

ACUIDADE DOS PONTOS DE CORTE DE ÍNDICE DE MASSA CORPORAL RECOMENDADOS PELA ORGANIZAÇÃO MUNDIAL DA SAÚDE PARA DIAGNOSTICAR OBESIDADE EM ADULTOS: UMA REVISÃO INTEGRATIVA

ACUITY OF BODY MASS INDEX CUT-OFF POINTS RECOMMENDED BY THE WORLD HEALTH ORGANIZATION TO DIAGNOSE OBESITY IN ADULTS: AN INTEGRATING REVIEW

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RESUMO

Introdução: A Organização Mundial da Saúde recomenda a utilização do Índice de Massa Corporal (IMC) para a avaliação do estado nutricional de indivíduos, porém, alguns estudos apontam uma necessidade de maior acuidade dos pontos de corte para diagnóstico de obesidade, uma vez que ele não tem sido representativo para todas as etnias. **Objetivo:** Verificar a acuidade do diagnóstico de obesidade a partir dos pontos de corte de IMC em adultos, por meio de uma revisão integrativa. **Métodos:** Foram pesquisadas as bases PubMed, SciELO e LILACS, artigos publicados entre os anos 2003 e 2018, em língua portuguesa e inglesa, utilizando os descritores “Índice de Massa Corporal”, “Obesidade”, “Avaliação Nutricional”, “Adultos”, “Doenças Crônicas”, “Mortalidade” e “Indicadores de Morbimortalidade”. Foram excluídos estudos de revisão, experimentais com animais, artigos em duplicidade nas bases de dados e relatos de caso. **Resultados:** Inicialmente foram encontradas 77 referências, mas após a análise de resumo e texto completo restaram 12 artigos para esta revisão. Os estudos foram classificados em transversal e longitudinal, e o IMC foi correlacionado e/ou associado com outros indicadores de diagnóstico de obesidade e/ou morbimortalidade. **Conclusão:** A literatura reforça que os pontos de corte do IMC estão inadequados para populações asiáticas, para mulheres, africanos, entre outros. Reforçando a necessidade de uma análise mais acurada a partir da composição corporal em populações multiétnicas para determinação de obesidade, assim como o uso em conjunto com outros indicadores.

Palavras-Chaves: Índice de Massa Corporal, Obesidade, Avaliação Nutricional, Adultos, Indicadores de Morbimortalidade.

ABSTRACT

Introduction: The World Health Organization recommends the Body Mass Index (BMI) for evaluation of the nutritional status. However, some studies point to a need for greater accuracy of the cut-off points for the diagnosis of obesity, since it has not been representative of all ethnic groups. **Objective:** To verify, through an integrative review, the accuracy of the diagnosis of obesity in adults from the BMI cut-off points. **Methods:** PubMed, SciELO and LILACS databases were searched from 2003-2018. Articles published in Portuguese and English languages using the descriptors “Body Mass Index”, “Obesity”, “Nutritional Assessment”, “Adults”, “Chronic Diseases”, “Mortality” and “Indicators of Morbidity and Mortality” were selected. It was excluded review studies, experimental studies with animals, articles in duplication in databases and case reports. **Results:** Initially, we found 77 articles, but after analysis of abstract and full text

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12 articles were considered for this review. The studies were classified as cross-sectional or longitudinal, and BMI was correlated and/or associated with other indicators of diagnosis of obesity and/or morbidity and mortality. **Conclusion:** The literature confirms that BMI cut-off points are inadequate for Asian populations, for women, for Africans, among others. This reinforces the need for a more accurate analysis of body composition in multiethnic populations to determine obesity, as well as its use with other indicators.

Keywords: Body Mass Index, Obesity, Nutrition Assessment, Adults, Indicators of Morbidity and Mortality.

INTRODUCTION

The balance between the consumption of nutrients and energy expenditure from the processes of ingestion, absorption, utilization, and excretion of nutrients is reflected in the nutritional status of the individual. This condition is measured by the nutritional assessment, which can be performed by means of anthropometric measurements, which involves measures such as height, body mass (weight), circumferences and skinfolds thickness, or through the analysis of body components.¹⁻³

After the assessment, the nutritional status of the individual can be classified primarily into three categories: a) Eutrophic, which is a condition that reflects the metabolic stability and the stability of body mass; b) Depletion, which reflects catabolic frames and body tissues reduced; c) Excesses, which reflects the increase of tissue reserves, especially in the adipose tissue.¹

In the category of excesses, the designation "overweight" is the classification of nutritional status that encompasses pre-obesity and obesity. In this condition, the individual presents abnormal deposit and excessive adipose tissue, which is a type of connective tissue formed mostly by fat cells (adipocytes), and whose primary function is the deposit of surplus energy in the form of triglycerides. In addition, for this type of tissue it is important to analyze not only the quantity present in the individual, but also as is the distribution of subcutaneous and visceral.^{4,5}

The continuous gain of adipose tissue causes the individual to pass the classification of pre-obese to obese that, in scalar unity, is the most severe stage. The World Health Organization (WHO) considers obesity as a Chronic Non-communicable Disease (CNCD), in which the increase in body fat promotes dysfunction of tissue, resulting in biochemical, metabolic, physiological and psychosocial issues. Obesity is multifactorial and may be influenced by environmental factors, such as, for example, excessive consumption of energy combined with a reduced energy expenditure and irregular practice of physical activity. Because it is a disease, obesity presents the code E66 in the International Classification of Diseases (ICD-10).^{1,5,6}

In addition, this condition is a risk factor for many diseases in adults, such as diabetes mellitus type 2 (DM2), arterial hypertension, strokes, cardiovascular diseases, dyslipidemia and some types of cancer, as well as presenting a high economic impact on society.⁷⁻¹⁰

The prevalence of obesity has reached all genres, in all ages and in all social strata. What was once a public health issue reported only in high-income countries, today is increasing considerably in low and middle-income countries, mainly in urban areas. Data from the WHO in 2016 reported

that approximately 650 million adults and older people were obese.^{5,11}

The adult phase corresponds to stabilization of the growth of the individual and of sexual maturation, being considered by the Pan American Health Organization (PAHO) and WHO of twenty to fifty and nine years of age for developing countries and up to sixty and five years for developed countries. As in the adult phase the growth of the bone mass was finalized, the focus of nutritional assessment are the body tissues and the analysis of their distributions to identify the nutritional status of the individual. The main indicator of obesity used worldwide and recommended by WHO is the Body Mass Index (BMI), which is obtained through the ratio of weight to squared height.^{1,4,5,12,13}

The classification of nutritional status in adults based on BMI was determined by an expert committee who examined the association between BMI and the risk of mortality in a study involving the population of the United States and Western Europe. In this study, the value of BMI of 30 kg/m² was the point of flexion of the curve, therefore, chosen as the initial value for the classification of obesity in adults. The BMI cut-off points are presented in table 1 and categorize the individual in underweight, normal range, pre-obese and obese.^{5,12,14}

Table 1 – BMI values for classification of adult nutritional status

BMI kg/m ²	NUTRITIONAL STATUS
< 18,5	Underweight
≥ 18,5 e < 25	Normal range
≥ 25 e < 30	Pre-obese
≥ 30 e < 35	Obese class I
≥ 35 e < 40	Obese class II
≥ 40	Obese class III

Source: WHO⁵, (2000).

The use of BMI has been worldwide recommended by low operating cost and absence of difficulties during the collection and, although it does not differentiate between fat mass of lean body mass, its use stands out in epidemiological studies, because their cut-off points for pre-obese and/or obese have been correlated with the development of chronic diseases in adults, especially the cardiovascular diseases. However, there is some controversy regarding the construction of the cut-off points of BMI, since the populations used in this study did not cover all the ethnic groups.^{5,15,16,17}

The objective of this study was to verify, through an integrative review, the accuracy of the diagnosis of obesity in adults from the BMI cut-off points recommended by the WHO for international use.

METHOD

For the present study, there was performed integrative review with original articles. There were consulted articles published between 2003-2018 in electronic databases PUBMED (National Library of Medicine and The National Institute of Health), SciELO (Scientific Electronic Library Online) and LILACS (Latin American and Caribbean Center on Health Sciences Information) published in Portuguese and English. In the search strategy, the descriptors used were “Body Mass Index”, “Obesity”, “Nutritional Assessment”, “Adults”, “Chronic Diseases”, “Mortality” and “Indicators of Morbidity and Mortality” (alone or in a combined form).

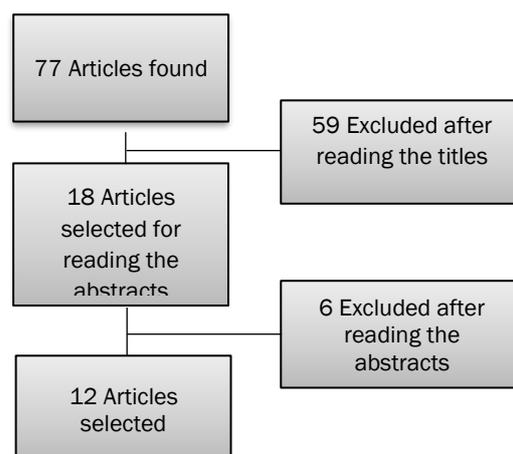
The studies were considered eligible for inclusion when corresponded to the following criteria: evaluated the BMI cut-off points for obesity and its associations with risk of mortality and/or morbidity in adults.

The selection of evidence was restricted to the original studies, being excluded review studies, experimental studies with animals, articles in duplication in databases and case reports.

RESULTS AND DISCUSSION

Seventy-seven articles published from 2003 to 2016 were located initially, but, after the inclusion and exclusion criteria, only 12 articles were considered for analysis in this review. Figure 1 shows the process of selection of articles in its different stages and the respective number of articles retrieved.

Figure 1 – Flowchart of the process of selection of articles researched.



In the literature, few studies those analyzed the association between BMI and morbidity and mortality were published. Among those available, we selected 12 evidences those met the inclusion criteria. They are presented in table 2 and it can be notice the scarcity of studies with multiethnic populations.

Table 2 – Characterization of the selected articles.

Authors and Year of publication	Study Design	Study population	Size Sample	Main Results
Yusuf et al., ¹⁸ 2005	Cross-sectional	Multiethnic, from 52 countries	27,089	BMI showed a modest association with myocardial infarction, while the waist-hip ratio (WHR) showed a high association.
Zhu et al., ¹⁹ 2005	Cross-sectional	Americans (Blacks, Hispanics and Whites)	10,969	Waist circumference (WC) cut-off points are more sensitive than BMI cut-off points for obesity in predicting risk of cardiovascular diseases.
Decoda Study Group, ²⁰ 2008	Cross-sectional	Asians	20,827	The waist-to-height ratio (WHtR) has a stronger association with diabetes than BMI. However, both indicators are strongly associated with hypertension in Asians.
Welborn e Dhaliwal, ²¹ 2007	Longitudinal	Australians	9,309	WHR showed a better prediction of mortality from all causes and of cardiovascular diseases than BMI.
Pischon et al., ²² 2008	Longitudinal	Europeans	359,387	BMI cut-off points for obesity showed a strong association with mortality.
Bigaard et al., ²³ 2003	Longitudinal	Danishes	57,053	BMI was a strong predictor of all-cause mortality.
WHO ²⁴ , 2004 (Expert Consultants)	Cross-sectional	Asians	291	BMI did not diagnose obesity in individuals with a high percentage of body fat by dilution of deuterium oxide (D ₂ O).

Rahman et al., ²⁵ 2010	Cross-sectional	American (White, Black and Hispanic) in reproductive age	555	Inadequate BMI cut-off points for obesity through analysis of body composition by dual-energy X-ray absorptiometry (DXA).
Hunma et al., ²⁶ 2016	Cross-sectional	Mauritians (descendants of Indians and Africans)	175	Inadequate BMI cut-off points for obesity by analyzing body composition.
Moock et al., ²⁷ 2010	Longitudinal	Brazilians hospitalized in an intensive care unit (ICU)	219	Obesity diagnosed by BMI did not increase the mortality rate, but showed a positive correlation with the mean length of stay in the ICU.
Rezende et al., ²⁸ 2010	Cross-sectional	Male Brazilians	98	BMI did not diagnose obesity in individuals who presented abdominal obesity by bioelectrical impedance analysis.
Bevilacqua e Gimeno ²⁹ , 2011	Longitudinal	Japanese Brazilians	1411	WHR presented higher capacity than BMI to predict mortality, especially for cardiovascular diseases.

The WHO has recommended the use of BMI for nutritional status assessment. For adults, the values of BMI from 30 Kg/m² define obesity. However, these cut-off points were established from studies involving only the populations of the United States and Western Europe, and other studies show the inadequacy of BMI for diagnosis of obesity in populations of other ethnic groups. In addition, studies suggest that the indicators WC, WHR, or WHtR have presented even better sensitivity for determination of obesity and/or risks of morbidity and mortality than BMI. ^{5,18-20}

Through the analysis of European populations, the use of BMI has been appointed as an excellent predictor of morbidity and mortality. However, the study by Yusuf et al.¹⁸ evidenced that the determination of obesity based on the WHR instead of BMI increases the prediction of myocardial infarction in multiethnic populations. In addition, when compared to the BMI, WHR showed as a better predictor for diabetes in Asians, for cardiovascular diseases and mortality among Japanese Brazilians and Australians. ^{20,21,29}

The use of WC in the American population showed to be more sensitive than BMI in predicting risk for cardiovascular diseases. While in Brazilian patients hospitalized, the BMI was positively associated with the increase of stay in hospital. ^{19,27}

In longitudinal studies conducted in European and Danish populations the BMI showed a strong positive correlation with mortality, and a strong prediction for all-cause mortality respectively. ^{22,23}

When compared to body composition, the BMI cut-off points were inadequate for the female population of the United States, for the Asian population and for the Mauritius (descendants of Indians and Africans). This reinforces the need to adjust the cut-off points for the diagnosis of obesity in certain populations, with differentiation for gender and ethnicity. ²⁴⁻²⁶

There is, however, a limitation on these interpretations, since the studies that thoroughly assess BMI cut-off points are scarce, showing that further studies addressing the topic, with both multiethnic and ethnic-specific populations are needed.

FINAL CONSIDERATIONS

The prevalence of obesity is a public health issue. The BMI has been the main indicator recommended by the WHO for

the diagnosis of nutritional status, because of its easy application, low cost and quick screening of obesity, and, in addition, this index correlates positively with several indicators of body composition and the outcomes of CNCD. However, the studies suggest that the cut-off points are inadequate for Asian populations, for women, Africans, among others. So, it is not reaching its representativeness to be used worldwide.

Due to the limitations found and presented, there is a need for a more accurate assessment of BMI cut-off points through the analysis of the body composition of multiethnic populations to determine obesity, as well as its use with other indicators such as waist circumference, waist hip-ratio and waist-to-height ratio.

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