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Hypertension and Obesity: A Cross-National Comparison of BMI and Waist-Height Ratio

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Abstract : Hypertension has been identified as a prominent co-morbidity of obesity. To improve clinical intervention of hypertension, it is critical to identify metrics that most accurately reflect risk for increased morbidity. Two of the most relevant and accurate measures for increased risk of hypertension due to excess adipose tissue are Body Mass Index (BMI) and Waist-Height Ratio (WHtR). Previous research has examined these measures in cross-national and cross-ethnic studies, but has most often relied on secondary means such as meta-analysis to identify and evaluate the efficacy of individual body mass measures. In this study, we instead use cross-sectional analysis to assess the cross-ethnic discriminative power of BMI and WHtR to predict risk of hypertension. Using the WHO SAGE survey, which collected anthropometric and biometric data from respondents in six middle-income countries (China, Ghana, India, Mexico, Russia, South Africa), we implement logistic regression to examine the discriminative power of measured BMI and WHtR with a known population of hypertensive and non-hypertensive respondents. We control for gender and age to identify whether optimum cut-off points that are adequately sensitive as tests for risk of hypertension may be different between groups. We report results for OR, RR, and ROC curves for each of the six SAGE countries. As seen in existing literature, results demonstrate that both WHtR and BMI are significant predictors of hypertension ($p < .01$). For these six countries, we find that cut-off points for WHtR may be dependent upon gender, age and ethnicity. While an optimum omnibus cut-point for WHtR may be 0.55, results also suggest that the gender and age relationship with WHtR may warrant the development of individual cut-offs to optimize health outcomes. Trends through multiple countries show that the optimum cut-point for WHtR increases with age while the area under the curve (AUROC) decreases for both men and women. Comparison between BMI and WHtR indicate that BMI may remain more robust than WHtR. Implications for public health policy are discussed.

Keywords : hypertension, obesity, Waist-Height ratio, SAGE
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