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Original Research

Sarcopenic obesity is associated with lower indicators of psychological health and quality of life in Koreans



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ABSTRACT

Sarcopenic obesity (SO) is known to contribute to morbidity and mortality from chronic diseases. However, there exists limited information regarding its effect on psychological health. The aim of this study was to evaluate association of SO with several indices of psychological health and quality of life (QoL) in Korean adults. This cross-sectional study was conducted with 11521 participants older than 20 years from the Korea National Health and Nutrition Examination Survey 2008–2011. Sarcopenic obesity was defined by a low appendicular skeletal muscle mass divided by body weight less than 1 standard deviation below the sex-specific mean for the young reference group, and by a high waist circumference of at least 90 cm for men and at least 85 cm for women. Psychological health status, including depressive symptoms, perceived stress, and suicidal ideation, as well as QoL, was assessed by a self-reporting questionnaire. Association between SO and psychological health status was assessed under a logistic regression model. After multivariate adjustment for demographics and lifestyle factors, SO was significantly associated with perceived stress (odds ratio, 1.24; 95% confidence interval, 1.07–1.44; *P* value = .004) and suicidal ideation (odds ratio, 1.26; 95% confidence interval, 1.06–1.50; *P* value = .010). In addition, SO was found to have a negative association with a range of QoL indicators. Interestingly, these association patterns were more significant in participants younger than 60 years. In conclusion, our results suggest that SO was associated

Abbreviations: ALT, alanine aminotransferase; ASM, appendicular skeletal muscle; AST, aspartate aminotransferase; BMI, body mass index; CI, confidence interval; EQ-5D, European Quality of Life Indices; FBG, fasting blood glucose; GO, general obesity; HDLC, high-density lipoprotein cholesterol; HOMA-B, homeostatic model assessment of β -cell function; HOMA-IR, homeostatic model assessment of insulin resistance; HPA, hypothalamic-pituitary-adrenal; KNHANES, Korea National Health and Nutrition Examination Survey; LDLC, low-density lipoprotein cholesterol; OR, odds ratio; QoL, quality of life; SO, sarcopenic obesity; TC, total cholesterol; TG, triglyceride; WC, waist circumference.

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with adverse psychological health and lower QoL more than body mass index-based general obesity.

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1. Introduction

Obesity and psychological disorders are global epidemics that place a high burden on public health [1,2]. They not only contribute to the onset of disability but also increase the risk of developing chronic diseases such as diabetes mellitus and cardiovascular disease [3,4]. Patterns of comorbidity between obesity and psychological disorders are often observed, and several epidemiological studies have suggested potential association between obesity and mental disorders using cross-sectional or prospective designs [5–7]. For example, *severe obesity* defined as a body mass index (BMI) greater than 30 kg/m² was positively associated with major mood disorder and depression predominantly in American adults [6]. In another study, Herva et al [7] reported that obesity in adolescence was associated with later depressive symptoms in both men and women. Furthermore, obesity was shown to be associated with adverse effects on quality of life (QoL) in Western population, particularly in the areas of physical function and public distress [8,9]. However, most of these studies are based on BMI-based general obesity (GO), although it may not take into account various types of obesity [10–12].

Sarcopenic obesity (SO) is a subtype of obesity characterized by excess body fat with an accompanying loss of muscle mass and strength known as *sarcopenia* [13]. Sarcopenic obesity is an emerging public concern because it seems to have more impact on some adverse health outcome than BMI-based GO, including physical disability, metabolic disorders, and mortality [14–16]. However, our understanding of the relationship between SO and psychological disorders is quite limited. Some studies have reported that sarcopenia has effect on depression in elderly populations [17–19]; but, to our knowledge, no studies have investigated a broad range of psychological disorders in relation with SO in the general population. Moreover, recent studies reported that the etiology and pathology of sarcopenia and obesity could differ among age groups [20]. However, there exist limited studies regarding sarcopenia or SO in younger individuals, especially in the aspect of psychological health and QoL.

The aim of the present study is to evaluate the association of SO with various psychological health status and with QoL in the Korean general population. We also aimed to compare SO and BMI-based GO with regard to their psychological health effect by assessing the same association using BMI-based GO as well. We further examined whether this association differs by age because we hypothesized that the association would be stronger in younger individuals than in older adults. Our findings may contribute to the management of various obesity types and psychological health.

2. Methods and materials

2.1. Study population

This cross-sectional population study was based on data from the Korea National Health and Nutrition Examination Survey

(KNHANES) IV-V conducted from 2008 to 2011. Details of the KNHANES are available elsewhere [21]. Briefly, the KNHANES is a nationwide survey conducted by the Ministry of Health and Welfare. The KNHANES is composed of 3 sections including a health interview, a health examination, and a nutrition survey. A nationally representative sample was chosen from the Korean population using household records developed by the 2005 Population and Housing Census in Korea. Twenty households from each district were selected by using a stratified, multistage probability cluster sampling method that considers the geographical area, age, and sex of each participant. In the KNHANES IV (2008–2009) and V (2010–2011), 50404 individuals participated in the examination (response rate: higher than 80% for age ≥ 1 year). Of the participants, we limited the analyses to adults aged at least 20 years. We excluded those whose data were missing for important analytic variables, such as dual-energy x-ray absorptiometry indices, psychological health questionnaires, and QoL indices. In addition, we excluded those diagnosed with chronic disease, including stroke, coronary artery disease, thyroid disease, liver cirrhosis, tuberculosis, and cancer, to eliminate factors affecting sarcopenia or depression. Pregnant women were also excluded because of unique changes in hormones. Ultimately, 11521 participants were included in the statistical analysis. The institutional review board of the Centers for Disease Control and Prevention in Korea approved the KNHANES. All the participants in the survey provided informed written consent.

2.2. General characteristics of the participants

We obtained data from KNHANES IV and V, including demographic, anthropometric, and personal medical history data. Trained experts obtained anthropometric measurements by following standardized protocols. The body weight and height of participants were measured to the nearest 0.1 kg and 0.1 cm, respectively. Body mass index (BMI) was calculated as weight (kg)/height squared (m²). Waist circumference (WC) was measured midway between the lower margin of last rib and the upper margin of the iliac crest to the nearest 0.1 cm. Systolic blood pressure and diastolic blood pressure were measured by a mercury sphygmomanometer (Baumanometer, Wabau, Copiague, NY, USA) on the right arm. Potentially confounding demographic variables included sex, age, income, education, alcohol use, smoking status, and physical activity.

Monthly income was reported as earned South Korean currency and divided into quartiles according to the equivalent income of household, as follows: lowest, lower middle, upper middle, or highest. Education level was divided into 4 categories according to the participant's highest achieved level, as elementary school, middle school, high school, or university. Alcohol use was defined as consuming at least 1 alcoholic drink in a month. Current smokers were defined as those who presently smoked cigarettes. Physical activity was

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