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

[1]AE Taylor, [2]S Ebrahim, [1,3]Y Ben-Shlomo, [1,3]RM Martin, [4]PH Whincup, [5]JW Yarnell, [6]SG Wannamethee, [1,3]DA Lawlor. *[1]Department of Social Medicine, University of Bristol, Canynge Hall, Bristol, UK; [2]Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK; [3]MRC Centre for Causal Analyses in Translational Epidemiology, Department of Social Medicine, University of Bristol, Oakfield House, Bristol, UK; [4]Division of Community Health Sciences, St. George's, University of London, London, UK; [5]Department of Epidemiology and Public Health, Queen's University Belfast, Belfast, UK; [6]British Regional Heart Study, UCL Department of Primary Care and Population Sciences, Royal Free and University College Medical School, London, UK*

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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

JW Hotchkiss, AH Leyland. *MRC Social and Public Health Sciences Unit, Glasgow, UK*

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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/m^2), 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

[1]GD Batty, [1]L Gray, [2,3]HD Sesso, [2,3]I-M Lee. *[1]Medical Research Council Social and Public Health Sciences Unit, Glasgow, UK; [2]Harvard School of Public Health, Boston, MA, USA; [3]Brigham and Women's Hospital, and Harvard Medical School, Boston, MA, USA*

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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, m^2), our measure of

adiposity, were measured directly. Study participants were traced, mailed a health questionnaire in 1962/1966 (mean age 45.1 years) which included enquiries regarding self-reported height and weight, and were followed for subsequent mortality experience – with > 99% completion – until the end of 1998. BMI was categorised into quartiles in the present analyses.
Setting: USA.
Participants: 14 638 men enrolled in Harvard University in the given years, who completed the subsequent health questionnaire, and whose vital status could be ascertained.
Main Outcome Measure: CHD death.
Results: Over a maximum of 82.5 years of follow-up (median 56.5 years), there were 1401 deaths from CHD. Following adjustment for age and other CHD risk factors (cigarette smoking, physical activity, blood pressure) at college entry, relative to the lowest weight quartile (mean BMI = 18.7 kg/m^2), there was an elevated risk of CHD mortality in men in the highest quartile (mean BMI = 25.0 kg/m^2; hazards ratio 1.28, 95% CI 1.10 to 1.49) but not the intermediate groups. Following additional control for BMI in middle-age, this increased CHD risk in the highest quartile was eliminated (1.03; 0.87 to 1.21).
Conclusion: In this cohort, higher BMI in early adulthood was associated with an elevated risk of CHD mortality several decades later but this effect appeared to be entirely meditated via BMI in middle-age.

056 THE LONG TERM EFFECTS OF CHILDBEARING AND BREASTFEEDING ON BODY MASS INDEX IN MIDDLE AGED WOMEN RESULTS FROM THE MILLION WOMEN STUDY

[1]K Bobrow, [2]M Quigley, [3]J Green, [3]G Reeves, [3]V Beral, on behalf of the Million Women Study Collaborators [1]*Department of Public Health, University of Oxford, Oxford, UK;* [2]*National Perinatal Epidemiology Unit, University of Oxford, Oxford, UK;* [3]*Cancer Epidemiology Unit, University of Oxford, Oxford, UK*

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Objectives: To examine the relation between childbearing and breastfeeding and subsequent body mass index (BMI) in middle-aged women.
Design: Cross-sectional analysis within a large prospective study.
Participants: One million UK women recruited into the Million Women Study during 1996–2001. Participants completed questionnaires collecting information on personal and lifestyle characteristics, medical and reproductive history including questions on childbearing and breastfeeding, anthropometry, physical activity, and socio-demographic in factors.
Main Outcome Measures: Mean BMI stratified by parity and breastfeeding and adjusted for age, geographical region, socio-economic status, smoking status, strenuous physical activity, age at first birth, and years since last birth.
Results: 980 474 women were included in the main analysis. 87% of the study population were parous, mean parity was 2.1 (1.2) and 68% of parous women ever breastfed. The mean lifetime duration of breastfeeding per child was 3.8 (SD 3) months. Mean BMI increased significantly with each birth from 25.8 (95% CI 25.7 to 25.8) for nullips to 28.1 (95% 28.1 to 28.3) for women with five or more births. Parous women who breastfed had significantly lower BMIs than their non-breastfeeding counter parts. The effect was attenuated by adjusting for socio-economic status but remained significant even after full adjustment The mean BMI decreased as lifetime duration of breastfeeding increased: compared with women who never breastfed, mean BMI decreased by 0.8 (95% CI 0.71 to 0.82)kg/m^2 in those with a lifetime breastfeeding duration of more than 9 months. This relationship was statistically significant ($p<0.0001$) and maintained at each parity level.
Conclusions: In this analysis including one million middle-aged women in the UK we found that BMI increased with increasing parity, but that this increase would be offset if women breastfed. These relationships were independent of socioeconomic status, geographic region, smoking, exercise, age at first birth and time since last birth. These findings contribute to the body of evidence that childbearing and breastfeeding have sustained long term effects on the health status of women.

Ethnicity and young people

057 EXPLAINING THE MENTAL HEALTH ADVANTAGE OF BRITISH INDIAN CHILDREN

A Goodman, V Patel, D Leon. *Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK*

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Objective: To investigate the causes of the lower rate of mental disorders diagnosed in British Indian children compared to White children.
Design: Secondary analysis of two population-based, cross-sectional surveys of child mental health (the British Child and Adolescent Mental Health Surveys of 1999 and 2004).
Setting: Great Britain (nationally-representative sample). Mental health outcome measures: Parent Strengths and Difficulties Questionnaire (SDQ); teacher SDQ; child SDQ; multi-informant clinical diagnosis.
Participants: 16 449 White and 419 Indian children aged 5–16. The detailed multivariable models focused on the 13 868 White and 361 Indian children from England whose parents had completed an SDQ in English.
Results: There was a substantially lower prevalence ($p<0.001$) of any mental disorder in Indians (3.4%, 95% CI 1.9 to 5.9) compared to Whites was (9.6%, 95% CI 9.1 to 10.2). Strong evidence ($p<0.002$) of an Indian advantage for externalising problems/disorders was consistently observed for the parent, teacher, child SDQs and for clinical diagnosis. Detailed psychometric analyses of the SDQ and clinical interview measures provided no evidence that this Indian mental health advantage could be explained by a measurement bias in the assessment of mental health. In multivariable analyses the unexplained difference between Indians and Whites decreased somewhat after adjusting for the fact that Indian children were more likely to live in two-parent families (92.2% vs. 65.4%) and less likely to have academic difficulties (e.g. 2.9% vs. 8.6% for parent-reported learning difficulties). In models adjusting for a larger number of child, family, school and area variables the difference reduced only by about a quarter (e.g. from 1.08 to 0.75 SDQ points on the parent SDQ) and remained highly significant ($p<0.001$). There was little or no evidence of an ethnic difference for internalising problems/disorders in unadjusted or adjusted models.
Conclusions: The mental health difference between Indian and White children is specific to a substantial advantage for externalising disorders, and this advantage appears to be real rather than due to a reporting bias. This advantage is largely unexplained by major risk factors for child mental health problems available in this dataset. Further qualitative and quantitative research into the causes of this advantage has the potential to yield insights which could improve the mental health of children of all ethnic groups.

058 EMERGENCE OF ETHNIC DIFFERENCES IN BLOOD PRESSURE IN ADOLESCENCE: THE DETERMINANTS OF ADOLESCENT SOCIAL WELL-BEING AND HEALTH LONGITUDINAL STUDY

[1]E Lenguerrand, [1]S Harding, [1]M Whitrow, [1]M Maynard, [2]K Cruickshank, [1]G Der, [1]A Teyhan. [1]*Medical Research Council, Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK;* [2]*Division of Cardiovascular and Endocrine Sciences, University of Manchester, Manchester, UK*

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Objective: To examine ethnic differences in changes in Blood Pressure (BP) between early and late adolescence in the UK.