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Review

Performance of the waist-to-height ratio in identifying obesity and predicting non-communicable diseases in the elderly population: A systematic literature review

Márcia Mara Corrêa[a,*], Elaine Thumé[b], Elizabete Regina Araújo De Oliveira[c], Elaine Tomasi[a]

[a] Postgraduate Program in Epidemiology, Federal University of Pelotas, Brazil
[b] Postgraduate Program of Nursing, Federal University of Pelotas, Brazil
[c] Postgraduate Program of Public Health, Federal University of Espírito Santo, Brazil

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ABSTRACT

A systematic review was carried out aiming to collect evidence on the use of the waist-to-height ratio (WHtR) on the elderly population, focusing on validity measures to identify the best anthropometric indicator in assessing obesity associated with non-communicable diseases. The review consisted in a search of papers published on the databases Pubmed, Web of Science, and Lilacs, with no restriction regarding period of publication, using the following combinations: *abdominal fat* ***or*** *overweight* ***or*** *obesity* ***and*** *waist-to-height ratio* ***or*** *waist height* ***or*** *waist ht* ***or*** *WHtR* ***or*** *waist to stature ratio* ***or*** *wst stature* ***or*** *WSR* ***or*** *stature and girth*. Sixteen papers were selected, most of which with high methodological quality. The receiver-operating characteristic (ROC) curves was the validity measure explored in 13 papers, followed by sensitivity and specificity measures. In all studies, the body mass index (BMI) and waist circumference (WC) received special attention for analysis along with WHtR. Five manuscripts showed evidence of WHtR being the best anthropometric index when used alone, four showed that both WHtR and WC had the best discriminatory power in predicting cardiovascular risk factors compared to the other indices, and two ranked WHtR at the same performance level as waist-to-hip ratio (WHR) and BMI. An association was shown of the obesity assessed by WHtR in predicting risk factors for cardiovascular diseases, metabolic syndrome, and diabetes compared to other anthropometric parameters.

Contents

1. Introduction

Considered a worldwide epidemic (James, Leach, Kalamara, & Shayeghi, 2001; World Health Organization, 2000), obesity is a relevant risk factor for the development (Guh et al., 2009; Strazzullo et al., 2010) and complication onset of non-communicable diseases (Canoy, 2008; Després et al., 2008; Taylor et al., 2010). Of multifactorial etiology (World Health Organization, 2000), it has stood out with high prevalence in all age groups

* Corresponding author at: Postgraduate Program in Epidemiology, Federal University of Pelotas, Marechal Deodoro 1160 – third floor, 96020-220 Pelotas, RS, Brazil.
E-mail addresses: marciamara@uol.com.br, profmarcia.correa@gmail.com (M.M. Corrêa).

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(Ng et al., 2014), which require international and national public policies to monitor and control obesity, as well as the disorders it causes (World Health Organization, 2012; Brasil, 2011).

Several anthropometric indicators have been proposed to assess obesity and, among the most acknowledged, the body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR) stand out (Leitzmann et al., 2011; de Koning, Merchant, Pogue, & Anand, 2007; Satoh, Kishi, & Tsutsui, 2010). More recently, the waist-to-height ratio (WHtR) has been receiving attention in the worldwide scientific literature for being strongly associated with several chronic diseases (Ashwell, Mayhew, Richardson, & Rickayzen, 2014; Odagiri et al., 2014; Silva, Lemos, Torres, & Bregman, 2014; Xu, Qi, Dahl, & Xu, 2013). It is considered more advantageous compared to the others since its adjustment for height allows a single threshold to be defined which is applicable to the overall population regardless of sex, age, or ethnic group (Browning, Hsieh, & Ashwell, 2010).

Anthropometric indices that use WC to assess obesity, mainly in elderly persons, are more accurate in predicting metabolic diseases and mortality (Dey, Rothenberg, Sundh, Bosaeus, & Steen, 2002; Picon et al., 2007) since these individuals physiologically accumulate more fat in the abdomen (Kanehisa, Miyatani, Azuma, Kuno, & Fukunaga, 2004; Scafoglieri, Provyn, Bautmans, Van Roy, & Clarys, 2011). In addition, the decrease in height due to thoracic kyphosis, scoliosis, osteoporosis, and intervertebral disk compression (Chumlea, Baumgartner, & Vellas, 1991) favor correcting this indicator through height.

Recent studies that used WHtR as an anthropometric indicator have found a strong association with altered blood pressure (Moges, Amare, Fantahun, & Kassu, 2014), cardiovascular events and mortality (Ashwell et al., 2014; Hsieh & Muto, 2005), type-2 diabetes (Xu et al., 2013), and metabolic syndrome (Fu et al., 2014), which makes it the best anthropometric marker to assess such disorders (Ashwell, Gunn, & Gibson, 2012).

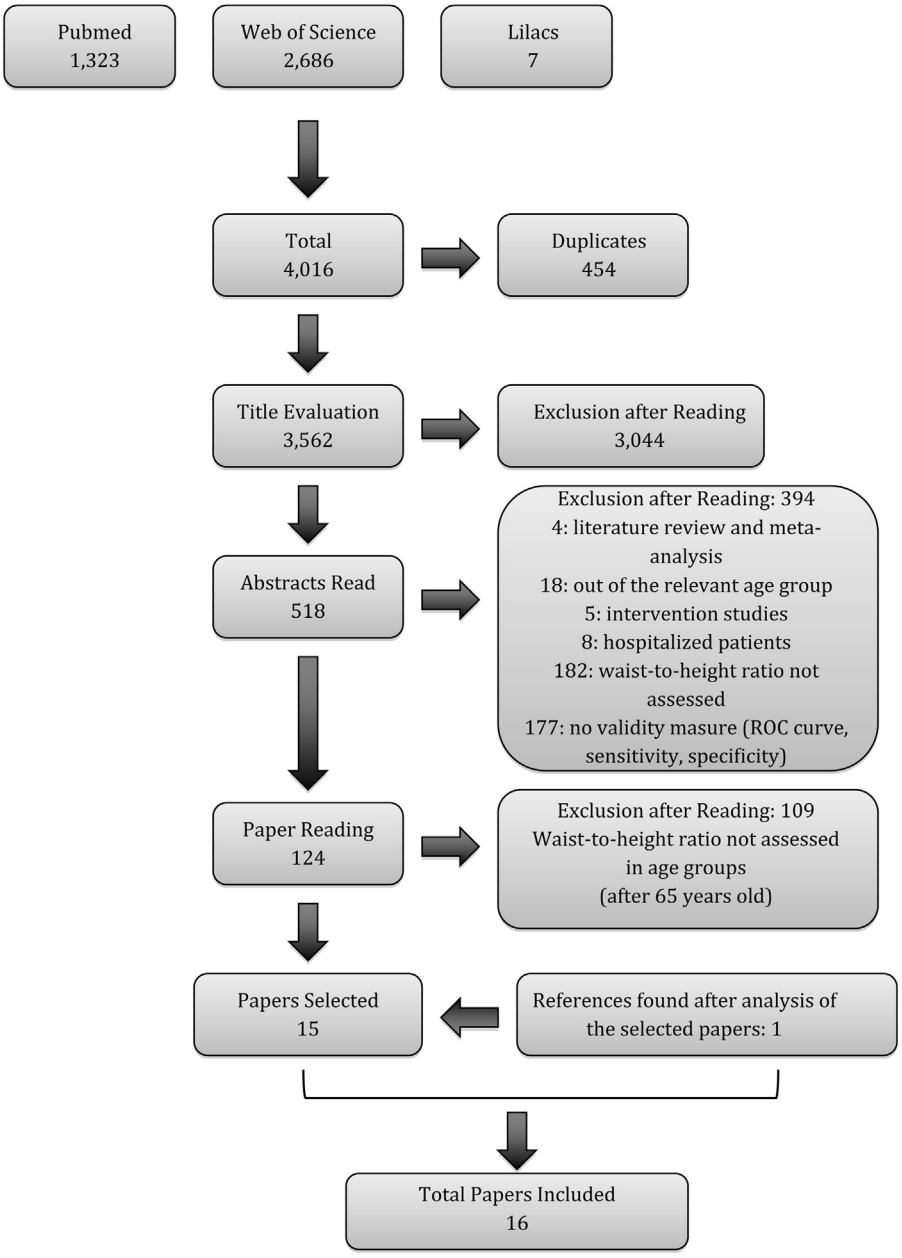

Fig. 1. Flowchart of the papers selected for review.