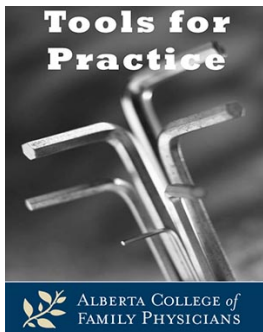


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## Chocolate: Can anything this tasty be good for us?

**Clinical Question: Is chocolate consumption linked to health concerns like cardiovascular disease?**

**Bottom-line: Chocolate consumption is associated with no change or a small reduction in cardiovascular disease in cohort studies. Evidence is too weak to recommend chocolate consumption for health benefits. Surrogate marker changes are minimal and perhaps unreliable. Chocolate likely increases acne lesions in susceptible individuals.**

### Evidence:

- Six systematic reviews:<sup>1-6</sup> Each with 5-9 observational studies (mostly prospective cohort) and 75,408-157,809 adults. Comparing highest chocolate consumption versus little to no consumption, after 8-16 years:
  - Cardiovascular disease: Relative Risk (RR) 0.63 (95% Confidence Interval (CI), 0.44-0.90).<sup>1</sup>
  - Myocardial infarction and angina: RR 0.90 (95% CI, 0.82-0.97).<sup>3</sup>
  - Stroke: RR 0.81 (95% CI, 0.73-0.90).<sup>4</sup>
  - Heart failure (admission or death): RR 0.81 (95% CI, 0.66-1.01).<sup>5</sup>
  - Issues: Overall mortality not reported, individual study results varied considerably,<sup>1,2,5</sup> and poor assessment of potential bias.<sup>2-6</sup>
    - Non-randomized so imbalanced groups: Chocolate eaters generally younger, lower BMI, active, etcetera (healthy).<sup>2,4,5</sup> Although researchers adjust for these factors, it is suboptimal.
    - Unclear if dark or milk chocolate<sup>1-5</sup> but possibly ~90% milk.<sup>4</sup>
    - Consumption measurement varied considerably but 'highest' often >50 grams/week or ≥1-2 servings/week.<sup>1-5</sup>
- Cardiovascular risk factors:
  - Blood pressure (BP): Three systematic reviews (10-20 Randomized Controlled Trials (RCTs), 297-856 patients).<sup>7-9</sup>
    - Statistically significantly reduced 2.8-4.5 mmHg systolic and 2.0-2.7 mmHg diastolic.<sup>7-9</sup>
    - Blood pressure reductions less if normotensive, studied longer or if comparator included cocoa product (example, dark versus milk chocolate).<sup>7</sup>
  - Lipids: Two systematic reviews (8-10 RCTs, 215-320 patients).<sup>10,11</sup>

- LDL reduced 0.15 mmol/L but other lipid parameters not statistically different.
  - Issues: Short-term studies (mean 4.4 weeks),<sup>7</sup> study BP results varied considerably.<sup>7</sup>
- Adverse events: Chocolate 5% versus 1% (gastrointestinal, bad taste, headache, jitteriness but numbers small).<sup>7</sup>

**Context:**

- Dark chocolate is 50-85% cocoa and milk chocolate is 20-30%.<sup>7</sup>
  - Cocoa contains flavanols: A proposed but unproven source of health benefits.
- Other health issues:
  - Depression: Not clinically assessed.<sup>12</sup>
  - Migraine: No reliable association.<sup>13</sup>
  - Acne: Two RCTs (13 and 54 acne patients): Increase of 4-5 lesions 2-3 days after chocolate ingestion.<sup>14,15</sup>
- Observational studies suggest chocolate consumption associated with lower risk of being overweight/obese, albeit likely confounding bias.<sup>16</sup>

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