



PURSUIT OF RELEVANCE OF CHARAK'S DEFINITION OF STHOULYA IN CONTEMPORARY ERA THROUGH AN ANALYTICAL STUDY OF BODY MASS INDEX VERSES WAIST-HIP RATIO

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Abstract

Obesity is a multifaceted health issue with significant implications for individuals and societies worldwide. Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR) are commonly used metrics to evaluate obesity and associated health risks. This article presents a comparative analysis of BMI and WHR as indicators of obesity, examining their strengths, limitations, and relevance in clinical and public health settings. While BMI provides a measure of overall adiposity, WHR offers insight into central obesity and distribution of fat as stated by Charakacharya while defining *sthoullya*/obesity. In this article a survey study was carried out for 100 healthy individuals for examining BMI and WHR. The study has shown significant P value in comparison between BMI and WHR. The discussion delves into the differential associations of BMI and WHR with health risk. Furthermore, the impact of age, gender on the interpretation of these metrics is explored elucidating the comparative merits of BMI and WHR in the context of obesity, especially Indian population where central obesity is prominent.

Keywords - *Sthoullya*, Obesity, BMI, WHR, Health risk.

Introduction

"You are not good enough, is the message family and society send to Overweight and Obese people especially to women". It is nearly 60 years since a poet Simone de Beauvoir famously wrote, one is not born a woman but becomes one. Many of Obese lives are bedeviled by the three-letter word, 'FAT' along with "social anxiety, loss of self-esteem, isolation and vulnerability in social and private lives". The word obesity is a noun form originated from Greek root word "Obesus" meaning "having eaten until fat", Latin "Edo" meaning "eat", obese is used as an adjective meaning "grossly fat" or "very fat"^[1]. Obesity is defined as an excess of adipose tissue that imparts health risk; a body weight of 20% excess over ideal weight for age, sex and height is considered a health risk^[2].

Thirty years ago^[3], overweight and obesity was defined as a nutritional disorder but it continues to be one of the most important yet preventable health hazards. Transformation of India into an affluent nation has brought changes in life style, and junk food diet that have led to an increase in Obesity^[4]. In ayurvedic literature *Sthoulya*(obesity) is considered as *Santarpanajanya vyadhi*^[5] and one among the *Ashta nindita*^[6] *purushas* and as *Kaphaja nanatmaja vyadh*^[7]. *Sthoulya* and *Medoroga* are the two words used to describe the obese person. The word *Sthoulya* is derived from root "*Sthu*" with suffix "*Ach*" which stands probably for thick or solid or strong or big or bulky^[8]. A person having pendulous appearance of *sphik*, *udara*, and *sthana* due to excess deposition of *meda* along with *mamsa dhatu* and also having unequal an abnormal distribution of *meda* with reduced zeal towards life is called *Atisthula*^[9].

Ati-sthoulya has been described as a congregation of pathological events caused by excessive growth of *meda dhatu*^[10]. It is a condition that is associated with several grievous diseases, which even could lead to sudden death^[11] It also has been identified as a cause of reduced life span in Charak Samhita^[12]. Two important Patho-physiological events have been mentioned in regards to *Ati-sthoulya*-
1.Undue enhancement of *Meda dhatu* and *Vishama-dhatuposhana*^[13]. (derangement in normal physiology of *dhatu*)

2.Medo-dushti^[14] (Vitiated *meda dhatu*)

In present era most of the cases diagnosis will be apparent from the patient's appearance but the degree of overweight or obesity need a precise assessment which requires measurements and reference standards. There are many methods of estimating body fat like BMI, WHR, Skin fold thickness, Ultrasound, Density immersion etc. Body Mass Index (BMI) and Waist-Hip Ratio (WHR) are two common metrics used to assess body composition and health risks associated with weight distribution. While both offer valuable insights, they have distinct advantages and limitations.

Body Mass Index (BMI) / Quetlet's Index: Weight(kg) / Height (m)

This index is more closely corresponds to measurement of body fat and better differentiates "Overweight" due to an increase in muscle mass from true obesity.

The international classification of BMI has been widely accepted based on the following ranges of BMI values^[15]

Body mass index	Grade
25-29.9	Overweight
30-34.9	Grade 1 obesity
35-39.9	Grade 2 obesity
40-49.9	Grade 3 obesity
More than 50	Super obesity

BMI is calculated by dividing a person's weight in kilograms by the square of their height in meters. It provides a general indication of whether a person is underweight, normal weight, overweight, or obese. However, BMI does not differentiate between fat and muscle mass, nor does it consider the distribution of fat within the body.

Body girth measurements: WHR: ^[16]

The measurement of body circumferences with a tape measure provides the same advantages of portability and acceptability as height weight measurements. In addition, circumference measurement appears to be more precise and less subject to inter observer errors even in very obese persons.

To check for abdominal obesity, one measures the waist hip ratio this is given by, Waist circumference in cms / Hip circumference (in cms)

The waist circumference is usually measured half -way between the superior iliac crest and the rib cage in the mid axillary line, whereas the hip circumference is measured one third of the distance between the superior iliac spine and the patella.

WHR compares the circumference of a person's waist to that of their hips. It is a measure of fat distribution and is often considered a better indicator of health risks associated with obesity, particularly abdominal obesity, which is linked to a higher risk of cardiovascular diseases, type 2 diabetes, and other metabolic syndromes.

Two Patho-physiological phenomena are thought to play an important role in the underlying mechanism of Metabolic syndrome. It includes

1. Impaired normal metabolic pathway of carbohydrate, fat, protein due to insulin resistance^[17].
2. Dysfunctional adipose tissue^[18] leading to chronic low-grade inflammation

There are major structural as well as functional differences of visceral or subcutaneous adipose tissue. Structurally visceral adipose tissues are more cellular, vascular, fortified and contains a larger number of inflammatory and immune cells than subcutaneous adipose tissue. Visceral adipocytes are more metabolically active and has a greater capacity to generate free fatty acids and to uptake glucose than subcutaneous adipose tissue^[19].

In obesity, a pro-inflammatory state of adipose tissue, as well as dysfunctional state of adipose tissue has a significant role toward an abnormal metabolic state^[20]. Rather than total adiposity, the core clinical component of the metabolic syndrome is visceral or ectopic fat^[21] hence central obesity is more gravies than generalised obesity.

The Charaka's definition of *sthoulya* "*Sphik Udara Stana chalatwa*" clearly denotes the central obesity which is more prevalent than generalised obesity in India. Keeping in view the definition of obesity according to Charak an attempt is made to understand the significance of WHR than BMI as WHR tend to be the precise method to evaluate obesity in Indian population as Charaka's definition suggests.

An analytical study was conducted to evaluate health risks related to obesity where BMI and WHR were recorded in healthy individuals.

Aims and objectives:

1. To establish Charak's definition of Sthoulya in contemporary era through waist-hip ratio
2. To focus on WHR suggested by Charaka is greater risk factor as compared with BMI in Indian population

Materials and Methods

Survey was conducted in the month of April 2024, in and around Kalaburagi city, a district in Karnataka state. The Data of 100 individuals was collected randomly from different health centres like PHC's, Paediatric Hospitals and Private clinics. Data includes Name, Age, Gender, Aadhar number and cell number and Measurements height, weight, waist circumference and hip circumferences were recorded by hospital/health centres staff under the supervision of author.

Inclusion criteria -

1. Healthy individuals accompanying patients.
2. Age group was selected between 20 to 60 years. (25 individuals of different age group in each decade)

Exclusion criteria -

1. Individuals of age below 20 and above 60
2. Diseased individuals

Results

Table 1: Distribution of patients according to Health Risk W/H and Obesity Grade (BMI). P value by chi square test

Health Risk W/H In cm	Obesity Grade with BMI						
	Grade 1 obesity (30 to 34.9)	Grade 2 obesity (35 to 39.9)	Grade 3 obesity (40 to 49.9)	Normal (Below 25)	Overweight (25 to 29.9)	Super obesity (Above 50)	Sum
High Health Risk (Male 1.0 + Female 0.85+)	10	05	04	17	19	00	52
Low Health Risk (Male 0.95 below Female 0.80 below)	04	00	11	14	09	01	28
Moderate Health Risk (Male 0.96 to 1.0 Female 0.81 to 0.85)	04	00	01	13	02	00	20
Sum	18	05	02	44	30	01	100
P value	0.0955						

Note: p value=0.0955>0.05, implies there is association between Health Risk W/H and Obesity Grade

Health Risk Categories:

- **High Health Risk:** This category includes individuals with a W/H ratio indicating high health risk (1.0 for males and 0.85 for females). In this table, there are 52% individuals falling into this category.
- **Low Health Risk:** Individuals with a W/H ratio indicating low health risk (0.95 or below for males and 0.80 or below for females). There are 28% individuals in this category.
- **Moderate Health Risk:** Individuals with a W/H ratio indicating moderate health risk (0.96 to 1.0 for males and 0.81 to 0.85 for females). There are 20% individuals in this category.

Obesity Grades with BMI:

- The table further categorizes individuals into different obesity grades based on their BMI (Body Mass Index). These grades include Grade 1, Grade 2, and Grade 3 obesity, as well as normal weight (below 25 BMI), overweight (25 to 29.9 BMI), and super obesity (above 50 BMI).
- The numbers in the table represent the count of individuals falling into each category.

Interpretation:

- There is a notable number of individuals categorized as having Grade 1 obesity who fall into the high health risk category (10% individuals).
- Most individuals in the low health risk category fall into the normal weight BMI range (14% individuals).
- Grade 2 and Grade 3 obesity categories also contribute to individuals with high health risk, though to a lesser extent compared to Grade 1 obesity.
- The table indicates that the distribution of individuals across obesity grades varies significantly based on their health risk category.

Results suggest that 44% people though their BMI lie under normal category still they pose health risk at different levels under WHR. This clearly indicates WHR is more appropriate to assess health risk in terms of obesity.

Discussion:

Excess deposition of fat in the abdominal region is termed as abdominal obesity or central obesity, which is explained by Charaka as *sphik udara stana chaalatva* and is associated with greater health risk. "The Patho-physiological phenomena involved in development of metabolic syndrome clearly overlap the Patho-physiology of *atisthoulya* explained by acharya Charaka".

BMI is used to define and diagnose obesity. According to WHO guidelines raised BMI is a risk factor for non communicable diseases such as diabetes, cardiovascular diseases, musculoskeletal disorders, resulting in dramatic decrease of life quality and expectancy. These all factors are been explained by Acharya Charaka while explaining *Roga* and *Yojana Chatushka*

Measures commonly used for assessing obesity are BMI and WHR. Though lot of significance is given to BMI in relation with cerebrovascular accidents, but in Asian Indian population, majority of people have central obesity, with relatively less BMI and still suffering from cerebral vascular accidents.

The data of 100 individuals collected in and around the Kalaburagi city in Karnataka height weight waist circumference and hip circumference were recorded. The 44 people found to be with a normal BMI and 56 people were obese with BMI more than 25 kg/m² but 44 number of people with normal BMI had waist hip circumference higher than the normal levels, which is indicative of abdominal obesity as per Charaka's definition of *sthoulya*.

This study indicates that the threshold for obesity parameter that is BMI is relatively low when compared with WHR in Indian population.

Even some national level studies suggest that for any given BMI Indians tend to have increased WHR. Further Indians also tend to have excess body fat, abdominal and truncal adiposity. These features have been referred to as Asian Indian phenotype or paradoxism.

BMI is a convenient and widely used tool for assessing weight status and associated health risks, it does have limitations. For instance, BMI does not differentiate between fat mass and muscle mass, which means that individuals with high muscle mass, such as athletes, may have a high BMI despite being healthy. Additionally, BMI does not account for factors such as age, gender, or body composition, which can influence health outcomes.

WHR is particularly valuable because it considers gender differences in fat distribution. Men tend to accumulate more fat around the waist getting an apple shape, leading to higher WHR values, while women typically store more fat around the hips and thighs resulting into pear shape which typically matches with Charaka's definition of *sthoulya*.

Conclusion

Obesity is defined as a nutritional disorder. It is one of the most important yet preventable health hazard. Charakacharya included the obese person under the category of eight undesirable personalities in the society. Charaka defined *sthoulya* as *Sphik Udara Stana chalatwa* typically defines the phenotype obesity or central obesity, which is more in Asian Indians. So, Charaka's definition of *Stoulya* is more appropriate for Indian population rather than BMI as per WHO definition in terms of BMI. As BMI evaluates the generalised body fat, WHR evaluates the local fat seen in central obesity. In the present study. 44 people were noticed with relatively lower BMI but with central obesity, hence raised WHR, so Indians with lower BMI, but with higher WHR, assessing obesity with WHR is more apparent and more appropriate than with BMI. Obesity/*sthoulya* is chronic illness that requires continuous attention. This needs higher-level research with large data to get still confirmatory results.

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