

Metabolic Syndrome: Modern India's Biggest Botheration and Concern

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India has added an alarming number of 135 million individuals to the list of being obese and the prevalence varies from rural to urban.^{1,2} Unlike the United States where obesity is prevalent among the lower income group, in India the urban population and states with high socio-economic status have high obesity rates.^{1,2} Our nation is in a translational state between poverty and obesity. While poverty rules in areas of low economic background obesity take precedence because of industrialization and rapid urbanization.¹⁻⁴ Obesity has led India to be a land of metabolic syndrome (MS) not just among adults but among adolescents as well. Studies in India throw light on the prevalence of the metabolic syndrome related to socio-economic, demographic, and lifestyle risk factors.¹⁻⁵ In a representative sample of Indian men and women by the International Diabetic Federation (IDF) criteria for metabolic syndrome, it is quite clear that metabolic syndrome is more prevalent among women than men.⁶ This recent rise in the prevalence of MS in India may be directly linked with rapid economic development and urbanization in the country influencing drastic changes in lifestyle patterns and nutrition.^{2,3}

Metabolic syndrome is a group of interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of cardiovascular diseases, type 2 diabetes mellitus (DM), cancer, and all-cause mortality.^{2,3,7} It is constituted by abdominal obesity, insulin resistance, hypertension, and hyperlipidemia. the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III).⁷⁻⁹ The main reason why metabolic syndrome is attracting scientific and commercial interest is that the factors defining the syndrome are associated with increased morbidity and mortality.

Most of the studies from India indicate a higher risk of metabolic syndrome among people belonging to higher-income groups and the wealthy. The main reason attributed is the sedentary lifestyle adopted.^{2,3,7} Also, a strong positive correlation between metabolic syndrome and post-menopausal women is well established in India.⁷ Also, studies show significant prevalence or susceptibility to metabolic syndrome among widowed, divorced, or separated women.^{6,7} The need to advocate for women's health and well-being is an important need in India. Metabolic syndrome in women leads to most of the women's cancers apart from type 2 diabetes and obesity. The prevalence of MS among adult females in India is reported to be 35% (95% CI: 31–38%); while for males, the prevalence is predicted at 26% (95% CI: 22–29%). There is significant heterogeneity among the studies reporting prevalence in females and males ($I^2 = 98\%$, $p < 0.001$).^{6,7}

The most appalling aspect of metabolic syndrome in India is the way it has affected the adolescent population. Studies indicate a higher prevalence of MS in males (5.7%) than females (4.7%). The

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adolescents who resided in urban areas had higher odds of having MS as compared to those living in rural areas (7.9% vs 4.2%).^{10,11} The reason stated for the higher prevalence in adolescents living in urban areas could be because of changes in the standards of living, unhealthy dietary habits, and the adoption of sedentary lifestyles. In urban India, an increase in the ownership of television, computer, and other modern amenities with, growing income has led adolescents to a sedentary lifestyle with low physical activities. This is regarded as an important association and risk factor of MS. The overall affinity to fast food and adopting a lifestyle where parents and caretakers depend on junk and adulterated food is also a major risk factor for metabolic syndrome. There is also a geographical variability observed among the adolescent population in India as regards metabolic syndrome. The major reasons are the level of urbanization, and access to fast food outlets, for adolescents, in six states (Uttar Pradesh, Karnataka, Gujarat, Tamil Nadu, Madhya Pradesh, and West Bengal) contribute to more than half the burden of MS in the country.¹⁰

Metabolic syndrome has also affected rural India.¹² Over 10.7% of the males and 20.3% of the females have been diagnosed with MS. Irrespective of sex, older individuals, being overweight/obese (body mass index of ≥ 23 kg/m²) had a higher probability of developing MS, whereas being underweight is deemed a protective factor against MS.^{2,3,7,12,13}

In Tamil Nadu, a cross-sectional based study was conducted in the rural area of Kancheepuram district recruited 360 participants between the age group of 20–40 years from nine villages using modified NCEP-ATP III guidelines, criteria for MS were evaluated. The study showed a high prevalence of MS amongst men 31–40 years and a strong association between MS and lifestyle risk factors could be a major health problem in rural areas, indicating that it was not necessarily a result of modernization. These findings make it critical to plan further healthcare interventions to prevent the adverse consequences of the disease.¹⁴

To summarize India lacks a nationwide pooled estimate to comment or predict on the burden of MS in the country that could then lead to policy action. Most of the studies reveal that in India women are more prone to MS than men. The treatment of MS is well observed in the adolescent in India with a lack of exercise and physical activity. Therefore, understanding the overall prevalence of MS in India becomes essential for predicting the future burden of type 2 DM and cardiovascular diseases. There is an alarming rise in MS in Indian rural areas reflecting increasing morbidity and mortality from heart disease. There is an urgent need to target interventions for rural women who appear to have the highest prevalence of cardiovascular risk factors. Prevention strategies should target knowledge and management of serum cholesterol and high blood pressure, which are both treatable and represent the most common preventable risk factors in this population. In India, overweight and obesity have been significantly associated with metabolic syndrome.

Given the evidence, clinicians and policymakers alike should implement weight reduction strategies among their patients and the general population. Though current results provide some crucial information for a better understanding of the association of anthropometric risk factors and metabolic syndrome, longitudinal studies are still needed to establish the temporality of the association and the causal link. Understanding this causal link with a special focus on the dose–response relationship will overcome a crucial barrier in the management of patients with metabolic syndrome and help prevent many cardiovascular diseases and deaths in India. For India MS led cancer is another developing story. We need a good team of clinical, research, advocates, and health care personnel to work in these areas very effectively with the government enhancing support.

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REFERENCES

- Ahirwar R, Mondal PR. Prevalence of obesity in India: A systematic review. *Diabetes Metab Syndr* 2019;13(1):318–321. DOI: 10.1016/j.dsx.2018.08.032.
- Barik A, Das K, Chowdhury A, Rai RK. Metabolic syndrome among rural Indian adults. *Clin Nutr ESPEN* 2018;23:129–135. DOI: 10.1016/j.clnesp.2017.11.002.
- Meher T, Sahoo H. The epidemiological profile of metabolic syndrome in Indian population: A comparative study between men and women. *Clin Epidemiol Glob Health* 2020;8(4):1047–1052. DOI: <https://doi.org/10.1016/j.cegh.2020.03.018>.
- Balkau B, Charles MA. Comment on the provisional report from the WHO consultation. European group for the study of insulin resistance (EGIR). *Diabet Med* 1999;16(5):442–443. DOI: 10.1046/j.1464-5491.1999.00059.x.
- National Cholesterol Education Program (NCEP) expert panel on detection and treatment of high blood cholesterol in adults. Third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment Panel III) final report. *Circulation* 2002;106(25):3143–3421. PMID: 12485966.
- Zimmer P, Magliano D, Matsuzawa Y, Alberti G, Shaw J. The metabolic syndrome: A global public health problem and a new definition. *J Atheroscler Thromb* 2005;12(6):295–300. DOI: 10.5551/jat.12.295.
- Krishnamoorthy Y, Rajaa S, Murali S, Rehman T, Sahoo J, Kar SS. Prevalence of metabolic syndrome among adult population in India: A systematic review and meta-analysis. *PLoS One* 2020;15(10):e0240971. DOI: 10.1371/journal.pone.0240971.
- Lipsy RJ. The national cholesterol education program adult treatment panel III guidelines. 2003;9(1):1–5. DOI: <https://www.jmcp.org/doi/pdf/10.18553/jmcp.2003.9.s1.2>.
- Consensus statements [Internet]. [cited 2019 Oct 22]. Available from: <https://www.idf.org/e-library/consensus-statements/60-idfconsensus-worldwide-definition-of-the-metabolic-syndrome.html>
- Ramesh S, Abraham RA, Sarna A, Sachdev HS, Porwal A, Khan N, et al. Prevalence of metabolic syndrome among adolescents in India: A population-based study. *BMC Endocr Disord* 2022;22(1):258. DOI: 10.1186/s12902-022-01163-8.
- Kapil U, Kaur S. Prevalence of pediatrics metabolic syndrome (PMS) amongst children in the age group of 6–18 years belonging to high income group residing in National Capital Territory (NCT) of Delhi. *Indian J Pediatr* 2010;77(9):1041. DOI: 10.1007/s12098-010-0195-x.
- Krupp K, Adsul P, Wilcox ML, Srinivas V, Frank E, Srinivas A, et al. Prevalence and correlates of metabolic syndrome among rural women in Mysore, India. *Indian Heart J* 2020;72(6):582–588. DOI: 10.1016/j.ihj.2020.09.015.
- Sundarakumar JS, Stezin A, Menesgere AL, Ravindranath V, SANSCOG and TLSA Collaborators. Rural-urban and gender differences in metabolic syndrome in the aging population from southern India: Two parallel, prospective cohort studies. *EclinicalMedicine* 2022;47:101395. DOI: 10.1016/j.eclinm.2022.101395.
- Selvaraj P, Muthunaryanan L. Prevalence of metabolic syndrome and associated risk factors among men in a Rural Health Centre Area in Tamil Nadu. *J Lif* 2019;9(1):44–51. DOI: 10.15280/jlm.2019.9.1.44.