

BMI, CVD and mortality

053 COMPARISON OF THE ASSOCIATIONS OF BMI AND MEASURES OF REGIONAL ADIPOSITY WITH CORONARY HEART DISEASE, DIABETES AND ALL CAUSE MORTALITY: A STUDY USING DATA FROM FOUR UK COHORTS

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Objective: To compare magnitudes of association of BMI and measures of regional adiposity with coronary heart disease, diabetes and all-cause mortality.

Design: 2 prospective cohort and 2 cross sectional studies.

Participants: Members of 4 UK cohorts aged ≥ 45 years: 3937 women from the British Women's Heart and Health Study (BWHHS), 2367 and 1950 men from phases 1 and 3 of the Caerphilly Prospective Study (CaPS), 403 men and women from Boyd Orr, 789 men and women from Maidstone and Dewsbury (MD) study.

Main Outcome Measures: Incident all cause mortality, coronary heart disease (CHD) and diabetes (in CaPS and BWHHS), cross sectional measures of arterial plaques (in Boyd Orr and MD), blood lipids, blood pressure (in all 4 cohorts) and fasting glucose and insulin (in BWHHS, phase 1 CaPS and Boyd Orr).

Results: In BWHHS women, all measures of adiposity were strongly positively associated with incident diabetes, the strongest relationships seen with waist circumference (WC) (HR 2.35, 95% CI 2.03 to 2.73) and waist: height ratio (WHtR) (HR 2.29, 95% CI 1.98 to 2.66). There was statistical evidence that both of these were more strongly associated with diabetes than BMI (HR 1.80 (95% CI 1.59 to 2.04) (p for heterogeneity both < 0.02). In phase 3 CaPS men, there was no strong evidence for differences in the strengths of association with incident diabetes between BMI and WC, waist: hip ratio (WHR) and WHtR (p all > 0.49). Pooling estimates from BWHHS and CaPS revealed no evidence for differences in strengths of associations between BMI, WC, WHR or WHtR and CHD. All cause mortality was associated with WC, WHR and WHtR (HRs: 1.07 to 1.11) but not with BMI (HR 0.98) in pooled estimates (BWHHS, CaPS). Pooled odds ratios (Boyd Orr, MD) revealed no strong evidence for differences between anthropometric measures in their associations with arterial plaques. There was little evidence of differences between associations of BMI and other measures of adiposity with blood lipids, blood pressure, glucose or insulin in any of the cohorts.

Conclusions: Measurements of central adiposity (WC, WHtR) were more strongly associated with diabetes than BMI in women but not men. There was no strong evidence for measurements of central adiposity being more strongly associated with CHD and stronger associations with all cause mortality were small. Further studies are required to determine whether measuring central adiposity in clinical practice would improve prediction of diabetes risk.

054 ASSOCIATION OF BODY MASS INDEX, WAIST CIRCUMFERENCE AND WAIST-HIP RATIO WITH MORTALITY IN THE SCOTTISH HEALTH SURVEYS

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Background: Obesity is a major health challenge of the 21st century. Simple anthropometric measurements, including body

mass index (BMI), waist circumference (WC) and waist-hip ratio (WHR), are utilised in epidemiological studies to capture (indirectly) summary estimates of body fat proportion. Some representative population surveys have not demonstrated the strong U or J shaped association between BMI and mortality that might be expected.

Objectives: To examine association of body size with mortality using BMI and two gender specific alternatives believed to reflect fat distribution: WC and WHR.

Design: The linked Scottish Health Surveys provide representative population data, collected by stratified and clustered probability sampling, and are linked to subsequent death records.

Participants: 22 426 respondents from three survey waves (1995, 1998 and 2003) who consented to data linkage and were between the ages of 18 and 86 years at the time of interview (9924 men, 12 502 women).

Main Outcome Measures: All-cause and cardiovascular mortality. **Methods:** Cox proportional hazards analyses were used to model the relationship between mortality and each of the variables BMI, WC and WHR. Only valid measurements of each were included and each was divided into four categories with the second lowest category (38.4%, 40.3% and 49.3% respectively) as referent. Hazard ratios (HR) for survival time from interview to death, or 31st December 2007, were firstly adjusted for age, gender, smoking status, alcohol consumption and survey year; and then further adjusted by measures of socio-economic status. Sensitivity analyses involved stratification by gender and age.

Results: The prevalence of obesity, according to World Health Organisation definitions BMI (≥ 30 kg/m²), WC (men ≥ 102 cm, women ≥ 88 cm) and WHR (men ≥ 1.0 , women ≥ 0.85) was 22.2%, 27.2% and 18.7% respectively. There was no increased risk of mortality associated with obesity as defined using BMI (HR 0.93, 95% CI 0.80 to 1.07). In contrast, the HR for subjects with obesity determined by WC was 1.17 (1.02 to 1.34) and by WHR was 1.34 (1.16 to 1.55). BMI and WC identified the association of "underweight" with increased mortality. Results for CVD mortality showed a stronger gradient. Inclusion of socio-economic status in the models attenuated the results to a limited extent. Gender stratification strengthened the association of underweight with mortality for men using BMI (HR 2.90; 1.87 to 4.51) and of obesity with mortality for women using WHR (HR 1.47; 1.19 to 1.83).

Conclusions: BMI may not capture the harmful association of body size with mortality. WC and WHR may more clearly define the health risks associated with excess body fat accumulation.

055 ELEVATED BODY MASS INDEX IN EARLY ADULTHOOD AS A PREDICTOR OF LATER CORONARY HEART DISEASE MORTALITY: UP TO 82 YEARS FOLLOW-UP IN THE HARVARD ALUMNI HEALTH STUDY

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Objectives: Few studies have examined the association between adiposity in early adulthood and later coronary heart disease (CHD). Further, whether the impact of early adiposity is mediated via adiposity in middle age or, if it exerts an independent effect, has yet to be tested. We examined these issues using extended follow-up of the Harvard Alumni Study.

Design: Cohort study of male University students who had a physical examination at college entry between 1914 and 1952 (mean age 18.4 years) when data on CHD risk factors including body mass index (BMI; weight, kg/height, m²), our measure of