

Statistical issues in studying the relative importance of Body Mass Index, Waist Circumference, Waist Hip Ratio and Waist Stature Ratio to predict type 2 diabetes.

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Background

Systematic and appropriate statistical analysis is needed to examine the relative performance of anthropometrical indices body mass index (BMI), waist circumference (WC), waist hip ratio (WHR), and waist stature ratio (WSR) for predicting type 2 diabetes. Collinearity and nonlinearity among the predictors should be examined. This article aims to examine (i) collinearity among the predictors, (ii) whether logistic regression analysis provide interpretable odds ratios, (iii) if not, the optimum cut points, (iv) existence of non linearity relationship between predictors and the outcome variable, and (v) relative performance of BMI, WC, WHR and WSR through multivariable fractional polynomial algorithm.

Methods

We collected data on socio demographic, anthropometrical and biochemical variables from 2148 males. The variable involving in collinearity is removed from further analysis. Relative importance of BMI, WC, and WHR is examined by logistic regression analysis. To avoid noninterpretable odds ratios, cut point theory is used. Optimal cut points are derived and tested for significance. Multivariable fractional polynomial (MFP) algorithm is applied to reconcile nonlinearity.

Results

WSR and WC were collinear with WHR and BMI. Since WSR was jointly as well as independently collinear, it was dropped from further analysis. The odds ratio for WHR could not be interpreted meaningfully. Cut point theory was adopted. Deciles emerged as the optimal cut point. MFP recognized nonlinearity effects on the outcome.

Conclusion

Multicollinearity among the anthropometrical indices should be examined. Conventional logistic regression analysis should be applied judiciously. Optimal cut points need to be adopted. MFP is recommended to accommodate nonlinearity among the predictors. WHR is relatively more important and significant than WC and BMI.

Key words: Multicollinearity, logistic regression, Optimal cut points, Quintile, non-linearity Multivariable fractional polynomial, anthropometrical indices.

Running heads: Statistical issues in analysing anthropometrical indices.