Usefulness of waist-to-height ratio in screening incident hypertension among Japanese community-dwelling middle-aged and elderly individuals

ABSTRACT

Background: The incidence of hypertension is increasing worldwide and obesity is one of the most significant risk factors. Obesity can be defined by various anthropometric indices such as body mass index (BMI), waist-to-hip ratio (WHpR), and waist-to-height ratio (WHtR). This study examined a range of anthropometric indices and their relationships with hypertension.

Methods: This study included 768 men aged 70 ± 10 years and 959 women aged 70 ± 8 years from a rural village. The relationship between anthropometric indices (BMI, WHpR, and WHtR) and hypertension was examined using cross-sectional (baseline, N=1,727) and cohort data (follow-up, N=419). Receiver operating characteristic (ROC) analysis was used to determine the predictive ability of obesity indices for hypertension in both genders. Logistic regression models were used to evaluate WHtR as a significant predictor of hypertension.

Results: In the cross-sectional study, WHtR, BMI, and WHpR showed significant predictive abilities for hypertension in both genders, with WHtR showing the strongest predictive ability. Also, in the cohort study, WHtR showed a significant predictive ability for incident hypertension in both genders, and, for women, BMI as well as WHtR had also predictive ability. In the cross-sectional study, the optimal WHtR cutoff values were 0.53 (sensitivity, 44.3%; specificity, 80.2%) for men and 0.54 (sensitivity, 60.9%; specificity, 68.6%) for women. In the cohort study, the optimal WHtR values were 0.47 (sensitivity, 85.4%; specificity, 39.8%) for men and 0.51 (sensitivity, 66.7%; specificity, 58.2%) for women.

Conclusions: The results suggest that WHtR is a useful screening tool for hypertension among Japanese middle-aged and elderly community-dwelling individuals.

Key words: waist-to-height ratio, hypertension, anthropometric indices, community-dwelling individuals

Background

The incidence of hypertension is increasing worldwide with the continuous increase in obesity prevalence (1). Since obesity increases the risk of hypertension, addressing the obesity and hypertension epidemic is crucial (2). Obesity can be defined by various obesity-related anthropometric indices such as body mass index (BMI), waist circumference (WC), waist-to-height ratio (WHtR), and waist-to-hip ratio (WHpR). The World Health Organization recommends the use of some anthropometric parameters as screening markers for individuals at risk for cardiovascular disease (CVD) as they can be determined easily and inexpensively (3) Epidemiological studies have shown that these anthropometric indices predict incident hypertension (4) (5) (6) (7) (8) (9). BMI is the most widely used indicator of obesity, but it does not reflect central fat distribution (10) (11). In Japan, cross-sectional and prospective studies have demonstrated a strong association between WHtR and hypertension (4) (5) (12). However, which index best predicts the development of hypertension remains controversial (13) (14) (15) (16), and more specifically, there is a lack of consensus on the best predictive indicator of hypertension among Japanese middle-aged and elderly individuals.

To address this controversy, we investigated the relationship between baseline visceral obesity indices (BMI, WHpR, and WHtR) and potential risk factors and hypertension using cross-sectional and prospective cohort data from community-dwelling middle-aged and elderly individuals.

Methods

Study participants and data collection

This study enrolled a population-based sample of community-dwelling Japanese adults from the Nomura Health and