IMPORTANCE OF BODY MASS INDEX (BMI) AND WAIST CIRCUMFERENCE (WC) IN PREEMPTING POSSIBLE COMPLICATIONS OF OBESITY

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ABSTRACT: The Body Mass Index (BMI) and Waist Circumference (WC) are objective measures that are normally used to detect and classify the state and level of obesity. These are simple and can be measured in any out patient (OPD) setting by Yoga therapists to evaluate obesity. This paper attempts to introduce these measures as tools to help predict the possible complications that may occur in the individual patient thus modifying the Yoga therapy schedules to suit the patient’s individual requirements.
Key words: Obesity BMI Waist Circumference Yoga therapy

INTRODUCTION:
“Heyam dukkam anagatham” says Maharishi Patanjali thus warning us to identify and prevent those miseries that are yet to manifest. This is a very sane approach to Yoga therapy and is true in the case of the modern pandemic of obesity that is threatening the health and subsequently even the wealth of the entire world. Early identification and classification of obesity is vital for managing the disorder and for effective prevention of the progressive complications.
The natural progression of the disorder is from a state of being overweight to being obese and ultimately to ending up being morbidly obese. If this is not controlled in the early stage with the right management then many complications begin to appear on the symptomatic horizon with a potential to cause death and disability for millions around the globe.

Yoga plays an important role in managing obesity and can help us prevent the manifold complications that may arise from it later. A recent study by Irwin ML et al has shown that while diet-induced weight loss is important, weight loss accomplished through physical activity improved fitness levels and subsequently reduced the risk of cardiovascular events.
The Body Mass Index (BMI) and Waist Circumference (WC) are objective measures that are normally used to detect and classify the state and level of obesity. These are simple and can be measured in any out patient (OPD) setting by Yoga therapists to evaluate obesity.

This paper attempts to also introduce these measures as tools to help predict the possible complications that may occur in the individual patient thus
modifying the Yoga therapy schedules to suit the patient’s individual requirements.

BODY MASS INDEX:
The BMI has been recognized worldwide as an effective method of quantifying obesity by the World Health Organization, the National Institutes of Health, and the Centers for Disease Control and Prevention, USA.

It is a simple and cost effective method of assessment that can be used with great benefit everywhere.

It is derived from a formula that uses the weight and height to estimate body fat and health risks.

\[ \text{BMI} = \frac{\text{weight in kilograms}}{\text{(height in meters)}^2} \]

Normal range of the BMI is between 18.5 and 24.9 units. Those between 25 and 29.9 are considered overweight and if it is 30 or greater, the person is considered to be obese. BMI above is considered to be extremely or morbidly obese and usually requires surgical intervention.

WAIST CIRCUMFERENCE:
Guidelines from the National Heart, Lung, and Blood Institute, USA suggest that in addition to BMI measurements, WC should also be assessed. The guidelines specify that the presence of excess fat in the abdomen that is out of proportion to an individual's total body fat is an independent predictor of "risk factors and morbidity." The guidelines differentiate between prevention and treatment and stress the importance of the former.

WC is measured by using a flexible measuring tape and noting the circumference of the waist at the level midway between the upper hip bone and the uppermost border of the right iliac crest. The tape should be placed around the abdomen at the level of this midway point that is near the navel region and a reading taken when the tape is snug but does not compress the skin.

Men and women with a WC of more than 94 cm and 80 cm respectively are at an increased risk whereas they are at a substantial increased risk when the WC goes beyond 102 cm and 88 cm respectively.

COMPLICATIONS OF OBESITY:
Obesity leads to numerous complications that affect virtually every system and organ of the human body. Some of the important ones are given below.

- Hypertension: The gain of weight in the body is mainly an increase of the fatty tissue. This tissue too relies on oxygen and nutrients and so the increased demand for oxygen and nutrients results in hyper dynamic circulation. This in turn results the added pressure on the artery walls. Weight gain also increases levels of insulin in the blood causing retention of sodium and water and resulting in an increased blood volume. Excess weight is associated with an increase in the heart rate and a reduction in the capacity of the blood vessels to transport
blood and so in combination all of theses factors lead to an increase in the blood pressure.

- Diabetes mellitus: Obesity is one of the leading causes of NIDDM or Type 2 diabetes mellitus. The excess fat creates insulin resistance and thus the hormone cannot maintain the proper level of blood sugar resulting in further complications in the nerves, eyes and kidneys.

- Dyslipidemia: Obesity is most often associated with elevated levels of triglycerides and bad cholesterol that are the low and very low density lipoproteins (LDL and VLDL). Too make matters worse it is also associated with low levels of the good cholesterol that is the high-density lipoprotein (HDL). Over a period of time, abnormal blood fats contribute to the buildup of fatty deposits in the arteries known as atherosclerosis. This is an important risk factor for coronary artery disease and strokes.

- Coronary artery disease: The buildup of fatty deposits in the coronary arteries causes less blood flow to the heart tissues. In cases of partial blockage this causes acute chest pain (angina) whereas complete blockage leads to myocardial infarction (commonly known as a heart attack).

- Stroke: Obesity is associated with atherosclerosis throughout the body and this includes the arteries supplying the brain. Obese people are more prone to thrombosis and if such blood clots reach the narrowed cerebral arteries they lead to dysfunction of the area supplied by that artery. This results in a stroke that affects the region of the body controlled by that part of the brain.

- Osteoarthritis: This degenerative joint disorder, most often affects the knees, hips and lower back. The excess weight in obesity puts extra pressure on these joints and wears away the cartilage that protects them, resulting in joint pain and stiffness.

- Sleep apnea: Most people with sleep apnea are overweight, which contributes to a large neck and narrowed airways. In this serious condition the person stops breathing for short periods during the sleep with heavy snoring. Due to the upper airway getting blocked, frequent awakening at night and subsequent drowsiness during the day occurs. This results in decreased performance in day time activities at the workplace decreasing productivity levels too.

- Cancer: People who are overweight and obese are at risk for many cancers. These include cancers of the colon, rectum, esophagus, kidney, breast and prostate.

- Fatty liver disease: The build up of fat in the liver due to obesity leads to inflammation and scarring of the liver that can cause cirrhosis.

- Gallbladder disease: Excess cholesterol produced by those who are overweight and obese is deposited in the gallbladder and increases the risk of gallstones.

- Fertility and pregnancy problems: the increase in body mass is often associated with fertility problems. It may also lead to gestational
diabetes and other problems during pregnancy and increase the risk of birth defects.

- Physical discomfort: The excess accumulation of fat leads to the crowding of space occupied by the internal organs. The obese patients often can’t sit comfortably because of the internal accumulation of fat in their abdomen. This often causes then difficulty in breathing and pain in the back, feet, joints and muscles also may occur due to wear and tear.

- Social and emotional consequences: Due to the deeply ingrained social behaviors, overweight and obese individuals may experience many manifestations of psychological stresses, suffer a reduced income and face discrimination.

- Patients often have a constellation of major risk factors, life-habit risk factors, and emerging risk factors that constitute a condition called the metabolic syndrome. Factors characteristic of the metabolic syndrome (also known as syndrome X) are abdominal obesity, atherogenic dyslipidemia (elevated triglyceride and LDL, VLDL levels and low HDL levels), raised blood pressure, insulin resistance (with or without glucose intolerance), and prothrombic and proinflammatory states.

BMI AS A PREDICTOR OF POSSIBLE COMPLICATIONS:

The BMI can also be used as a measure to help us understand the possible complications that can occur in different patients. This is especially important for Yoga therapists whose aim should included the prevention of those complications that have yet to come as advised by Maharishi Patanjali.

The risk of death, although modest until a BMI of 30 is reached, increases with an increasing BMI. Obese adults have a 50% to 100% increased risk of premature death compared with adults with a BMI of 20-25.

A survey by Mokdad AH et al reported that individuals classified with extreme obesity (BMI >40) were > 7 times more likely than people with normal body weight to be diagnosed with diabetes and > 6 times more likely to have hypertension. Knowledge of this fact can help the Yoga therapist to focus on preventing complications and ensure better health for the patient.

Kenchaiah S et al have reported that individuals who are only "slightly" overweight face an increased risk of heart failure, independent of other risk factors associated with obesity.

They also noted that each 1-unit increment of BMI was associated with a 5% increased risk of heart failure in men and a 7% increased risk for women.

Kurth T et al have demonstrated that obese men faced an increased incidence of stroke compared with men of normal weight (BMI < 23). They also reported that each unit increase in BMI was associated with a 6% increase in the incidence of all strokes.

De Michele M et al identified obesity as an independent risk factor for increased carotid intima-media thickness, that is a marker of coronary artery disease and stroke. Women with the highest BMI had an increased incidence in carotid artery thickening compared with women who had lower BMI. They
concluded that high values for both BMI and WC were significant and independent predictors of carotid wall thickness and encouraged adding carotid artery ultrasound to the assessment protocol of obese patients.

Other recent studies by Tsai AW et al, Sinha R et al and Singhal A et al have also highlighted correlations between high BMI levels and an increased risk of venous thromboembolism, long QT syndrome in obese African-American women, and impaired glucose tolerance and arterial stiffness among obese children and adolescents.

These findings make us realize the importance of BMI in identifying patients who are at high risk for various complications arising out of obesity and thus help us in improving the overall patient assessment and Yogic management.

WC AS A PREDICTOR OF POSSIBLE COMPLICATIONS:

Persons carrying most of their fat around their waist or upper body are classified as apple shaped whereas those carrying most of their fat around their hips and thighs or lower body, are referred to as pear shaped. Those having an apple shape have more fat in and around their abdominal organs with an increased risk of many serious complications of obesity.

Some male patients can develop multiple metabolic risk factors when waist circumference is > 37 inches; usually, the male waist circumference risk is set at > 40 inches. Kuczmarski RJ et al have shown that such patients may have a strong genetic predisposition to insulin resistance but should benefit from therapeutic lifestyle changes, a program of prescribed behavioral changes focusing on weight loss and physical activity, in the same ways as those with more categorical increases in waist circumference.

Dey DK et al have shown that the presence of abdominal obesity is more highly correlated with metabolic risk factors than is an elevated BMI. This means that the Yoga therapist can focus on those aspects that can prevent the metabolic complications and ensure better health for the patient.

Guidelines from the National Heart, Lung, and Blood Institute, USA suggest that in addition to BMI measurements, WC should also be assessed. The guidelines specify that the presence of excess fat in the abdomen that is out of proportion to an individual’s total body fat is an independent predictor of "risk factors and morbidity." It is also vital to note that the guidelines differentiate between prevention and treatment and stress the importance of the former.

In recent years, much attention has focused on the location of the excess weight and its contribution to overall cardiac risk, and the abdominal area has been cited as a particular trouble spot.

Studies by Siani A et al and Zhu S et al reported in the American Journal of Hypertension and the American Journal of Clinical Nutrition respectively have suggested that WC is a stronger predictor of cardiovascular risk than obesity per se. Yoga therapists with such an understanding can develop better individually tailored schedules for such patients and decrease the risk of such untoward incidents.

Siani A et al found that higher WCs were strongly correlated to increased systolic and diastolic blood pressures, heart rates, and insulin levels,
independent of BMI and insulin resistance. This is vital information that can modify the Yoga therapy schedules and help such patients by focusing on their core needs and prevention of complications arising out of these pathological states.

The study by Zhu S et al supported these findings and reported that WC was more closely correlated with elevated LDL cholesterol, lower HDL cholesterol, hypertension, and insulin levels than the BMI. They found that WC was a more accurate and specific predictor of cardiovascular risk than the standard BMI of 25 and 30. Specifically, WCs of 90-100 cm for men and 83-93 cm for women identified those at increased risk.

Nieves DJ et al have shown that larger WCs were associated with an increased risk of atherosclerosis, lower levels of HDL-C, and higher levels of LDL-C. They also noted that this increased atherogenic risk was more closely correlated to WC than to insulin resistance, and they suggest that individuals who are "seemingly slim" but who carry excess abdominal weight may face increased risk.

A study by Dey DK et al has indicated that men over the age of 70 years who had large WCs were 65% more likely to suffer a stroke than those with smaller WCs.

He Q and other researchers from St Luke's-Roosevelt Hospital in New York investigated the relationship between blood pressure and body fat distribution in a pediatric population. They found a significant correlation between higher levels of "trunk fat" and the incidence of increased levels of blood pressure in boys across all age groups and races.

One potential explanation as to why excess abdominal fat increases cardiovascular risk may be that weight gain in this area increases cytokine production, subsequently inciting an inflammatory response, which has been identified as a mechanism involved in the development and buildup of atherosclerosis.

All of these findings help us to realize the importance of WC in identifying patients at high risk for cardiovascular disorders and stress the need to consider it in the overall patient assessment and yogic management.

CONCLUSION:
Yoga therapist must try to understand and prevent the complications of obesity that have not yet affected their patient. To this end the BMI and WC help give us a clue as to the possibilities of the types of complications that may occur in the individual. This helps the Yoga therapist to prepare the Yoga therapy schedule and plan that is best suited to the individual rather than following a haphazard and general plan that may or may not benefit the patient ultimately. This knowledge can also help in counseling and motivating the patient regarding diet and lifestyle and in improving their general attitude towards their weighty problem.

REFERENCES:


