

Obesity and its Metabolic Phenotypes

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The affordable and easy availability of processed calorogenic fat rich food globally has been the driving force for obesity pandemic worldwide. The adult obese are around 600 million and this population has doubled in the last 50 years. 41 million children under the age of 5 are overweight or obese. Body Mass Index (BMI) is the most widely used index for categorizing underweight, overweight and obese adults but it does not distinguish between weight associated with muscle and weight associated with fat. Anthropometric measurements like waist circumference, waist-to-hip ratio (WHR), waist-to-height ratio (WHtR) have been studied but no consensus could be achieved to include them in defining obesity. As a result every obese is considered at risk of future comorbidities and every non-obese/ overweight is considered healthy. The economic implications of treatment of every obese is enormous and unnecessary and at the same time depriving non-obese population from any future risk protection is underestimating their actual health.

This observation is not new and it was realized as early as 1980 that metabolic health should be assessed separately in any individual irrespective of presence or absence of obesity and BMI. Thus came the concept of Metabolically healthy obese (MHO) and Metabolically Unhealthy Normal Weight (MUHNW)/Metabolically Obese Normal Weight (MONW).

Metabolically healthy obese (MHO)

There exist a subgroup of obese population which meet the criteria defined for obesity but lack the traditional cardiovascular risk factors associated with obesity like insulin resistance, type 2 diabetes, dyslipidemia, hypertension and a favorable inflammatory profile [1-3]. The need for treatment of these individuals with life style or drugs remain questionable in the absence of any clear future risk profile. However equally questionable is to prove if MHO are really metabolically healthy. The use of different reference range and parameters for defining metabolic syndrome, ethnic variations in measuring waist circumference and no clear normal values for inflammatory markers has made it difficult to form a consensus definition for metabolic health. This has resulted in variable prevalence of MHO from 6% to 40% in obese population depending on the study design and criteria used in the population. Now it is well established that metabolic health is not static. Studies have demonstrated that MHO may convert to MUO (Metabolically unhealthy obese) over a period of time. The accelerators for this transition are unhealthy lifestyle, less incretin response after meals, abdominal fat accumulation, more visceral and ectopic fat accumulation, higher inflammation, and greater insulin resistance [4,5].

Metabolically Unhealthy Normal Weight (MUHNW)

These non-obese individuals have abnormal fat distribution and may have metabolic derangements despite normal weight. Thus there exists a range of population which may be metabolically unhealthy irrespective of weight. Studies have shown higher waist circumference, increased insulin resistance, low HDL, high triglyceride and high inflammatory markers in MUHNW individuals. No clear definition is

present for identifying these patients. Some have suggested for presence of at least three or more metabolic derangements to say metabolic unhealthy while recently TyG index-a product of the fasting blood glucose and triglyceride levels has also been suggested to identify MUHNW patients.

The treatment for MHO and MUHNW is as controversial as their origin. Lifestyle modifications and exercise are of limited benefit in MHO in some studies whereas both life style and pharmaceutical therapies are beneficial in MUHNW individuals.

The paucity of consensus on defining these phenotypes of obesity is an opportunity for further in depth research in area of metabolic health.

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