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Non-overweight 'apples' have higher cardiometabolic risk factors than overweight 'pears': waist-to-height ratio is a better screening tool than BMI for blood levels of cholesterol and glycated haemoglobin

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Introduction

We have previously shown that using BMI as a sole proxy for obesity and ignoring measures of central obesity such as waist to height ratio (WHtR) would misclassify around 10% of the whole UK population, and more than 25% of those of normal weight, as "not at risk"¹.

Objective

To explore the implications of this 'misclassification' in screening for the cardiometabolic risk factors, total cholesterol (TC) and glycated haemoglobin (HbA1c) using data from the Health Survey for England 2009 (HSE).

Results

In HSE adults aged 16y and over (n=2917), 41% of men and 29% of women classified as 'normal' by BMI, have WHtR exceeding 0.5. Overall, 12% of the total population who would be missed by BMI screening (non-overweight 'apples').

When the HSE population was classified into four groups (2x2) using standard boundary values of BMI ($\leq 25\text{kg/m}^2$) and WHtR (≤ 0.5), mean TC was, as expected, lowest in the group with low/normal BMI and low WHtR (mean 5.1mmol/L) and highest among those with high BMI and high WHtR (mean 5.7mmol/L). Of greater interest, the group with 'low/normal BMI but high WHtR' ('non-overweight apples') had significantly higher mean TC than the group with high BMI but low WHtR overweight 'pears' (5.73mmol/L SE 0.08 vs 4.98mmol/L; SE 0.11; $P < 0.0001$). Similarly, HbA1c levels were higher among non-overweight 'apples' than among overweight 'pears' (5.62% SE 0.03 vs 5.33% SE 0.04; $P < 0.0001$). These differences were also significant in both sexes.

Conclusions

This study not only supports our previous findings on the superiority of WHtR over BMI as a primary screening method for morbidity² and mortality³ risk, but it also demonstrates the potentially severe implications of misclassification by BMI alone in screening for cardiometabolic risk factors.

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1. Ashwell M, Gibson S. A proposal for a primary screening tool: 'Keep your waist circumference to less than half your height'. *BMC Med.* 2014;12:207.
2. Ashwell M, Gunn P, Gibson S. Waist-to-height ratio is a better screening tool than waist circumference and BMI for adult cardiometabolic risk factors: systematic review and meta-analysis. *Obes Rev.* 2012;13(3):275-286.
3. Ashwell M, Mayhew L, Richardson J, Rickayzen B. Waist-to-height ratio is more predictive of years of life lost than body mass index. *PLoS One.* 2014;9(9):e103483.