SCIENTIFIC LETTER

Hostility is an independent predictor of recurrent coronary heart disease events in men but not women: results from a population based study

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Heart 2005;91:1609–1610. doi: 10.1136/hrt.2004.056994

Epidemiologic evidence suggests healthy individuals characterised by hostile personalities are at increased risk for coronary heart disease (CHD).¹ We tested if hostility predicts CHD recurrence differentially for men and women.

METHODS

Using the Nova Scotia Health Survey 1995 (NSHS95), a population based, prospective survey of 3227 community dwelling, outpatient Nova Scotian adults,² we examined participants with CHD at survey baseline. Of the NSHS95 participants, 227 (139 men, 88 women), 7% of the NSHS95 sample, had baseline CHD, determined by query of the provincial health registry for previous CHD discharges (diagnoses of ICD-9-CM codes 410-414) during the five years preceding survey enrolment. Of these 227 participants, 206 (91%) had complete hostility data (Cook-Medley hostility scale³), constituting our sample (128 men, 78 women). Other variables measured at survey baseline included age, sex, smoking status (never smoked/abstinence > 1 year versus current/abstinence < 1 year), physical activity, family history of early CHD, alcohol consumption (yes/no), education, diabetes (present/absent), blood pressure (analysed continuously), body mass index (BMI, kg/m²) (continuous), fasting lipids, depression (Center for Epidemiological Studies–Depression (CES-D) scale, scored < 16/≥ 16), and social support (analysed continuously using a self report questionnaire⁴). With the exception of older age, the 21 participants with established CHD, but without baseline hostility scores, did not differ from those with hostility data (78 and 69 years, $p = 0.002$). Hostility scores were dichotomised based on the sex specific median (men = 21 (≥ 21/< 21); women = 19 (≥ 19/< 19)). Recurrent CHD hospitalisations and mortality for the four years following NSHS95 administration were determined from query of the provincial health registry (assessing discharge/mortality codes ICD-9-CM 410-414). Participants with recurrent events were counted only once, regardless of the number of events they had in four years. Only when ICD codes 410-414 were the first discharge diagnosis was the event counted as an end point.

RESULTS

Men and women had similar average hostility scores (21.9 and 20.0, respectively, $p = 0.16$). Men reported more physical activity ($p < 0.001$) and were significantly more likely to drink alcohol (20% and 16%, $p = 0.02$). Women were more likely to report more social support ($p = 0.01$) and depressive symptoms (23% and 11%, $p = 0.02$). The baseline characteristics of high and low hostile participants, defined by the sex specific median hostility score, were compared. For both sexes, those with high hostility scores were significantly more likely to report depression symptoms

Figure 1 Hazards analysis for coronary heart disease (CHD) recurrence over four years following survey administration, adjusted for age, systolic blood pressure, diastolic blood pressure, total cholesterol to high density lipoprotein ratio, low density lipoprotein, family history of premature CHD, smoking, diabetes, body mass index, alcohol consumption, physical activity, years of education, social support, and depression.

and were less educated. High hostile men had significantly higher average BMI and total cholesterol/high density lipoprotein (HDL) ratio than low hostile men. Compared to low hostile women, high hostile women were significantly more likely to report diabetes. Over the four year follow up, 45% of the entire sample suffered recurrent CHD events (89 hospitalisations and four deaths). There was no difference in CHD recurrence between men and women (44% v 47% respectively, $p = 0.61$, odds ratio (OR) 1.2, 95% confidence interval (CI) 0.66 to 2.04). Among men, the recurrence rate in low hostile men was 33%; high hostile men had a CHD recurrence rate of 54% ($p = 0.02$, OR 2.71, 95% CI 1.2 to 5.7). No difference existed in CHD recurrence rates between high and low hostile women (44% v 52%, respectively, $p = 0.51$, OR 0.81, 95% CI 0.33 to 1.97). Hazards analyses controlling for age, systolic blood pressure, diastolic blood pressure, total cholesterol to HDL ratio, low density lipoprotein (LDL), family CHD history, smoking, diabetes, BMI, alcohol, physical activity, and depression, detected a significant interaction term between sex and hostility for predicting CHD recurrence (Wald test 4.87, $p = 0.027$). We therefore conducted sex specific data analyses. High hostile men were more likely to experience CHD recurrence than low

Abbreviations: BMI, body mass index; CHD, coronary heart disease; HDL, high density lipoprotein; LDL, low density lipoprotein; NSHS95, Nova Scotia Health Survey 1995

hostile men (hazard ratio (HR) 2.03, 95% CI 1.07 to 3.84, $p = 0.03$) over four year follow up. In women, however, higher hostility scores did not confer additional risk for CHD recurrence (HR 0.69, 95% CI 0.30 to 1.60, $p = 0.39$). Prior studies that demonstrated adjusting for social support and economic status attenuated the association between hostility and CHD; we therefore replicated the hazards analyses, controlling for social support and education and similar results were found (fig 1). In men, high hostility, relative to low hostility, was associated with a doubling of risk for recurrent CHD events (HR 2.41, 95% CI 1.21 to 4.82, $p = 0.01$). There was no risk associated with high hostility in women (HR 0.82, 95% CI 0.34 to 1.97, $p = 0.65$).

DISCUSSION

Our findings challenge those of other studies. The heart and estrogen/progestin replacement study (HERS) hostility ancillary study⁵ found hostility predicted recurrent non-fatal myocardial infarction and CHD death in women. However, important differences exist between our participants and those in the HERS substudy. Women in our sample were community dwelling and selected randomly, whereas the HERS substudy subjects volunteered for a randomised controlled trial. Since hostility reflects cynicism and distrust, women volunteering for randomised controlled trials may not be representative of all women, especially hostile women. We cannot directly compare hostility scores from our sample to the HERS substudy because of modifications to the Cook Medley scale used in the latter investigation. Alternatively, our study may have been underpowered to detect an association between hostility and CHD in women. Even so, our data argue that hostility is a much stronger risk for CHD recurrence in men than women.

Our data have important limitations. Our results may have limited application since all participants were from Nova Scotia and overall mortality was comparatively low over a four year follow up. Outcomes were assessed using diagnostic coding, which may be limited in its accuracy. NSHS95 did not assess severity of CHD at baseline, which may influence CHD recurrences. It is possible that those with more severe CHD were more hostile but suffered more recurrent events because of their advanced CHD. This may raise the question of why more hostile men suffered more severe CHD, particularly since a hostile personality tends to form early and remain relatively constant from early adulthood.

Among a population based sample, hostile men, but not women, were more than twice as likely to suffer recurrent

CHD events. Hostility may have different consequences in men and women. The underlying mechanisms through which hostility engenders CHD recurrence are not known. Further studies are warranted to confirm our findings, to elucidate the effects of hostility in women, if any, and to determine if hostile patients may benefit from hostility management. Future mechanistic studies of the hostility-CHD association should be mindful of possible sex-specific effects.

ACKNOWLEDGEMENTS

This work was supported by the Heart and Stroke Foundation of New Brunswick; the National Health Research and Development Program of Canada; the Nova Scotia Department of Health; National Institutes of Health grants HL04458, HL76857, HL072866-01, and HC25197.

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Accepted 30 March 2005

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