SHORT REPORT

Milk, dairy products, and coronary heart disease

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Milk has been considered a risk factor for atherosclerosis and coronary heart disease (CHD) because of its content in cholesterol, saturated fatty acids, and possibly lactose. However, epidemiological data are scanty and inconclusive. A Scottish prospective study found a relative risk of 0.92 for CHD in men with higher milk intake, and the preliminary analyses of the Caerphilly study found a protective association.[1] No significant relation with CHD was found in other prospective studies, including the British Regional Heart study conducted in men (relative risk, RR, 0.88 for drinkers compared with non-drinkers),[2] a British study on vegetarians (increased risk in high milk consumers and reduced in moderate consumers),[3] and the Iowa study in postmenopausal women (RR 0.94 for the highest tertile of intake compared with the lowest),[4] although absolute numbers of events were limited. An Italian case-control study of acute myocardial infarction (AMI) in women found an odds ratio (OR) of 0.9 for the highest tertile of milk consumption.[5]

Data in various populations with different diet, baseline risk, and perhaps different confounding factors are useful.

We have analysed the effect of milk consumption on non-fatal AMI risk in a new case-control study conducted in Italy, based on a detailed and validated food frequency questionnaire.[6]

METHODS

The data derive from a case-control study of non-fatal AMI, conducted between 1995–1999 in the greater Milan, Italy. Cases were 507 patients, 378 men and 129 women (median age 61, range 25–79 years) with a first episode of non-fatal AMI, admitted to a network of general hospitals in the area. Controls were 478 patients, 297 men and 181 women (median age 59, range 25–79 years), admitted to the same hospitals for acute conditions unrelated to known or likely AMI risk factors (34% traumas, 30% non-traumatic orthopaedic disorders, 14%

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Abbreviations: CHD, coronary heart disease; RR, relative risk; AMI, acute myocardial infarction

Table 1 Distribution of 507 cases of acute myocardial infarction (AMI) and 478 controls, and corresponding odds ratios (OR) with 95% confidence intervals (CI), according to various measures of milk and diary product intake. Italy, 1995–99

	AMI	Controls	OR (95% CI)*
Total milk (cups/week)†			
0	136	116	1‡
>0 to 6	159	139	0.91 (0.62 to 1.34)
≥7	211	223	0.78 (0.54 to 1.12)
χ^2 trend			1.88 (p=0.170)
Whole milk (cups/week)†			
0	330	297	1‡
>0 to 6	117	115	0.92 (0.65 to 1.30)
≥7	59	66	0.89 (0.57 to 1.38)
χ^2 trend			0.41 (p=0.522)
Semiskimmed milk (cups/week)			
0	257	236	1‡
>0 to 6	105	90	0.97 (0.67 to 1.42)
≥7	145	152	0.83 (0.59 to 1.16)
χ^2 trend			1.09 (p=0.296)
Yoghurt (portions/week)			
0	322	260	1‡
>0 to 6	151	166	0.76 (0.55 to 1.05)
≥7	34	52	0.55 (0.32 to 0.95)
χ^2 trend			5.91 (p=0.015)
Cheese (g/week)			
<200	206	161	1‡
200 to 349	170	177	0.82 (0.59 to 1.14)
≥350	131	140	0.77 (0.54 to 1.11)
χ^2 trend			2.04 (p=0.153)
Calcium (mg/day)			
<800	183	150	1‡
800 to <1000	121	115	0.88 (0.59 to 1.31)
≥1000	203	213	0.72 (0.49 to 1.07)
χ^2 trend			2.66 (p=0.103)

*Estimates from multiple logistic regression models including terms for age, sex, education, body mass index, serum cholesterol, smoking, coffee, alcohol, vegetables, fruit, meat, calorie intake, physical activity, hyperlipidaemia, diabetes, hypertension, and family history of AMI in first degree relatives; †the sum does not add up to the total because of some missing values; ‡reference category.

surgical conditions, 22% miscellaneous other diseases). Less than 5% of cases and controls refused interview.

Interviews were conducted in hospital using a structured questionnaire, including information on sociodemographic factors, anthropometric variables, lifelong tobacco and alcohol intake, other lifestyle habits, medical history, physical activity, and family history of AMI.

Information on diet was based on a validated food frequency section,[6] including 78 foods or food groups. Information on milk and dairy products included weekly frequency of consumption and portion size of whole, semi-skimmed, and skimmed milk (one cup=225 ml); cappuccino (40 ml); yoghurt (125 g); mozzarella and ricotta (fresh cheese, 100 g), and all other cheeses (80 g). Calcium and total energy intake were computed using an Italian food composition database.

Data analysis
Odds ratios (OR) of AMI, and the corresponding 95% confidence intervals (CI), were derived using unconditional multiple logistic regression, including terms for age, sex, calorie intake, and selected confounding factors (see the table 1).

RESULTS
Compared with non-drinkers (drinkers of <1 cup/month) of any kind of milk, drinkers of ≥7 cups/week had a multivariate OR of AMI of 0.78 (table 1); the corresponding OR were 0.89 and 0.83 for whole and skimmed milk respectively. The OR was 0.55 for an intake of ≥7 cups/week of yoghurt, with a significant inverse trend in risk, and 0.77 for the highest level of cheese consumption ≥350 g/week. Compared with subjects with an intake of <800 mg/day of calcium, those with an intake of ≥1000 mg had an OR of 0.72.

CONCLUSIONS
Our results confirm that the intake of milk and cheese, and consequently of calcium does not increase the risk of non-fatal AMI in this Italian population, characterised by comparably low consumption of milk (average intake was 137 ml/day among cases and 148 ml/week among controls), but high intake of cheese (average intake was 36.4 g/day among cases and 40.0 g/day among controls).

Cases and controls came from the same geographical area, participation was almost complete, and only patients admitted to hospital for a wide spectrum of acute conditions were included as controls. The food frequency questionnaire was satisfactorily valid and reproducible. The potential confounding of several covariates, including social class status, tobacco, alcohol and coffee drinking, and calorie intake, was allowed for in the analysis, but did not modify the risk estimates, as the age and sex adjusted OR was 0.78 (95% CI 0.58 to 1.08) for drinkers of ≥7 cups/week compared with non-drinkers.

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