Omega-3 Fatty Acids Compared to Placebo in Secondary Prevention of Myocardial Reinfarction

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Abstract. Introduction: Significant research exists to support the use of omega-3 fatty acids in the primary prevention of coronary heart disease (CHD); however few studies exist to support the use of omega-3 fatty acids in those patients already diagnosed with CHD. This study aims to investigate the cardioprotective benefits of dietary and non-dietary intake of omega-3 fatty acids in patients diagnosed with CHD. Methodology: A systematic review of evidence-based literature was performed using Medline and Cochrane databases. Inclusion criteria included 1) randomized controlled trials (RCT) comparing dietary or supplemental intake of omega-3 fatty acids with a control diet or placebo, 2) trials reporting cardiac endpoints including fatal or nonfatal myocardial infarction and overall mortality, 3) trials following patients with established CHD for at least 6 months. Results: Six RCTs and two meta-analyses were included. Research shows supplementation with omega-3 fatty acids decreases the incidence of myocardial reinfarction, sudden death due to fatal cardiac arrhythmias, and all cause mortality. However, although individual studies reviewed were of high quality, when compared, their findings were inconsistent. Conclusion: There is insufficient evidence to recommend the use of omega-3 fatty acids for secondary prevention of myocardial reinfarction in patients with existing CHD.

1. Introduction

During the last 35 years, omega-3 polyunsaturated fatty acids have emerged as a topic of scientific scrutiny and public interest. In the 1970’s, epidemiological studies of Greenland Eskimos linked their diet, high in whale, seal, and fish rich in omega-3 polyunsaturated fatty acids, to a low incidence of cardiovascular mortality [1,2]. Further, research shows promising evidence indicating that moderate doses of omega-3 polyunsaturated fatty acids not only reduce the risk of cardiovascular disease, but decrease mortality due to myocardial reinfarction, sudden death, and overall mortality in patients with established coronary heart disease.

While much research has been done to investigate omega-3 polyunsaturated fatty acids and the prevention of coronary heart disease few studies have focused on secondary prevention and myocardial reinfarction in populations with established coronary heart disease. Further, studies that investigate omega-3 polyunsaturated fatty acid therapy in patients with established coronary heart disease have shown an inconsistent association between n-3 polyunsaturated fatty acids intake and the risk of myocardial reinfarction. This study aims to investigate the protective properties of long chain omega-3 fatty acids, particularly DHA and EPA. This study will focus on both dietary and supplemental interventions in populations with established coronary heart disease and the prevalence of myocardial reinfarction, sudden death, and overall mortality.

2. Experiment, Results, Discussion, and Significance

Methods. A systematic review of evidence-based literature was performed using Medline and Cochrane databases. Studies reviewed include randomized controlled trials and meta-analysis and systematic reviews of randomized controlled trials and cohorts from 1971 to 2006. Studies reviewed included the following criteria: 1) randomized trials comparing dietary or supplemental intake of n-3 PUFAAs with a control diet or placebo, 2) trials reporting cardiac endpoints such as fatal or nonfatal MI and overall mortality, 3) trials following patients with established coronary heart disease for at least 6 months.

Review of Literature. The DART was the fist trial to investigate the effects of dietary fish or fish oil on the survival of men with a recent MI. At the end of 2 years, researchers found that there was a decrease in total mortality and deaths due to CHD in the groups educated on the intake of fatty fish. To date, this clinical landmark trial still offers some of the most convincing evidence for the cardioprotective benefits on omega-3 fatty acids in those with established CHD [3]. A decade later the GISSI-Prevenzione trial found comparable results. At the end of 3 ½ years, it was found that those subjects taking Omacor, an omega-3 fatty acids supplement, enjoyed a reduction in all
-cause mortality and in cardiovascular endpoints including fatal- and non-fatal MIs and strokes [4]. The Lyon Diet Heart Study investigated the effects of a Mediterranean Diet high in fish, bread, fruit, vegetables, and food containing non-marine omega-3 PUFA a-linolenic acid like walnuts and olive and canola oils compared to a Western diet higher in animal fat in post myocardial infarction patients. It was found that a Mediterranean style diet lowered cardiac morbidity and mortality when compared to those assigned to a western diet [5]. Two meta-analyses of randomized controlled trials investigated the use of fish oil in the care of coronary heart disease patients. Researchers found a decrease in mortality due to myocardial reinfarction, sudden death and overall mortality in patients diagnosed with coronary heart disease and treated with fish oil however these studies were plagued with limitations [6, 7].

There is growing evidence to support that the anti-arrhythmic property of omega-3 fatty acids is most valuable benefit in populations already diagnosed with CHD. The DART trial was the first human trial to show possible anti-arrhythmic benefits. A reduced mortality in those instructed to eat fish was found. The patients consuming omega-3 fatty acids had a lower mortality rate after a myocardial infarction, possibly due to a decrease in sudden cardiac death resulting from fatal arrhythmias [3]. In the GISSI trial, a relative reduction in sudden cardiac death was found. After 3.5 years, treatment was found to have decreased mortality. Scientists concluded that the reduction in cardiovascular mortality resulted primarily from prevention of sudden cardiac death due to fatal arrhythmias [4]. The Lyon Trial also supports the hypothesis that omega-3 fatty acids have a beneficial effect on sudden cardiac death. In the intervention group, there were no reports of sudden cardiac death while 8 cases were recorded in the control [5].

Results. Six RCTs and two meta-analyses were included. Research shows supplementation with omega-3 fatty acids decreases the incidence of myocardial reinfarction, sudden death due to fatal cardiac arrhythmias, and all cause mortality. However, although individual studies reviewed were of high quality, when compared, their findings were inconsistent.

Limitations in the Literature. The body of literature to support the use of omega-3 polyunsaturated fatty acids in coronary heart disease populations’ looks promising, however more studies are called for before a systematic recommendation can be made. Many of the studies in this review were done outside of the United States, additional research is necessary to insure the validity of applying the results to US populations. Further, randomized controlled trials should involve more women and minority groups. Also needed is the continued exploration of the most beneficial dose of omega-3 PUFAs as well as the most optimal ratio of EPA to DHA. Studies should also explore the efficacy of fish oil sources such as dietary fish, dietary oils, and supplements. Finally, it is important to know the most optimal length of intervention and how long the benefits are retained after stopping omega-3 polyunsaturated fatty acid therapy.

3. Conclusion

What place does omega-3 fatty acid supplementation have in the care of coronary heart disease patients? The majority of the literature points to a decrease in morbidity and mortality due to CHD with the incorporation of fatty fish intake or supplementation. However, this story is far from over. The quality of studies conducted to this point is far from optimal and questions such as the dose and ratio of EPA to DHA still exist. More studies are needed to confirm and further define the health benefits of omega-3 fatty acids for preventing subsequent cardiovascular events. There is insufficient evidence to recommend the use of omega-3 fatty acids for secondary prevention of myocardial reinfarction in patients with existing CHD at this time.

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