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Clinical Insights

Body Mass Index (BMI): Still be used?

Giovanna Muscogiuri^{a,b,c}, Ludovica Verde^{b,d}, Annamaria Colao^{a,b,c,*}^a Dipartimento di Medicina Clinica e Chirurgia, Unità di Endocrinologia, Diabetologia e Andrologia, Università degli Studi di Napoli Federico II, Via Sergio Pansini 5, Naples 80131, Italy^b Centro Italiano per la cura e il Benessere del paziente con Obesità (C.I.B.O), Dipartimento di Medicina Clinica e Chirurgia, Unità di Endocrinologia, Diabetologia e Andrologia, Università degli Studi di Napoli Federico II, Via Sergio Pansini 5, Naples 80131, Italy^c Cattedra Unesco "Educazione alla salute e allo sviluppo sostenibile", University Federico II, Naples, Italy^d Department of Public Health, University of Naples Federico II, Naples, Italy

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The Body Mass Index (BMI) is a commonly used measure that calculates an individual's body weight in relation to their height [1]. It was developed by Adolphe Quetelet in the early 19th century and initially intended for population-level studies rather than individual health assessments. Over time, BMI gained popularity as a quick and straightforward way to determine if one's weight falls within a healthy range [1]. However, with advancements in our understanding of health and body composition complexities, the question arises: does BMI still hold relevance in today's context? This Clinical Insight examines both the strengths and limitations of BMI, exploring its place in modern healthcare.

BMI serves as a valuable tool for assessing the overall health of populations and identifying trends in weight distribution across different demographic groups [2]. It provides a standardized measure that aids in monitoring the prevalence of underweight, normalweight, overweight, and obesity within a cohort of subjects. By using BMI data, public health officials can develop targeted interventions to address obesity-related health issues such as type 2 diabetes, cardiovascular diseases, and joint problems [3].

One of the primary reasons for the continued use of BMI is its simplicity and accessibility. It requires only two variables—weight and height—which can be easily measured by healthcare professionals, researchers, and even individuals at home. This makes it a cost-effective and time-efficient tool for initial assessments, particularly in settings with limited resources.

In addition, BMI has a long history of use and familiarity, making it a

benchmark for comparisons and studies that extend over several decades [2,4]. This historical context provides a valuable basis for assessing changes in population health over time. It also offers a point of reference for comparing contemporary findings with historical data, allowing for a broader perspective on trends in weight and health.

However, one of the most significant criticisms of BMI is its inability to differentiate between different types of body composition [5,6]. It does not take into account factors such as muscle mass, bone density, and the distribution of fat. This means that individuals with high muscle mass, such as athletes, may be classified as subjects with overweight or obesity, even if their body fat percentage is low. Similarly, older adults may have a BMI in the normal range but still carry excess visceral fat, which is a risk factor for metabolic diseases [6,7].

In addition, BMI does not consider the variations in body composition based on ethnicity and sex [8]. Different ethnic groups may have varying proportions of muscle, bone, and fat at the same BMI value. This leads to the potential misclassification of individuals from certain ethnic backgrounds, making it an inaccurate indicator of health risk in those populations. Additionally, research suggests that the health implications of a given BMI value may differ between sexes [8].

Of note, individual health is a complex interplay of various factors, including genetics, lifestyle, diet, and environmental influences [9]. Two individuals with the same BMI could have vastly different health profiles based on these factors. Some individuals may have a high BMI due to genetic predisposition yet maintain healthy metabolic markers, while others with a seemingly normal BMI might exhibit metabolic

* Corresponding author at: Dipartimento di Medicina Clinica e Chirurgia, Unità di Endocrinologia, Diabetologia e Andrologia, Università degli Studi di Napoli Federico II, Via Sergio Pansini 5, Naples 80131, Italy.

E-mail address: colao@unina.it (A. Colao).

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abnormalities [10]. Relying solely on BMI for health assessments overlooks this crucial heterogeneity.

Finally, overemphasis on BMI in society can lead to negative psychological impacts, particularly for individuals struggling with body image issues [11]. The pressure to achieve a specific BMI can contribute to unhealthy dieting behaviors, eating disorders, and a distorted perception of one's body [11]. The focus on BMI as the sole measure of health may lead individuals to neglect other important aspects of their well-being, such as mental health and overall fitness.

As our understanding of human health and physiology advances, there is a growing recognition of the importance of considering body composition beyond BMI. Technologies such as dual-energy X-ray absorptiometry (DXA), bioelectrical impedance analysis (BIA), and air displacement plethysmography provide more accurate insights into an individual's muscle mass, bone density, and body fat distribution [12]. In fact, these methods offer a more comprehensive view of health risks and guide personalized interventions. However, limited availability and potential cost can be barriers to accessing this technology routinely for some individuals. Moreover, DXA may not be suitable for certain populations, such as pregnant women, due to potential risks associated with radiation exposure [12,13].

In addition, instead of relying solely on BMI, health professionals are increasingly turning to metabolic health markers like blood pressure, blood glucose levels, cholesterol levels, and waist circumference to assess an individual's risk of chronic diseases [14,15]. For example, in the context of obesity, these markers distinguish between “*metabolically healthy obesity*”, in which despite excess weight, an individual maintains favorable metabolic parameters, and “*metabolically unhealthy obesity*”, in which excess weight coincides with adverse metabolic profiles. It is interesting to note that this distinction of phenotypes is not possible through BMI assessment alone [14,15]. Markers such as those previously mentioned provide a more nuanced understanding of an individual's health and can guide interventions that focus on reducing specific health risks rather than solely targeting weight.

In particular, a holistic approach to health assessment acknowledges the role of behavioral factors such as physical activity, diet quality, and stress management [16,17]. These factors have a significant impact on overall health and disease risk, independent of BMI. Health practitioners now advocate for comprehensive lifestyle assessments to guide individuals toward healthier habits, irrespective of their BMI category.

While BMI has played a crucial role in assessing population health and providing a simple snapshot of weight-related health risks, its limitations are becoming more evident in our evolving understanding of human health and body composition [1]. In a world where personalized medicine and holistic well-being are gaining importance, the reliance on BMI as the sole determinant of health is diminishing [17,18]. Instead, health assessments are moving toward a more comprehensive approach that considers body composition, metabolic health markers, and individual behaviors. BMI, though not obsolete, should be used in

conjunction with other measures for a more accurate and personalized assessment of health risks [17]. As we continue to refine our methodologies and technologies, the goal should be to provide individuals with the most accurate and actionable information to support their health and well-being journey.

Declaration of Competing Interest

The authors declare they have no conflict of interest.

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