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Dietary habits after myocardial infarction – results from a cross-sectional study

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Objective. Comparing habitual nutrient intakes in persons with a history of acute myocardial infarction (AMI), and age-matched controls.
Design. Cross-sectional study.
Subjects. Men and women (525 cases and 1890 matched controls), aged 47–73 years, of the population-based Malmö Diet and Cancer cohort.
Methods. Nutrient intakes were assessed by a validated modified diet history method. Body fatness was assessed by bioimpedance analysis. Case ascertainment was provided by national and regional registries. Men and women were analysed separately. Median time since AMI was 5.5 years in men and 3.8 years in women. Cases reported lower energy intakes (EIs) than controls, despite having similar basal metabolic rates. After adjustment for total EI, both male and female cases had lower fat intake and higher intake of several micronutrients, such as ascorbic acid, folate, and vitamin E, than controls, the difference being largest in men. Most of the cases reporting dietary change quoted 'disease' as their main reason for change. They had lower EI and lower energy-adjusted intake of fat than other cases.
Conclusions. Survivors of AMI reported dietary habits more in line with current recommendations, particularly those who afterwards reported having changed their dietary habits. The possible bias introduced by social desirability is discussed.

Keywords: body composition, cross-sectional studies, diet, middle-aged, myocardial infarction/rehabilitation, nutrition.

Introduction

For at least four decades, diet has been believed to be causally associated with the occurrence of acute myocardial infarction (MI) [1]. Persons who survive their first MI and subsequently receive medical attention, are thus often advised to change their dietary habits [2]. These advice, however, may vary with time, place, and setting, and are often not followed up on. Little is thus known about the extent of this change. Further, evidence for a role of diet in secondary prevention has been scarce. However, it was recently shown that certain dietary habits may actually prevent further MIs [3, 4] and/or subsequent mortality [5]. It may therefore be of interest to study how an MI affects dietary habits. We here describe a cross-sectional study within the prospective Malmö Diet and Cancer (MDC) cohort, concerning dietary habits in persons with a history of verified MI, and matched controls.

Methods

Study population

The MDC study is set in Malmö, Sweden's third largest city [6]. The background population consisted of all men born between 1923 and 1945 and all women born between 1923 and 1950 who were living in Malmö during 1991–96 ($n = 74\ 138$). This population was identified through the Swedish national population registries. The final cohort consisted of 28 098 individuals (participation rate 40.8%). The subjects were recruited through advertisements in local media and through invitation by mail. The only exclusion criterion was inadequate

Swedish language skills [7, 8]. The Ethics Committee at Lund University approved the design of the MDC study.

Cases and controls

Subjects with a history of MI before baseline examination (cases) were identified from the national Hospital Discharge Register (Centre for Epidemiology, National Board of Health and Welfare, Stockholm). For each case, four controls (if possible) were selected, matched on sex, season of examination (spring, summer, autumn or winter), year of examination, and age (within one quarter of a year). If fewer than two controls satisfying these criteria were available, controls were assigned up to a total number of two, with the goal of as close a fit as possible in terms of season of dietary interview, year of dietary interview, and age (in falling order of priority). No controls with a different season from the case were assigned. The most relaxed matching was an age difference of 310 days and dietary interview performed in the same season, but 1 year earlier. However, 96% of the controls were matched according to the initial criteria. Of the 525 cases, 395 were assigned four controls, whilst another 50 received three controls, and 80 had two controls.

The median time since the first infarction was 5.5 years (range 0.2–21.5) in men and 3.8 years (range 0.3–20.1) in women. The median ages at first infarction were 57 and 58 years respectively.

Data collection

The study subjects visited the MDC study centre twice. At the first visit project staff provided information on the background and aim of the project, and detailed instructions about the dietary assessment and the other procedures of the study, including the lifestyle questionnaire. At the second visit, a dietary interview was performed (see below), and the lifestyle questionnaires were checked for incomplete answers.

Dietary assessment

The MDC dietary assessment method has been described previously. Briefly, it is a modified diet history method, which combines quantitative and semi-quantitative approaches and measures the entire diet, including cooking methods [9]. It consists of two parts: a 'menu book' for description of cooked meals and registration of cold beverages (including juices and alcoholic beverages) and dietary supplements during seven consecutive days; and a 168-item food questionnaire on regularly consumed foods during the past year. Data on the validity [10, 11] and reproducibility [12] of the method have been published. The correlations between dietary factors estimated by the MDC study method and the reference method (18 days of weighed food records, collected during the previous year) were similar to or better than those found in other validation studies of similar methods, performed in other populations [13].

In September 1994, the dietary assessment procedures were altered because of an unexpected reduction of funding of the MDC study. An evaluation of these changes has been published [14]; it was shown that the effects of the alterations were very small. However, no case–control pairs in the present study were matched across method versions.

Dietary variables

The dietary variables used in this study were mean daily intakes of energy (kcal), fat (g), carbohydrates (g), protein (g), alcohol (g), saturated fatty acids (SFA; g), mono-unsaturated fatty acids (MUFA; g), poly-unsaturated fatty acids (PUFA; g), the P : S-ratio (PUFA/SFA) and $\omega 6 : \omega 3$ ratio [which is the ratio between the following combinations of fatty acids: (20 : 4 + 18 : 2)/(20 : 5 + 22 : 5 + 22 : 6 + 18 : 3)], and percentage of nonalcohol energy (E%) derived from fat, carbohydrates, and protein. A number of micronutrients were also selected: mean daily intake of ascorbic acid (mg), dietary fibre (g), folate (μg), potassium (g), beta carotene (mg), magnesium (mg), selenium (μg), and vitamin E (TE).[1]

Smoking, alcohol, physical activity and dietary change

A structured multiple-choice questionnaire was used in the MDC study to collect information on sociodemographic factors, smoking status, alcohol habits, and several other factors. The agreement

[1]TE = Tocopherol equivalents. 1 TE corresponds to 1 mg *RRR*-α-tocopherol.

between the baseline questionnaire and the same questionnaire when repeated after 3 weeks was high for most variables (kappa statistics >0.75) [8].

The subjects defined themselves as being regular, occasional, former or never-smokers. In this study, we combined the regular and occasional smokers into a current smoker category. In some analyses, we also combined former and never-smokers into one nonsmoker category.

Alcohol intake (g day^{-1}) was assessed from the 7-day menu book registration [9, 11]. We also collapsed the information on alcohol consumption into a four-category variable. Subjects, who reported zero consumption in the menu book, and who indicated in the questionnaire that they had not consumed any alcohol during the previous 30 days, were categorized as zero consumers. The other subjects were categorized according to an assumption of biological risk [15]. Category ranges were, for men and women respectively, <20 g/<15 g (low), 20–40 g/15–30 g (medium), and >40 g/>30 g (high) alcohol per day.

Physical activity during leisure time was assessed by a list of 18 different activities in the questionnaire [16], which was adapted from the Minnesota Leisure Time Physical Activity Questionnaire [17]. The subjects were asked to fill in how many minutes per week they on the average were spending on the activity mentioned during each of the four seasons. These figures were all multiplied by an activity-specific factor. A physical activity score was obtained by computing the sum of all activity products. Four categories of physical activity status were identified by the subjects' quartile ranking (men and women separately).

Information on long-term stability of food habits was collected through a questionnaire item reading: 'Have you substantially changed your dietary habits because of illness or for some other reason?'.

Bioimpedance analysis

Bioimpedance analysis (BIA) was used for estimating body composition according to procedures provided by the manufacturer (BIA 103, RJL-systems, Detroit, MI, USA; single-frequency analyser), as described previously [18]. The algorithm used to estimate body fat weight from impedance was developed by Heitmann in a similar population to the present one [19]. Estimated body fat was used to calculate percentage body fat (%BF).

Assessment of misreporting of energy intake

The body composition data was used for estimation of basal metabolic rate (BMR), according to the equation of Garby *et al.* [20]. This was used in a calculation of the energy intake (EI)/BMR ratio. A very low or high ratio may indicate systematic error of the EI measurement [21]. Obesity, for example, is a known cause of differential misclassification in nutritional epidemiology [22, 23].

Statistical methods and design

We first described cases and the matched controls in terms of alcohol and smoking habits, education, leisure physical activity, and having changed dietary habits, according to the questionnaire item. We also analysed differences between cases and controls in anthropometric data and body composition. Differences were examined by conditional logistic regression.

Secondly, differences in intake of energy, fat, carbohydrates and protein, major groups of fatty acids, and selected micronutrients were estimated. These differences, too, were examined by conditional logistic regression.

Thirdly, cases were examined separately. They were divided in two groups based on history of having changed dietary habits. Intakes of the macronutrients fat, carbohydrates, protein, and alcohol were compared. These nonmatched analyses also included adjustment terms for EI, age, dietary methodology version and season, where applicable. Although the MDC method is designed to capture usual diet, some of its estimates may be influenced by season of participation, e.g. the vegetable or alcohol estimates.

In some analyses, the nutrient variables were adjusted for total EI (standard multivariate method) [24]. This procedure allows comparison of intakes independently of energy requirements, and also to some extent corrects for measurement errors [24, 25].

All dietary variables were Ln-transformed before use in statistical tests. Statistical tests resulting in $P \leq 0.05$ were considered statistically significant, except where otherwise noted. All statistical analyses were performed with SPSS for Windows, version 11.5 (SPSS Inc., Chicago, IL, USA).

Results

The average total EI was lower in cases than in controls, although the difference was statistically significant only in men (Table 1). Further, male cases had lower energy-adjusted intake of fat, and higher intakes of carbohydrate and protein. The pattern was similar but less pronounced in women. The energy-adjusted intakes of saturated (SFA) and MUFA were lower in cases than in controls, although the differences were not significant in the case of MUFA in women. The P : S ratio was significantly higher in both male and female cases. There were no significant differences in intake of $\omega 6$ or $\omega 3$ fatty acids, but the $\omega 6 : \omega 3$ ratio was higher in male cases than in male controls. There were no significant differences in alcohol consumption between cases and controls. When expressed as energy percentages, the differences in macronutrient intakes were similar to the energy-adjusted intakes, although the difference in fat intake was now significant in women. The EI/BMR ratio was shown to be higher in controls than in cases, particularly in men.

Percentage body fat, body mass index and waist circumference were all higher in cases than in controls, although the differences were only significant in men (Table 1). However, the calculated BMR was almost exactly the same in cases and controls.

After adjustment for EI, male cases had significantly higher intakes of most of the selected nutrients than had the controls, indicating higher dietary quality (Table 2). This pattern was far less pronounced in women.

A self-reported history of having changed dietary habits was considerably more common amongst cases than amongst controls. Sixty-three per cent of male cases and 66 per cent of female cases, as compared with 20% and 25% of controls, respectively, reported having changed dietary habits. Cases were more

Table 1 Anthropometric data and average daily intake of macronutrients in cases and controls. Matched *P* values are energy adjusted (standard multivariate, alcohol energy included) for all nutrients, except those for energy intake. Mean values are arithmetic

	Men			Women		
	Controls (n = 1485)	Cases (n = 420)	Matched *P* value	Controls (n = 405)	Cases (n = 105)	Matched *P* value
Daily dietary intake						
Energy (kcal)	2577 (655)	2281 (577)	<0.001	1938 (477)	1830 (460)	0.054
Nutrients						
Fat (g)	**111 (36)**	90 (32)	<0.001	**80 (27)**	73 (26)	0.20
Carbohydrates (g)	276 (82)	**255 (71)**	<0.001	217 (58)	**209 (55)**	0.17
Protein (g)	93 (24)	**88 (23)**	<0.001	75 (19)	**73 (17)**	0.090
Alcohol (g)	14 (15)	**13 (13)**	0.67	**7 (8)**	6 (7)	0.26
SFA (g)	**48 (19)**	37 (15)	<0.001	**35 (14)**	30 (14)	0.009
MUFA (g)	**39 (12)**	32 (11)	<0.001	**27 (9)**	26 (9)	0.90
PUFA (g)	17 (6)	**16 (6)**	0.25	12 (5)	**12 (4)**	0.11
P : S ratio	0.39 (0.14)	**0.45 (0.15)**	<0.001	0.38 (0.14)	**0.42 (0.14)**	0.004
$\omega 6$ fatty acids (g)	13.9 (5.4)	**12.5 (4.9)**	0.29	9.9 (4.7)	**9.6 (3.5)**	0.14
$\omega 3$ fatty acids (g)	**2.8 (1.1)**	2.5 (1.1)	0.39	2.1 (0.8)	**2.1 (0.8)**	0.20
$\omega 6 : \omega 3$ ratio	5.1 (1.6)	**5.3 (1.7)**	0.024	4.9 (1.8)	**4.9 (1.7)**	1.00
Fat (E%)	40.0 (6.2)	36.9 (6.3)	<0.001	37.8 (6.1)	36.4 (6.1)	0.043
Carbohydrate (E%)	44.7 (6.1)	46.9 (6.2)	<0.001	46.2 (5.9)	47.0 (5.9)	0.21
Protein (E%)	15.3 (2.4)	16.2 (2.6)	<0.001	16.1 (2.7)	16.6 (2.6)	0.061
Anthropometrics						
BF%	33.3 (5.2)	34.4 (4.5)	<0.001	29.7 (6.6)	30.5 (6.7)	0.38
BMI	26.3 (3.5)	27.1 (3.3)	<0.001	26.0 (4.4)	26.6 (5.1)	0.22
Waist circumference (cm)	93.9 (10.2)	96.1 (10.7)	<0.001	79.5 (10.8)	81.8 (13.0)	0.06
BMR (kcal)	1681 (183)	1681 (188)	1.00	1468 (186)	1465 (203)	1.00
Energy intake/BMR ratio	1.55 (0.41)	1.37 (0.36)	<0.001	1.34 (0.38)	1.26 (0.35)	0.08

Values are presented as mean (SD). Figures in bold were the highest in the case–control comparisons after energy adjustment. The energy percentages were calculated from nonalcohol-derived energy. SFA, saturated fatty acids; MUFA, mono-unsaturated fatty acids; PUFA, polyunsaturated fatty acids; E%, energy percentage; BF%, percentage body fat; BMR, basal metabolic rate.

Table 2 Average daily intake of micronutrients in cases and controls. Matched *P* values are unadjusted, whilst the matched and adjusted values are energy adjusted (standard multivariate method, alcohol energy included). Mean values are arithmetic

	Men		*P*-value		Women		*P*-value	
Daily dietary intake	Controls ($n = 1485$)	Cases ($n = 420$)	Matched	Matched and adjusted	Controls ($n = 405$)	Cases ($n = 105$)	Matched	Matched and adjusted
Ascorbic acid (mg)	95 (58)	**98 (63)**	0.86	0.002	110 (57)	**108 (56)**	0.75	0.82
Fibre (g)	21.5 (8.0)	**20.7 (7.5)**	0.056	<0.001	**19.1 (6.3)**	18.4 (6.3)	0.20	0.80
Folate (μg)	255 (87)	**240 (78)**	0.001	0.006	228 (71)	**220 (70)**	0.27	0.95
Potassium (g)	3.6 (0.9)	**3.4 (0.9)**	0.006	<0.001	3.1 (0.8)	**3.1 (0.8)**	0.91	0.097
Beta carotene (mg)	3.1 (2.8)	**3.2 (3.0)**	0.52	0.027	**3.8 (3.1)**	3.6 (2.8)	0.50	0.69
Magnesium (mg)	378 (96)	**359 (88)**	<0.001	<0.001	314 (76)	**306 (78)**	0.34	0.39
Selenium (μg)	42 (15)	**39 (14)**	<0.001	0.23	34 (11)	**36 (13)**	0.32	0.026
Vitamin E (TE)	9.9 (3.9)	**9.3 (3.4)**	0.001	0.007	8.3 (3.8)	**8.2 (3.2)**	0.60	0.34

Values are presented as mean (SD). Figures in bold were the highest in the case–control comparisons after energy adjustment. TE, tocopherol equivalents; 1 TE corresponds to 1 mg *RRR*-α-tocopherol.

highly educated than matched controls (data not shown). There were no statistically significant differences between cases and controls in terms of categories of alcohol consumption (data not shown). However, the proportion of current smokers were significantly higher amongst female cases than amongst female controls (32.4% vs. 21.2%, $P = 0.020$), whilst it was lower amongst male cases than amongst male controls (19.3% vs. 26.1%, $P = 0.005$). There were no significant differences in degree of physical activity during leisure time (data not shown).

Table 3 shows the major causes of dietary change in those who reported dietary change. In participants with a history of MI, the predominant reason given was disease, whilst in noncases, the reasons were more varied, although health-related concerns were most common.

As mentioned previously, the further analyses were limited to cases only. EI was lower in subjects who had changed diet; the difference was largest in women (Table 4). In the comparison of energy-adjusted macronutrient intake, male subjects with altered diet had lower relative fat intake and higher relative carbohydrate and protein intake, whilst there were no significant differences in alcohol intake. The pattern was similar, but weaker, in women.

Those who had not changed diet tended to be both more obese and larger overall than those who had changed diet. In combination with lower reported EIs, this meant that the EI/BMR ratios were smaller in those who had changed their diet, particularly in women.

Discussion

In this study, cases, particularly those with a history of changed habits, reported dietary habits more in line with current recommendations. It is likely, although not entirely certain, that cases who changed diet, did this because of their MI. Most

Table 3 Major causes of dietary change in participants with and without a history of myocardial infarction

	Male noncases ($n = 272$)	Male cases ($n = 240$)	Female noncases ($n = 86$)	Female cases ($n = 61$)
Disease	90 (33.1)	193 (80.4)	28 (32.6)	55 (90.2)
Medical examination	39 (14.3)	13 (5.4)	6 (7.0)	1 (1.6)
Health check-up	47 (17.3)	7 (2.9)	8 (9.3)	1 (1.6)
Diet/health information	32 (11.8)	9 (3.8)	15 (17.4)	2 (3.3)
Dietician's advice	15 (5.5)	4 (1.7)	4 (4.7)	0
Changed working conditions	5 (1.8)	1 (0.4)	0	1 (1.6)
Changed living conditions	11 (4.0)	7 (2.9)	8 (9.3)	0
Family member	13 (4.8)	3 (1.3)	6 (7.0)	0
Other cause	20 (7.4)	3 (1.3)	11 (12.8)	1 (1.6)

Values are presented as *n* (%).

Table 4 Anthropometric data, average daily intakes of energy and macronutrients, and BMRs, in male and female subjects of the Malmö Diet and Cancer cohort with a history of myocardial infarction

	Men			Women		
	Unchanged dietary habits (*n* = 156)	Changed dietary habits (*n* = 264)	Adj. *P* value	Unchanged dietary habits (*n* = 35)	Changed dietary habits (*n* = 69)	Adj. *P* value
Daily dietary intake						
Energy (kcal)	**2366 (616)**	2232 (547)	0.033	**2080 (568)**	1699 (334)	0.001
Nutrients						
Fat (g)	**100 (36)**	85 (27)	<0.001	**88 (35)**	65 (16)	0.16
Carbohydrate (g)	254 (67)	**256 (73)**	<0.001	231 (58)	**198 (50)**	0.40
Protein (g)	88 (24)	**87 (22)**	0.007	77 (19)	**71 (16)**	0.017
Alcohol (g)	**13 (12)**	13 (14)	0.31	**7 (8)**	5 (6)	0.74
Fat E%	**39.2 (6.3)**	35.5 (6.0)	<0.001	**38.4 (5.9)**	35.3 (6.0)	0.026
Carbohydrate (E%)	45.2 (6.0)	**47.9 (6.2)**	<0.001	**46.2 (5.4)**	47.4 (6.1)	0.38
Protein (E%)	15.7 (2.3)	**16.6 (2.7)**	0.001	**15.4 (2.4)**	17.3 (2.5)	0.001
Anthropometric data						
BF%	**34.7 (4.9)**	34.3 (4.3)	0.40	**31.8 (6.7)**	29.7 (6.6)	0.18
BMI	**27.4 (3.6)**	26.9 (3.1)	0.09	**27.9 (6.0)**	25.8 (4.3)	0.07
Waist (cm)	**97.8 (12.5)**	95.1 (9.4)	0.011	**83.7 (14.1)**	80.6 (12.3)	0.30
Calculated BMR (kcal)	**1702 (202)**	1669 (178)	0.034	**1516 (247)**	1436 (173)	0.052
Energy intake/BMR ratio	1.40 (0.38)	1.35 (0.35)	0.15	1.39 (0.43)	1.20 (0.29)	0.045

Values are presented as mean (SD). Figures in bold were the highest in the inter-group comparisons after adjustment for age, energy intake (fat, carbohydrate, protein and alcohol only), dietary method version and season (dietary variables only). E%, energy percentage; BF%, percentage body fat; BMR, basal metabolic rate.

changers with an MI history reported disease as the major cause of their change (Table 3), and three-fourths of these men, and two-thirds of these women, reported having changed diet within 1 year of their first MI (data not shown).

The substantially lower EI in cases, compared with controls, is compatible with the idea that cases do have lower EI, in spite of having similar BMR to controls, being more obese than controls, and in spite of us not detecting any relevant differences in physical activity. This could be explained by cases being more weight-stable than the controls. For example, the average control may be slowly gaining weight [26]. It is also possible that more cases than controls (or cases who had changed their diet, as opposed to nonchangers) were actively trying to lose weight. However, all participants were told at the first visit to the MDC study centre that those who currently were trying to lose weight should wait until their dietary habits had been stable for at least 6 months, before participating.

Another possibility is undetected differences in physical activity between groups. The MDC adaptation of the Minnesota method [17] only covers leisure time, and has not been properly validated. However, an internal control (telephone interviews) of the approximately 450 MDC subjects reporting the highest activity levels indicated that at least those figures were highly valid [27].

Several EI/BMR ratios in this study were low; indeed, some of them were lower than is normally considered compatible even with a sedentary lifestyle, or weight stability [21]. It is thus, for example, possible that cases may be under-reporting their EI to a larger extent than controls (Table 1). The same could be true of cases who have changed dietary habits compared with cases who have not (Table 4). It is well established that obese persons are more prone to under-reporting EI than normal-weight persons [22]. Thus, selective under-reporting is probably present in the present population, as well as in most others. However, adjustment for body fatness hardly changed the results of Table 1 at all (data not shown). Further, the female diet changers, whose EI/BMR ratio was particularly low, were less obese than the nonchangers. This might indicate that obesity-related misreporting is not a major problem in this study.

An influence of 'social desirability', which in this case would manifest itself through a tendency to report dietary habits perceived as being 'healthy', is a possibility that cannot be entirely ruled out. If present, this tendency might be stronger amongst cases than amongst controls. Even though there was little formal nutrition education of MI patients in Malmö during the period covered by these data, most MI patients would probably have been aware of recommended diets through television, lay press, etc. Whatever the cause, a selective under-reporting of fatty and sweet foods with low nutrient density will artificially increase energy-adjusted estimates of nutrient intakes.

It is conceivable that the low measured EIs represents an inherent flaw in the MDC method, although this, obviously, does not explain the differences between cases and controls. The validation studies indicated that the method tended to overestimate EI compared with the reference method [11]. However, diet records, which was the reference method of the MDC method, tend to reduce true intake, at least of certain food groups, resulting in factual under-reporting [28]. Further, even if diet is not altered, it may be cumbersome to report everything eaten, which also may lead to under-reporting when using dietary records. A true understanding of measurement error in nutritional epidemiology can only be achieved by incorporating data from large-scale application of valid biomarkers of dietary intake and energy expenditure into traditional studies of dietary intake. Such data are still scarce, due to a combination of lack of valid markers and prohibitive costs, but progress is being made [29].

To our knowledge, few similar studies have been published previously. Karvetti performed a controlled trial of a nutrition education programme in male post-MI patients [30]. Interestingly, she observed lasting dietary changes up to 2 years after MI not only in the intervention group, but also in the control group. For example, the control group lowered their EI by 27% on average, with the energy percentage derived from fat decreased from 40 to 36. Nutrition education led to more marked changes. Kris-Etherton *et al.* [31] evaluated the effects of routinely given dietary advice to MI patients. The researchers concentrated on consumption of certain foods and on certain food preparation techniques. They found that although patients lowered their consumption of eggs, whole milk, high-fat meat and butter, it was easier to make patients change food preparation techniques rather than dietary habits. Thus, less fried food was eaten, meats were trimmed off fat, skins were removed from poultry, and sauces and casseroles were made with fewer 'restricted items', according to the so-called 'prudent diet' of the time. Although the present study differs substantially from these earlier studies methodologically, it supports the view that patients surviving an MI tend to adopt dietary habits currently believed to be health promoting.

It should be noted that the present study population was recruited from a 'healthy cohort', although it has been shown that the MDC cohort appears to be representative of at least 75% of its background population in terms of key variables such as smoking, alcohol habits and body fatness [7]. The cases, who survived their first MI in relatively good shape, may be a particularly selected group. For example, persons with low education are known to have higher case fatality rates for MI [32]. This might, at least partly, explain the higher level of education amongst cases compared with controls. It is unclear, however, how an entirely representative sample would have influenced the results.

An interesting feature of the present study is that our estimations show that female cases appear to be less different from their controls than are male cases – the relative differences in average values are most often smaller in women. This may be more than an effect of lower statistical power. One explanation is that the women were more health conscious than the men to begin with; therefore change was more difficult to achieve in women. This is partly contradicted by the finding that women of this population are worse than the men at quitting smoking. Fifty-nine per cent of the ever-smokers amongst female cases were ex-smokers at the MDC examination, whilst the corresponding figure in male cases was 77% ($P = 0.001$ by Fisher's exact test; data not shown). This result is in line with much previous research; the causes are largely unknown, although psychological and psychosocial factors, such as weak partner support and fear of weight gain, may be involved [33, 34].

Conclusion

This study shows that middle-aged citizens of Malmö (Sweden) who have survived a MI report dietary habits more in line with current recommendations than matched controls. The differences are larger in men than in women. In MI survivors, the difference in dietary habits between those who report having changed dietary habits and those who do not, is somewhat larger in women. The data should, however, be interpreted with caution, due to the possibility of misreporting on the grounds of social desirability.

Conflict of interest statement

No conflict of interest was declared.

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