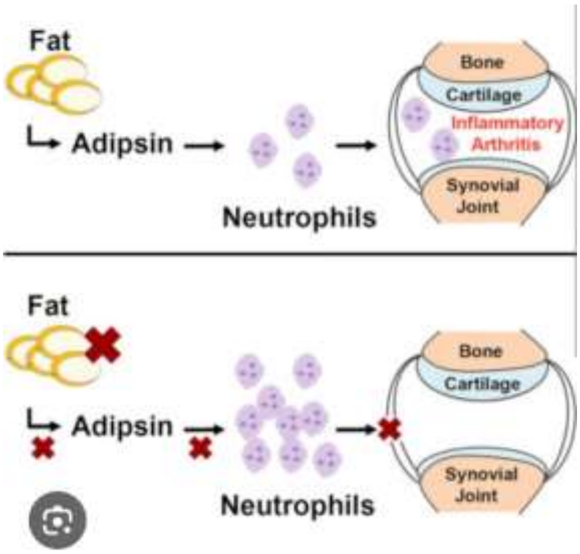
The complex ailment known as metabolic syndrome (MetS) is regarded as a global public health burden [1,2] and is linked to elevated serum lipids, type 2 diabetes mellitus (T2DM), and an increased risk of cardiovascular diseases (CVDs). Abdominal obesity, insulin resistance, raised arterial blood pressure, elevated triglycerides, and decreased HDL-C contribute to MetS, resulting from physiological, biochemical, and metabolic abnormalities [6,7]. Whether these aspects of MetS are distinct diseases or part of a more extensive, shared pathogenic process is still up for dispute.

Although the pathophysiology of MetS is thought to be caused by several theories, the most prevalent ones are insulin resistance and chronic inflammation, especially adipose tissue (AT) inflammation. In this context, several MetS pathologies, such as type 2 diabetes, obesity, hypertension, and cardiovascular diseases, have been associated with growth and differentiation factor 15 (GDF-15), a member of the transforming growth factor-β (TGF-β) superfamily. Patients with MetS have higher levels of GDF-15 in their blood. GDF-15 may also function as an adipokine because it is secreted by adipocytes and expressed in AT.

It is commonly known that the development of obesity and insulin resistance is strongly linked to adipokines, primarily leptin and adiponectin, as well as the ratio of leptin/adiponectin (L/A). Interestingly, the L/A ratio correlates more with the risk of type 2 diabetes than either leptin or adiponectin alone. Notably, a higher GDF-15/adiponectin ratio (G/A) was discovered to be independently linked to a higher risk of type 2 diabetes, indicating that this ratio could be a disease biomarker.



Increased levels of the natural glycoprotein Follistatin and numerous other adipokines, including chemerin and adiposin, are linked to MetS-related disorders and implicated in inflammation. In individuals with MetS, it has been demonstrated that increased levels of chemerin in the blood are associated with inflammation and insulin resistance. Adipsin's plasma concentrations positively correlate with metabolic risk anomalies in non-alcoholic fatty liver disease, and it plays a significant role in energy balance, glucose and lipid metabolism, and islet β-cell activity. According to recent reports, Follistatin plasma levels have been linked to an increased risk of type 2 diabetes by causing insulin resistance in adipose tissue. Furthermore, in another study, these authors found that Follistatin levels are linked to a higher risk of heart failure, which may be partially mediated by type 2 diabetes. Still, they are also linked to stroke, ischemic stroke, and other pathological disorders on their own.



A significant body of research suggests systemic inflammation also has a role in the onset of MetS. The monocyte-to-high-density lipoprotein cholesterol ratio (MHR) is a frequent systemic inflammatory marker used to evaluate inflammation in CVDs. MHR was higher in patients with MetS than in controls, and it showed a positive correlation with the severity of MetS. Therefore, we aimed to determine the degree to which MetS is linked to this inflammatory marker in our cohort.
A growing body of research indicates that alterations in body composition are linked to modifications in metabolic parameters, which raise the risk of MetS. For instance, while fat mass (FM) increases the risk of MetS, lean body mass and appendicular skeletal mass have a protective impact. It should be noted, therefore, that there is currently little and conflicting published data about the potential link between MetS and body composition, specifically body mass index (BMI). Measures of obesity, particularly BMI, have been repeatedly associated with MetS, and some research indicates that BMI is the best indicator of body composition's relationship to MetS. Other research, however, has found that a higher BMI does not always translate into a higher risk of MetS. Furthermore, assessing individual compartments, such as fat and muscular mass separately, may more effectively assess the body composition connection with MetS because BMI is a surrogate measure of body composition that includes all types of tissues, including fat, lean, and skeletal mass.
In conclusion, several earlier research looked at how several possible risk factors can contribute to the development of MetS. However, this is the first study to assess the joint relationship between several inflammatory variables and several particular body composition traits and MetS.

REVIEW OF LITERATURE
Laaksonen, David E. et al. A prospective cohort study on the development of diabetes mellitus, metabolic syndrome, and the use and validation of recently proposed definitions of the metabolic syndrome was carried out by et al. (2002). We compared four definitions based on WHO and NCEP guidelines. When identifying the 47 prevalent and 51 incident cases of diabetes, the WHO criteria that

included waist-hip ratio > 0.90 or body mass index ≥ 30 kg/m2 was the most sensitive and least specific. Despite being the most specific (0.89 and 0.90), the NCEP definition, which classified obesity as waist circumference > 102 cm, only identified 61% of prevalent and 41% of incident diabetes. Given its comparatively high sensitivity and specificity in predicting diabetes, the WHO definition appears reliable. Although it is relatively insensitive in predicting diabetes, the NCEP definition, which includes a waist circumference of more than 102 cm, also identifies people at high risk for the disease.

Garcia M. et al. To improve blood glucose management, blood pressure (BP) control, diabetic complications, and hypoglycemia episodes, al. (2002) conducted a study on the quality of life of diabetic patients. Two cross-sectional samples of patients with type II diabetes were randomly assigned to blood glucose management treatments. The generic questionnaire (EQ5D) evaluated general health, whereas the particular questionnaire evaluated specific domains of QOL, such as symptoms, work satisfaction, cognitive errors (Cognitive Failures Questionnaire), and mood disruption (Profile of Mood State). Type 2 diabetes problems in patients impacted QOL, but it was unaffected by treatment strategies that were demonstrated to lower the likelihood of complications.

Bott, Uwe et al. In a population-based study, al. (2002) evaluated the psychometric qualities of the Diabetes-Specific Quality-of-Life Scale for Patients with Type II Diabetes in a sizable sample of patients with Type II diabetes. The diabetes-specific quality-of-life scale (DSQOLS), which included 64 items on individual treatment goals (10 items), satisfaction with treatment success (10 items), and diabetes-related distress (44 items), was completed by 657 patients in total. A validated well-being scale and treatment satisfaction substantially correlated with the six subscales. The scale can identify societal injustices and differentiate between patients on various diets and treatment plans.

A review of the prevalence of type 2 diabetes and metabolic syndrome in children and adolescents was conducted by D. Molnar (2004). According to population-based data, type II diabetes mellitus is on the rise, particularly among minorities and in the United States, as a result of the childhood obesity epidemic. Regarding type II diabetes mellitus in children and adolescents, no population-based incidence and prevalence statistics are available for European countries. The extent of the issue appears to be significantly smaller in the European Caucasian population than in North America, based on the currently available data.

To ascertain the percentage of MS among patients with type 2 DM and its correlation with MS risk factors, Ali Hussein Alwan and Ameer Alhusuny (2004) carried out a cross-sectional study at Merjan Teaching Hospital in Al Hilla City on 300 patients with type 2 diabetes. According to the findings, 226 (75.3%) of the 300 diabetic individuals had multiple sclerosis. Seventy-seven per cent of individuals had hypertension. Compared to those with normal triglycerides, those with elevated triglycerides had a 71-fold increased risk of developing multiple sclerosis. According to the study's findings, a significant percentage of MS patients had type II diabetes.

Viter et al. al. (2004) investigated the metabolic syndrome's prevalence, components, and related lifestyle and demographic characteristics in people with type 2 diabetes. 200 individuals with a history of type 2 diabetes undergoing treatment at the Tamale Teaching Hospital's outpatient clinic in Ghana participated in this cross-sectional study. MetS was present in 24.0% of the population (n=48). Compared to men (13.0%, n = 6), the prevalence was higher in women (27.3%, n = 42). Abdominal obesity (77.0%) and increased FPG (77.0%), which indicate uncontrolled diabetes, were the most prevalent MetS components. High blood pressure was more common in men (56.5%) than in women (40.3%), with a prevalence of 44.0% (n=88).

Maumus Sandy et al. A prospective study on the prevalence of metabolic syndrome in 371 healthy French families was carried out by al. (2005). In women, the prevalence of metabolic syndrome was 2.1%, whereas in men it was 5.9%. It appears to predict low HDL cholesterol and elevated TNF-α, two important cardiovascular variables, in the children of affected individuals. Therefore, even in populations that appear to be healthy, it is crucial to identify and monitor individuals with metabolic syndrome and their children to facilitate early illness therapy.

In a cross-sectional study of 732 women from the Nurses' Health Study I cohort (83), Dario Giugliano (2006) evaluated the impact of diet on metabolic syndrome and discovered that, after controlling for all confounders, the Western pattern had a positive relationship with CRP, E-selectin, sICAM-1, and sVCAM-1, while a prudent pattern was inversely associated with plasma concentrations of these two markers. Higher plasma CRP levels in men have also been observed to correlate with the Western pattern (42) positively. Furthermore, the risk of type II diabetes is increased by a Western-style eating pattern that elevates chronic inflammation.

Patel J. L. et al. (2008) examined the metabolic syndrome's clinical profile and its constituent parts in individuals with type II diabetes mellitus and their asymptomatic first-degree relatives. Participants with type II diabetes mellitus (T2DM) who were older than 40 and their asymptomatic first-degree relatives who were older than 30 were chosen at random. 85% of T2DM participants had metabolic syndrome, 30% of males and 80% of females had central obesity, 90% had hypertension, and 85% had low HDL. 48.7% of asymptomatic first-degree relatives of T2DM sufferers had metabolic syndrome, which includes impaired glucose tolerance, low HDL, hypertension, and central obesity.

Kamble Pranita et al. (2009) conducted a study on metabolic syndrome in 300 adults in rural Wardha, central India, who were chosen at random. Following an overnight fast, a blood sample was obtained and subjected to biochemical quantification, including measurements of triglycerides, total cholesterol, and fasting blood sugar. Adults in Wardha's rural areas have a lower prevalence of metabolic syndrome than those in urban areas. In these study participants, a BMI of 23.32 kg/m and above was observed to predict a considerable risk of metabolic syndrome.

Pyykkönen, Antti-Jussi et al. (2009) used a large population-based cohort to evaluate relationships between stressful life events, their accumulation, and the metabolic syndrome. 3,407 women and men living in Western Finland between 18 and 78 made up this population-based, random sample. Fifteen stressful life events related to housing, job, social relationships, health, and finances were self-rated for severity. The accumulation of stressful life experiences was linked to triglycerides, obesity, and insulin resistance.

Chuengsamarn Somlak et al. (2010) conducted a study titled "Association between Metabolic Syndrome and Risk of Cardiovascular Disease," stratified by sex and used a variety of criteria. 608 participants participated in a cross-sectional study at the Thai Internal Medicine outpatient clinic. Blood pressure had the highest correlation with cardiovascular risk among the various components of metabolic syndrome. According to the IDF criterion, high blood pressure and the cutoff point of waist circumference in females and high triglycerides in males are the proper factors to forecast cardiovascular risks.

Chillarón Juan J. et al. To ascertain the frequency of metabolic syndrome in individuals with type 1 diabetes and pinpoint risk variables, al. (2010) conducted a cross-sectional investigation in Spain. Metabolic syndrome was present in 31.9% of type-1 diabetic patients overall. Furthermore, the prevalence of microangiopathy, which reached 100% in individuals who fit all diagnostic criteria, was directly correlated with the number of metabolic syndrome components present. Patients with type 1 diabetes frequently experienced metabolic syndrome, which was linked to microvascular problems.

Rodríguez Angel et al. (2010) investigated risk factors linked to metabolic syndrome in individuals with type II diabetes mellitus based on the International Diabetes Federation, Third Report National Cholesterol Education Program, and World Health Organization criteria. Glycosylated haemoglobin (HbA1c) of 7%, hypertension, and dyslipidemia were linked to a higher risk of metabolic syndrome as defined by the WHO. The necessity for a single clinically and epidemiologically meaningful definition of metabolic syndrome is supported by the fact that the risk factors for the syndrome in individuals with type II diabetes mellitus are strongly influenced by the criteria used to define it.

To investigate the separate and combined relationships between physical activity, body mass index, and the likelihood of developing metabolic syndrome in 448 police officers, Hyelim Yoo (2011) evaluated factors that contribute to the condition in law enforcement personnel. Of all the subjects, 27.5% had metabolic syndrome, 48.7% were overweight, and 31.7% were obese. In police officers, a higher risk of metabolic syndrome was linked to both lower levels of physical activity and higher BMI.

Katulanda Prasad et al. (2012) used a population-based cross-sectional study between 2005 and 2006 to analyse the prevalence pattern and correlates of metabolic syndrome in adults in Sri Lanka. The

International Diabetes Federation's criteria defined MS. Gender, age group, place of residence, ethnicity, income, education, and physical activity were the independent co-variants. The age-adjusted prevalence of MS was 24.3%, whereas the crude prevalence was 27.1%. The frequency was considerably higher in urban adults (34.8%) than in rural people (21.6%). According to the study's findings, about one-fourth of Sri Lankan individuals suffer from multiple sclerosis.

The frequency of metabolic syndrome and concomitant diseases among elderly home residents was investigated by Sathyanarayana Rao K.N. and Subbalakshmi N K. (2012). 180 participants of either sex living in assisted living facilities between the ages of 55 and 75 participated in this study. Of the study participants, 57.67% had metabolic syndrome. The age group of 55–60 years had a greater prevalence of metabolic syndrome. The group with metabolic syndrome had a more significant disease load of hypertension, diabetes mellitus, and dyslipidemia. The frequency of subjects with hyperglycemia and blood pressure was higher in the metabolic syndrome group than in the non-metabolic syndrome group among patients undergoing therapy for diabetes and hypertension.

Tziallas Dimitrios et al. (2012) assessed patients with metabolic syndrome's health-related quality of life. The purpose of this research is to determine whether depression and poorer health-related quality of life (HRQoL) are linked to MetS. HRQoL was evaluated using the Medical Outcomes Study, Short Form 36 (SF 36). Among subjects with MetSyn, anxiety [60%] and depressive symptoms [67%] were prevalent. There was no change in the general or mental health of MetSyn patients receiving a treatment approach. More depressive behaviours and a lower HRQoL were linked to MetSyn participation.

Muhammad Zafar Iqbal Hydrie (2012) studied metabolic syndrome, insulin resistance, and primary prevention as risk factors for type 2 diabetes mellitus. In 2004, an epidemiological survey was conducted among 500 randomly chosen houses in the urban Lyari neighbourhood of Karachi. The study found a high frequency of metabolic syndrome. Dietary adjustments should be implemented within the population to start preventative programs because there are notable variations in dietary patterns that appear to increase the risk of metabolic syndrome in the same population.

Yadav Dhananjay et al. al. (2013) conducted a study in the Gwalior Chambal Region of Central India on the prevalence of Metabolic Syndrome in Type II Diabetes Mellitus utilising the NCEP-ATPIII, IDF and WHO Definition and Its Agreement. Determining the prevalence of metabolic syndrome (Met S) in individuals with type II diabetes mellitus (T2DM) was the study's goal. The World Health Organization (WHO), the International Diabetes Federation, and the National Cholesterol Education Program (NCEP) ATPIII Criteria were used to quantify the metabolic syndrome and determine whether the three criteria used to identify metabolic syndrome were consistent. All subjects had their anthropometry blood pressure, blood lipids (T-cholesterol, triglycerides, and HDL-cholesterol), and fasting blood glucose tested. The highest frequency of metabolic syndrome was noted when IDF criteria were followed.

Tan Mun Chieng et al. (2013) conducted a comparative analysis of the prevalence of metabolic syndrome in individuals with type II diabetes in Malaysia using the WHO, NCEP ATP III, IDF, and Harmonized criteria. 313 patients with type II diabetes mellitus (T2DM) from two tertiary institutions in Malaysia participated in this study. The WHO, NCEP ATP III, IDF, and Harmonized definitions all reported a 95.8% overall prevalence rate of MetS. While the Harmonized criteria against all three definitions demonstrated the highest specificity (100%) in detecting MetS, the WHO against NCEP ATP III criteria demonstrated the highest sensitivity (99.66%). In summary, out of the four definitions used, the new Harmonized criteria determined the highest prevalence of MetS. The WHO and NCEP ATP III standards were in excellent agreement.

Simões Patrícia Passos et al. (2013) carried out a study to identify the presence of metabolic syndrome in the Brazilian population and describe the characteristics of individuals with diabetes mellitus type II (DM2). Of the patients (n = 54), 42.5% had dyslipidemia. The mean value of the BMI evaluation was 29.7 kg/m. The fasting glucose mean and standard deviation were higher than usual. The prevalence of MetS in the population under study was about 32%. Overweight, hypertension, and poor glycemic control were prevalent in the population under study.

Asian Indians in the US were evaluated for Type II Diabetes Risk by Annie Thomas and Alyce Ashcraft (2013). Thirty-seven adult Asian Indian volunteers, aged 20 to 70, who did not have diabetes, participated in the study using a descriptive correlational methodology. Of the participants, 21 (56.82%) had a family history of type II diabetes. Just nine participants had hypertension, and the majority (75.75%) had blood pressure readings less than 120/82 mmHg within the month before the study. A higher body fat percentage and Body Mass Index (BMI) were linked to decreased physical activity.

Pathania Deepak et al. In a rural part of the Ambala district of Haryana, al. (2014) conducted a community-based cross-sectional investigation to identify metabolic syndrome. A multi-stage cluster sampling technique was used to determine the necessary sample size. Anthropometric parameters like height, weight, and waist circumference were measured using accepted practices. Out of 1200 participants, 110 (9.2%) had MS, with females having a higher prevalence (11.64%) than males (6.45%). A larger waist circumference was associated with a higher prevalence of MS. Most MS cases (88.8%) had fasting blood sugar levels in the range of 150–200 mg/dl.

A cross-sectional study was carried out by Jaspinder Kaur (2014) to evaluate and screen risk factors for metabolic syndrome and its constituent parts. According to the updated National Cholesterol Education Program–Adult Treatment Panel III criteria, the frequency of MetS was 17.38%. In addition to promoting healthy eating habits and physically active lifestyles that may help combat the growing epidemic of Metabolic Syndrome, everyday concerns of female gender, increasing age and BMI, sedentary lifestyle, stress, and positive family history should be taken into consideration for early identification and appropriate intervention.

Murad, Manal A. et al. A case-control research called Assessment of the Common Risk Factors Associated with Type II Diabetes Mellitus in Jeddah was conducted by al. (2014). Any Saudi adult, male or female, with a fasting blood glucose level of 126 mg/dl or higher who was known to have diabetes was recruited as a case. As controls, Saudi Primary Health Care Centre (PHC) employees who did not have diabetes were chosen. Data from 159 cases and 128 controls were gathered using a pretested questionnaire. According to the study, cases were more likely than controls to be male, native to eastern Saudi Arabia, have less education, be retired, earn less money, or be married or divorced.

Naji J. Aljohani (2014) evaluated metabolic syndrome risk factors in Saudi Arabian individuals. This epidemiologic investigation established the incidence of MetS throughout the kingdom. 4578 Saudis between the ages of 15 and 64 were chosen at random from 20 different locations in Saudi Arabia. The overall prevalence of MetS is 28.3%, according to the results. Males had a substantially higher prevalence than females. The northern and central regions had the highest prevalence of MetS, which increased in tandem with age and inversely with educational attainment. MetS was significantly influenced by region as well.

Roohafza Hamidreza et al. al. (2014) investigated the connection between psychological distress and metabolic syndrome and its constituent parts. Three counties in central Iran were used to choose 9553 men and women at least 19 years old. 9553 participants (50 per cent male) had an average age of 38.7 ± 15.8 years. After controlling for demographic variables, hypertension, central adiposity, and MetS were linked to significant distress. According to the study's findings, the correlation between MetS and its main elements and a considerable degree of discomfort highlights how crucial it is to incorporate psychological testing and treatment into the routine care of MetS patients.

Bergmann N. et al. A meta-analysis of chronic psychosocial stress as a risk factor for the onset of metabolic syndrome (MES) was conducted by al. (2014). There were thirty-nine studies. The four components of MES are as follows: i) weight gain: prospective studies supported the etiological roles of relationship stress, perceived stress, and distress, whereas work-related stress (WS) studies displayed contradictory findings; ii) dyslipidemia: there were insufficient studies on psychosocial stress as a risk factor for dyslipidemia to draw firm conclusions, but there was a trend toward a positive association; iii) type II diabetes mellitus (DM2): prospective studies supported perceived stress and distress as risk factors for the development of DM2 in men. iv) hypertension: blood pressure (BP) may be impacted by marital stress and perceived stress; however, no correlation was observed with distress.

Spasic, Ana et al. (2014) conducted a cross-sectional study in the City of Niš involving 86 patients with type II diabetes mellitus. The short-form survey (SF-36), which generates an 8-scale health profile, was used to measure the patient's health-related quality of life. Particularly in the vitality and pain dimensions, male respondents felt their quality of life was higher than that of female respondents. The QOL scores of the co-morbid patients (93.64%) were lower across the board. For diabetes patients, a high quality of life is the ultimate objective and a significant result of all medical interventions. Patients with uncontrolled diabetes had a worse quality of life than those with controlled diabetes.

A study by U Sinha and B Mukhopadhyay (2015) examined how lifestyle and sociodemographic factors affected metabolic syndrome in Kolkata's urban senior population. In the middle-class urban region of Salt Lake City, Kolkata, 100 Bengali women and 108 men between the ages of 65 and 79 were randomly chosen between 2010 and 2012. Using the three distinct criteria, the prevalence of MetS was 34.13%, 47.12%, and 35.58%. In males, MetS was linked to hypertension and hypertriglyceridemia; in females, it was related to obesity, low HDL, and hypertension. Compared to other Indian towns, the Salt Lake city of Kolkata had a comparatively greater prevalence of MetS.

Nicola Magnavita (2015) conducted a study to assess the relationship between metabolic syndrome and psychological harm brought on by typical occupational trauma. 571 employees from 20 small Italian businesses were asked to complete the Psychological Injury Risk Indicator (PIRI) as part of their regular on-the-job medical assessment. Those with a high PIRI score were substantially more likely to have at least one metabolic syndrome component than those without psychological harm. Male employees were significantly more likely to have hypertriglyceridemia, and female employees were significantly more likely to have hypertension.

A systematic evaluation of Iranian studies on the quality of life for people with diabetes was conducted by Aliasghar A. Kiadaliri in 2015. In Iran, the health-related quality of life (HRQoL) assessment among people with diabetes has increased within the past ten years. 46 studies, in all, met the requirements for inclusion and were added to the review. The majority of research examined HRQoL in individuals with type II diabetes. The primary tools utilised in these investigations were the WHO Quality of Life instruments (WHOQOL) and the Short Form Health Survey (SF-36). Research revealed that the HRQoL of individuals with diabetes was poorer than that of those without the disease. Better HRQoL among diabetic patients was linked to improved socioeconomic position and management of cardiovascular risk factors.

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