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ORIGINAL ARTICLE

Correlations between obesity indices and cardiometabolic risk factors in obese subgroups in women with severe obesity: A multicenter, cross-sectional study

Seung Hun Lee[a], Young Jin Tak[a], Yu Hyeon Yi[a], Sang Yeoup Lee[b,c,*], Young Hye Cho[c], Jeong Gyu Lee[a], Yun Jin Kim[a], Hwang Hye Rim[a], Kyung Won Shim[d], Sung Soo Kim[e], Sang Woo Oh[f]

[a] *Department of Family Medicine, Pusan National University Hospital, 179 Gudeok-ro, Seo-gu, Busan-si 602-739, South Korea*
[b] *Medical Education Unit and Medical Research Institute Pusan National University School of Medicine, Yangsan 626-780, South Korea*
[c] *Obesity, Nutrition and Metabolism Clinic, Department of Family Medicine and Research Institute of Convergence of Biomedical Science and Technology, Pusan National University Yangsan Hospital, Yangsan 626-770, South Korea*
[d] *Department of Family Medicine, Ewha Womans University Mokdong Hospital, Seoul, South Korea*
[e] *Department of Family Medicine, Chungnam National University School of Medicine, Daejeon, South Korea*
[f] *Department of Family Medicine, Center for Obesity, Metabolism, and Clinical Nutrition, Dongguk University International Hospital, South Korea*

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KEYWORDS
Obesity;
Insulin resistance;

Summary
Background: To investigate associations between degrees of obesity using correlations between obesity indices and cardiometabolic risk factors in women.

* Corresponding author at: Family Medicine Clinic, Obesity, Metabolism and Nutrition Center and Research Institute of Convergence of Biomedical Science and Technology, Pusan National University Yangsan Hospital, Yangsan, Gyeongsangnam-do 626-770, South Korea. Tel.: +82 10 9134 5959; fax: +82 51 510 8.
E-mail address: saylee@pnu.edu (S.Y. Lee).

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Cardiovascular disease risk;
Metabolic disease;
Risk factors

Methods: BMI, waist circumference (WC), fasting insulin, fasting glucose, lipids, and visceral adipose tissue (VAT) area using computed tomographic images were measured in 113 women with obesity. Correlations between obesity indices and cardiometabolic risk factors were analyzed in subgroups defined using sequential obesity indices.
Results: Mean BMI and WC were 29.6 kg/m^2 and 92.8 cm. BMI showed significant correlations with all five cardiometabolic risk factors until the BMI cut-off point reached 29 kg/m^2, but when it exceeded 30 kg/m^2, correlations no longer existed. WC was significantly correlated with all five cardiometabolic risk factors up to a value of 85 cm, but when WC exceeded 90 cm, correlations no longer existed.
Conclusions: Our cross-sectional study suggest that significant correlations between obesity indices and cardiometabolic risk factors may disappear, when obesity cut-off points exceed certain limits in women.

Introduction

According to the most recent estimates of the 2012 Korean national health and nutrition examination survey, 36.3% of men and 28.0% of women were obese [1]. There is compelling evidence that individuals with obesity are at increased risk of a variety of health problems, such as, type 2 diabetes mellitus (DM), hypertension, and cardiovascular disease (CVD) [2,3]. Therefore early detection and proper treatment of obesity is essential to prevent and manage obesity-related chronic diseases. Measurements of body mass index (BMI) and waist circumference (WC) provide an essential first step to determine the level and distribution of adiposity in individuals with obesity [4].

Generally, modest weight loss of 5—10% of body weight is suggested to improve health status in individuals with obesity [5,6]. However, it remains unclear whether this percentage loss should be applied equally to individuals with obesity. One prospective study conducted on 24 people with a mean BMI of 33 kg/m^2 showed a decrease in systolic blood pressure (BP) of 5.4% and an improvement in insulin resistance of 40% after a 8.9% mean weight reduction achieved by therapeutic life style change (TLC) and pharmacological therapy [7]. However, other studies have reported that modest weight reduction does not significantly ameliorate markers of CVD risk in patients with morbid obesity [8,9]. In one study in patients with severe and morbid obesity (mean BMI 46.3 kg/m^2) it was found although mean body weight was reduced by 8.7%, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and high-sensitivity C-reactive protein (hs-CRP) levels (all inflammatory markers of CVD) did not improve significantly [8]. These results suggest that moderate weight reduction may be inadequate in terms of achieving health benefits or reducing obesity-related metabolic and cardiovascular risks in the patients with severe obesity. However, there is no such data regarding changes in the strengths of associations between obesity indices and cardiometabolic risk factors in individuals with different severities of obesity. It has been established that obesity is associated with insulin resistance and cardiovascular risk factors [10,11], and therefore, we hypothesized that correlation coefficients between BMI or WC (obesity indices) and insulin resistance or cardiovascular risk (obesity-related biomarkers) may no longer exist in individuals with severe obesity. The purpose of this study was to explore correlations between obesity indices and obesity-related biomarkers at different obesity levels in individuals with severe obesity.

Subjects, materials and methods

Study population

This cross-sectional, hospital-based study was performed on women with severe obesity, who visited university hospitals located in four main provinces of South Korea during the period January 2003—December 2004 for the management of obesity. Initially, a total of 557 women were considered for this study. Key eligibility requirements were an age of at least 18 years, and a BMI of >25 kg/m^2. Participants were excluded if they had history of thyroid disease, DM, CVD, malignancy, a severe debilitating disease, and hyperlipidemia or if they were pregnant, lactating or taking agents known to improve insulin sensitivity or plasma lipoprotein-lipid levels. Participants with a history

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