AYUSHDHARA
ISSN: 2393-9583 (P)/ 2393-9591 (O)
An International Journal of Research in AYUSH and Allied Systems

Research Article

PREVALENCE OF *ATISTHAULYA* AND METABOLIC SYNDROME RISK FACTORS AMONG ADULTS IN SELECTED *PANCHAYATS* OF *MALAPPURAM* DISTRICT, KERALA: A CROSS-SECTIONAL STUDY

Jyoti Hiremath[1]*, M. C. Shobhana[2], Ashwani Kumar[3]

*[1]Assistant Professor, Department of Swasthavritta Evam Yoga, Government Ayurvedic College, Patiala, Punjab,
[2]Professor, Department of Swasthavritha, Vaidyaratnam P. S. Varier Ayurveda College, Kottakkal, Kerala,
[3]Medical Officer, National Institute of Ayurveda, Jaipur, Rajasthan, India.

Article info

Article History:
Received: 24-08-2026
Accepted: 21-09-2026
Published: 02-11-2026

KEYWORDS:
Atisthaulya, Obesity, Metabolic Syndrome.

ABSTRACT

Obesity is an important modifiable contributor to chronic disease, including cardiovascular disease and type 2 diabetes. Metabolic syndrome is a clustering of cardiometabolic risk factors, including central obesity, elevated blood pressure, raised glucose and dyslipidaemia. *Atisthaulya*, described in Ayurveda as excessive accumulation of *Meda* and *Mamsa dhatu*, has clinical overlap with contemporary concerns about obesity and cardiometabolic risk. District-level data from Malappuram were reported to be limited. **Objective:** To estimate the prevalence of *Atisthaulya* and metabolic syndrome among adults aged 20–50 years in selected Panchayats of Malappuram district, Kerala, and describe their sociodemographic, lifestyle, anthropometric and biochemical characteristics. **Methods**: This cross-sectional study aimed to estimate the prevalence of *Atisthaulya* and metabolic syndrome among adults aged 20–50 years in selected Panchayats of Malappuram district. Three Panchayats were selected using a geographical sampling approach. A total of 1,000 participants of both sexes were recruited by cluster sampling: 333 participants from each of two Panchayats and 334 from the third. Data were collected using a structured questionnaire, anthropometric measurements, blood pressure assessment and laboratory investigations. Metabolic Syndrome was assessed using Adult Treatment Panel III (ATP III) criteria, while *Atisthaulya* was classified using specified Ayurvedic clinical features. **Results**: The manuscript reports an overall prevalence of *Atisthaulya* of 14.3% and metabolic syndrome of 8.5%. Within the reported metabolic syndrome group, 85.89% were aged 41–50 years and 83.34% were women. Most participants in the metabolic syndrome group reportedly did not exercise regularly (91.77%). **Conclusion**: The reported findings indicate a potential burden of obesity-related and cardiometabolic risk in the sampled population.

INTRODUCTION

The burden of disease in India has increasingly included non-communicable conditions associated with behavioural, environmental and metabolic risk factors. These conditions contribute to premature morbidity and mortality, making early identification of modifiable risks important.

Access this article online	
Quick Response Code	
	https://doi.org/10.47070/ayushdhara.v13i5.3045

Published by Mahadev Publications (Regd.) publication licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

Metabolic syndrome refers to the coexistence of multiple cardiometabolic risk factors, commonly including central obesity, raised blood pressure, dysglycaemia and dyslipidaemia. The clustering of these factors is associated with increased cardiovascular risk.[1] Obesity and excess adiposity are closely linked to this risk profile.

Obesity is characterised by excess adipose tissue resulting from increased adipocyte size, increased adipocyte number, or both.[2] Body mass index (BMI) is commonly used to classify weight status, although appropriate cut-offs can vary by population and clinical purpose.

In the Ayurvedic literature, *Atisthaulya* is included among the eight categories described as undesirable or requiring particular clinical consideration *(Ashta Nindita Purusha).* Charaka describes excessive accumulation of *Meda* and *Mamsa* with pendulousness of the buttocks, abdomen and breasts[3]. Although metabolic syndrome is not described as a single entity in classical Ayurvedic texts, its individual features may be discussed in relation to Ayurvedic concepts such as *Sthaulya* and associated disorders. Such conceptual parallels should not be interpreted as diagnostic equivalence.

The relationship between obesity and type 2 diabetes is well established, and excess adiposity is also associated with hypertension and lipid abnormalities.[4] The prevalence and distribution of these risks vary by geography, age, sex, lifestyle and diagnostic criteria.

At the time the study was planned, the authors identified a lack of local data on Atisthaulya and metabolic-syndrome risk factors in Malappuram district. The study therefore assessed these features in adults from three selected Panchayats.

OBJECTIVES

The primary objectives were to estimate the prevalence of Atisthaulya and metabolic syndrome and to describe the sociodemographic, dietary, lifestyle, anthropometric and biochemical characteristics reported for the study population.

Study design: Community-based cross-sectional study

Study setting: Three selected Panchayats, Malappuram district, Kerala, India

Study period: 18 months

Sample size: 1,000 participants

Sampling: Geographical selection of Panchayats followed by cluster sampling of participants

Participant selection and data collection

A total of 1,000 adults aged 20–50 years, of both sexes, were recruited from the three selected Panchayats. After written informed consent, a pre-designed, pre-tested structured questionnaire was used to collect personal, socioeconomic, dietary and lifestyle information. Height, weight, waist circumference and blood pressure were measured during the first phase. Participants meeting the study's initial screening criteria were invited for laboratory investigations at V. P. S. V. Ayurveda College, Kottakkal, during the second phase.

Diagnostic and Assessment Criteria

Metabolic syndrome was assessed using ATP III criteria.[5]

The source manuscript lists the following thresholds and states that any three criteria were required:

Central obesity: waist circumference >40 inches (M) and >35 inches (F)

Blood pressure: >130/85 mmHg or Rx

Fasting blood glucose: >100 mg/dl or Rx

Dyslipidaemia: Triglycerides: >150 mg/dl or Rx

HDL cholesterol: <40 mg/dl in men or Rx

HDL cholesterol: <50 mg/dL in women or Rx

Atisthaulya clinical assessment

The study assessed *Atisthaulya* using the Ayurvedic clinical features listed below. The original manuscript classifies *Chala Spik-Udara-Sthana* as a defining feature, alongside major and minor symptoms.

Major symptoms: *Chala Spik-Udara-Sthana*; *Atikshudha; Nidradhikya; Kshudra Shwasa*.

Minor symptoms: *Daurbalya; Swedabadha; Daurgandhya; Javoparodha; Atipipasa;*

The stated classification rules were: (1) *Chala Spik-Udara-Sthana* plus any two major symptoms; or (2) *Chala Spik-Udara-Sthana* plus any one major symptom and any three minor symptoms.

Data collection and measurements

A structured questionnaire was administered. Height was measured without footwear to the nearest centimetre and weight was recorded to the nearest 0.5 kg with light clothing. BMI was calculated as weight in kilograms divided by height in metres squared. Waist circumference was measured midway between the lowest rib and iliac crest using a non-stretchable tape at minimal inspiration. Blood pressure was measured in the sitting position using an adult mercury sphygmomanometer. The source manuscript does not provide sufficient detail on laboratory assay methods, quality control, missing-data handling or the statistical analysis plan; these details should be added if available.

Chala spik udara sthana+ any 1 major symptom + any 3 minor symptoms.

Statistical Analysis: Data were analysed using descriptive statistics. The prevalence of *Atisthaulya* and metabolic syndrome was expressed as a percentage with corresponding 95% confidence intervals.

RESULTS

A structured questionnaire was administered. We recorded anthropometric measurements, including height, weight, and waist circumference, using standard techniques. We measured height to the nearest centimetre without footwear and recorded weight to the nearest 0.5kg while wearing light clothing. BMI was calculated as weight (kg)/height (m^2). Waist circumference was measured midway between the lowest rib and iliac crest using a non-stretchable tape at minimal inspiration. We measured

blood pressure in the sitting position using a standard adult mercury sphygmomanometer.

Table 1: Reported prevalence of *Atisthaulya* and metabolic syndrome in the study area

Study Area	*Atisthaulya* (%)	Metabolic Syndrome (%)
Malappuram District	14.3%	8.5%

Table 2: Sociodemographic characteristics of participants

	Variable		*Atisthaulya*	Metabolism Syndrome	General population
1.	Age in yr	20-30	20%	4.70%	33%
		31-40	19%	9.41%	26%
		41-50	61%	85.89%	41%
2.	Sex	Male	24%	16.66%	38%
		Female	76%	83.34%	62%
3.	Religion	Hindu	11%	11.76%	23%
		Christian	2%	4.70%	2.4%
		Muslim	87%	83.54%	74.6%
4.	Education	Graduate	11.18%	11.05%	17.1%
		Higher secondary	27.27%	9.26%	9.7%
		Secondary	41.28%	42.64%	33.6%
		Primary	11.18%	19.41%	33%
		Illiterate	9.09%	17.64%	6.6%
5.	Occupation	Professional	2.79%	1.17%	7.3%
		Trained	6.99%	4.70%	5.3%
		Unemployed	4.19%	2.35%	6.1%
		House wife	70.62%	75.29%	52.2%
		Student	1.45%	2.4%	4.8%
		Manual labour	0.69%	2.12%	8%
		Agriculture	0.69%	1.7%	1.4%
		Business	10.48%	13.8%	7.9%
		Skilled	2.79%	1.17%	7%
6.	Economic status	High	10.48%	3.52%	9%
		Middle	79.02%	77.64%	79%
		Poor	10.50%	18.84%	12%
7.	Marital status	Married	95.80%	98.82%	89.8%
		Unmarried	4.2%	1.18%	10.2%

Table 3: Dietary and lifestyle characteristics

	Variable		*Atisthaulya*	Metabolic Syndrome	General Population
1	Diet	Veg	1.40%	1.17%	4.5%
		Mixed	98.60%	98.82%	95.5%
2	Type of food	Sweet	61.53%	56.47%	47.60%
		Fried food	65.73%	56.47%	56.40%

		Meat	81.81%	72.94%	76.50%
		Fish	87.41%	88.23%	82.70%
		Spicy	51.04%	54.17%	64.60%
		Salty	38.46%	41.17%	46.50%
		Fruits	71.32%	63.52%	73.10%
		Vegetables	87.41%	80.52%	87.20%
		Rice	91.60%	88.23%	90.30%
3	Physical activity	Hard	2.80%	0%	10.3%
		Moderate	70.62%	62.35%	61%
		Sedentary	26.58%	37.65%	28.7%
4	Exercise	Regular	1.39%	2.35%	4.2%
		Irregular	3.49%	5.88%	7.8%
		Never	95.12%	91.77%	88%
5	Type of exercise	Walking	4.88%	8.23%	73%
		Yoga	0	0	8%
		Gym	0	0	7%
		Sports	0	0	12%
		Never	95.12%	91.77%	00
6	Addiction	Tobacco	0.69%	1.17%	3.9%
		Smoking	11.18%	8.23%	13%
		Alcohol	7.69%	4.72%	5.3%
		No add	80.44%	85.88%	77.8%

Table 4: Distribution of reported *Sthaulya* symptoms

S.No.	***Sthaulya* Symptoms**	**Total**
1.	*Javoparodha*	63.63%
2.	*Daurbalya*	76.22%
3.	*Daurgandhya*	70.62%
4.	*Chala spik-udara-stana*	100%
5.	*Swedabadha*	91.60%
6.	*Atikshudha*	65.73%
7.	*Atipipasa*	62.93%
8.	*Nidradhikya*	79.02%
9.	*Kshudra swasa*	88.11%

Table 5: Clinical and anthropometric characteristics

	Variable		***Atisthaulya***	**Metabolic Syndrome**	**General Population**
1.	BMI	Under weight	0	0	5.50%
		Normal	4.19%	11.76%	54.90%
		Over weight	40.55%	44.70%	29.40%
		Obese I	44.75%	32.94%	8.60%
		Obese II	7.69	9.41%	1.20%

		Obese III	2.82	1.19 %	0.40%
2.	Central obesity	Male	21.58%	16%	3.50%
		Female	78.42%	84%	29.60%
3.	Systolic blood pressure (mmHg)	100-120	11.18%	4.70%	24.50%
		121-140	53.84%	42.35%	58.40%
		141-160	30.79%	44.73%	13.90%
		161-180	4.19%	7.05%	2.60%
		181-200	0%	1.17%	0.60%
4.	Diastolic blood pressure (mmHg)	60-80	13.28%	2.35%	23.90%
		81-100	76.24%	85.05%	70.50%
		101-120	9.79%	11.43%	5.40%
		121-140	0.69%	1.17%	0.20%

Table 6: Reported comorbidities and biochemical parameters

			Atisthaulya	**Metabolic Syndrome**	**General population**
1	Disease	Diabetes	32.86%	64.70% 64.7	11.8%
		Hypertension	35.66%	72.94%	18%
		Dyslipidaemia	27.97%	62.35%	9.9%
		Heart disease	2.97%	5.88%	1.5%
		Other	0.54%	15.29%	15%
2	Lab parameter	FBS	104.76 ± 46.29	107.73 ± 41.82	112.4± 41.82
		Triglyceride	150.34 ± 49.81	167.61± 42.58	145.6 ± 51.73
		HDL	37.34 ± 9.25	39.5 ± 9.25	42.5±13.7

DISCUSSION

This cross-sectional study examined *Atisthaulya* and metabolic syndrome-related characteristics among 1,000 adults aged 20–50 years in three Panchayats of Malappuram district. The study reports overall prevalences of 14.3% for *Atisthaulya* and 8.5% for metabolic syndrome.

Atisthaulya

Most *Atisthaulya* subjects (61%) were aged 41–50 years, and 76% were females. Modern literature supports this trend, as women generally accumulate more body fat than men with advancing age, particularly in the femoral, gluteal, and breast regions under hormonal influence during puberty.

Most subjects (98.60%) consumed a mixed diet. Dietary preferences included rice (91.60%), fish (88.11%), vegetables (87.41%), and meat (81.81%). According to the *Samanya–Vishesha Siddhanta*, excessive intake of foods with similar properties promotes the increased accumulation of corresponding *Dhatus*.

Most subjects (70.62%) performed moderate work, while 26.58% had sedentary occupations. Reduced physical activity and daytime sleeping *(Cheshta Dwesha, Divaswapna)* aggravate *Kapha* and promote *Meda* accumulation. Most subjects (95.12%) did not exercise. *Avyayama* is a recognized etiological factor of *Atisthoulya* in Ayurveda.

In the present study, 9 subjective symptoms of Atisthaulya were assessed. The most prevalent were *Chala Sphik Udara Stana* (100%), *Swedabadha* (91.60%), *Kshudra Shwasa* (88.11%), *Nidradhikya* (79.02%), *Daurgandhya* (76.62%), *Daurbalya* (76.22%), *Atikshudha* (65.73%), *Javoparodha* (63.63%), and *Atipipasa* (62.93%).

Kshudra Shwasa may result from restricted respiratory movement due to excessive body fat. *Atikshudha* and *Atipipasa* are attributed to *Medovaha Srotosanga* and *Jatharagni Sandhukshana*, while *Nidradhikya* results from *Kapha Vriddhi*. *Daurbalya* is associated with impaired nourishment of *Uttara Dhatus*, whereas *Swedabadha* and *Daurgandhya* are attributed to *Medodushti*.

Most subjects were classified as obese I (44.75%), followed by overweight (40.55%) and obese II (7.69%). This shows that the subjective parameters are closely related to objective parameters of metabolic syndrome and obesity. Central obesity was observed in 78.42% of females and 21.58% of males. Systolic BP was 121–140 mmHg in 53.84% and 141–160 mmHg in 30.79%, while 76.24% had diastolic BP of 81–100mmHg. Associated diseases included hypertension (35.66%), diabetes (32.86%), dyslipidaemia (27.97%), other diseases (0.54%), and heart disease (2.97%). These findings indicate a substantial burden of metabolic risk factors among Atisthaulya subjects, suggesting susceptibility to metabolic syndrome. Ayurveda also describes *Prameha* as a serious complication of *Sthaulya.*

Metabolic Syndrome

In the metabolic syndrome group, most subjects were aged 41–50 years (85.89%), with female predominance (83.34%). These findings are consistent with studies by Gupta et al.[6] Ramachandran et al.[7] and Kamble et al.[8] reporting higher prevalence among females, while Thiruvagounder M et al.[9] observed higher prevalence among males. Overall, the findings suggest an association of metabolic syndrome with advancing age and sex-related differences.

Most subjects (77.64%) belonged to the middle socioeconomic class. Improved living standards, reduced physical activity, and increased consumption of calorie-rich foods may contribute to obesity, diabetes, and metabolic syndrome. Similar dietary patterns were reported by Mohan et al.[10]

We found that most subjects (98.82%) consumed a mixed diet, while 1.17% were vegetarian. Higher intake of calorie-dense foods may contribute to obesity. Ayurveda also identifies excessive *Mamsa Sevana* as a causative factor of *Sthaulya*.

In the metabolic syndrome group, 62.35% of subjects performed moderate activity, and 37.65% were sedentary, with none engaged in heavy work. Similar findings of low physical activity were reported by Mohan et al.[10] and the ICMR Sentinel Surveillance Project.[11]

Most subjects were overweight (44.70%), followed by Obese Class I (32.94%), normal weight (11.76%), Obese Class II (9.41%), and Class III (1.19%). Similar overweight prevalence was reported by Mohan et al. (44.5%)[10] and the ICMR Sentinel Surveillance Project in Hyderabad (50%).[11]

Central obesity was more common among females (84%) than males (16%) in the metabolic syndrome group. Comparable prevalence was reported in CURES (49.2%)[12] and by Mohan et al. (42.1%)[10]. This female predominance may be associated with age-related hormonal changes and increased body fat accumulation.

In the metabolic syndrome group, most subjects had systolic BP of 141–160mmHg (44.73%) or 121–140mmHg (42.35%), while 85.05% had diastolic BP of 81–100mmHg. Mean systolic/diastolic BP was 138.3±16.61/87.85±51.85mmHg in females and 133.35±11.68/89±8.69mmHg in males. Mean fasting blood sugar and triglyceride levels were 107.73±41.82mg/dL and 167.61±42.58mg/dL, respectively. Mean HDL was 39.98±10.1mg/dL in females and 37.83±3.31mg/dL in males. In the present study, hypertension (72.94%), diabetes mellitus (64.70%), and dyslipidaemia (62.35%) were the most common associated conditions in the metabolic syndrome group, followed by other diseases (15.29%) and heart disease (5.88%). The higher proportion of heart disease in this group suggests an association between metabolic syndrome and cardiovascular risk. Obesity-related insulin resistance, endoplasmic reticulum stress, and increased hepatic glucose production may contribute to hyperglycaemia, while activation of the renin–angiotensin system, leptin resistance, and endothelial dysfunction may promote hypertension. Dyslipidaemia was more prevalent in the present study (62.53%) than reported by Mohan et al. (40.2%)[10], possibly due to differences in dietary habits, particularly higher consumption of fat-rich foods, and lifestyle factors. These findings highlight the close association of obesity and metabolic syndrome with cardiometabolic disorders.

From an Ayurvedic perspective, excessive intake and inadequate physical activity are described as factors relevant to *Sthaulya*. The observed coexistence of reported obesity and cardiometabolic abnormalities provide a context for discussing these concepts alongside contemporary risk assessment.

CONCLUSION

The present cross-sectional study conducted among 1,000 adults aged 20–50 years in Malappuram district, Kerala, revealed an overall prevalence of 14.3% for *Atisthaulya* and 8.5% for metabolic syndrome. Both conditions were more frequently observed among females and individuals aged 41–50 years. Physical inactivity, lack of regular exercise, and dietary habits emerged as important associated lifestyle factors.

The findings demonstrated considerable overlap between the clinical manifestations of *Atisthaulya* and the metabolic abnormalities associated with metabolic syndrome, particularly central obesity, hypertension, hyperglycaemia, and dyslipidaemia. The higher prevalence of cardiometabolic disorders among

subjects with metabolic syndrome further highlights their increased cardiovascular risk.

The study suggests that Atisthaulya and metabolic syndrome share several clinical and metabolic characteristics. Ayurvedic concepts of *Kapha–Meda Dushti, Avyayama*, and *Santarpanajanya Nidana* may provide a complementary framework for understanding obesity-related metabolic disturbances. Early identification, dietary modification, regular physical activity, and lifestyle interventions are essential for preventing obesity-related complications. However, the cross-sectional design limits causal interpretation, and further analytical studies are required to establish the relationship between Atisthaulya and metabolic syndrome.

Ethics Statement

The source manuscript reports institutional ethics approval (IEC reference: ICE/DOC/008/09) and written informed consent from all participants.

REFERENCES

1. Alberti KGMM, Zimmet P, Shaw J, IDF Epidemiology Task Force Consensus Group. The metabolic syndrome- a new worldwide definition. Lancet. 2005; 366(9491): 1059-62
2. Park K. Park's textbook of preventive and social medicine. 20th ed. Jabalpur: Banarsidas Bhanot Publishers; 2007. p. 332
3. 3.Shastri K, Chaturvedi G, editors. Charaka Samhita of Agnivesha with Vidyotini Hindi Commentary. Reprint ed. Varanasi: Chaukhambha Bharati Sansthan; 2005. Sutrasthana, Chapter 21, Ashtaninditiya Adhyaya, Verse 8-9. p. 408–409.
4. Kahn BB, Flier JS. Obesity and insulin resistance. J Clin Invest. 2000; 106(4): 473-81
5. National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA. 2001; 285(19): 2486-2497.
6. Ramachandran A, Snehalatha C, Satyavani K, Sivasankari S, Vijay V. Metabolic syndrome in urban Asian Indian adults- a population study using modified ATP III criteria. Diabetes Res Clin Pract. 2003; 60(3): 199-204. doi:10.1016/S0168-8227(03)00060-3.
7. Kamble P, Deshmukh PR, Garg N. Metabolic syndrome in adult population of rural Wardha, central India. Indian J Med Res. 2010; 132(6): 701-705. PMID: 21245618
8. Gupta R, Deedwania PC, Gupta A, Rastogi S, Panwar RB, Kothari K. Prevalence of metabolic syndrome in an Indian urban population. Int J Cardiol. 2004; 97(2): 257-261. doi:10.1016/j.ijcard.2003.11.003
9. Thiruvagounder M, Khan S, Sheriff DS. The prevalence of metabolic syndrome in a local population in India. Biochem Med (Zagreb). 2010; 20(2): 249-252. doi:10.11613/BM.2010.031
10. Mohan V, Shanthirani S, Deepa R, Premalatha G, Sastry NG, Saroja R. Intra-urban differences in the prevalence of the metabolic syndrome in southern India- the Chennai Urban Population Study (CUPS No. 4). Diabet Med. 2001; 18(4): 280-287. doi:10.1046/j.1464-5491.2001.00421.x.
11. Reddy KS, Prabhakaran D, Chaturvedi V, Jeemon P, Thankappan KR, Ramakrishnan L, et al. Methods for establishing a surveillance system for cardiovascular diseases in Indian industrial populations. Bull World Health Organ. 2006; 84(6): 461-469. doi:10.2471/BLT.05.027037
12. Deepa M, Farooq S, Deepa R, Manjula D, Mohan V. Prevalence and significance of generalised and central body obesity in an urban Asian Indian population in Chennai, India (CURES: 47). Eur J Clin Nutr. 2009; 63(2): 259-267. doi:10.1038/sj.ejcn.1602920.

Cite this article as:
Jyoti Hiremath, M. C. Shobhana, Ashwani Kumar. Prevalence of Atisthaulya and Metabolic Syndrome Risk Factors Among Adults in Selected Panchayats of Malappuram District, Kerala: A Cross-Sectional Study. AYUSHDHARA, 2026;13(5):366-372.
https://doi.org/10.47070/ayushdhara.v13i5.3045
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Jyoti Hiremath
Assistant Professor,
Department of Swasthavritta Evam Yoga, Government Ayurvedic College, Patiala, Punjab, India.
Email: drjyotih009@gmail.com

Disclaimer: AYUSHDHARA is solely owned by Mahadev Publications - A non-profit publications, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. AYUSHDHARA cannot accept any responsibility or liability for the articles content which are published. The views expressed in articles by our contributing authors are not necessarily those of AYUSHDHARA editor or editorial board members.