



## **Ayurveda Concept of Medoroga with Special Reference to Obesity and Related Complication and their Medical Management**

**Prasad Navanath Ghanawat<sup>1\*</sup>, Prakash Mane<sup>2</sup>, Pallavi Lahanu Nibe<sup>1</sup>  
and Ravindra Mirgane<sup>3</sup>**

<sup>1</sup>PMT's Ayurved College Shevgaon Ahmednagar (MS), India.

<sup>2</sup>Dr. D. Y. Patil Ayurved College and Hospital Pune (MS), India.

<sup>3</sup>Department of Agad Tantra Aswin rural Ayurvedic College Manchihil  
Ahmednagar India.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/JPRI/2021/v33i41A32329

#### Editor(s):

(1) Dr. Thomas F. George, University of Missouri- St. Louis, USA.

#### Reviewers:

(1) Thiyagarajan Sathish Kumar, Kumaraguru College of Technology, India.

(2) Parulkar Geeta Deodatt., Maharashtra University of Health Sciences, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/72766>

**Review Article**

**Received 10 June 2021**  
**Accepted 13 August 2021**  
**Published 19 August 2021**

### **ABSTRACT**

Obesity or *medoroga* is the only disease that is gaining more and more attention at the global level. This disease is prevalent in developing as well as in developed countries, in both sexes, across all ages and socioeconomic groups. Obesity is one of the prices we have to pay for rapid urbanization and a sedentary lifestyle. Obesity has been described in Ayurveda texts as *medoroga* or *Sthaulya*. Acharya Charaka has described eight varieties of impediments known as *ashta nindita Purusha*. *Ati Sthaulya* comprises one of them. Obesity is the risk factor for many diseases like diabetes, CVA, hypertension, etc. It is difficult to prevent and treat lifestyle diseases like obesity with the modern system of medicine alone. Ayurvedic science has great potential in preventing and treating lifestyle disorders like obesity. The presenter's view deals with aetiopathogenesis, symptomatology prevention, and management of *Sthaulya* as given in the Ayurveda classics.

\*Corresponding author: E-mail: [dr.prasad.ghanawat99@gmail.com](mailto:dr.prasad.ghanawat99@gmail.com);

**Keywords:** Ayurveda; medoroga; obesity; sthaulya.

## 1. INTRODUCTION

Sedentary lifestyles and poor eating habits, particularly ready-to-eat fast food, have made man the victim of numerous ailments in today's society. Sthaulya (obesity) is one of these disorders that has wreaked havoc on the health of a whole generation. Obesity is becoming a major health issue in India as well. Obesity (Sthaulya) is a disease that can lead to a variety of illnesses, including hypertension, ischemic heart disease, diabetes, osteoarthritis, infertility, impotency, and psychological problems such as stress, anxiety, and depression. As a result, obesity can be considered a substantial contributor to health decline. Sthaulya is mentioned in practically every extant literature in Ayurveda. Atisthool purusha is one of Charaka's "Ashta Nindit Purusha"

- As well as Samtarpanjanita roga
- Sthaulya is a Sleshma Dosha illness that is seated in Medodhatu
- Ati Sthula is defined as a person "who is disfigured with pendulous buttocks, belly, and breasts due to an abnormal growth in fat and flesh, and whose increased weight is not matched by a proportionate gain in energy."
- Obesity is described as a condition in which there is an excess of adipose tissue mass.
- Obesity epidemics have erupted in various Asian nations as a result of dietary changes combined with an increase in inactive lifestyle [1-5].

There has been a large increase in fat and dense food consumption, accompanied by a decrease in physical activity. With the quick speed of industrialization and economic advancement, an increasing number of employment are becoming sedentary, and dietary patterns are changing as well, with a decrease in cereal consumption and an increase in sugar and fat consumption. As a result of all of this, the incidence of obesity and its accompanying disorders has increased. According to a poll conducted by India's Nutrition Foundation, 45 percent of women and 29 percent of males in the country's urban areas are overweight. In terms of the obesity index, India ranks seventh [6]. Obesity was once considered a lifestyle issue, but the World Health Organization now considers it a disease. When it

comes to the notion of health, Ayurveda places a greater emphasis on the balanced state of body tissues. Obesity is defined as a condition in which the Medodhatu (Fatty Tissue) is in a state of Vikrita Vriddhi (Abnormal Increase) according to Ayurveda [7-10].

### 1.1 The study's Necessity

Obesity prevalence worldwide more than doubled between 1980 and 2014, according to the World Health Organization<sup>6</sup>. In 2014, approximately 13% of the world's adult population (11 percent of men and 15% of women) was obese. Obesity is a risk factor for a variety of diseases, including cardiovascular disease, which was the leading cause of death in 2012; diabetes; musculoskeletal problems (particularly osteoarthritis); and various malignancies. Recently, the entire world has been seeking for ways to enhance lifestyle and nutritional habits in order to prevent this disease [11-15].

### 1.2 Causative Factors for Obesity

The heredity component (*Bijadosha*), besides dietetic, regimen, and psychological factors in the causation of obesity is described in Charaka Samhita [16]. Except for these factors, the components which may vitiate *Meda* (Fatty Tissue) and *Kapha* (One of the three senses of humor of the Body) could be considered as causative factors of Obesity. *Dhatvagni Mandya* (Weak digestive fire at the level of body tissues) is the main cause besides other components in the etiopathology of *Sthaulya* [17]. In the context of obesity, exogenous causes are *Meda* potentiating diet and regimens whereas *Dosha* (Three senses of humor of the body), *Dhatu* (Body tissues), *Mala* (Excreta) *Srotas* (Body channels), etc. come under the endogenous factor.

All the factors can be categorized into four groups.

1. *Aharatmaka Nidana* (Dietetic Causes)
2. *Viharatmaka Nidana* (Regimonal Causes).
3. *Manasa Nidana* (Psychological factors).
4. *Anya Nidana* (Other).

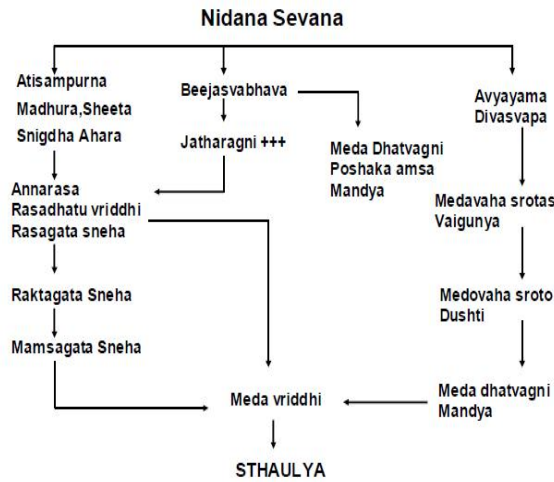


Fig. 1. Samprapti (Etiopathogenesis)

Table 1. Endogenous factors of Obesity

Ahartmaka	Viharatmaka	Manasa	Anya
<i>Adhyashana</i> (Taking food after lunch or dinner)	<i>Avyayama</i> (No Exercise)	<i>Harshanityatva</i> (Happiness)	<i>Amarasa</i> (Indigestion)
<i>Atisampurna</i> (Binge eating)	<i>Avyavaya</i> (No sexualactivities)	<i>Atichintana</i> (No worries)	<i>Snighda, Madhura Basti sevana</i> (Enema which contain Oily andsweet drugs)
<i>Ati Brimhana</i> (Over nourishment)	<i>Divaswapa</i> (Day sleeping)	<i>Manasonivritti</i> (Idle Mind)	<i>Tailabhyanga</i> (Oil Massage)
<i>Guru Ahara Sevana</i> (Taking food which is heavy to digest)	<i>Sukha Shayya</i> (Very comfortable bedding)	<i>Priyadarshana</i> (Very comfortable bedding)	<i>Snigdha Udvartana</i> (Powder massagewith oily drugs)
<i>Madhura Ahara sevana</i> (Excessive use of Sweets)	<i>Atisnana Sevana</i> (Excessive Bathing)		
<i>Shleshmala Ahara Sevana</i> (Food which will increase <i>Kapha</i> )			

## 2. PATHOGENESIS OF OBESITY (MODERN PERSPECTIVE)

Adipose cell hypertrophy with the least amount of hyperplasia is the hallmark of adult-onset obesity. In addition to the increase in the size of conventional depots (e.g. In obesity, subcutaneous tissue, omentum, retroperitoneal tissues, and epicardium, as well as adipose tissue, may be extensive to tissues where it is not normally present [18]. The three primary components in the aetiology of obesity are excessive lipid accumulation, decreased lipid

mobilisation, and decreased lipid consumption. Increased food intake, hypothalamic abnormalities, adipose cell hyperplasia, or hyper lipogenesis can all cause excessive lipid accumulation. By metabolic development, increased food consumption in the form of carbs, proteins, and fats eventually transforms to fats and is stored in fat depots [19]. Reduced lipid metabolism is caused by a decrease in lipolytic hormones, abnormalities of autonomous innervating thyroxine, and adrenaline, which stimulates the mobilisation of unsaturated fatty acids from adipose tissue. Abnormalities of these

two causes reduce lipid mobilisation, increase lipid authentication, and ultimately lead to obesity. Aging, inefficient lipid oxidation, inadequate thermogenesis, and immobility all contribute to reduced lipid exploitation. The major pathophysiology in middle-aged obesity is decreased lipid utilisation [20-24].

### 2.1 Rupa (Sign & Symptoms)

- Charaka has enlisted the subsequent symptoms as cardinal symptoms of Obesity.
- *Medomamsa ativridhi* (Excessive growth of Muscle & Fat tissue),
- *Chala Sphik-Udara- Stana* (Pendulous Buttocks-Abdomen-Breast),
- *Ayatha Upachaya Utsaha* (Disproportionate strength with his physical growth) [25].

Besides these cardinal symptoms, eight disabilities of *Atisthaulya* (Morbid Obesity) i.e. are the most prominent clinical features of Morbid Obesity narrated by Charaka [26].

- *Ayusho Hrasa* (Lacking in longevity),
- *Javoparodha* (Fewer energy levels),
- *Krichchra Vyavaya* (Complexity during Sexual Intercourse),
- *Daurbalya* (Weakness),
- *Daurgandhya* (Awful Smell),
- *Swedabadha* (Additional Sweating),
- *Ati Kshudha* (Too much Hunger)
- *Ati Pipasa* (Excessive Thirst)

### 2.2 Diagnosis

Specific criteria for diagnosis of obesity:

1. Age-specific weight for height table
2. Body Mass Index (BMI)
3. Skinfold Measurements
4. Body girth measurement [27]

### 2.3 Classification of Sthaulya (Obesity)

The demonstration of sthaulya can be elaborated based on contributory factors, demonstration, etc.

#### 2.4 Hina Sthaulya (BMI 25-30- kg/m<sup>2</sup>) – Overweight

A mild degree of overweight without any complications or secondary diseases with less than 1-year duration is considered as *Hina* [28].

#### 2.5 Madhyama Sthalya (BMI 30-40 kg/m<sup>2</sup>) – Obese

A reasonable degree of flabby with the least complications lacking secondary diseases having a period of 1 to 5 years can be considered as *Madhyama Sthaulya* [29].

#### 2.6 Adhika Sthaulya (BMI > 40 kg/m<sup>2</sup>) – Morbid Obese

Excessive stage of overweight with complications and secondary diseases, with all 8 detrimental effects and having a period of more than 5 years can be considered as *Adhika Sthaulya* [30].

### 2.7 Types of Obesity

#### 2.7.1 Android

Male type of obesity where surplus fat is marked in the upper half of the body. The lower portion of the body is thinner beyond percentage and judgment with the upper part. It is common in females too:

- Undergone hormone treatment.
- Around menopause due to thyroid

gland's disturbance Vital organs affected – Heart, Liver, Kidney & Lungs Major risk factor for heart diseases [31].

#### 2.7.2 Gynaecoi

Ordinary in both sexes but females more affected. Excess fat declaration is in the lower part of the body. The spine is never erect due to heavy hips and thighs.

- Vital organs affected: Kidneys, uterus, intestines, bladder.
- These organs may affect the heart.

### 2.8 Neither Android nor Gynoid

The whole body is affected. The fat tissues in their body hinder the movement of all the internal organs and consequently affect their functioning [32].

#### 2.9 Upadrava (Complications)

Chronic steadiness of Obesity leads to the deformity of several systems, and organs thus eventually leading to death. The following

complications are described in Ayurveda Sushruta has described that the complications happen due to grave impediment of various body channels particularly *Medovaha Srotas* [33] (A body channel that regulates fatty tissue in the body).

1. *Amaroga*; 2. *Apachi*; 3. *Arsha*; 4. *Atisara*; 5. *Bhagandara*; 6. *Jwara*; 7. *Kamla*; 8. *Kasa*; 9. *Kustha*; 10. *Mutra Kriccha*; 11. *Prameha*; 12. *Prameha pidika*; 13. *Shlipada*; 14. *Sanyasa* 15. *Udarroga*; 16. *Urusthambha*; 17. *Vata vikara*; 18. *Vridhi*.

## 2.10 Complications which are Described in Modern Science

1. Diabetes; 2. Heart Diseases; 3. Arthritis; 4. Cancer; 5. Hypertension; 6. Gall stones; 7. Sleep disorders; 8. Piles etc.

### 2.10.1 Sadhyasadhyata (Prognosis)

*Krichchrasadhya* (Difficult to cure) nature of Obesity has been described by most of the Ayurvedic classics. Furthermore, lack of immune power is mentioned as a general characteristic as well as a somber drawback of Obesity [34]. The bad prognosis of *Sahaja* (Congenital) diseases is described in Charakasamhita [35]. Therefore prognosis of Obesity can be constructed based on general principles of prognosis depicted in Ayurvedic classics [36] which is as follows:

### 2.10.2 Sukhasadhya

*Jatottara Hina Sthaulya* having a chronicity of 1 to 5 years and without complications and having BMI between 25 to 30 kg /m<sup>2</sup>.

### 2.10.3 Kricchrasadhya

*Jatottara Madhyama Sthaulya* having the chronicity of 5 to 10 years with the least complications and having BMI between 30 to 40 kg/m<sup>2</sup>.

### 2.10.4 Asadhya

*Sahaja* (Congenital) *Sthaulya* is *Asadhya*, *Jatottara Adhika Sthaulya* having chronicity of more than 10 years and with all the complications and having BMI of more than 40 kg/m<sup>2</sup>.

### 2.10.5 Sthaulya Chikitsa (Organization of Obesity)

The first line of management of Obesity is to avoid the contributory factors. *Nitya langhana* therapy (Reducing Therapy) and *Langhana* even in *Shishira Ritu* (Winter Season) are advised for the patients of Obesity by Vagbhata [37].

Types of *Langhana* therapy i.e.

*Vamana*, *Virechana* (Biopurification therapies), etc. are advised for practice according to *Vyadhibala* (strength of the disease) and *Dehabala* (strength of the patient) by Charaka [12]. Amongst *Shadvidha Upakrama* (Sixfold Therapy), *Langhana* and *Rukshana* (Drying) therapies are more appropriate for the treatment of Obesity. Vagbhata included all therapies underneath two main headings i.e.

- *Langhana* (Reducing therapy)
- *Brimhana* (Nourishing therapy)

*Langhana*, the line of treatment for Obesity has been additionally divided into *Samshodhana* (Biopurification therapies) and *Samshamana* (Alleviating Therapies) [38].

### 2.10.6 Samshodhana

All Obese patients with *Adhika Dosha* (Increased Bio humor) and *Adhika Bala* (More strength) should be treated with *Samshodhana* therapy including *Vamana* (Medicated Emesis), *Virechana* (Medicated Purgation), etc. [39] Being a syndromic condition, *Samshodhana* treatment is highly recommended for obese patients possessing endurance and strength [40]. *Ruksha*, *Ushna*, *Tikta Basti* (Enema containing dry, hot, and bitter drugs) are also suggested by Charaka. [41] *Ruksha Udvartana* (Dry powder massage) is the *Bahya Shodhana* (External therapy) indicated for the management of Obesity [17]. Exigency use of *Taila* (Oil) is recommended [42].

### 2.10.7 Shamana

Amongst the *Shat Upakramas*, *Langhana* and *Rukshana* can be administered in them [43]. Alleviation of *Vata*, *Pitta*, and *Kapha* especially *Samana Vayu*, *Pachaka Pitta*, and *Kledaka Kapha* (Biohumors) along with reduction of *Medodhatu* by increasing *Medodhatvagni* is the main goal of treatment of Obesity. Administration of *Guru* and *Apatarpana* articles which possess ad

ditional *Vata Shleshma* (Alleviating *Vata-Kapha-Meda*) properties is considered as an ideal for *Sanshamana* therapy [44]. In Ashtanga Samgraha usage of *Laghu* (Light), *Ushn* (Hot), *Ruksha* (Dry), *Tikshna* (Sharp), etc. are suggested for Obesity management as they possess *Medonashaka*, *Kaphanashaka* and *Sthaulyahara* actions [45]. *Lekhaniya* (Drugs having scrapping action) *Dashemani* (Ten) *Gana* (Group) mentioned by Charaka can be useful in managing obesity [46].

### 3. DOSE PERIOD AND METHOD OF TREATMENT

Pragbhakta i.e. intake of medicine before meals is insisted for *Krishikarana* (losing weight) purpose [47]. Among *Panchavidha Kashaya Kalpana* (Five pharmaceutical processes),

- *Kalka Kalpana* (Paste)
- *Karshana* (To reduce fat)
- *Durjara* (Difficult to digest)

is attributed to have properties, and the same is advocated in the treatment of Obesity. The use of *Avishadkara*, *Mridu*, *Sukhakara* *Aushada* in steady increasing dose with caution is advised for *sthaulya* management [48]. Further, it has been emphasized to believe

- *Agnibala* (Strength of the Digestive fire),
- *Dehabala*, *Doshabala* (Strength of the vitiated body humor) & *Vyadhibala* before fixation of dose and duration of treatment of Obesity [49].

### 3.1 *Sthaulya Pathyapathya* (Suitable- Obesity) *Pathyapathya Ahara* (Food) Unsuitable for the Patients of

Table 2. *Pathyapathya Ahara* (Food)

	<b>Pathya (Suitable)</b>	<b>Apathya (Unsuitable)</b>
<i>Shuka Dhanya</i> (Food grain)	<i>Yava, Venuyava, Kodrava, Nivara</i>	<i>Godhuma, Navanna, Sali</i>
<i>Shami Dhanya</i> (Pulses)	<i>Mudga, Rajmasha, Kullatha, Masura, Adhaki</i>	<i>Masha, tila</i>
<i>Shaka Varga</i> (Vegetables)	<i>Vrintaka, Patrashaka, Patola</i>	<i>Madhuraphala</i>
<i>Drava</i> (Liquid Stuff)	<i>Takra, Madhu, Ushnodaka, Dugdha, til taila, Asava, Arishta</i>	<i>Ikshu, Navnita, Ghrita, Dadhi</i>
<i>Mamsa</i> (Meat)	<i>Rohita Matsya</i>	<i>Anupa, Audaka</i>

### 3.2 *Pathya / Apathya Vihara* (Regimen)

Table 3. *Pathya / Apathya Vihara* (Regimen)

<b>Pathya</b>	<b>Apathya</b>
<i>Shrama</i> (Hardwork)	<i>Sheetala Jalasnana</i> (Use of cold water for bath)
<i>Jagarana</i> (Late nights)	<i>Divaswapa</i> (Day sleeping)
<i>Vyavaya</i> (Sexual activity)	<i>Avyayama, Avyavaya</i> (less exercise and less indulgence in sexual activity)
<i>Nitya Langhana</i> (Regular use of Reducing therapy)	<i>Swapna Prasanga</i> (Excessive sleeping)
<i>Chintana</i> (Thinking)	<i>Sukha Shaiyya</i> (Comfortable bedding)
<i>Shoka</i> (Sorrow)	<i>Nitya Harsha</i> (Happiness)
<i>Krodha</i> (Anger)	<i>Achintana, Manaso Nivritti</i> (Idle mind)

### 3.3 Diet

Diet must be nutritionally sufficient but must be lesser in calories, with vitamins and mineral supplements. A mixed balanced diet is a reasonable move toward to long-term weight reduction. The protein should be of soaring quality so that necessary amino acids can be utilized to maintain lean body mass. Food, high in fiber should be used generously because of its low caloric density.

#### 4. DISCUSSION

Charaka has given a detailed explanation of causative factors, etiopathogenesis, signs, and symptoms of Obesity. Acharya Susruta has added the complications of the disease & given consequence to avoid contributory factors of the disease. Out of the commentators, Dalhana has introduced the perception of *Dhatvagni Mandya*. The term '*Sthula*' (Obese) itself indicates the acknowledgment of *Prithvi* and *Apa Mahabhuta* overriding factors in the body. *Nidana* of *Sthaulya* is divided in four categories *Aharatmaka*, *Viharatmaka*, *Manasa* and *Anyas*. Besides these *Nidanas*, nowadays it is seen that due to highly sophisticated food with maximum percentages of carbohydrates & high-tech equipment which makes a person less active & prone to Obesity. Nowadays, *Nidanas* of *Sthaulya* are changing e.g. beforehand *Manasonivrtti* and *Harsanivrtti* were said to be the *Nidanas* of *Sthaulya* but these are now changing to increasing stress which causes episodes of binge eating leading to Obesity. Hereditary factor is also coming up as the famous cause for Obesity. Etiopathology of Obesity can be interpreted two ways, according to Charaka Samhita in which there is just increased *Jatharagni* (Digestive fire) which causes utmost ingestion and leads to maximum absorption of *Prithvi* and *Apa Mahabhuta* foremost factors in the body leading to increased *Medodhatu* in the body. According to Dalhana, there is a state of *Medodhatvagnimandya*, which leads to extreme arrangement of inappropriate *Medodhat* leading to Obesity. There is abundant growth of *Medodhatu* in Obesity which is having *Prithvi* and *Apa Mahabhuta* dominance. It is a condition of *Vridhdha* (Increased) *Medodhatu*. It requires the drug which can cause a attenuation of *Medodhatu* for its cure. Ayurveda recommends various management modalities like *Shodhan* and *Shaman*. According to the stage of the disease and potency of the patient appropriate management modality can be selected [50-51].

#### 5. CONCLUSION

Charaka has mentioned *Sthaulya* (Obesity) beneath the caption of *Santarpanotha Vikara* and it should be treated with *Apatarpan* (Reducing Therapy). Though *Sthaulya* is mentioned as *Krichhrasadhya Vikara* based on BMI one can say that if a person's BMI lies between 25-30 kg/m<sup>2</sup> it can be termed as *Sadhya* (Curable) but if it goes beyond 30 kg/m<sup>2</sup> then it becomes

complicated to cure. *Nidanas* of *Sthaulya*, mentioned in classics are now altering. Increasing pressure, faulty dietary habits, and decreased consciousness regarding work out are becoming the famous causative factors. *Kapha Prakriti* (Kapha principal body constitution) persons are more flat to *Sthaulya* so they should be advised of appropriate diet regimens and work out. In Society, the Percentage of the inhabitants anguish from *Sthaulya* is increasing day by day so they should be made aware of the disease and its severe complications before it reaches its epidemic level. Reducing on the whole energy intake is key to losing weight. Increasing physical activity can also be helpful together with calorie reduction in achieving weight loss and sustaining a healthy body weight, as well as improving overall health. Conglomerate food and drink corporations, physical activity and sports organizations, NGOs, employers, and local NHS staff all need to work collectively to help communicate the messages about why we need to look at our lifestyles, but also to modify the environment so the healthier alternative becomes the easier choice. Avoidance is the most important key factor for this disease. Patients should be educated to follow the lifestyle changes recommended by Ayurveda. The use of Biopurification methods along with drugs can give better results in obesity.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Gallagher EJ, Karnieli E, LeRoith D. The metabolic syndrome: From insulin resistance to obesity and diabetes. *Med Clin North Am.* 2011;95:855.
2. Austin MA, Hokanson JE, Edwards KL. Hypertriglyceridemia as a cardiovascular risk factor. *Am J Cardiol.* 1998;81:7B-12.

3. Kruth HS. Lipoprotein Cholesterol and Atherosclerosis. *Curr Mol Med*. 2001;1:633–53.
4. Castelli W. Lipoproteins and cardiovascular disease: Biological basis and epidemiological studies, *Value Health*. 1998;1:105–9.
5. Agnivesha, Charaka, Dridhabala. In: *Charaka Samhita, Sutra Sthana, Ashtauninditeeya Adhyaya, 21/3*. 5th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Sanskrit Sansthan; 2009;116.
6. Chakrapani D. In: *Commentator, Sushruta Samhita, Sutra Sthana, Doshadhatumalakshayavruddhi Vijnaniya Adhyaya, 15/4*. 8th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Orientalia; 2005;68.
7. Agnivesha, Charaka, Dridhabala. In: *Charaka samhita, Sutra Sthana, Deerghanjeeviteeya Adhyaya, 1/61*. 5th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Sanskrit Sansthan; 2009;17.
8. Sushruta. In: *Sushruta Samhita, Sutra Sthana, Doshadhatumalakshayavruddhi Vijnaniya Adhyaya, 15/4*. 8th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Orientalia; 2005;67.
9. Agnivesha, Charaka, Dridhabala. In: *Charaka samhita, Sutra Sthana, Ashtauninditeeya Adhyaya, 21/4*. 5th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Sanskrit Sansthan; 2009. p. 116.
10. Sushruta . In: *Sushruta Samhita, Sutra Sthana, Dravyasangrahaneeyam Adhyaya, 38*. 8th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Orientalia; 2005. pp. 164–8.
11. Vagbhata. *Ashtanga Samgraha, Sutra Sthana, Vividhadravayaganasangraha Adhyaya, 16, translated by Srikantha Murthy*. 9th ed. Varanasi: Chaukhamba Orientalia; 2005. p. 310.
12. Vagbhata. In: *Ashtanga Hrudaya, Sutra Sthana, Shodhanadiganasangraha Adhyaya, 15*. 9th ed. Anna Moreshwar Kunte, Krishnashastri Navare, Harishastri, editors. Varanasi: Chaukhamba Orientalia; 2005;229.
13. Sharma PV, editor. *Dhanvantari Nighantu*. 4th ed. Varanasi: Chaukhamba Orientalia; 2005.
14. Bhavamishra. In: *Bhava Prakasha Nigantu*. Chuneekar K.C, Pandeya G.S, editors. Varanasi: Chaukhamba Bharati Academy; 2006.
15. Vaidya Bapalal. *Nighantu Adarsha*. 1 and 2. Varanasi: Chaukhamba Bharati Academy; 2005.
16. Nishteswar K, Hemadri K. *Dravyaguna Vijnana*. 1st ed. Delhi: Chaukhamba Sanskrit Prathishthan; 2010.
17. Lucas SK. *Dravyaguna Vijnana*. 1st ed. Vol. 2. Varanasi: Chaukhamba Visvabharati; 2008.
18. Agnivesha, Charaka, Dridhabala. In: *Charaka Samhita, Sutra Sthana, Ashtauninditeeya Adhyaya, 21/4*. 5th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Sanskrit Sansthan; 2009;116.
19. Ibidem. *Charaka Samhita, Langhanabrumhaneeya Adhyaya, 22/4*;120.
20. Sushruta In: *Sushruta Samhita, Sutra Sthana, Rasavisheshavijnaniyam Adhyaya, 42\10*. 8th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Orientalia; 2005; 185.
21. Agnivesha, Charaka, Dridhabala. In: *Charaka samhita, Sutra Sthana, Atreyabhadrakapya Adhyaya, 26/53-54*. 5th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Sanskrit Sansthan; 2009;146.
22. Ibidem *Charaka Samhita, Atreyabhadrakapya Adhyaya, 26/53* .:146.
23. Ibidem *Charaka Samhita, Atreyabhadrakapya Adhyaya, 26/43* .:144.
24. Ibidem *Charaka Samhita, Atreyabhadrakapya Adhyaya, 26/42* .:143.
25. Ibidem *Charaka Samhita, Atreyabhadrakapya Adhyaya, 26/64* .:147.
26. Sushruta. In: *Sushruta Samhita, Sutra Sthana, Dravyarasagunaveeryavipaka vijnaniyam Adhyaya, 40/10*. 8th ed. Vaidya Jadavaji Trikamji Acharya., editor. Varanasi: Chaukhamba Orientalia; 2005;179.
27. Agnivesha, Charaka, Dridhabala. *Charaka Samhita, Sutra Sthana, Deerghanjeeviteeya Adhyaya 1/62*. In: Vaidya Jadavaji Trikamji Acharya., editor. 5th ed. Varanasi: Chaukhamba Sanskrit Sansthan; 2009;17.



28. Sushruta. In: *Sushruta Samhita, Sutra Sthana, Dravyasangrahaniam Adhyaya*, 389. 8th ed. Vaidya Jadavji Trikamji Acharya., editor. Varanasi: Choukhambha Orientalia; 2005:164.
29. Ibidem *Sushruta Samhita, Dravyasangrahaniam Adhyaya*, 38\15.:165.
30. Ibidem *Sushruta Samhita, Dravyasangrahaniam Adhyaya*, 38\19. :168.
31. Ibidem *Sushruta Samhita, Dravyasangrahaniam Adhyaya*, 38\19. :165.
32. Vaghata. In: *Ashtanga Hrudaya, Sutra Sthana, Shodhanadiganasangraha Adhyaya*, 15/31. 9<sup>th</sup> ed. Anna MK, Krishnashastri N, Harishastri, editors. Varanasi: Choukhambha Orientalia; 2005;237.
33. Bhavamishra. In: *Bhava Prakasha Nigantu, Sthaulyadhikara*, 39. 11<sup>th</sup> ed. part 2. Brahma Shankara Mishra., editor. Varanasi: Choukhambha Bharati Academy; 2009:406–7.
34. Sukh Dev. New Delhi: Anamaya Publishers; 2006. A selection of prime Ayurvedic plant drugs Ancient-modern concordance; p. 91.
35. Khare CP. Indian Medicinal Plants. *Springer*. 2007
36. Sabnis Mukund. Varanasi: Chaukhambha Amarabharati Prakashan; 2006. Chemistry and pharmacology of Ayurvedic medicinal plants.
37. Semwal BC, Gupta J, Singh S, Yogesh K, Mahendra G. Antihyperglycemic activity of roots of *Berberis aristata* D.C. in alloxan-induced diabetic rats. *Int J Green Pharm*. 2009:259–62.
38. Nagulendran KR, Mahesh R, Hazeena V. Preventive role of *Cyperus rotundus* rhizomes extract on age associated changes in glucose and lipids. *Pharmacologyonline*. 2007;2:318–25.
39. Kiran VP, Neeraj SV, Rajendra TG, Vilas KM. Antidiabetic Evaluation of *Dalbergia Sissoo* against alloxan induced diabetes mellitus in wistar albino rats. *J Nat Prod Plant Resour*. 2012;2:81–8.
40. Punitha R, Manoharan S. Antihyperglycemic and antilipidperoxidative effects of *Pongamia pinnata* (Linn.) Pierre flowers in alloxan induced diabetic rats. *J Ethnopharmacol*. 2006;105:39–46.
41. Tatiana S, Carolini Z, Michele S, Larissa L, Juana V, Taciene C, et al. Hypoglycemic and hypolipidemic effect of leaves from *Syzygium cumini* (L.) Skeels, Myrtaceae, in diabetic rats, Revista Brasileira de Farmacognosia. *Braz J Pharmacogn*. 2010;20:222–7.
42. Thakur CP, Thakur B, Singh S, Sinha PK, Sinha SK. The Ayurvedic medicines *Haritaki*, *Amla* and *Bahira* reduce cholesterol-induced atherosclerosis in rabbits. *Int J Cardiol*. 1988;21:167–75.
43. Kumari K, Augusti KT. Lipid lowering effect of S-methyl cysteine sulfoxide from *Allium cepa* Linn in high cholesterol diet fed rats. *J Ethnopharmacol*. 2007;109:367-71.
44. Fuchs M. Bile acid regulation of hepatic physiology: III. Regulation of bile acid synthesis: Austin MA, Hokanson JE, Edwards KL. Hypertriglyceridemia as a cardiovascular risk factor. *Am J Cardiol*. 1998;81:7B–12.
45. Waggiallah H, Alzohairy M. The effect of oxidative stress on human red cells glutathione peroxidase, glutathione reductase level and prevalence of anemia among diabetics. *N Am J Med Sci*. 2011;3:344-7.
46. Moncada S, Palmer RM, Higgs EA. Nitric oxide: Physiology, pathophysiology, and pharmacology. *Pharmacol Rev*. 1991;43:109-42.
47. Singh RB, Niaz MA, Ghosh S. Hypolipidemic and antioxidant effects of *Commiphora mukul* as an adjunct to dietary therapy in patients with hypercholesterolemia. *Cardiovasc Drugs Ther*. 1994;8:659-64.
48. Singh K, Chander R, Kapoor NK. Guggulsterone, a potent hypolipidaemic, prevents oxidation of low density lipoprotein. *Phytother Res*. 1997;11:291-94.
49. Meselhy MR. Inhibition of LPS-induced NO production by the oleogum resin of *Commiphora wightii* and its constituents. *Phytochemistry*. 2003;62:213-18.
50. Gujral ML, Sareen K, Tangri KK, Amma MK, Roy AK. Antiarthritic and anti-inflammatory activity of gum Guggul (*Balsamodendron mukul* Hook). *Indian J Physiol Pharmacol*. 1960;4:267-73.

51. Sharma JN, Sharma JN. Comparison of the anti-inflammatory activity of *Commiphora mukul* (an indigenous drug) with those of phenylbutazone and ibuprofen in experimental arthritis induced by mycobacterial adjuvant. *Arznei mittel for schung.* 1977;27:1455-57.

---

© 2021 Ghanawat et a.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle4.com/review-history/72766>