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Original Research Article

A study to assess the correlation between metabolic syndrome and cardio-cerebrovascular diseases among the patients admitted in the selected hospitals, Lucknow

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Abstract: Metabolic syndrome (MetS) is a cluster of risk factors such as central obesity, hypertension, dyslipidemia, and hyperglycemia that predispose individuals to cardio-cerebrovascular diseases (CVDs and CeVDs). Both conditions are major contributors to morbidity and mortality in India, making it important to explore their correlation in hospital settings. This cross-sectional hospital-based study was conducted among 30 admitted patients in St. Mary's Polyclinic, Lucknow, chosen through non-probability purposive sampling. Data were collected using a socio-demographic and lifestyle proforma, a metabolic syndrome assessment checklist, and a cardio-cerebrovascular disease record form. Analysis was performed using descriptive statistics and inferential tests such as chi-square and Fisher's Exact test. The findings revealed that 53.3% of patients with metabolic syndrome had cardio-cerebrovascular disease compared to 26.7% without, though the association was not statistically significant ($\chi^2 = 2.143$, $p = 0.143$). Smoking/tobacco use showed a significant association with metabolic syndrome ($\chi^2 = 9.65$, $p = 0.008$; Fisher's $p = 0.005$). For cardio-cerebrovascular diseases, education, smoking, and history of hypertension were significantly associated. The study concludes that while metabolic syndrome did not show a statistically significant correlation with cardio-cerebrovascular diseases in this sample, lifestyle factors such as smoking and hypertension remain important determinants, highlighting the need for preventive strategies, health education, and lifestyle modification programs.

Keywords: Metabolic syndrome, cardio-cerebrovascular diseases, correlation, risk factors, Lucknow, hospital-based study.

INTRODUCTION

Metabolic syndrome (MetS) is a complex cluster of interrelated metabolic abnormalities that significantly increase the risk of developing cardiovascular and cerebrovascular diseases. It is characterized by the coexistence of central obesity, dyslipidemia, hypertension, and impaired glucose metabolism. The syndrome reflects an underlying pathophysiological state of insulin resistance and chronic inflammation, both of which are major contributors to vascular dysfunction (Alberti et al., 2009). Globally, the prevalence of metabolic syndrome has been rising alarmingly, paralleling the increase in obesity and sedentary lifestyles (Saklayen, 2018).

Cardio-cerebrovascular diseases, including coronary artery disease, myocardial infarction, stroke, and transient ischemic attacks, remain the leading causes of morbidity and mortality worldwide. According to the World Health Organization (WHO, 2021), cardiovascular diseases account for nearly one-third of all deaths globally, with a disproportionate burden in low- and middle-income countries. In India, rapid urbanization, lifestyle transitions, and dietary changes have further accelerated the incidence of both metabolic syndrome and cardio-cerebrovascular conditions, posing significant public health challenges (Prasad et al., 2022).

The interplay between metabolic syndrome and cardio-cerebrovascular diseases is well documented.

Each component of metabolic syndrome—whether hypertension, hyperglycemia, dyslipidemia, or obesity—independently increases the risk of vascular complications. When these risk factors cluster together, the likelihood of developing severe cardiovascular and cerebrovascular outcomes multiplies (Mottillo et al., 2010). Early identification of this correlation is crucial for designing preventive strategies, optimizing patient care, and reducing the healthcare burden associated with long-term complications.

Lucknow, being a rapidly developing urban center in Uttar Pradesh, reflects the dual burden of lifestyle-related disorders and their complications. Hospitals in the city frequently encounter patients admitted with cardiovascular and cerebrovascular conditions, many of whom also present with underlying metabolic syndrome. Assessing the correlation between these two conditions in this setting is highly relevant, as it will provide insight into the magnitude of the problem and guide clinicians and policymakers in implementing targeted interventions.
Therefore, this study is undertaken to assess the correlation between metabolic syndrome and cardio-cerebrovascular diseases among patients admitted in St. Mary's Polyclinic, Lucknow hospitals at Lucknow, with the ultimate aim of strengthening preventive healthcare approaches and improving patient outcomes.

Need for the Study

Metabolic syndrome has emerged as one of the most significant non-communicable health problems of the 21st century. Its presence not only increases the likelihood of developing type 2 diabetes but also amplifies the risk of cardio-cerebrovascular diseases such as myocardial infarction and stroke (Saklayen, 2018). With the rising prevalence of obesity, sedentary behavior, and dietary imbalances, metabolic syndrome is being increasingly identified among hospital-admitted patients, particularly in urban centers of India (Prasad et al., 2022).

Cardio-cerebrovascular diseases are among the leading causes of death in India, accounting for over 28% of all mortality (WHO, 2021). Uttar Pradesh, including its capital city Lucknow, reports a high burden of cardiovascular and cerebrovascular morbidity due to lifestyle transitions, urban stress, and poor health-seeking behavior (Gupta et al., 2019). This makes it imperative to understand how metabolic syndrome contributes to the development and severity of these conditions in hospitalized patients.

Although the association between metabolic syndrome and vascular diseases has been well-documented in global literature (Mottillo et al., 2010), there is limited region-specific data from North India, particularly Lucknow. Hospital-based studies focusing on this correlation will provide critical insights into the epidemiology of metabolic syndrome in admitted patients and its direct relationship with cardio-cerebrovascular outcomes. Such evidence can guide clinicians in early screening, targeted interventions, and integrated disease management approaches.

Furthermore, identifying the correlation in this specific population will help policymakers and health administrators develop preventive strategies such as lifestyle modification programs, structured health education, and routine screening of metabolic risk factors in hospitals. Early detection and management of metabolic syndrome can significantly reduce the incidence, recurrence, and complications of cardio-cerebrovascular diseases, ultimately improving quality of life and reducing healthcare costs.

Therefore, this study is needed to highlight the magnitude of the problem, generate hospital-based evidence, and strengthen preventive and therapeutic strategies against cardio-cerebrovascular diseases among patients with metabolic syndrome in Lucknow.

Objectives

1. To examine the correlation between metabolic syndrome and cardio-cerebrovascular diseases among patients admitted in selected hospitals at Lucknow.
2. To analyze the association between selected socio-demographic variables (age, gender, occupation, lifestyle factors) and the occurrence of metabolic syndrome and cardio-cerebrovascular diseases.

Hypotheses

- **H1:** There will be a significant correlation between metabolic syndrome and cardio-cerebrovascular diseases among admitted patients.
- **H2:** There will be a significant association between selected socio-demographic variables and metabolic syndrome among admitted patients.
- **H3:** There will be a significant association between selected socio-demographic variables and cardio-cerebrovascular diseases among admitted patients.
- **H0 (Null Hypothesis):** There will be no significant correlation between metabolic syndrome and cardio-cerebrovascular diseases among admitted patients in selected hospitals at Lucknow.

Research Approach

A **quantitative, non-experimental correlational**

research approach was adopted to assess the relationship between metabolic syndrome and cardio-cerebrovascular diseases among patients admitted in St. Mary's Polyclinic, Lucknow.

Research Design

The study utilized a **cross-sectional hospital-based design**. Data were collected at a single point in time from admitted patients using structured tools, and associations were analyzed statistically.

Research Setting

The study was conducted in **St. Mary's Polyclinic, Lucknow, Uttar Pradesh**, where patients were admitted with varied medical conditions, including cardiovascular and cerebrovascular disorders.

Population

The target population comprised **adult patients admitted to St. Mary's Polyclinic, Lucknow** during the study period.

Sample and Sample Size

- **Sample size:** 30 patients.

Inclusion criteria:

  - Patients aged ≥18 years.
  - Patients admitted with or without a diagnosis of cardio-cerebrovascular disease.
  - Patients with available clinical/laboratory reports for metabolic syndrome components.
  - Patients willing to participate and provide informed consent.
- **Exclusion criteria:**
  - Patients with gestational diabetes mellitus.
  - Critically ill or unconscious patients unable to respond.

Sampling Technique

A **non-probability purposive sampling technique** was used to select eligible patients fulfilling the inclusion criteria.

Variables

- **Independent variable:** Presence of metabolic syndrome (assessed by IDF/NCEP ATP III criteria).
- **Dependent variable:** Presence and severity of cardio-cerebrovascular diseases (CAD, MI, stroke, TIA).
- **Associated variables:** Socio-demographic and lifestyle factors (age, gender, education, occupation, residence, income, smoking, alcohol, physical activity, diet, hypertension, diabetes, family history).

Tools for Data Collection

Three structured tools were developed and validated:

1. **Socio-demographic and Lifestyle Proforma**
   - Age, gender, marital status, education, occupation, residence, income, lifestyle factors (smoking, alcohol, physical activity, dietary habits), and family/medical history.
2. **Metabolic Syndrome Assessment Checklist**
   - Waist circumference
   - Blood pressure
   - Fasting blood sugar
   - Triglycerides
   - HDL cholesterol
   - *Interpretation:* Presence of ≥3 criteria = Metabolic Syndrome
3. **Cardio-Cerebrovascular Disease Record Form**
   - Coronary Artery Disease (CAD)
   - Myocardial Infarction (MI)
   - Stroke (ischemic/hemorrhagic)
   - Transient Ischemic Attack (TIA)
   - Confirmed through physician diagnosis and medical records.

Data Collection Procedure

- Permission was obtained from hospital authorities and institutional ethics committee.
- Eligible patients were identified based on inclusion criteria.
- Informed consent was obtained from each participant.
- Demographic and lifestyle data were collected through structured interviews.
- Clinical and laboratory values were extracted from case records/reports.
- Presence of cardio-cerebrovascular diseases was confirmed from hospital records.

Plan for Data Analysis

Data were coded, tabulated, and analyzed using descriptive and inferential statistics:

- **Descriptive statistics:** Frequency, percentage, mean, and standard deviation for socio-demographic and clinical variables.
- **Inferential statistics:**
  - Chi-square test / Fisher's Exact test for association between variables.
  - Contingency tables for correlation between metabolic syndrome and CVD/CeVD.
  - Significance level set at $p < 0.05$.

Ethical Considerations

- Approval obtained from the Institutional Ethics Committee.
- Written informed consent was taken from all participants.
- Confidentiality and anonymity of data maintained.
- Patients had the right to withdraw at any stage without affecting their treatment.

RESULTS

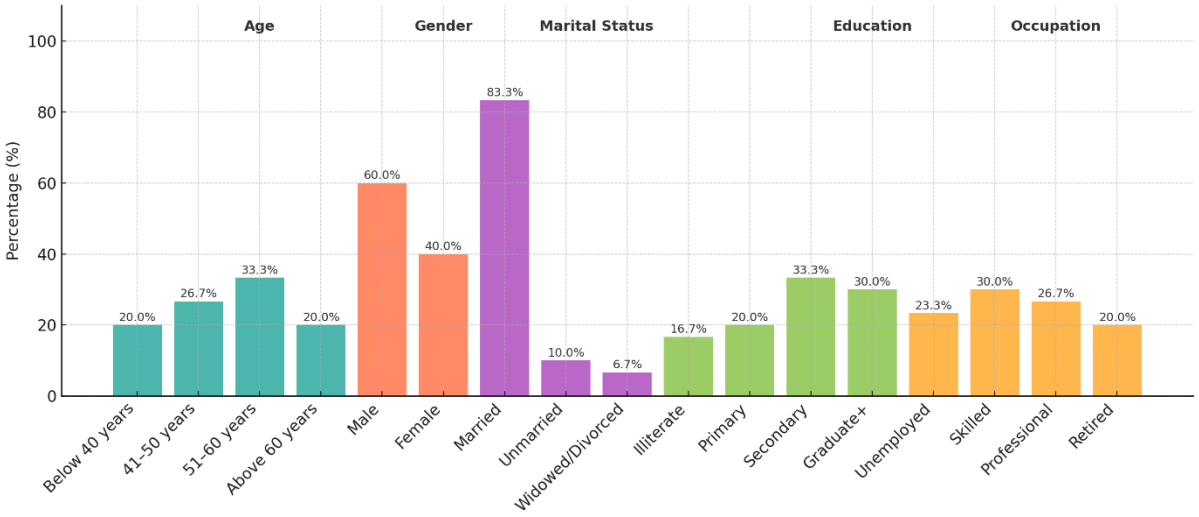

Figure 1: Percentage distribution based on the age, gender, marital status, education and occupation.

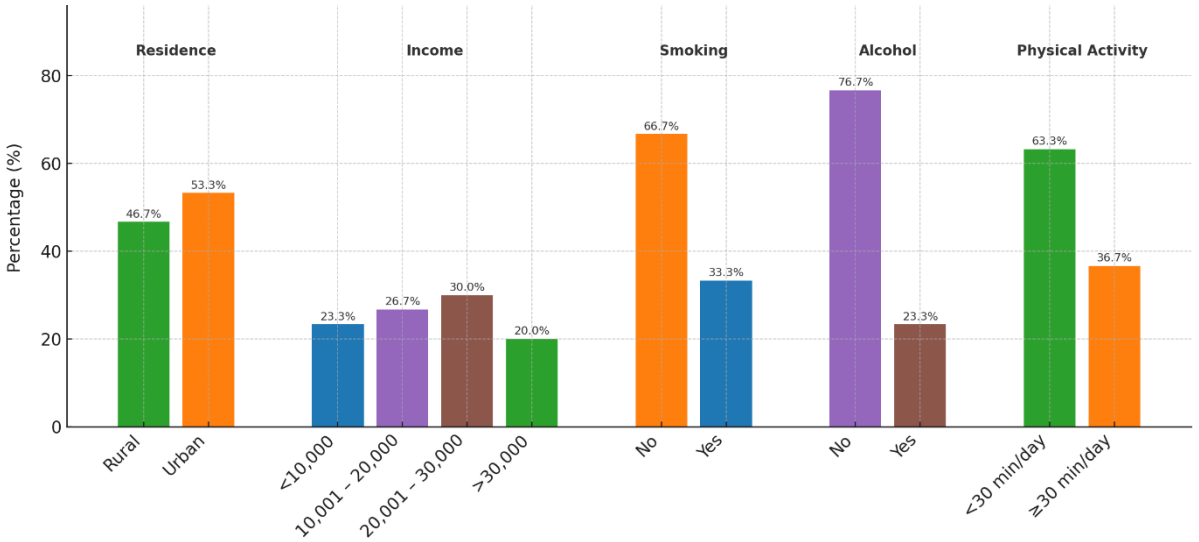

Figure 2: Percentage distribution based on the residence, income, smoking, alcohol and physical activity

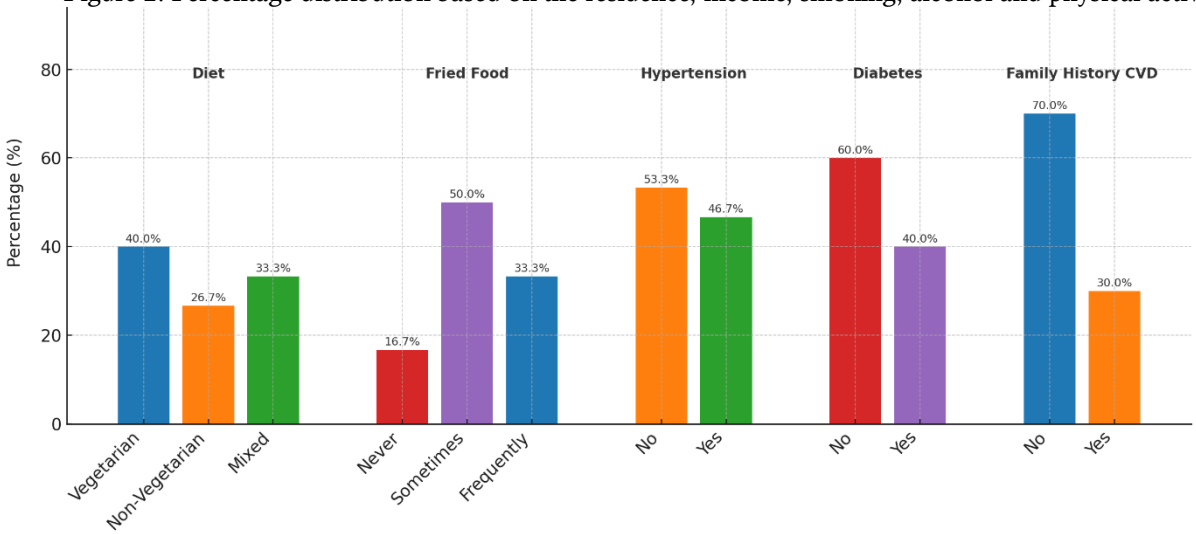

Figure 3: Percentage distribution based on the diet, fried food, hypertension, diabetes and family history

Table 1: Corelation between metabolic syndrome and cardio-cerebrovascular disease

Test Statistic	Value	df	p-value
Pearson χ^2	2.143	1	0.143
Fisher's Exact	—	—	0.176

The contingency table showed that among patients with metabolic syndrome, **53.3%** had cardio-cerebrovascular disease, compared to **26.7%** among those without metabolic syndrome. However, this association was not statistically significant ($\chi^2 = 2.143$, df = 1, p = 0.143). Therefore, the hypothesis (H1) is rejected.

Table 2: Association between demographic variables and Cardio-Cerebrovascular Disease Severity (N = 30)

Variable	χ^2 (df)	p-value (χ^2)	Fisher's Exact p
Age	5.56 (6)	0.474	0.545
Gender	2.82 (2)	0.244	0.272
Marital Status	7.09 (4)	0.131	0.207
Education	4.71 (6)	0.582	0.722
Occupation	4.18 (6)	0.652	0.754
Type of Residence	0.579 (2)	0.749	0.892
Monthly Family Income	4.48 (6)	0.612	0.641
Smoking / Tobacco Use	9.65 (2)	**0.008***	**0.005***
Alcohol Consumption	1.68 (2)	0.431	0.537
Physical Activity	1.31 (2)	0.519	0.614
Dietary Habit	2.86 (4)	0.582	0.635
Fried / Fatty Food Consumption	4.63 (4)	0.328	0.294
History of Hypertension	1.11 (2)	0.573	0.634
History of Diabetes Mellitus	2.54 (2)	0.281	0.308
Family History of CVD	3.70 (2)	0.157	0.216

Out of the fifteen socio-demographic and clinical variables tested, only smoking/tobacco use showed a statistically significant association with the severity of metabolic syndrome ($\chi^2 = 9.65$, df = 2, p = 0.008; Fisher's Exact p = 0.005). All other variables did not demonstrate significant associations (p > 0.05). Therefore, the hypothesis (H2) is accepted.

Table 3: **Association between Socio-Demographic Variables and Cardio-Cerebrovascular Disease Severity (N = 30)**

Variable	χ^2 (df)	p-value (χ^2)	Fisher's Exact p
Age	4.09 (6)	0.664	0.686
Gender	4.26 (2)	0.119	0.143
Marital Status	6.86 (4)	0.144	0.205
Education	14.6 (6)	**0.023***	**0.014***
Occupation	5.50 (6)	0.482	0.617
Type of Residence	0.368 (2)	0.832	0.899
Monthly Family Income	6.81 (6)	0.339	0.393
Smoking / Tobacco Use	7.82 (2)	**0.020***	**0.025***
Alcohol Consumption	1.45 (2)	0.484	0.640
Physical Activity	2.86 (2)	0.240	0.343
Dietary Habit	4.62 (4)	0.328	0.424
Fried / Fatty Food Consumption	3.91 (4)	0.418	0.454
History of Hypertension	7.54 (2)	**0.023***	**0.032***
History of Diabetes Mellitus	3.44 (2)	0.179	0.220
Family History of CVD	2.11 (2)	0.348	0.466

(*Significant at p < 0.05)

Out of the fifteen socio-demographic and lifestyle variables tested, three demonstrated statistically significant associations with the severity of cardio-cerebrovascular disease. These were education ($\chi^2 = 14.6$, p = 0.023; Fisher's p = 0.014), smoking/tobacco use ($\chi^2 = 7.82$, p = 0.020; Fisher's p = 0.025), and history of hypertension ($\chi^2 = 7.54$, p = 0.023; Fisher's p = 0.032). All other variables did not show significant associations (p > 0.05). Therefore, the hypothesis (H3) stating that selected socio-demographic variables are associated with cardio-cerebrovascular diseases is accepted.

DISCUSSION

This study assessed the correlation between metabolic syndrome and cardio-cerebrovascular diseases among admitted patients in Lucknow. Although 53.3% of patients with metabolic syndrome had cardio-cerebrovascular disease compared to 26.7% without, the association was not statistically significant ($\chi^2 = 2.143$, $p = 0.143$). This contrasts with larger studies reporting significant correlations, suggesting the need for a bigger sample size.

Among socio-demographic and clinical variables, smoking/tobacco use showed a significant association with metabolic syndrome, consistent with literature linking tobacco use to insulin resistance and dyslipidemia. For cardio-cerebrovascular diseases, education, smoking, and history of hypertension were significantly associated, confirming their role as established risk factors.

Overall, while metabolic syndrome did not show a significant correlation in this study, lifestyle factors—particularly smoking and hypertension—emerged as important determinants. These findings emphasize the need for targeted preventive strategies and patient education in hospital and community settings.

Conclusion

The study concludes that while metabolic syndrome showed a higher proportion of cardio-cerebrovascular disease, the correlation was not statistically significant in this sample. However, lifestyle and clinical factors, especially smoking and hypertension, played a significant role in disease occurrence. These findings highlight the importance of preventive measures, health education, and lifestyle modifications to reduce the burden of cardio-cerebrovascular diseases in patients with metabolic risk factors.

Summary

The study was conducted to assess the correlation between metabolic syndrome and cardio-cerebrovascular diseases among patients admitted in St. Mary's Polyclinic, Lucknow. A cross-sectional design was adopted with 30 participants, and data were collected using a socio-demographic proforma, metabolic syndrome checklist, and cardio-cerebrovascular disease record form.

Findings showed that 53.3% of patients with metabolic syndrome had cardio-cerebrovascular disease compared to 26.7% without metabolic syndrome, though the association was not statistically significant. Among socio-demographic and clinical variables, smoking/tobacco use was significantly associated with metabolic syndrome. For cardio-cerebrovascular diseases, education, smoking, and hypertension were significantly associated. Other variables did not show significant associations.

Conflict of Interest

The investigator declares that there is no conflict of interest regarding the conduct of this study.

Funding

This research was self-funded by the investigator. No external financial support or sponsorship was received for the study.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee prior to data collection. Formal permission was also obtained from the hospital authorities where the study was conducted. Written informed consent was taken from all participants after explaining the purpose of the study, and participants were assured of the right to withdraw at any time without affecting their treatment. Confidentiality and anonymity of the collected data were strictly maintained throughout the study.

References

1. Alberti, K. G. M. M., Eckel, R. H., Grundy, S. M., Zimmet, P. Z., Cleeman, J. I., Donato, K. A., ... & Smith, S. C. (2009). Harmonizing the metabolic syndrome: A joint interim statement 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. Circulation, 120(16), 1640–1645. https://doi.org/10.1161/CIRCULATIONAHA.109.192644
2. Gupta, R., Mohan, I., & Narula, J. (2019). Trends in coronary heart disease epidemiology in India. Annals of Global Health, 82(2), 307–315. https://doi.org/10.1016/j.aogh.2016.04.002
3. Mottillo, S., Filion, K. B., Genest, J., Joseph, L., Pilote, L., Poirier, P., ... & Eisenberg, M. J. (2010). The metabolic syndrome and cardiovascular risk: A systematic review and meta-analysis. Journal of the American College of Cardiology, 56(14), 1113–1132. https://doi.org/10.1016/j.jacc.2010.05.034
4. Mottillo, S., Filion, K. B., Genest, J., Joseph, L., Pilote, L., Poirier, P., ... & Eisenberg, M. J. (2010). The metabolic syndrome and cardiovascular risk: A systematic review and meta-analysis. Journal of the American College of Cardiology, 56(14), 1113–1132. https://doi.org/10.1016/j.jacc.2010.05.034
5. Prasad, D. S., Kabir, Z., Dash, A. K., & Das, B. C. (2022). Metabolic syndrome: An Indian

public health perspective. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 16(2), 102–110. https://doi.org/10.1016/j.dsx.2022.102482

6. Prasad, D. S., Kabir, Z., Dash, A. K., & Das, B. C. (2022). Metabolic syndrome: An Indian public health perspective. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 16(2), 102–110. https://doi.org/10.1016/j.dsx.2022.102482
7. Saklayen, M. G. (2018). The global epidemic of the metabolic syndrome. Current Hypertension Reports, 20(2), 12. https://doi.org/10.1007/s11906-018-0812-z
8. Saklayen, M. G. (2018). The global epidemic of the metabolic syndrome. Current Hypertension Reports, 20(2), 12. https://doi.org/10.1007/s11906-018-0812-z
9. World Health Organization. (2021). Cardiovascular diseases (CVDs). https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
10. World Health Organization. (2021). Cardiovascular diseases (CVDs). https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

