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Come 2020 !; Welcome body volume index !!; Bye bye body mass index !!!

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Abstract

Science keep growing with changes. Otherwise, it becomes history. This applies to an important variable that is very often used in the filed of medicine and health sceinces namely; body mass index (BMI). BMI is related particularly, to cardiovascular and metabolic health rsiks. This notion has been shown to be unwarranted and there have been suggestions to look beyond BMI for accurate assessment of obesity or body fat by actual measurements of body composition. Body volume index is suggested to provide a most accurate information on body fat and other anthropometric variable that will be very useful for both research and clinicalpractice.

The current practice of measuring obesity or body adiposity

Body Mass Index (BMI) was first described in 1832 by Lambert Adolphe Jacques Quetelet (1796-1874), a Belgian astronomer, mathematician, statistician and a sociologist, who had a great passion for probability calculus [1]. BMI was based on the observation that body weight was proportional to the squared height in adults with normal body frames and it was termed in 1972 by Ancel Keys as Quetelet index. BMI and waist circumference (WC) are two common parameters very closely related to metabolic and cardiovascuar risks and for the last few decades, obesity has been assessed primarily on the basis of BMI. It has been extensively employed in a wide range of epidemiologic studies, and has been strongly recommended for individual use in clinical practice [2,3].

However, the accuracy of BMI in determining the degree of obesity or the body fat (BF) levels is limited, particularly for men and the elderly individuals in the intermediate BMI ranges [4]. BMI and WC do not take into account fat or muscle distribution in the body or it is unable to differentiate adipose tissue from lean body mass. And, they do not allow for differentiating the gender, age or ethnicity [5-7]. For example, in men, BMI showed a better correlation with lean mass than with BF%, while in women it correlated better with BF% than with lean mass [4]. Moreover, as BMI is soley dependent on height and weight of an individual, it leads to a simplistic and quite often incorrect assumptions regarding the body composition. Furthermore, BMI is less sensitive in older age groups due to the loss of height in old age as BMI increases in such cases despite the absence of a corresponding increase in body weight [8]. Because, BMI does not take into account some of the important factors into consideration as mentioned above, it may incorrectly classify the healthy, muscular men and women with different body shapes and heights as being overweight or obese. Similarly, WC although, reflects abdominal fat distribution more accurately, it is variable in terms of reproducibility and less reliable as it is operator-dependant and thus has certain limits [9-11].

Therefore, it is believed that obesity may be substantially under or overestimated due to reliance on BMI and that the same level of BMI for example may reflect an altered degree of fatness. Taking these facts into account, some studies have challenged the association between adiposity and BMI with mortality and cardiovascular diseases [10-14]. Very interestingly, Romero and his co-workers [15] have clearly shown that patients with low BMI had high risks of total and cardiiovascular mortality and those who were overweight had lower risks. Interestingly, obese people had no risks of higher BMI in the same study. These findings strongly suggest the lack of discrimatory power of BMI to reflect the body fatness, the root cause of all ailments in obesity and go against the medical knowledge relating excess body fat to several harmful conditions, including diabetes, heart disease and several types of cancer [14].

It was thus, sugegested some time ago that in future, studies must concentrate on body composition measurements that can predict obesity-related risks better than does BMI, WC, waist-to-hip ratio or other measures of body fat distribution [4,11].

What is there alternative?

Measuring obesity in this technical age should be about accuracy, consistency and speed. The Body Volume Index (BVI) is proposed as a new and alternative measurement of human obesity that might offer a potential, realistic and appropriate measure of individual health risk. BVI has also been suggested to be one of the most recent parameters for a more accurate calculation of chemotherapy for cancer patients [16]. A recent study from India involving about 500 women with a mean age of 35 years has reported that BVI correlated well with musculoskeletal pain in housewives. However, they have calculated the BVI using a mathematically derived formula rather than the BVI imaging [17].

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Therefore, discussions are currently underway to formulate the most effective means of implementing BVI that could be adopted for use in clinics and research by 2020.

What is BVI?

BVI was designed and developed in 2000 as a computer based three dimensional scan producing far superior and accurate results of the human body with regard to obesity as a potential substitute for the BMI. BVI divides the body shape of an individual into eight segments so that the body volume of the body parts and body composition can be analysed. This allows BVI to differentiate between people with the same BMI rating. After a three-year successful and innovative validation from collaborators across the world, BVI was launched in October 2010. The Body Benchmark Study involved Select Research and 5 international collaborators: Heartlands Hospital in Birmingham, Aston University, University of Hull, the National Physical Laboratory (NPL) and the Mayo Clinic in the United States for clinical trials on BVI. Since then a few studies have shown that BVI is a better indicator of fatness as compared to BMI [4,11,18,19]. Thus, BVI has become the world's first dedicated computer based anthropometric system for obesity assessment.

How is BVI measured?

BVI data is captured using a 3D camera that can be better described as a 'Human Photocopier', by reproducing a person's body shape to get measurements that simply can't be done by the human hand. BVI scanner alllows analysis of 130 separate linear data that can provide information on body voume distribution, body shape and body fat, BMI, WC and waist-hip ratio (WHR) etc. A patient walks into the 7ft scanner and is scanned in their underclothes to ensure that the contours of the skin are correctly measured. The new software allows the 3D image of the body to be used not only to extract the amount of total body volume, but the volume in all eight segments of body. The system is perfectly safe as no radiation (uses white light only) or water submersion or intervention whilst being comfortable for the patient and the whole process takes 2-3 minutes from the start to finish. From the scan it takes less than 6-7 seconds to get the body volume and can extract an infinite combination of measurements for healthcare analysis.

Conclusion

Preliminary studies suggest that 3-D scanners are able to accurately reproduce body volume (BV) estimates. And, total or regional BV estimates correlates positively and significantly with biomarkers of cardiovascular risk, suggesting that BV indices may be a better tool than conventional obesity measures like BMI and WC. Thus, in conclusion, BVI is a valid new, perfectly safe method for assessing overweight/obesity, measures the differences in body shape between patients with the same BMI rating or WC by creating an exact 'virtual' image of a person's shape and weight distribution. It can objectively track an individual's data over time to assess changes in body shape and body composition both in health and disease conditions. It may be also helpful to determine the cut off levels to define obesity by using body composition data in future and correlate BVI and obesity related complications.

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