ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Review Article

METABOLIC SYNDROME- AN AYURVEDIC PERSPECTIVE

Varsha Babu[1]*, MS Deepa[2]

*[1]PG Scholar, [2]Professor, Dept. of Dravyaguna Vijnana, Govt. Ayurveda College, Thiruvananthapuram, Kerala, India.

Article info

Article History:

Received: 23-08-2022

Revised: 12-09-2022

Accepted: 21-09-2022

KEYWORDS:

Diabetes mellitus, Insulin resistance, Lifestyle disorders, Metabolic Syndrome, *Santhartanajanya vikaras.*

ABSTRACT

The prevalence of lifestyle diseases like hypertension, diabetes mellitus, dyslipidemia, and obesity, has been exponentially increasing. Metabolic Syndrome (MS) is a lifestyle disorder that has become a major public-health challenge around the world, owing to rising obesity and sedentary lifestyles. Abdominal obesity, insulin resistance, hypertension, and hyperlipidaemia were the common pathological conditions involved in MS. Ayurveda is the science intended for employing the measures of healthy life. There is no direct reference of metabolic syndrome in Ayurveda classics. Different scholars have different opinion about the nearest possible diseases. Some scholars included it in *Medapradooshaja vikaras*, while others classified it as *Sthoulya upadravas* or *Avaranajanya vikaras*. In Charaka Samhita, lack of physical activity and unhealthy eating habits which are the causes of lifestyle diseases are mentioned in *Santharpaneeyam adhyayam*. Aetiology and symptomatology of *Santharpanajanya vikaras* shows a remarkable similarity with metabolic syndrome, since it includes sedentary lifestyle and dietary factors. Therefore, MS can be included under the broad umbrella of *Santhartanajanya vikaras* and Ayurveda can put forward a better management strategy by reassessing the metabolic syndrome on the basis of *Santharpanajanya vikaras.*

INTRODUCTION

Lifestyle diseases occur primarily based on people's daily habits and result from an inappropriate relationship between people and their environment. The onset of these lifestyle diseases is gradual; they take years to develop and, once diagnosed, are difficult to treat. The most common lifestyle diseases include hypertension, diabetes, arthritis, obesity, insomnia etc.[1] Metabolic Syndrome (MS) is a lifestyle disorder that has become a major public-health challenge around the world, owing to rising obesity and sedentary lifestyles. Abdominal obesity, insulin resistance, hypertension, and hyperlipidaemia were the common pathological conditions involved in MS. MS states to a constellation of several interrelated risk factor that promote the development of atherosclerotic cardiovascular disease (CVD) and Type 2 diabetes mellitus (T2DM). MS is a disease of modern era occurs due to life style changes like modernization, decreased level of physical activities and increased intake of calories.[2] So, it is much difficult to describe MS in Ayurvedic parlance. There is no reference of single entity, which can be correlate with MS. Different scholars have different opinion about the nearest possible diseases. Some scholars consider it as *Medapradooshajavikaras* (Diseases due to vitiated *Medodhatu*), because *Medas* is the prime *Dooshya* involved in the pathogenesis.[3] Again, some scholars associate MS with *Avaranajanyaroga* (Disease developed due to occlusion of *Srotas*), as *Avarana* is involved in the pathogenesis of *Madhumeha* and *Atisthoulya*, both of which are considered as components of MS.[4]

Access this article online

Quick Response Code

https://doi.org/10.47070/ijapr.v10i9.2514

Ayurveda, the most ancient traditional health care system in India has always emphasized the prevention of disease and maintenance of health by proper diet and regime rather than curing the disease. According to Ayurveda, *Chikitsa* is of two types, mainly *Santarpana* and *Apatarpana. Santarpana Chikitsa* for *Apatarpana Rogas* and *Apatarpana* is the *Chikitsa* for *Santarpana Rogas Santarpana chikitsa* comprises of

Brimhana, Snehana and *Sthambana;* whereas *Apatarpana* comprises of *Langhana, Swedana* and *Rukshana.* Now a day's most of the diseases are of *Santharpanajanya* mainly caused by sedentary stress full life and change in eating habit. It then vitiates *Kapha, Mamsa* and *Meda,* and causes various metabolic disorders like *Prameha* (diabetes), *Atistoulya* (obesity), *Sopha* (inflammatory conditions), *Dhamani prathichaya* (atherosclerotic changes) etc. These were some of the common manifestations in MS. Thus the concept of MS can be connected with *Santharpanajanya vikaras*. [5]

Metabolic Syndrome

Metabolic syndrome (MS) was first described by Reaven (1988), as Syndrome X whereby he noted that clustering of several risk factors which is the central feature of cardiovascular diseases and diabetes. The major components of the syndrome include hyperglycemia, abdominal obesity, dyslipidaemia, elevated blood pressure, elevated triglyceride levels, low high-density lipoprotein cholesterol levels. People with MS have twice the probability of developing and dying from cardiovascular diseases and more than five times the risk of developing diabetes. Further, patients with MS are at 2- to 4-fold increased risk of stroke, a 3- to 4-fold increased risk of myocardial infarction (MI). The presence of this syndrome is a broader pointer of higher risk for these conditions. [2]

Prevalence of MS has increased considerably reaching pandemic proportions worldwide. International Diabetic Federation (IDF) estimates that approximately 25% of world population have MS.[6] it may vary widely due to the age, ethnicity, gender etc. The prevalence of MS in India has documented to be from 11% to 41% across the vast country with copious socio economic cultures,[7] in Kerala it is 33% according to harmonized criteria. [8]

In order to introduce the MS into clinical practice several organisations have attempted to develop a simple criterion for its diagnosis. World Health Organization (1998), European Group for the study of Insulin Resistance (1999), United States third report of the National Cholesterol Education Program, Adult Treatment Panel (ATP) (2001), ATPIII revised criterion (2005), International Diabetes Federation (IDF 2005) and the harmonized ATP III and the IDF consensus in 2009 have proposed various definitions.

Harmonized criteria- 2009 [9]

According to Harmonized Criteria, any three of the five components would suffice for a diagnosis of MS, with the thresholds for measuring waist circumference (WC) requiring ethnic and nation specificity.

Table 1: Definition of Metabolic syndrome - Harmonized criteria

Risk factor	Defining level
Waist circumference	Population and country - specific
Elevated triglycerides	≥150mg/dL (1.7mmol/L) or on drug treatment for elevated triglycerides
Reduced HDL-C (High Density Lipo protein Cholesterol)	≤40mg/dL (1.03mmol/L) in men ≤50mg/dL (1.3mmol/L) in women or on drug treatment for reduced HDL-C
Elevated blood pressure	≥130mm Hg systolic blood pressure or ≥85mm Hg diastolic blood pressure or on antihypertensive drug treatment in a patient with a history of hypertension
Elevated fasting glucose	≥100mg/dL or on drug treatment for elevated glucose.

Visceral adiposity and Insulin resistance are considered to be the primary trigger for most of the pathways involved in MS.

Santarpanajanya vyadhis

The word "*Tharpanam*" originated from the root word "*Trip Preenane*" which means to satisfy, to bring contentment, to nourish etc. *Santharpanam* means to cause immense pleasure, contentment or nourishment. Hence *Santharpanajanya vikaras* can be considered as diseases due to over nourishment or pleasure.[10] *Santharpana janya vikaras* are *Prameha, Pitaka, Kandu, Kotha, Pandu, Jwara, Kushtham, Amapradosha, Mutrakricchra, Arochakam, Tandra, Klaibyam, Atisthoulyam, Alasyam, Gurugatrata, Indriya srotasam lepa, Buddhermoha, Prameelaka* and *Sopha*. [5]

A combination of genetic and acquired factors contributes to MS. Environmental and lifestyle factors such as consumption of excess calories and lack of physical activity are the major contributors. [2] *Atisthoulyam* (obesity) and *Prameham* (diabetes) are components of MS. *Prameha* is said as *Kulaja vikaras*. Diseases in which *Beejadushti* as *Nidanas* (causative factor) are termed as *Kulaja vikaras*. [11] According to Acharya Charaka, offspring born to a woman who takes excess *Madhura rasa* during pregnancy is said to have predisposition to the development of *Sthoulyam* and *Prameha.*[12] So, *Beejadushti* can be correlate to

genetic factors. Excessive consumption of *Madhura* (sweet), *Amla* (sour), *Lavana* (salt), *Guru* (heavy), *Snigdha* (unctuous), *Nava annapanas* (Food grains used up within one year after harvest), *Gramya oudaka anupa mamasa rasas* (meat of aquatic animals and of those living in marshy areas), *Payas* (milk), *Guda ikshu vikrtis* (Food made of Jaggery, sugar cane) are the *Aharaja nidanas* mentioned in *Prameha, Atisthoulya* and *Santharpanajanya vikaras . Vihraja* nidanas include *Asyasukha* (sedentary life), excessive indulgence in *Nidra* (sleep), *Avyayama* (lack of physical activity), *Divaswapna*(day sleep), *Avyavaya* (lack of sexual life). *Achintana* (lack of Tension) is mentioned in the *Nidanas* of *Sthoulya, Prameha* and *Santharpanotha vikaras. Harshnityatvata* (uninterrupted cheerfulness) is specifically stated among *Sthoulya nidanas*. [13, 14, 5]

Management

Early diagnosis is important in order to employ effective lifestyle and risk factor modification. Pharmaceutical therapy in MS is aimed at treating the individual components. According to Ayurveda, general management of any disorder is divided into *Apakarshana (*Expulsion of unwanted harmful elements from the body), *Prakrthi vighata* and *Nidana parivarjana*.[15] *Nidanaparivarjanam*- Individuals diagnosed with MS should be properly educated to avoid the risk factors like excessive intake of carbohydrates and fats, sedentary life style, smoking, alcohol etc. The aim of *Prakrthi vighata* is to bring back the equilibrium of the *Dosha* and to facilitate the normal functioning of *Dhatus* and *Malas*. *Langhana* should be adopted in general as it is a *Santharpanotha vyadhi*. *Langhana chikitsa* is of two types- *Sodhana* and *Samana.*[16] *Sodhana* therapy should be adopted in patients who are having sufficient *Bala* (strength) or in whom *Doshas* are markedly vitiated.[17] *Virechana* is more preferable, it is a specific modality for the elimination of *Pitta dosha* but it is also effective upon *Kapha* and *Vata.*[18] *Acharya Charaka* has mentioned *Vamana Karma* and *Virechana Karma* in the management of *Santarpanajanya Vyadhi*. On the other hand, if the patient does not have sufficient *bala* (strength)to undergo *Shodhana* therapy or when *Doshas* are moderately vitiated, *Samana* therapy can be adopted.[16] In MS, disease is of chronic nature and long term practise of drug is essential. So *Samana* therapy is more beneficial. Drugs having *Deepana, Pachana, Lekhana, Medakledo Upasoshana, Tridoshasamana, Ushna veerya* will be the more appropriate which helps in alleviating *Agni vaishamya,* removing *Srothorodha* and *Kapha-medo dushti.* MS involves a constellation of *Vyadhis* like *Prameha, Sopha, Hrdroga, Sthoulya* etc, Drugs acting on particular diseases like *Mehajith*, *Hrdroghasamana*, *Sophahara, Medorogahara, Yakrt uttejaka* were used. Free radicals and the oxidative stress caused by them play a key role in the development of many diseases such as atherosclerosis, Diabetes mellitus, CVDs, dementia, stroke, and so on. Drugs with *Rasayana* properties are beneficial in these conditions as they are rich in Vitamin C, Vitamin E, Beta carotene, riboflavin, and other substances that can counteract the damaging effects of oxidation.[19] As a result, they act as anti-oxidants. They also augment the regeneration of hepatocytes, pancreatic beta cells etc. Some of the drugs which may found to be beneficial in MS are given in the table.2

Table 2: Drugs beneficial in MS

Drug	Rasa	Guna	Virya	Vipaka	Karma	Proven Pharmacological activities
Hareetaki *[20]*	*Tikta Kashaya Madhura Katu Amla*	*Ruksha Laghu Sara*	*Ushna*	*Madhura*	*Tridoshahara, Rasayana, Pramehagna, Medohara, Sothahara, Hrdhya*	Antioxidant, anti-inflammatory immunomodulatory Hypoglycemic, hepatoprotective Anti hyperlipidemic Cardioprotective[21]
Katuki[22]	*Thikta Katu*	*laghu, Ruksha Sara*	*Seeta*	*Katu*	*Kapha Pitha hara, Dipana, Bhedani, Pittarechani, Kaamala Hara, Yakrt Rogahara Hrdhya, Mehagna*	anti-oxidant,cardio-protective, hepato-protective, anti-diabetic, anti-inflammatory, anti-cancer, and nephro-protective [23]
Amalaki *[24]*	*Pancha rasa*	*Ruksha Laghu Sara*	*Sita*	*Madhura*	*Tridoshahara, Rasayana, Pramehagna. Medohara, Sophahara*	antioxidant, anti-inflammatory, hepatoprotective, immuno imodulatory hypolipedemic , anti-diabetic, [25]
Guggulu *[26]*	*Tikta Kashaya Madhura*	*Ruksha Laghu Sara*	*Ushna*	*Katu*	*Tridoshahara, Rasayana, Mehagna*	Anti-oxidant Antidiabetic Cardioprotective Antiatherosclerotic Antioxidant

	Katu	*Vishada*			*Medohara, Kledahara Sophahara,*	Antiinflammator hypolipidemic[27]
Asana[28]	*Kashaya*	*Ruksha Laghu*	*Ushna*	*Katu*	*KP Samana Rasayana, Pramehagna, Medohara*	Antidiabetic activity Hepatoprotective Antioxidant, anti hyperlipidemic Anti-inflammatory[29]

DISCUSSION

Metabolic Syndrome is a disease of modem era which is more prevalent in people leading a sedentary lifestyle. In Charaka Samhita lack of physical activity and unhealthy eating habits which are the causes of lifestyle diseases are mentioned in *Santharpaneeyam adhyayam*.[5] Excessive consumption of energy dense foods and drinks, high fat diet, processed and fried meat and refined grains etc are all considered as risk factors for metabolic syndrome**.** This will increase the *Guru, Snigdha, Mandha, Sita, Pichila gunas* and leads to vitiation of *Kapha*, and produces *Agnimandhyam* (impairment of digestive fire). Further Intake of same *Nidanas* leads to *Dhatvagnimandya* and *Dhathumala-sanchaya* (accumulation of metabolic waste*)* which cause *Srothorodha* (occlusion of channels). This *Srothorodha* can be co related to insulin resistance. Here *Katu, Tikta* and *Kashaya rasas* are more beneficial. They are *Deepana pachana, Lekhana* and *Medakledo upasoshana*. It aids in *Amapachana*, alleviating *Agni vaishamya,* removing *Srothorodha* and *Kapha-medo dushti.* [30]

*Avyayama (*Lack of physical exercise) and *Divasvapna* (day sleep) are the main *Viharaja nidanas* contributing to the development of metabolic syndrome. *Vyayama* is said to be the one which brings about *Laghutwa* [31] to the body therefore *Avyayama* or lack of physical exercise causes the increase of *Guru guna*. Similarly *Divaswapna* also increases *Abhishyanti* and *Guru gunas*. Behavioural factors like lack of enthusiasm, over indulgence in luxury, laziness, greed, etc. are the key factors that make an individual adopt sedentary life style and excessive consumption of food. So, they should be considered as etiological factors. . [13, 14, 5]

According to Acharya Charaka food is not properly digested if a person is afflicted by deep thoughts, grief, fear, anger etc. this will lead to *Agnimandya* and *Ajeerna* (indigestion). In chronicity this will lead to *Dhatvagnimandya* and *Dhathumalasanchaya.*[32] Increased *Guru, Mandha, Sthira* and *Abhisyanthi gunas* causes *Kapha dushti* and *Agnimandhya* which further cause *Ama* (toxic metabolic wastes). *Ama* has *Picchila* and *Guru guna* and it causes manifestations like *Srothorodha.*

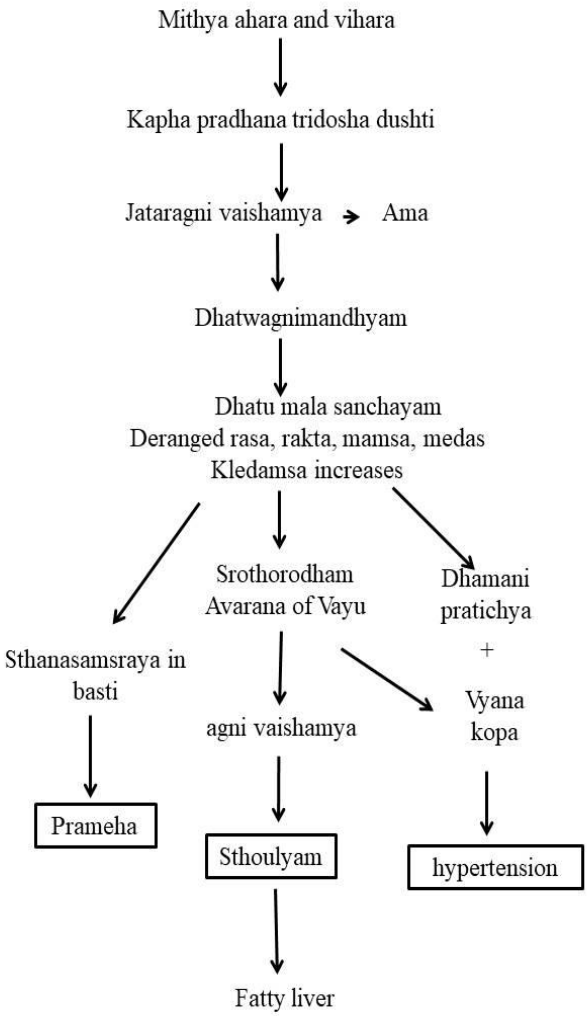
Then the various components in MS will manifest in different ways either alone or in combination. Due to the *Avarana* by *Medas*, movement of *Vata* (especially *Samana* and *Vyana vata*) get obstructed and is specially confined to *Koshta.* This *vayu* aggravates *Pachaka pitta* resulting in *Agnivaishamya*, which causes *Kshudadhikya*, then it will leads to *Mamsa medho dhatu adhivrdhi* and the person becomes *Sthoola*. [13]

Srothorodha causes aggravation of *Vata, Vata* along with other *Doshas* vitiates *Soumya dhatus* like *rasa, Rakta. Mamsa, Medas lasika* etc got *Sthanasamsraya* in *Vasti,* and manifested as *Prameha*. Insulin resistance is the main mechanism in the pathogenesis of MS. It is the inability of target tissues to respond to actions of insulin even if it is adequately present in blood. So, Insulin resistance can be considered as a *Srothorodha* due to *Bahudrava kapha, Kleda* and other *Dooshyas*. Hyperinsulinaemia occur as a result of insulin resistance, which can be considered as *Mala sanchaya.*[14]

Srotholepa caused by *Picchila guna* of *Kapha* and *Kleda* vitiate *rasa* and *Raktha dhathu* will lead to *Dhamani prathichaya* (atherosclerotic changes) which can be considered as elevated triglycerides and LDL-C. Again, *Srothorodha* will lead *to Vyanavathakopa* along with other *Vayus*. Thus we can explain the peripheral vascular resistance leading to hypertension in metabolic syndrome. Due to *Nidanas*, there is *Kaphavridhi* and due to resultant *Koshtagni* and *Dhatvagni mandya, Dhathus* formed will be improper and there will be formation of *Ama* and *Kleda. Kledayuktha rasa* and *Raktha* will lead to *Vyanavatha kopa* in *Svasthana* i.e., *Hridayam* leading to increased cardiac output which also contributes to hypertension. [33] Thus the pathogenesis of Ms can be explained. A flowchart of the same is represented in fig.1

MS is a chronic disease, long-term medication is essential. So, the particular drug having *Tridoshaghna* (pacifying three *Doshas*), *Rasayana* (rejuvenating property), and disease-specific like *Pramehagna, Sophahara, Hrdroganasana* etc. should be considered.

Figure 1: *Samprapti* of Metabolic syndrome



CONCLUSION

Metabolic syndrome is one of the major health hazards, which is increasing in an exponential manner. In Ayurveda the concept of MS can be included under the broad umbrella of *Santarpanajanya vyadhis* which include *Sthoulya* (obesity/dyslipidemia), *Prameha,* (diabetes), *Srotasam lepam* (arterial occlusion which may cause peripheral resistance and there by hypertension), *Hrdroga* (cardiac disorders), *Ama pradushaja vikaras* (certain inflammatory conditions). Aetiology, clinical manifestations and treatment modalities of MS were precisely explained in classics. *Since Santharpanajanya roga, Apatharpana chikitsa* should be done. Along with *Nidana parivarjana* and *Pathya, Sodhana* and *Samana* are needed. Considering the chronic nature of disease, *Samana* therapy with drugs having *Deepana, Pachana, Lekhana* and disease specific like anti-diabetic, anti-inflammatory, anti-hypertensive, anti-obesity, hepatoprotective and cardio protective will be beneficial.

REFERENCES

1. Sharma M, Majumdar P. Occupational lifestyle diseases: An emerging issue. Indian J Occup Environ Med. 2009;13(3):109.
2. Jameson JL, editor. Harrison's principles of internal medicine. Twentieth edition. New York: McGraw-Hill Education; 2018. 2903 p.
3. Dr.Sukanya H. Patil. Role of Ayurveda in Metabolic syndrome W.S. R to Medo pradushajavyadhi - a review article. IJSR. 10(6).
4. Priya. S, Shajahan M A. A Review on the Role of Avarana (Occlusion of Body Channels) in Metabolic Syndrome. International Journal of Ayurveda and Pharma Research. 2017;5(6):40-46
5. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2020. Vol. 1. Varanasi: Choukhamba Sanskrit Series office; p. 395
6. Alberti KGMM, Zimmet P, Shaw J. Metabolic syndrome-a new world-wide definition. A Consensus Statement from the International Diabetes Federation. Diabet Med. 2006 May; 23(5):469–80.
7. Khan Y, Lalchandani A, Gupta A, Khadanga S, Kumar S. Prevalence of metabolic syndrome crossing 40% in Northern India: Time to act fast before it runs out of proportions. J Family Med Prim Care. 2018;7(1):118
8. Harikrishnan S, Sarma S, Sanjay G, Jeemon P, Krishnan MN, Venugopal K, et al. Prevalence of metabolic syndrome and its risk factors in Kerala, South India: Analysis of a community based cross-sectional study. Alamian A, editor. PLoS ONE. 2018 Mar 27;13(3):e0192372
9. Alberti KGMM, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, et al. 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. 2009 Oct 20;120(16):1640–5
10. Radhakantadeva. Śabdakalpadrumaḥ: 2015th ed. Vasu V, Vasu H, editors. Varanasi: Caukhamba Surabharatī Prakaśana; 20. p. 600
11. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2017. Vol. 3. Varanasi: Chaukhamba Sanskrit Series Office; p. 315
12. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2011. Vol. 2. Varanasi: Chaukhamba Sanskrit Series Office; 474 p.
13. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2020. Vol. 1. Varanasi: Choukhamba Sanskrit Series office; p. 374
14. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2020. Vol. 1. Varanasi: Choukhamba Sanskrit Series office; p. 327

15. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 1998. Vol. 2. Varanasi: Choukhamba Sanskrit Series office; p. 203
16. Prof. K R Srikanta Murthy. Vagbhata's Ashtanga Hrdhayam. reprint 2018. Vol. 1. Varanasi Chaukhamba Krishnadas Academy; 192 p.
17. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2020. Vol. 1. Varanasi: Choukhamba Sanskrit Series office; p. 302
18. Prof. K R Srikanta Murthy. Vagbhata's Ashtanga Hrdhayam. reprint 2009. Vol. 1. Varanasi, Chaukhamba Krishnadas Academy; 226 p.
19. Bijita Chutia, Khagen Basumatary. Free Radical Mediated Diseases and their Prevention: An Ayurvedic Perspective. International Journal of Ayurveda and Pharma Research. 2016;4(6):84-91
20. Bhavamisra S. Bhavaprakasha Nighantu (Indian Materia Medica). Reprint 2018. Chunekar K, editor. Varanasi: Chaukhamba Bharati Academy; p 5.
21. Meher, Sudhanshu & Bhuyan, G.C. & Das, Banamali & Panda, Purnendu & Ratha, Kshirod. (2018). Pharmacological Profile of Terminalia chebula Retz. and Willd. (Haritaki) in Ayurveda with Evidences. Research Journal of Pharmacology and Pharmacodynamics. 10. 115-25. 10.5958/2321-5836.2018.00023.X.
22. Bhavamisra S. Bhavaprakasha Nighantu(Indian Materia Medica). Reprint 2018. Chunekar K, editor. Varanasi: Chaukhamba Bharati Academy; p 67.
23. Mehta, S., Sharma, A. K., & Singh, R. K. (2021). Advances in Ethnobotany, Synthetic Phytochemistry and Pharmacology of Endangered Herb Picrorhiza kurroa (Kutki): A Comprehensive Review (2010-2020). Mini reviews in medicinal chemistry, 21(19), 2976–2995. https://doi.org/10.2174/1389557521666210401090028
24. Bhavamisra S. Bhavaprakasha Nighantu (Indian Materia Medica). Reprint 2018. Chunekar K, editor. Varanasi: Chaukhamba Bharati Academy; p 10
25. Sharma, Kavitha, Sharma, P., Srivastav, R., Srivastava, A., & Sharma, D. (2017). Pharmacological Study of Amalaki with Special Reference to its Antimicrobial Action. International Journal of Ayurveda and Pharma Research, 2017;5(5):93-96.
26. Bhavamisra S. Bhavaprakasha Nighantu(Indian Materia Medica). Reprint 2018. Chunekar K, editor. Varanasi: Chaukhamba Bharati Academy; p 196
27. Sarup P, Bala S, Kamboj S. Pharmacology and Phytochemistry of Oleo-Gum Resin of Commiphora wightii (Guggulu). Scientifica. 2015;2015:1–14.
28. Bhavamisra S. Bhavaprakasha Nighantu (Indian Materia Medica). Reprint 2018. Chunekar K, editor. Varanasi: Chaukhamba Bharati Academy; p 512
29. Ahmad, Hilal & Rajagopal, Kalyanaraman. (2015). Pharmacology of Pterocarpus marsupium Roxb. Medicinal Plant Research. 55. 1-6. 10.5376/mpr.2015.05.0003.
30. Prof. K R Srikanta Murthy. vagbhata's Ashtanga Hrdhayam. reprint 2009. Vol. 1. Varanasi, Chaukhamba Krishnadas Academy; 146-147 p.
31. Prof. K R Srikanta Murthy. vagbhata's Ashtanga Hrdhayam. reprint 2009. Vol. 1. Varanasi, Chaukhamba Krishnadas Academy; 24 p.
32. RK Sharma, Bhagwan Dash. Agnivesa's Caraka Samhita. Reprint 2013. Vol. 2. Varanasi: chaukhamba Sanskrit Series Office; 135p.
33. RK Sharma, Bhagwan Dash. Agnivesa'sCaraka Samhita. Reprint 2018. Vol. 1. Varanasi: Choukhamba Sanskrit Series office; 370 p

Cite this article as:
Varsha Babu, MS Deepa. Metabolic Syndrome- An Ayurvedic Perspective. International Journal of Ayurveda and Pharma Research. 2022;10(9):64-69.
https://doi.org/10.47070/ijapr.v10i9.2514
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Varsha Babu
PG Scholar,
Dept. of Dravyaguna Vijnana,
Govt. Ayurveda College,
Thiruvananthapuram.
Email:
sasikalavarsha@gmail.com