



Review Article

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Sthoulya Asthadosha – Review on understanding of complications of obesity through Ayurveda and modern science

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ABSTRACT

Sthoulya is major problem the whole world is facing today. Recently many research works have suggested that, over 1.9 billion population of middle age are overweight and 650 million are suffering with obesity worldwide. In India, over 135 million people had suffered *obesity*. It is a major reason of medical and financial burdens for the government. Central obesity is one among the important risk for vascular diseases of heart (CVDs) and a major reason of mortality in India. *Atisthula* who is having excessive deposition of meda and mamsa in sthana, udara and sphik is considered as dosha (that can cause many untoward health consequences) as per Ayurveda. Modern pathophysiology also suggests central obesity which is considered *Metabolically unhealthy obesity* (MUHO) in contrast with peripheral obesity as *metabolically healthy obesity* (MHO). Charaka said eight doshas (complications or syndrome) namely *Ayukshaya* (reduced life expectancy), *Javoparodha* (reduced physical activities), *Krichravayavayata* (infertility both male and female, loss of libido and erectile dysfunction), *Dourbalya* (reduced physical strength and reduced immunity), *Dourgandya* (Bromhidrosis), *Swedabhada* (difficulties with sweating), *Atikshudha* (increased appetite and hunger) and *Atitrishna* (excessive thirst). *Asthadosha* when analysed critically covers almost complications and consequences of obesity explained in modern literature. After reviewing both Ayurveda and modern literature about the obesity and its complications there are lots of similarities are observed and makes easy to understand *sthoulya* better.

Keywords: Sthoulya, Atisthula, Obesity, Asthadosha.

INTRODUCTION

Sthoulya is not only a disease but it is also considered as phenotype, where in diseases manifesting are going to be difficult for management [1]. Very recent example; patients of Covid 19 associated with obesity have higher rates of hospital admission, needs oxygen, more ICU admissions and even higher rates of mortality [2]. When *Sthoulya* becomes *atisthoulya* suffer array of pathological changes leading to manifestation of several upachayaja (metabolic diseases like type 2 DM) and *vatavardhaja* (occlusion or obstruction or over accumulation leading to *vata margavarana* causing *vatavyadhi* like cardiovascular diseases, stroke, cancers and many) diseases. It reduces life expectancy and finally destroy whole body like a little fire destroy whole forest with a support of heavy wind [3]. *Sthoulya* is pendulous deposition of meda in udara (abdomen), sthana(chest) and sphik (gluteal) which directs towards central obesity having more clinical implication in causing diseases than peripheral obesity [4]. Imbalance in upachaya of dhatus (excess fat and less of other tissues), *avarana* of *vata* by meda and *kapha* in different areas of *shareera* and errors in hunger and food intake are the key factors in the pathology of diseases occurring in *sthoulya* [5].

Recently many research works have suggested that, over 1.9 billion population of middle age are overweight and 650 million are suffering with obesity worldwide. In India, over 135 million people had suffered *obesity*. Occurrence rates of obesity in India, changes because of age, sex, environment, social and economic factors. Recent study of Indian Council of Medical Research in the year 2015 (ICMR-INDIAB) says that in India, obesity and abdominal obesity ranges accordingly between 11.8% to 31.3% and 16.9%-36.3%. Central obesity is one among the important risk for vascular diseases of heart (CVDs) and a major cause of mortality in India [6].

Definition: It is characterised by excessive increase in meda and mamsa dhatu (compared to other dhatus), bulky and pendulous chest, gluteal and abdomen which is a result of unequal nourishment of body (excessive meda and less other dhatus) leading to loss of body strength even though person looks stout is called as *sthoulya* [4].

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Ayurveda defines obesity not merely on weight or BMI but by the physical signs mainly unequal nourishment of dhatus (excess meda and mamsa and less of other dhatus) that ultimately leading to bala kshaya (body strength). Person becomes exhausted even with little work or exercise. He will be unable to perform his moderate daily physical activities with ease. That unequal nourishment is a major sign of atisthoulya which is a dosha that can have health consequences. Those who are not over obese and don't have loss of strength will not have serious health consequences of sthoulya. That means a person looking obese but carry out his daily moderate to all activities with ease may not need rigorous weight reduction modalities as long as he is fit by physical activities.

Another important physical sign which indicates sthoulya is excess deposition of meda and mamsa (fat and muscle) in chest, belly and gluteal (central obesity) and they look flabby and pendulous. Such persons will be having more health consequences rather than those having equally distributed fat all over body and having compactness of fat and muscle (samhananata).

Many of the recent studies classifies obese into two viz Metabolically healthy obese and metabolically unhealthy obese (MHO and MUHO). The total amount of fat in the body is not the main reason that describe, obese population are metabolically at risk. Site of accumulation of excessive adipose tissue and its altered activity will decide the metabolic health of an individual. Deposition of excessive adipose mass in abdomen and chest is the major reason for development of complications of obesity and also mortality. Another group of population having obesity, called as metabolically healthy obese (MHO) people, are comparatively safe from manifestation of metabolic diseases of heart than those of metabolically unhealthy obese population. Subjects who are metabolically unhealthy obese are having lesser subcutaneous adipose tissue, hypertrophy of adipocytes, higher inflammatory response of adipose mass and changed storage capacity of adipocytes, that results in internal accumulation of fat (i.e., higher fat in viscera, deposition of lipids in hepatic tissues and skeletal muscles) and raised inflammatory response in adipose cells, ultimately developing insulin resistance and chronic metabolic conditions of heart [7].

ASTHADOSHA OF STHOULYA

Acharya Charaka says sthoulya is not a nindita but atisthoulya (over obese) is nindita who is going have doshas. Atisthula person will have health issues rather than merely sthula [8].

अतिस्थूलस्य तावदायुषो हासो जवोपरोधः कृच्छ्रव्यवायता दौर्बल्यं दौर्गन्ध्यं स्वेदाबाधः क्षुदतिमात्रं पिपासातियोगश्चेति भवन्त्यष्टौ दोषाः ।।

Common Health issues that obese person is going to suffer in his lifetime are called sthoulya dosha and they are eight in number.

1. Ayu kshaya: reduce your life span

Unbalanced nourishment in obesity where only fat tissues are going to nourish and deposit in excess compared to other tissues as well. This imparity/disproportionate nourishment of tissues are going to suffer with meda santarpana janya vyadhi like prameha and margavarana

janya vyadhi like vatavyadhi will result in ayu kshaya due to early morbidity and mortality [9].

Obese individuals may die early, develop many complications and suffer with cardiovascular disorders, raised blood pressure, cerebrovascular accidents, insulin dependent diabetes mellitus, insulin resistance syndrome and also impairs mental status [10]. Charaka says that sthula will suffer with one or other dharuna (Serious/Acute life threatening) vyadhi. Shivadasa sena commentator of charaka explains that what are all the serious illnesses that a sthula can suffer in his life like prameha, pidakas, jwara, bhagandara, vidradhi, vatavyadhi (pakshaghata, hridroga of vataja variety, etc). Such kind of diseases are certainly going to cause morbidity and mortality of obese population. That means a sthula person is going to lose his life early. That is how ayu khaya is going to happen in sthula [9].

2. Javoparodha: Reduced quickness in activity

Meda by the virtue of its properties like laxity, heaviness, softness and delicateness makes a sthula person lose quickness, speed and swift in his physical activities. Java refers to speed, swift and quickness [11-12].

Reduced activity (contraction) of skeletal muscles leads to restricted movement and increases obesity linked health issues. Obesity interrupts calcium signalling and 5'-adenosine monophosphate-activated protein kinase (AMPK) functions in muscle cells. Obesity and ageing are having same functional impairments of body. Elder population associated with Obesity affects greatly muscular functions and have higher morbidity and deaths [13].

3. Krichra vyavaya: loss of libido and infertility

Reduced shukra dhatu production (low sperm count and hypogonadism) due impaired nourishment of shikra dhatu and obstruction by meda to shukra will result in difficulties with sexual life and infertility (Erectile dysfunction of atherogenic origin) [11]. Obesity has been reported to be associated with erectile dysfunction, low testosterone concentrations and infertility. Overweight in males is well-known for development of secondary hypogonadism. Secondary hypogonadism is associated with reduced levels of testosterone along with clinical symptomatology, viz. loss of libido and sexual performance, reduced voluntary erections, reduced body hair especially in axilla and pubic region, loss of facial hairs (beards), hampered sperm production along with low inhibin B levels and reduced/normal follicular stimulating hormone and luteinizing hormone levels. Males associated with overweight more commonly suffer with Erectile dysfunction (ED). Many research papers established that obesity, and especially abdominal obesity is connected with atherogenic erectile dysfunction. Insulin resistance, leptin resistance, inflammatory mediators, kissproteins are key factors resulting in hypogonadism. Fat mass present in abdomen, above the pubic region and medial aspects of thighs covering and applying pressure on scrotum causing raised temperature inside the scrotum and leading to raised DNA splitting and higher oxidative stress. The abdominal, suprapubic and medial thigh fat, wrapping the scrotum, leads to an increase in intrascrotal temperature determining an increased DNA fragmentation and an increased oxidative stress. It further affects reduced sperm standards; raised temperature inside scrotum impact on low sperm motility and count [14].

Not only men even women of reproductive age also suffer infertility. In Females, suffering with obesity; especially those associated with abdominal obesity, the possibility of conception per cycle is low. They also suffer disturbances to the hypothalamic-pituitary-ovarian axis, impaired menstruation cycle, and oligo-ovulation or anovulation three times more than non-obese. Obese women are having infrequent ovulation and obesity negatively affects development of endometrium and attachment of fertilized egg to it. Manifestation of polycystic ovarian disease (PCOD) is common in women with obesity, so obese women with PCOD are having a severe phenotype and frequently suffer subfertility. Obese women negatively respond to invitro fertilization (IVF), intracytoplasmic sperm injection (ICSI) and other assisted fertilization methods [15].

4. Dourbalya: reduced body strength

Loss of body strength is because of improper nourishment of all dhatus. Shivadasa sena says bala is too low compared to size of body. Even though size of body is big but its majority is deposited fat and less of other vital dhatus like rasa to shukra [9]. Charaka opine that in sthoulya only meda dhatus is nourishment less of other dhatus resulting in bala kshaya [8]. Bala is dependent on quantity and quality of every dhatu mainly mamsa and asthi dhatu which is also deficient in sthoulya due to obstruction of meda to rasa and other nourishing dhatu. Obesity reduces the muscle strength and its activities. It likely develops the dysfunction of muscles and are movement, power and limit the postural and dynamic balance. There is a general agreement that, subjects with obesity without consideration of age, have higher absolute muscle power in comparison with non-obese subjects. It suggests that higher adiposity add a long-term overload on muscles that act against the gravity (e.g., quadriceps and calf), there by expanding muscle size and power. Even though, there is a greater muscle strength but it is nullified by deposited adipose mass and such subjects experience low strength. Here comparative loss of strength is due to low mobility, neural adaptations and altered size of muscle [16].

Body strength is dependent on function of mainly Musculo-skeletal system. Due to insulin resistance all tissues of the body get impaired glucose supply and hence impaired nourishment of tissues leading to reduced metabolism of glucose and hence energy synthesis within cells. The same mechanism is possible with Musculo-skeletal tissues. Study showed that anti-oxidant supplementation and exercise training in patients of obesity have increased insulin sensitivity and increased uptake of glucose by muscle cells regaining the muscle strength [17].

5. Dourgandya: Bad body odour

Vitiated meda by dosha [18-19], nature of meda [20], and excess sweat [21] in obesity will cause bad body odour. All above three causes have individual effect in bad body odour [9]. Bad body odor is called as Bromhidrosis which is of four types namely eccrine, apocrine, exogenous and endogenous. Endogenous causes include systemic diseases overweight, type 1 and 2 DM, hepatic disorders, kidney failure and dermatological diseases of palms, soles and flexures. Obesity also affects sebaceous and sweat glands and causes circulatory and lymphatic changes [22].

6. Swedabhada: Problems of sweating

Association of kapha with meda, liquification of meda, excessive meda, heaviness of meda and intolerance of physical activities by obese altogether will result in problems of sweating like excessive sweating, reduced sweating due to obstruction, skin manifestations due to vitiated sweda [5, 8]. Increased sweating also comes with obesity. Low body surface area (BSA) compared to the adipose mass, is the cause why obese individuals unable to expel excess heat strongly and they sweat more compared to non-obese or thin population. When sweda elimination insufficient as compared to the meda upachaya (sweda is mala of meda), it starts to get accumulate within subcutaneous tissues and cause many of the skin manifestations.

Impairment of protective role of skin, sebum secretion and sebaceous glands activity, sweat glands, lymphatic system, collagen formation and physiology, natural ulcer healing, circulation in micro and macro vessels, and subcutaneous adipose tissue are caused by obesity. Obesity is also responsible for range of skin disorders, acanthosis nigricans, pain due to fat folds, chicken skin, in females; acne, hair loss on scalp, increased hair growth on face and skin due to raised sex hormones, stretch marks, lymphoedema, varicose veins, infectious skin diseases, acne inversa, psoriasis and gouty arthritis with tophi [23].

7. Ati Kshudha: excessive hunger and

8. Ati pipasa: excessive thirst

Intense digestive fire and excessive vata in kosta due to Avarana of vata by kapha and meda, aggravates samanavata situated in the kosta. Samana vata strong contributor for aharpachana (aids digestion by stimulation of pachakagni), sarakitta vibhajana (separation of nutrients and excreta), ahara grahana (collecting food through gut movement) and munchana (propulsion of food forward in gut). It helps in pachana by stimulating amashaya to secrete more pachaka pitta and other substances, leading to more appetite and hunger [8, 24]. Due to disparity in the nourishment of dhatus, which signals further need of food and hunger.

There is a significant insulin resistance is observed in obesity which further leads to increased glucose levels but inability to convert glucose into energy. Cell become starved and body signals for more food (glucose) results hunger. This vicious cycle continues. During insulin resistance condition in obesity and obese diabetics, there is more glucose in blood. Whenever there is, high blood glucose levels, body excretes the excessive glucose through urine. The sugar then draws in water from the surroundings to further increase the volume of urine that will cause polydipsia or thirst to fulfil the needs. Excess body weight needs excess food and, that will naturally cause hunger and thirst to supply the needs.

Hypothalamus is responsible for regulation of weight and food intake. Hypothalamus modifies food consumption depending on energy stores and requirement of body. In due time, when there is weight gain by continuous heavy food indulgence, then individual will start to consume less food and loose the weight automatically. In most of the

over obese individuals, the spontaneous process of weight loss will not happen, such subjects continue to take more food, leading to further weight gain. Surprisingly, Ghrelin which is a hunger hormone secreted in gastrium, stimulating the hypothalamus is found to be in normal levels or even low in obese individuals. Many studies have found that some specific antibodies, or immunoglobulins in overweight subjects and such antibodies identify the hunger hormone and control appetite. Immunoglobulins will attach to hormone and safeguard it from quick fragmentation in blood. Finally, normally secreted ghrelin hormone is saved from early destruction or disappearance and allowed to act for more duration and cause hunger [24].

CONCLUSION

Sthoulya is a phenotype not mere a disease. Asthadoshas are different complications and health issues associated with sthoulya. The diseases manifesting in a sthoulya are going to become severe. Pathology and treatment of those diseases require a special attention to understand. Sthoulya persons are having poor strength in terms of body and immunity, become susceptible to infections. Pathologies undergoing in obesity like *hyperlipidemia*, *insulin resistance*, *hypertension* and other conditions are going to end up in dreadful *cardiovascular and cerebrovascular* diseases and are major causes of mortality. The same concept is mentioned in Ayurveda as *medavruta vata* is a major culprit of all the complications that sthoulya suffer like *vatavyadhi* (hidroga and pakshaghata), *prameha*, *vandhyatwa* (infertility), impaired hunger-thirst and others. Presently sthoulya is disease of concern of modern days high in its prevalence due to sedentary lifestyle and altered food habits. Due to the complications of obesity and due to severity of other diseases like infectious origin are going to cause early mortality and reducing the life expectancy.

Conflict of Interest

None declared.

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