Is Higher Dairy Consumption Associated with Lower Body Weight and Fewer Metabolic Disturbances? The Hoorn Study

**OBJECTIVE**
To evaluate the relationship between dairy intake and body weight as well as the components of the metabolic syndrome.

**STUDY DETAILS**
- A cross-sectional analysis of 1896 subjects (852 men, 1044 women) aged 50 to 75 years who were part of the Hoorn Study of glucose tolerance
- Measurements included: weight, height, body mass index (BMI), waist circumference, blood pressure (BP), fasting glucose and insulin concentrations, and serum lipid-lipoprotein profile
- Metabolic syndrome was defined according to the National Cholesterol Education Program criteria as the presence of ≥ 3 of the following 5 components: elevated fasting glucose (≥ 6.1 mmol/l), elevated triglycerides (TG) (≥ 1.7 mmol/l), low HDL (< 1.0 mmol/l in men or < 1.3 mmol/l in women), high BP (≥ 130/85 mmHg) and abdominal obesity (waist ≥ 102 cm in men or ≥ 88 cm in women)
- Lifestyle factors (including smoking status, exercise level, alcohol consumption, income and education level) were assessed via self-administered questionnaire verified by a personal interview
- A 92-item semi-quantitative food-frequency questionnaire was used to assess average food and nutrient intakes, including calcium and fibre
- Consumption of dairy products was carefully screened, even taking into account seasonal variations in consumption

• 1 serving was defined as 150 g for liquids and 20 g for solids
• total dairy consumption was categorized as low fat (≤ 2%) or high fat (> 2%)
• dairy desserts included yogourt, curds and custard
• milk and yogourt included low-fat, skim and whole varieties

- A linear regression model was used to examine linear trends in baseline characteristics across the quartiles of total dairy consumption
- Logistic regression analyses were performed to investigate the association between dairy consumption and the individual components of the metabolic syndrome
- Exclusion criteria: subjects who had missing data for dietary intake, BMI, waist circumference, systolic or diastolic BP, HDL or LDL cholesterol, TG, fasting glucose, physical activity, smoking status, income level, or educational level

**KEY FINDING**
Higher dairy consumption was not significantly associated with weight or the components of the metabolic syndrome, except for a significant trend with lower BP and lower TG concentrations.

**RESULTS**
- The median consumption of total dairy products was 4.1 servings/day (interquartile range: 2.9 to 5.6)
  - median daily consumption was milk: 0.7 servings yogourt: 0.5 servings cheese: 1.2 servings dairy desserts: 0.9 servings
Weighing The Evidence: What Is The Role of Milk Products in Healthy Weights?

- Higher consumption of dairy products was significantly associated with higher intakes of total energy, fibre, saturated fat, protein and carbohydrate, lower intake of polyunsaturated fat and higher sports activity and reduced smoking status.
- After adjustment for age and sex, total dairy consumption was modestly inversely associated with systolic and diastolic BP and with TG concentrations but not with BMI or other components of the metabolic syndrome.
- When high-fat and low-fat dairy products were separated:
  - high-fat dairy was significantly inversely associated with BMI, waist circumference, TG, and insulin and positively associated with HDL concentrations, after adjustment for confounders; however, the significance disappeared after additional adjustment for BMI.
  - low-fat dairy was significantly positively associated with BMI, waist circumference and fasting glucose concentrations.
- Cheese consumption was positively associated with BMI.
- Total dairy consumption was not associated with the presence of the metabolic syndrome, after adjustment for potential confounders.
- Higher intakes of most dairy products were associated with lower systolic and diastolic BP.

<table>
<thead>
<tr>
<th>Associations between dairy consumption with weight and metabolic variables after adjustment for potential confounders*</th>
<th>Total dairy</th>
<th>High-fat dairy</th>
<th>Low-fat dairy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β ± SE</td>
<td>p value</td>
<td>β ± SE</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>0.06 ± 0.04</td>
<td>0.17</td>
<td>−0.11 ± 0.06</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>0.07 ± 0.11</td>
<td>0.51</td>
<td>−0.39 ± 0.16</td>
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<tr>
<td>Systolic BP (mmHg)</td>
<td>−0.23 ± 0.22</td>
<td>0.29</td>
<td>−0.37 ± 0.31</td>
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<tr>
<td>Diastolic BP (mmHg)</td>
<td>−0.31 ± 0.12</td>
<td>0.01</td>
<td>−0.28 ± 0.17</td>
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<tr>
<td>LDL (mmol/l)</td>
<td>−0.02 ± 0.01</td>
<td>0.17</td>
<td>−0.02 ± 0.02</td>
</tr>
<tr>
<td>HDL (mmol/l)</td>
<td>0.00 ± 0.00</td>
<td>0.94</td>
<td>−0.01 ± 0.00</td>
</tr>
<tr>
<td>Triglycerides (mmol/l)</td>
<td>−0.00 ± 0.01</td>
<td>0.69</td>
<td>−0.02 ± 0.01</td>
</tr>
<tr>
<td>Fasting glucose (mmol/l)</td>
<td>0.04 ± 0.02</td>
<td>0.01</td>
<td>0.01 ± 0.02</td>
</tr>
<tr>
<td>Fasting insulin (mmol/l)</td>
<td>−0.22 ± 0.61</td>
<td>0.71</td>
<td>−1.81 ± 0.85</td>
</tr>
</tbody>
</table>

* All values are per serving/day
† Adjusted for age, sex, total energy intake, fibre intake, level of physical activity, alcohol intake, smoking status, income, educational level and use of antihypertensive agents

SE: standard error

Adapted from Snijder et al. 2007