Impact of a Mediterranean Diet on Outcomes of Coronary Heart Disease

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Abstract

Background: Coronary heart disease is a condition that occurs when the coronary arteries are narrowed by the accumulation of plaque and fatty deposits thereby decreasing the blood flow to the heart. A Mediterranean diet is one that consists of eating plant-based foods, limiting the intake of red meats, and using a healthy source of fat, olive oil, rather than other unhealthy fats.

Research Question: What is the effect of a Mediterranean diet on health outcomes in adults with coronary heart disease compared to adults not following a Mediterranean diet?

Methods: The PubMed database was searched systematically using the keywords 'coronary heart disease' (or synonyms) and 'Mediterranean diet.' Included articles were high-quality, peer reviewed, published after 2004, discussed the impact of the Mediterranean diet on health outcomes of people with coronary heart disease, and measured adherence to the Mediterranean diet using an index score. These included articles measured outcomes in terms of changes in mortality rates and/or risk of developing coronary heart disease.

Results: All 9 articles reviewed found beneficial outcomes of a Mediterranean diet. Of these, 3 showed a reduction in mortality rates and 6 showed a reduction in risk of coronary heart disease.

Conclusion: A Mediterranean diet is beneficial in adults with coronary heart disease.

Background

Coronary Heart Disease: Coronary heart disease occurs when the coronary arteries are narrowed by the accumulation of plaque and fatty deposits thereby decreasing the blood flow to the heart. Signs and symptoms include chest pain, shortness of breath, weakness and fatigue, and myocardial infarction. Despite the severity of this condition, it can be managed through surgical procedures, medications, and lifestyle changes including diet and exercise. Sources: Mayo Clinic,[6] Johns Hopkins[7]

Mediterranean Diet: Although the Mediterranean is a large area that includes 16 countries (Figure 1) that border the Mediterranean Sea there is no single diet among the various cultures.[4]

Figure 1: Map of the Mediterranean

For the purposes of this review, 'Mediterranean diet' refers to the traditional diet of people in Greece and Southern Italy in the mid-1900s. This traditional diet is characterised by the consumption of food mainly from plant sources, a high ratio of monounsaturated fats (30-40% of total energy intake), moderate amounts of fish and poultry, and low amounts of red meat. Moderate consumption of wine is also common.[4]

Figure 2 shows a food pyramid for this traditional Mediterranean diet.

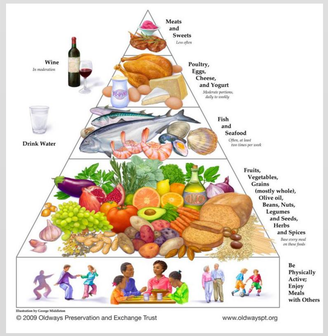

Figure 2: Mediterranean Diet Pyramid

Investigations into the health effects of a Mediterranean diet began when epidemiological data from the WHO[4] revealed a disparity between mortality rates in the Mediterranean despite a high incidence of smoking and lower quality health care compared to health care in North America.[3]

Historically, research focused on the fat content of this diet to elucidate its beneficial effects. Recent studies suggest that antioxidants may also play a beneficial role.[4]

Research Question

What is the effect of a Mediterranean diet on health outcomes in adults with coronary heart disease compared to adults not following a Mediterranean diet?

Methods

The PubMed database was searched systematically using the keywords 'coronary heart disease' (or synonyms) and 'Mediterranean diet.' Both qualitative and quantitative data were accepted. Accepted quantitative data included participant mortality rates. Accepted qualitative data included reports of increases or decreases in mortality or risk.

The inclusion and exclusion criteria below were used to determine which articles to include in this review.

Table 1: Inclusion and Exclusion Criteria

	Inclusion Criteria	Exclusion Criteria
Population		
Age	18 or older	17 or younger
Diagnosis	coronary heart disease (or risk thereof)	other cardiovascular diseases, other conditions
Smoking status	smoking permitted, but not as experimental variable	smoking as experimental variable
Intervention		
Mediterranean diet	entire scope of diet	single component of diet (ex. α-linolenic acid)
Measurements		
Adherence	use of Mediterranean Adequacy Index, Mediterranean Diet Score, or similar	qualitative measurements
Outcomes	mortality, risk of developing coronary heart disease	other qualitative or quantitative measures
Study Information		
Publication date	2004 – 2014	before 2004
Quality	systematic review, meta-analysis, RCT, cohort, case-control	case report, editorial, opinion, animal or in vitro research
Language	English	other languages
Review	peer reviewed	not peer reviewed
Availability	through the University of Ottawa library network	unavailable through the University of Ottawa library network

The search results were first assessed using the article titles. The abstracts of the remaining articles were then reviewed for relevance. Finally, the full text of each remaining article was analysed for relevance.

Data extracted from the reviewed articles included information on study participants and outcomes, including measurement method. The reviewers considered potential confounders and ensured they were controlled for by the researchers.

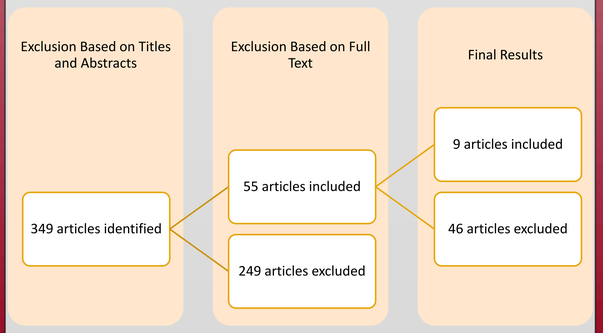

Figure 3: Study Inclusion Based on Inclusion and Exclusion Criteria

Results

Of the 349 articles found in the preliminary search, 294 were excluded based on title and abstract. The full text of the 55 remaining articles were read, leading to an exclusion of 46 articles. A total of 9 studies were included for review including 4 qualitative systematic reviews and 5 quantitative cohort studies. Figure 3 illustrates this process.

Table 2: Types of Articles Included

Type of Study	Articles Included
Systematic review	de Lorgeril and Salen 2011;[2] Dontas, et al. 2007;[3] Giugliano and Esposito 2005;[5] Naska and Trichopoulou 2014[9]
Cohort study	Buckland, et al. 2009;[1] Guallar-Castillón, et al. 2012;[5] Menotti, Alberti-Fidanza and Fidanza 2012;[8] Trichopoulou, Bamia and Trichopoulos 2005;[10] Trichopoulou, et al. 2007[11]

All 9 of the reviewed articles concluded that a Mediterranean diet had a beneficial impact on health outcomes of patients with coronary heart disease. Of the 4 qualitative systematic reviews, 1 (25%) showed a reduction in mortality and 3 (75%) showed a reduction in the risk of developing coronary heart disease. Some of the systematic reviews also reported other outcomes, such as the risk of developing other cardiovascular diseases, but these outcomes are not relevant to this review. Of the 5 quantitative cohort studies, 2 (40%) showed a reduction in mortality rates and 3 (60%) reported hazard ratios indicating a reduction in risk of developing coronary heart disease.

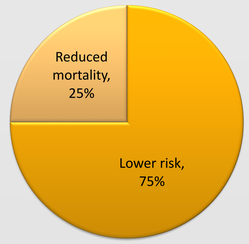

Figure 4: Percent of Qualitative Systematic Reviews Reporting Beneficial Effects

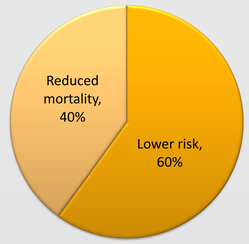

Figure 5: Percent of Quantitative Cohort Studies Reporting Beneficial Effects

The following tables show the different types of outcomes reported and the distribution of these outcomes among the qualitative systematic reviews and the quantitative cohort studies.

Table 3: Outcomes Reported in the 4 Systematic Reviews

Study	Outcomes
de Lorgeril and Salen 2011	risk
Dontas, et al. 2007	risk
Giugliano and Esposito 2005	mortality
Naska and Trichopoulou 2014	risk

Table 4: Outcomes Reported in the 5 Cohort Studies

Study	Outcomes	Data (95% Confidence Intervals, if reported)
Buckland, et al. 2009	hazard ratio	0.60 (0.47-0.77)
Guallar-Castillón, et al. 2012	hazard ratio	0.72 (0.57-0.91)
Menotti, Alberti-Fidanza and Fidanza 2012	hazard ratio	At 20 years: 0.74 (0.56-0.98) At 40 years: 0.79 (0.65-0.96)
Trichopoulou, Bamia and Trichopoulos 2005	mortality rates	Average adherence: 0.79 (0.51-1.22) Better than average adherence: 0.57 (0.33-0.97) Very good adherence: 0.25 (0.08-0.73)
Trichopoulou, et al. 2007	mortality rates	0.78 (0.69-0.88)

Discussion

This review found that adherence to a Mediterranean diet is beneficial for adults with coronary heart disease.

A major limitation of this review is the inability to generalise to North American populations because the included articles only discussed the benefits in European populations. The systematic search and review methods used to identify and include high-quality longitudinal studies were a strength of this review. There were no major biases identified in the reviewed articles. The excellence of the chosen database, PubMed, adds to the strength of this review; but the use of only one database may have resulted in the inadvertent exclusion of important articles. Although necessary, the inclusion and exclusion criteria engendered inherent weaknesses in this review. The exclusion of articles in a language other than English led to a foreign language exclusion bias in this review. Key foundational studies in this field were also excluded because they were published before 2004; but these studies were mentioned frequently in the included articles so their findings contribute to the conclusions of this review.

Current dietary guidelines such as Step 1 from the American Heart Association have been shown by this review to be less effective at reducing mortality and risk of developing coronary heart disease than a Mediterranean diet. Accordingly, the benefits of current dietary guidelines should be re-evaluated, especially these guideline's aversion to all types of fat. As mentioned previously, a Mediterranean diet is high in fat but still contributes to improved mortality and reduced risk.

Future studies on Mediterranean diets should continue to investigate the benefits of the types of fats consumed by Mediterranean populations. This review could be expanded to include all forms of cardiovascular disease, rather than only coronary heart disease. In addition, if these suggested studies reveal benefits of a Mediterranean diet on all cardiovascular disease, the impact of this diet on other chronic diseases should be investigated.

Conclusion

According to this review, a Mediterranean diet is beneficial in adults with coronary heart disease. As such, health care practitioners should consider this diet when evaluating treatment and prevention options for their adult patients with coronary heart disease.

References

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