Risk factors for coronary heart disease: a study in inner London

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SUMMARY. A survey was carried out among 281 men and women aged between 30 and 64 years randomly selected from five general practices located in the inner London borough of Tower Hamlets, to determine the prevalence of risk factors for coronary heart disease. Smoking and obesity were both more pronounced in Tower Hamlets than in comparable national studies: 51% of men and 44% of women were smokers and 57% of these were smoking 20 or more cigarettes per day. A body mass index of 30 or more was present in 18% of men and 10% of women and a body mass index of 25 or more in 71% of men and 49% of women. Two or more risk factors for coronary heart disease (smoking and/or hypertension and/or raised cholesterol levels) were present in 25% of men and 22% of women. For every person known by their general practitioner to have established cardiovascular disease, there were an additional two people also at risk on the basis of multiple risk factors. In this inner city population the prevalence of cardiovascular risk, for women as well as men, has major resource and organizational implications for primary care. A strategy for change requires action based on graded multiple risks for both men and women.

Keywords: coronary disease; coronary risk factors.

Introduction

THE relative risks of coronary heart disease associated with major risk factors such as smoking, cholesterol level and blood pressure are similar for women and men.[1] While absolute risks are lower for women than men, particularly at younger ages, coronary heart disease is the leading cause of death for both women and men over 45 years old in the United Kingdom (OPCS mortality statistics). Local and national studies have demonstrated the high prevalence of multiple risk factors for coronary heart disease in the UK.[2-5]

The inner London boroughs have historically been areas of high morbidity and mortality combined with low levels of preventive care, and the London borough of Tower Hamlets has one of the highest rankings for social deprivation in the country.[6,7] In Tower Hamlets, up to 30% of the population is non-white, 24% of men are unemployed and 44% of men and women are in social classes 4 and 5.[8] These factors contribute to the high cardiovascular mortality rate of the area. Standardized mortality ratios (where the standardized mortality ratio for England and Wales is 100) over the period 1985–89 in Tower Hamlets for men and women aged between 35 and 64 years were 121 and 134 respectively for acute myocardial infarction and 164 and 124 for hypertensive disease. The standardized mortality ratio for all cause mortality in the borough was 107 (North East Thames Regional Health Authority, unpublished data, 1990).

The Healthy East Enders Project was set up to promote organized prevention in general practice in Tower Hamlets.[9,10] As part of the project, it was decided to identify the centiles of risk distribution for coronary heart disease based on multiple risk factors, to help plan a strategy for action on the basis of graded risk. Action was to include more intensive intervention for those at highest risk (the top 15% of the risk distribution) as well as appropriate advice for those at lower risk, focusing on men and women aged between 30 and 64 years. The aim of the survey was, therefore, to examine the distribution of risk factors for coronary heart disease by age and sex and to compare the local distribution of risks with national surveys.

Method

The study, carried out between February and August 1989, was based in five general practices in Tower Hamlets, serving 13 000 patients within the 30–64 years age group. A health promotion nurse, trained in the prevention of coronary heart disease, was employed by each practice as part of the project.

In order to have a 95% confidence interval of 11% to 20% around the 15% of the population at the top of the risk factor distribution it was necessary to ensure that the final sample contained at least 300 people. As practice registers were known to be inflated by at least 15% and as it was assumed that response rates might be difficult to raise above 70%, 100 people aged between 30 and 64 years were selected from each of the registers of the five practices using random number tables (one practice only selected 99 people). After selection, addresses were checked against the medical records. If there was no record of consultation within the preceding year, the family practitioner committee was contacted to discover whether the patient was still registered with the practice. People found to be no longer registered were excluded. In addition, people were excluded from the survey if their general practitioner felt pre-existing medical or psychiatric conditions, such as terminal illness or psychosis, precluded their participation.

A letter of explanation (translated where necessary) invited those remaining in the sample to see the health promotion nurse on a specified date. A second appointment was sent to non-respondents. Non-respondents to the second letter were telephoned if possible. If no contact was made, a letter addressed to the occupier enquired if the person was still resident at the address. Where no response was received or doubt remained as to the continued residence or registration of the patient, a home visit was made and enquiries made at the address and immediate neighbours.

Consultations with the health promotion nurse lasted approximately 30 minutes. All nurses followed a standard protocol for the measurement of blood pressure. Blood pressure was measured using standard upright sphygmomanometers. The subject's right arm was used, the subject having been seated for at least five minutes before measurements were made. The diastolic pressure was determined at the fifth phase (disappearance of Korotkoff sounds) and all readings made to the nearest 2 mmHg. Two readings were taken at an interval of approximately

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20 minutes and the mean of the two used for analysis. Height was measured (the patients having removed their shoes) to the nearest centimetre, using a fixed rule with slide attachment. Weight was measured to the nearest 0.1 kg using digital scales in all but one practice which used newly calibrated lever arm scales. Non-fasting venous blood samples were taken and analysed for serum cholesterol level using an enzymic method in a quality controlled hospital laboratory. For 21 people serum cholesterol level had already been recorded using the same methods within the preceding year and for ethical reasons, this result was used. Data on smoking, family history of myocardial infarction in first degree relatives under 60 years old, past medical history of cardiovascular disease, (angina, drug treatment for hypertension or myocardial infarction) and diabetes were collected using a questionnaire administered by the nurse. Patients' medical records were checked for past medical history of cardiovascular disease and diabetes.

Body mass index was calculated (weight (kg)/height (m^2)) and people were considered to be overweight if their body mass index was 25 or over. Risk factors for coronary heart disease were also estimated, taking into account three factors: current smoking, serum cholesterol level of 6.5 mmol l^{-1} or more, and a systolic blood pressure of 160 mmHg or more and/or a diastolic blood pressure of 95 mmHg or more (World Health Organization definition of high blood pressure).[11] The results of this study were compared with those of comparable national studies.

Statistical methods used in analysis were multiple regression, analysis of variance and chi square tests, including tests for trend. The Mantel-Haenszel chi square test was used to compare prevalence, adjusting for stratifying variables.

Table 1. Smoking status, serum cholesterol level, body mass index and blood pressure: percentage of men and women, by age group.

	% of men		% of women	
	30–49 years (*n* = 79)	50–64 years (*n* = 49)	30–49 years (*n* = 97)	50–64 years (*n* = 56)
Smoking status				
Never smoked	30	10	34	30
Ex-smoker	18	41	23	25
Current smoker	52	49	43	45
Serum cholesterol level (mmol l^{-1})[a]				
<5.5	36	22	54	14
5.5–6.4	31	43	30	30
6.5–7.7	27	22	11	36
7.8+	5	12	4	20
Body mass index (kg/m^2)[b]				
<25	24	18	58	39
25–29	51	57	36	43
30+	14	24	6	18
Blood pressure (mmHg)[c]				
<160/95	95	65	90	79
160/95+	5	35	10	21

n = number of patients in age group. [a]Data missing for two men and one woman. [b]Data missing for one man and two women. [c]Data missing for one man.

Results

Of the 499 people randomly selected from the five practices, 10 were excluded by their general practitioners for medical or psychiatric reasons and 117 (23%) had moved away, died or were no longer registered. Of the remaining 372 eligible people, 75 declined or did not attend and 16 could not be contacted. Thus risk factors for coronary heart disease were ascertained on 281 people (128 men, 153 women), a response rate of 76%. Blood pressure was recorded for all but one person and serum cholesterol level for all but three people. The weights of one man in a wheelchair and two pregnant women were not recorded.

Thirty two per cent of those surveyed (89/281) had a family history of myocardial infarction. Half of these events (45/89) had occurred in relatives under 60 years old. Pre-existing cardiovascular disease or a personal history of diabetes was known to the general practitioner and recorded in the patient records in 11% of the survey population (17/128 men and 14/153 women).

Calculation of the mean body mass index, systolic and diastolic blood pressures and serum cholesterol levels for men and women by age group showed that for each variable there was a significant rise with age ($P<0.01$). Body mass index, cholesterol level and blood pressure were all positively associated with one another. Smoking status, cholesterol level, body mass index and blood pressure, by age and sex are shown in Table 1. Fifty one per cent of men and 44% of women were smokers. There were more ex-smokers and fewer who had never smoked among the older men compared with the younger men. No such pattern was seen for women. Younger women had lower serum cholesterol levels than younger men and older women had higher cholesterol levels than older men. Twenty per cent of older women and 12% of older men had a serum cholesterol level of 7.8 mmol l^{-1} or more. The test for interaction between age, sex and cholesterol level, using analysis of variance, was statistically significant ($P<0.001$). Blood pressure of 160/95 mmHg or more was present in 21 of the 127 men (17%) and 22 of the 153 women (14%).

Both men and women in Tower Hamlets were more likely to smoke and to smoke more heavily than those sampled in the 1988 general household survey.[12] In the general household survey 1301 men (15%) smoked 20 or more cigarettes per day compared with 38 men (30%) in Tower Hamlets, while 5211 (67%) were non-smokers compared with 63 (50%) in Tower Hamlets. The test for trend comparing differences in the two surveys was significant ($P<0.05$). In the general household survey, 1012 (10%) of women smoked 20 or more cigarettes per day, compared with 37 (24%) in Tower Hamlets, and 7085 (70%) were non-smokers compared with 86 (56%) in Tower Hamlets ($P<0.05$). The age structure of the general household survey was different from the age structure in this study, but by comparing the age groups 35–49 years, 50–59 years and 60+ years a significant difference in smoking prevalence was found (Mantel-Haenszel test for men, $P<0.01$ and women $P<0.01$).

A comparison of the body mass index of men aged between 40 and 59 years in the Tower Hamlets study and the British regional heart study[2] found a body mass index of 26.5 or more in 2661 men (34%) in the British regional heart study compared with 40 men (61%) in Tower Hamlets. The test for trend comparing differences in the body mass index categories in the two studies was significant ($P<0.01$). There was no significant difference in men's cholesterol levels between the two studies. The distribution of men's blood pressure differed in the two studies: mean systolic pressure in Tower Hamlets was 138 mmHg compared with 145 mmHg in the British regional heart study (chi square test for trend $P<0.01$) and mean diastolic pressures were 86 mmHg and 82 mmHg respectively (chi square test for trend $P<0.001$).

The percentages of men and women with one, two or three risk factors for coronary heart disease are shown in Table 2. The percentages of men and women with one or more risk factors were 69% and 63% respectively and for those with two or more

Table 2. Percentage of men and women with risk factors[a] for coronary heart disease, by age group.

Number of risk factors	% of men		% of women	
	30–49 years (*n* = 79)	50–64 years (*n* = 49)	30–49 years (*n* = 97)	50–64 years (*n* = 56)
0	*35*	*27*	*43*	*25*
1	*46*	*39*	*45*	*34*
2	*16*	*24*	*10*	*36*
3	*3*	*10*	*1*	*5*

[a]Risk factors: current smoker and/or cholesterol level of 6.5 mmol l^{-1} or more and/or blood pressure of 160/95 mmHg or more.

risk factors 25% and 22% respectively. Sixty per cent of the younger adults (106/176) and 74% of the older adults (78/105) had at least one risk factor for coronary heart disease. Almost one quarter of respondents (23%) had two or more risk factors. There were important age differences: two or more risk factors were present in 19% of men and 11% of women aged between 30 and 49 years and 35% of men and 41% of women aged between 50 and 64 years. Of these 65 people with two or more major risk factors, 56 were not known by their general practitioner to have pre-existing cardiovascular disease. Of those with a serum cholesterol level of 7.8 mmol l^{-1} or more, eight out of 15 women and three out of 10 men had one additional risk factor (smoking or hypertension) and three out of 15 women and four out of 10 men had both risk factors.

Discussion

This study confirms the high prevalence of risk factors for coronary heart disease among men and women in an inner London population. Sixty per cent of the younger adults and three quarters of older adults in Tower Hamlets had at least one easily identified risk factor for coronary heart disease. One quarter of adults had two or more risk factors and in the older age groups more than a third of the population (38%) had two or more risk factors. A greater prevalence of smoking and obesity was found among study subjects than in either the national British regional heart study (carried out 10 years earlier), the general household survey or in local surveys, such as the 'oxcheck' trial.[13]

Many of the respondents in this survey were overweight, especially men. A body mass index of 25 or more, was found in 71% of men, a higher prevalence than in other studies.[2-4] In Tower Hamlets, 51% of men and 44% of women were smokers. Of these, 58% of men and 55% of women were smoking 20 or more cigarettes per day, indicating a higher prevalence of heavy smokers than in other surveys.[2-4]

There were significant differences in the systolic and diastolic pressures found in this survey and in the British regional heart study.[2] While these may have been due to small numbers in the Tower Hamlets survey, the fact that the systolic blood pressure tended to be lower and the diastolic tended to be higher, suggests that the use of standard rather than random-zero sphygmomanometers may have contributed to systematic errors in measurement.

Cholesterol levels were similar to those found in the British regional heart study.[2] There was a high prevalence of high cholesterol levels among older women. A cholesterol level of 7.8mmol l^{-1} or more was present in 4% of women under 50 years and in 20% of those aged between 50 and 64 years. High cholesterol levels were more prevalent in older women than older men (56% of older women had a cholesterol level of 6.5 mmol l^{-1} or more compared with 34% of older men). Of those with a cholesterol level of 7.8 mmol l^{-1} or more, 44% had one additional risk factor and 28% had two additional risk factors. Raised serum cholesterol levels cannot be considered in isolation from other risk factors for coronary heart disease.

The survey identified two or more major risk factors for coronary heart disease in 23% of the study population. Eleven per cent of the people studied (31/281) were known by the general practitioner to have diabetes or pre-existing cardiovascular disease: angina, myocardial infarction or treated hypertension. Therefore, for every person known to have pre-existing cardiovascular disease there were an additional two people with two or more major risk factors who were also at high risk of coronary heart disease.

The results of the survey raise two important issues. First, there are considerable resource and workload implications if advice on cardiovascular risk is to be given to the whole population and more intensive advice and services are to be extended to those at high risk who are not already receiving care. The existing primary care workload in areas such as Tower Hamlets is already above average and services are stretched.[14] In the 'oxcheck' trial, the authors commented on the workload resulting from a high prevalence of risk factors.[13] Smoking among women in Tower Hamlets was almost twice as common as in the 'oxcheck' survey and among men was 50% greater. Obesity (body mass index greater than 30) was twice as common among men in Tower Hamlets than among men in the 'oxcheck' trial. These health needs, compounded by problems of health care delivery to a socially deprived and culturally diverse population, place major additional burdens upon providers in London's inner city and comparable areas. There is an urgent need to secure resources and to develop programmes that can accommodate the task of counselling whole populations (which may include several ethnic minorities and must include the economically and socially constrained who are at greatest risk) as well as giving more intensive and sustained advice or treatment to the individual based on graded risk. The issue is not whether to intervene, but how best to resource and organize primary care services to promote changes in lifestyle. The disparity between the magnitude of health needs and the paucity of organized provision is conspicuous in such inner city areas in London.

Secondly, there is a need to address the multifactorial nature of the problem. Advice and treatment need to be tailored to the risk profile and personal priorities of the individual. People's health is not simply a function of their serum cholesterol level, yet some existing guidelines tend to concentrate on this one factor.[15,16] Two scoring systems capable of identifying centiles of risk based on multiple risk factors are now available[17,18] and several bodies have produced recommendations on the management of multiple risks.[19-21] The Dundee risk score and ranking system,[22] together with the recommendations of the Coronary Prevention Group and British Heart Foundation,[23] should help resolve uncertainty among general practitioners about the definition of multiple risks among both men and women across a wide age range. It will allow agreed action to be based on age-specific centiles derived from multiple risks, endorsing both the population and individual approach in the form of appropriate responses to graded risk. The next task for primary care teams will be to translate this into culturally sensitive and personally appropriate advice or treatment, reconciling the social priorities of the individual with the risks that they face.

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