

Evidence summary Title:

Dietary advice for reducing cardiovascular risk: Evidence and implications for public health

Review Quality Rating: 8 (strong)

Review on which this evidence summary is based:

Brunner, E.J., Rees, K., Ward, K., Burke, M., Thorogood, M. (2007). **Dietary advice for reducing cardiovascular risk.** *Cochrane Database of Systematic Reviews*, Issue 4. Art. No.: CD002128. DOI: 10.1002/14651858.CD002128.pub3.

The Cochrane review that this evidence summary is based on has been updated. This evidence summary summarizes the above-cited version of this review, not the updated version. An updated evidence summary will be provided as soon as possible.

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This is an evidence summary written to condense the work of the authors of this systematic review, referenced above. The intent of this summary is to provide an overview of the findings and implications of the full review. For more information on individual studies included in the review, please see the review itself.

Review content summary

This is a systematic review with meta-analysis of 38 randomized controlled trials (RCT) or quasi-randomised trials (17,871 participants/clusters randomized) aimed to determine the effectiveness of dietary advice for obtaining sustained desirable dietary changes or improving cardiovascular risk profiles among healthy adults. Participants studied were: healthy community-dwelling adults aged 18 years or older. To be included, studies were: trials involving dietary advice designed to reduce chronic disease risk and had at least three months of follow-up from recruitment. Trials were excluded if there was greater than 20% drop out, involved children, focused on weight reduction, or used dietary supplements. Interventions described in this review included: advice delivered by peers or health professionals by one-to-one contact, group sessions, and written materials. Primary outcomes measured include: a) cardiovascular risk factors (resting blood pressure, blood lipids and lipoproteins (cholesterol), and blood or red cell folate and/or homocysteine); b) bio-markers of dietary intake such as urinary sodium, urinary potassium; and c) blood diet-derived antioxidants such as β -carotene. Secondary outcomes included: self-reported measures of dietary intake, including fat, fat fractions, dietary fibre, fish, fruit and vegetables, vitamin C (ascorbic acid), vitamin E (tocopherols), carotenoids, flavonoids, and folic acid. Authors report that dietary advice promoted modestly beneficial changes in dietary intake (lower fat consumption, and more fibre, fruit and vegetables) and improvements in some cardiovascular risk factors (blood pressure, total cholesterol, low density lipoprotein cholesterol) over nine months.

Comments on this review's methodology

This is a methodologically strong systematic review. A focused clinical question was clearly identified. Appropriate inclusion criteria were used to guide the search. A comprehensive search was not employed using only health databases, reviewing reference lists, and contacting key informants, but no mention was made of searching other databases, the grey literature, or handsearching relevant journals. The search was not limited by language. Primary studies were not assessed for methodological quality. The methods were described in sufficient detail so as to allow replication and two reviewers were involved in quality appraisal. Any discrepancies in appraisal results were rectified by discussion or by another reviewer. The results of this review were transparent. Results were clearly presented in graphical/narrative form so as to allow for comparisons across studies. Heterogeneity was assessed. Appropriate analytical methods (fixed effects, random effects) were employed to enable the synthesis of study results.

Why this issue is of interest to public health

Public health is interested in promoting healthy behaviours in order to reduce the burden of chronic diseases, including cardiovascular disease (CVD), cancer, respiratory and type 2 diabetes. In Canada, over two-thirds of deaths result from these four chronic diseases¹, which share many common modifiable risk factors (e.g., physical inactivity, unhealthy diet, and tobacco use). Cardiovascular diseases are among the leading causes of hospitalization among Canadians.² In 2000, cardiovascular disease (heart disease, stroke, and atherosclerosis) resulted in the deaths of 76,321 Canadians and accounted for 35% of all deaths in the country.³ Cardiovascular diseases alone cost Canada almost \$25 billion a year in direct and indirect costs.³ Eight out of 10 Canadians have at least one risk factor for CVD and 10% have three or more.² The consumption of trans fats and fewer than 5 servings of vegetables and fruits each day are two of the main dietary risk factors for coronary heart disease.²

Evidence and implications

Evidence points are in order of the strength of evidence

What's the evidence?	Implications for practice and policy:
<p>1. Blood pressure (8 studies)</p> <p>1.1. Participants receiving dietary advice to reduce salt intake experienced a statistically significant reduction in systolic blood pressure of 2.07 mmHg. The true effect ranged from a reduction of 3.17 to 0.95. (95% CI -3.17 to -0.95; (8 studies).</p> <p>1.2. Participants receiving dietary advice to reduce salt intake experienced a statistically significant reduction in diastolic blood pressure of 1.15 mmHg. The true effect ranged from a reduction of -1.85 to -0.46. (95% CI -1.85 to -0.46).</p>	<p>1. Blood pressure</p> <p>1.1. Dietary advice to reduce salt intake promotes modestly beneficial changes in blood pressure in healthy adults.</p> <p>1.2. While statistically significant, these reductions may not be clinically significant. Reductions of this magnitude may be meaningful at a population level, but the intensity of intervention required to achieve this reduction may not be realistic for community-wide interventions.</p> <p>1.3. Since lowering salt intake is unlikely to cause harm, health care providers should continue to advocate for decreased salt consumption and to follow Canada's Food Guide.</p> <p>1.4. Individual research studies should evaluate both the statistical and clinical significance of intervention effect, while also assessing applicability in community settings.</p>
<p>2. Twenty-four hour urinary sodium output (3 trials)</p> <p>2.1. Participants receiving dietary advice experienced a statistically significant reduction in urinary sodium output as compared with those people in the control group 44.2 mmol/24 hr. The true effect ranged from a reduction of 54.7 to 33.6mmol/24hr (95% CI 33.6 -54.7).</p>	<p>2. 24-hr urinary sodium</p> <p>2.1. Dietary advice can be effective in reducing 24-hour urinary sodium output, which is a bio-marker indicating decreased sodium intake.</p> <p>2.2. It is not clear whether a reduction in sodium output is associated with a greater reduction in blood pressure at an individual level. Further research should determine whether it is a valid measure for determining decreased salt intake in community practise.</p> <p>2.3. While statistically significant, these reductions may not be clinically significant. Reductions of this magnitude may be meaningful at a population level, but the intensity of intervention required to achieve this reduction may not be realistic for community-wide intervention.</p> <p>2.4. Individual research studies should include measures of statistical and clinical significance, assessing applicability in community settings.</p>
<p>3. Cholesterol (13 studies)</p> <p>3.1. Participants receiving dietary advice experienced a statistically significant reduction in total cholesterol of 0.16 mmol/l as compared with those in control groups. The true effect ranged from a reduction of -0.25 to -0.06 (95% CI -0.23 to -0.03).</p> <p>3.2. Six of these trials enrolled people with elevated cholesterol levels.</p> <p>3.3. There was a similar reduction in LDL cholesterol of 0.18 mmol/l (95% CI -0.27 to -0.10) (11 studies).</p> <p>3.4. There was no statistically significant effect reported for HDL between intervention and control groups (0.01 mmol/l; 95% CI [-0.02, 0.02]) (10 studies)</p>	<p>3. Cholesterol</p> <p>3.1. Dietary advice results in modest reductions in total and LDL cholesterol.</p> <p>3.2. Dietary advice alone may not be effective in achieving increases in HDL cholesterol. However health care providers should continue to advise lifestyle changes that are associated with increased HDL, as these are not demonstrated to cause harm.</p> <p>3.3. High quality program evaluation and rigorous research studies should be conducted. These studies should involve</p> <p>3.3.1. the impact of advice targeting specific foods and nutrients and non-dietary lifestyle changes such as increased activity level and smoking cessation</p> <p>3.3.2. the impact of advice provided by different health professionals</p> <p>3.3.3. optimal intervention dose (frequency, duration, and intensity)</p> <p>3.3.4. population level impacts of dietary interventions</p> <p>3.3.5. morbidity and mortality outcomes associated with dietary advice and reductions in cholesterol</p>
<p>4. Fat intake (18 studies)</p> <p>4.1. Participants who received dietary advice reported a statistically significant reduction in total dietary fat intake as a percentage of total energy of 4.49 %kcal, compared to those in control groups. The true effect ranged from a reduction of -6.66 to -2.31 (95% CI -6.66 to -2.31). (18 studies)</p> <p>4.2. Participants who received dietary advice reported a statistically significant reduction in saturated fatty acid intake of 2.36 %kcal. The true effect ranged from a reduction of -3.39 to 01.32.(95% CI -4.64 to -1.92). (10 studies).</p>	<p>4. Fat intake</p> <p>4.1. Dietary advice can lead to a reduction in self-reported dietary fat intake as a percentage of total energy and in saturated fat intake.</p> <p>4.2. While statistically significant, these reductions may not be clinically significant. Reductions of this magnitude may be meaningful at a population level, but the intensity of intervention applied to individuals required to achieve this reduction may not be realistic for community control of cardiovascular disease.</p>

	<p>4.3. It is undetermined whether these reductions are associated with reductions in cardiovascular risk. The research community should determine a standard set of research indicators for chronic disease prevention.</p> <p>4.4. Although high intensity interventions were shown to be most effective at reducing dietary fat intake in individuals, this may not be feasible in community settings. Further research should examine health outcomes and the cost effectiveness of advice in relation to provider, setting, and level/type of intervention.</p> <p>4.5. Individual research studies should include measures of statistical and clinical significance, assessing applicability in community settings</p>
<p>5. Fruit and vegetables (15 studies)</p> <p>5.1. Self-reported fruit and vegetable intake in those given dietary advice increased significantly by 1.25 servings compared to participants in control groups. The true effect ranged from an increase of 0.70 to 1.81 servings per day (95% CI 0.70 to 1.81)</p>	<p>5. Fruit and vegetables</p> <p>5.1. Dietary advice can lead to increased fruit and vegetable intake.</p> <p>5.2. While statistically significant at a population level, these increases may not be clinically significant for community control of cardiovascular and other chronic diseases.</p> <p>5.3. Quality research in this area should include valid, standardized measures of fruit and vegetable intake, and would be enhanced by stratifying for fruit versus vegetable intake.</p> <p>5.4. Individual research studies should include measures of statistical and clinical significance, assessing applicability in community settings</p>
<p>6. Dietary fibre (7 studies)</p> <p>6.1. Participants given dietary advice reported statistically significant more dietary fibre intake of 5.99 grams per day) compared to those in the control group. The true effect ranged from an increase of 1.12 to 10.86 grams per day (95% CI 1.12 – 10.86).</p>	<p>6. Dietary fibre</p> <p>6.1. Dietary advice can lead to increased dietary fibre intake.</p> <p>6.2. While statistically significant at a population level, these increases may not be clinically significant for community control of cardiovascular and other chronic diseases.</p> <p>6.3. Research into treatment effects on dietary fibre intake should stratify for type of fibre.</p> <p>6.4. Research into effect of fibre intake on health outcomes should stratify for type of fibre.</p> <p>6.5. Individual research studies should include measures of statistical and clinical significance, assessing applicability in community settings</p>
<p>7. Methodological Issues with the Primary Studies in the Review</p> <p>7.1. All reported studies had some methodological weakness that may have impacted the outcomes. These issues included:</p> <ul style="list-style-type: none"> 7.1.1. randomization procedure 7.1.2. allocation concealment 7.1.3. blinding of outcome assessment 7.1.4. loss to follow-up 7.1.5. intervention dose 	<p>7. Implications for Future Research</p> <p>7.1. Rigorous program evaluations and high quality research should be funded and conducted. These studies should involve:</p> <ul style="list-style-type: none"> 7.1.1. appropriate randomization, allocation, and blinding procedures 7.1.2. control for various potentially confounding factors such as motivation, stage of change, etc? 7.1.3. effective recruitment and retention strategies 7.1.4. longer duration of follow-up 7.1.5. valid outcome measures 7.1.6. determination of effective dose (frequency, duration, intensity) 7.1.7. cost effectiveness of interventions
<p>8. Cost Benefit or Cost-effectiveness Information</p> <p>8.1. No cost related information was included in the review</p>	<p>8. Cost Benefit or Cost-effectiveness Information</p> <p>8.1. Future research should assess cost benefit or cost-effectiveness of the interventions</p>

General Implications

- The review showed that dietary advice promotes modestly beneficial changes in reported dietary intake and in some cardiovascular risk factors. Long term benefits, in terms of reduced morbidity and mortality, are not known.
- For enhanced outcomes analysis, the research community should strive to establish standardized definitions and indicators among studies.
- Future research should allow for analysis of intervention outcomes by age, sex, ethnicity and risk status. Details on source and content of advice and specific behavioural components of interventions should also be delineated.
- Research funding must be sufficient to provide for adequate assessment of community and population health outcomes over time.
- Cost-effectiveness studies are needed to determine the most feasible approaches to dietary advice and counseling.
- Rigorous program evaluations and high-quality research should be funded and conducted in these priority areas.

Legend: CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk

**for definitions see the [healthevidence.org](http://www.healthevidence.org/glossary) glossary <http://www.healthevidence.org/glossary.aspx>

References used to outline issue

1. The Secretariat for the Intersectoral Healthy Living Network in partnership with the F/P/T Healthy Living Task Group and the F/P/T Advisory Committee on Population Health and Health Security (ACPHHS). (2005). The integrated Pan-Canadian healthy living strategy. Cat. N° HP10-1/2005. ISBN 0-662-69384-1. Retrieved from http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf
2. Heart and Stroke Foundation of Canada. (2006). Tipping the scales of progress: Heart Disease and Stroke in Canada 2006. Ottawa: Heart and Stroke Foundation of Canada. Retrieved from http://www.heartandstroke.com/atf/cf/%7B99452D8B-E7F1-4BD6-A57D-B136CE6C95BF%7D/Tipping_the_Scales_new.pdf
3. Mirolla, M. (2004). The cost of chronic disease in Canada. Ottawa: The Chronic Disease Prevention Alliance of Canada. Retrieved from <http://www.gpiatlantic.org/pdf/health/chroniccanada.pdf>

Other quality reviews on this topic

- Ciliska, D., Thomas H., Catallo C., Gauld M., Kinston D., Cantwell B., et al. (2006). The effectiveness of nutrition intervention for prevention and treatment of chronic disease in primary care settings: A systematic literature review. Toronto: Dietitians of Canada. www.dietitians.ca
- Flynn, M.A., McNeil, D.A., Maloff, B., Mutasingwa, D., Wu, M., Ford, C., et al. (2006). Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. *Obesity Reviews*, 7 (Suppl 1), 7-66.
- Pavlovich, W., Waters, H., Weller, W., & Bass, E. (2004) Systematic review of literature on the cost-effectiveness of nutrition services. *JADA*, 104 (2), 226-232.
- Pignone, M.P., Ammerman, A., Fernandez, L., Orleans, C.T., Pender, N., Woolf, S., et al. (2003). Counseling to promote a healthy diet in adults: A summary of the evidence for the U.S. Preventive Services Task Force. *American Journal of Preventive Medicine*, 24 (1), 75-92.

Related links

- Dietitians of Canada <http://www.dietitians.ca>
- Guide to Clinical Preventive Services: Recommendations of the US Preventive Services Task Force <http://www.preventiveservices.ahrq.gov>
- Health Canada. Eating Well with Canada's Food Guide to Healthy Eating <http://www.healthcanada.gc.ca/foodguide>
- Health Canada. Dietary Reference Intake tables <http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/index-eng.php>

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