

A COMPARISON OF ANTHROPOMETRIC INDICES FOR PREDICTING HYPERTENSION AND TYPE 2 DIABETES in a MALE INDUSTRIAL POPULATION OF CHENNAI, SOUTH INDIA

Objectives: To assess the association of four obesity-related indices—body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-stature ratio (WSR)—with hypertension and type 2 diabetes among a male industrial population in south India.

Design, Setting, and Participants: A cross sectional study of 2148 men aged 18–69 years in two purposely selected industrial units in Chennai, India, in 2003–2005.

Main Outcome Measures: The examination included blood pressure and anthropometric measurements (height, weight, hip circumference, and WC) to calculate BMI, WHR, and WSR. Fasting blood samples were taken to assess plasma glucose.

Results: Prevalence of overweight was 43.4%; prevalences of central obesity using WC ≥ 90.0 cm and WHR > 0.90 were 50.0% and 70%, respectively. The prevalences of hypertension and type 2 diabetes were 26.5% and 16.3%, respectively. There was a significant increase in the prevalence of type 2 diabetes and hypertension across the quintiles for the four anthropometric indices. In logistic regression analysis, BMI and WC showed a significant graded increase in the odds ratio for hypertension after adjusting for age. In case of type 2 diabetes, only WHR showed significant increase in odds ratio across quintiles after adjusting for age and BMI.

Conclusions: WHR was the best predictor for type 2 diabetes in the study sample. BMI and WC were good predictors for hypertension. We recommend that WHR should be routinely used in this clinical setting in addition to BMI to detect persons at high risk in these industrial units. Prospective studies are needed to provide evidence of the predictive power of anthropometric indices for Asian Indians. (*Ethn Dis.* 2008;18:31–36)

Key Words: India, Risk Factors, Hypertension, Diabetes, Anthropometric Indices, Central Obesity, Asian Indian

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INTRODUCTION

Obesity, a risk factor for type 2 diabetes mellitus and for cardiovascular disease, is increasing in prevalence in both developed and developing countries.¹ In India, the prevalence of obesity among adults is 10%–50%, depending on the definitions used.² Obesity is defined by certain anthropometric indices, such as body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-stature ratio (WSR). Among these, BMI is the most widely used indicator of obesity, but it does not measure body fat distribution and, in particular, abdominal fat mass.^{3,4} The pattern of body fat distribution has been noted to be a determinant of cardiovascular disease risk. Accumulation of fat in the abdominal region is particularly related to an increased risk of cardiovascular disease.^{5,6} Hence, anthropometric indices that measure abdominal fat or central obesity such as WC and WHR are increasingly used in research and clinical settings.^{3,7}

The ethnic origin of the population studied influences the predictive power of various anthropometric indices.^{8–10} Hence, population-specific anthropometric indices are needed to identify subjects at risk for hypertension and type 2 diabetes. Asian Indians are a unique ethnic group in terms of body

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morphology and cardiovascular disease risk. Asian Indian immigrants have a higher rate of cardiovascular diseases than do other ethnic groups in Canada.¹¹ In terms of body morphology, Asian Indians have lower BMIs, and for any given BMI, Asian Indians have higher central obesity and abdominal fat than do Europeans.^{12,13} In Indians, studies have reported the risk threshold levels of various anthropometric indices, but none have measured all four commonly used anthropometric indices in the same population to assess the relative importance of these indices for predicting cardiovascular risk factors.^{14–17} A high prevalence of cardiovascular risk factors is reported among workers in industrial populations in India.¹⁸ We determined the prevalence of cardiovascular risk factors in an industrial sample in south India. We measured BMI, WC, WHR, and WSR and determined which of these indices best identified patients with hypertension and type 2 diabetes mellitus.

METHODS

Setting, Design, and Participants

Chennai is the fourth-largest metropolitan city in India, with a population

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