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Original Article

A randomized study of coconut oil versus sunflower oil on cardiovascular risk factors in patients with stable coronary heart disease



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ABSTRACT

Background and rationale: Coronary artery disease (CAD) and its pathological atherosclerotic process are closely related to lipids. Lipids levels are in turn influenced by dietary oils and fats. Saturated fatty acids increase the risk for atherosclerosis by increasing the cholesterol level. This study was conducted to investigate the impact of cooking oil media (coconut oil and sunflower oil) on lipid profile, antioxidant mechanism, and endothelial function in patients with established CAD.

Design and methods: In a single center randomized study in India, patients with stable CAD on standard medical care were assigned to receive coconut oil (Group I) or sunflower oil (Group II) as cooking media for 2 years. Anthropometric measurements, serum, lipids, Lipoprotein a, apo B/A-1 ratio, antioxidants, flow-mediated vasodilation, and cardiovascular events were assessed at 3 months, 6 months, 1 year, and 2 years.

Results: Hundred patients in each arm completed 2 years with 98% follow-up. There was no statistically significant difference in the anthropometric, biochemical, vascular function, and in cardiovascular events after 2 years.

Conclusion: Coconut oil even though rich in saturated fatty acids in comparison to sunflower oil when used as cooking oil media over a period of 2 years did not change the lipid-related cardiovascular risk factors and events in those receiving standard medical care.

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1. Introduction

Coronary artery disease (CAD) resulting from atherosclerosis is closely associated with serum lipids.^{1–3} Dietary fats and oils influence the metabolism of lipids and increase the chance of CAD if the hyperlipidemic state persists for a long time. Atherogenic dyslipidemia is constituted by increased low-density lipoproteins (LDL), reduced high-density lipoprotein (HDL) and elevated triglycerides. In a recent study of (Md-CCC) by principle component analysis, it is shown that this type of metabolic abnormality is predictive of atherosclerosis and cardiovascular diseases.⁴ Since 1963 after the Framingham heart trial, the fats and oils containing saturated fatty acids are considered one of the important causes for CAD.⁵ Aggressive lipid lowering strategies have shown reduced morbidity and mortality from CAD.⁶ Though the management of dyslipidemia by lipid lowering drugs is very effective,^{7–10} modulating HDL to therapeutically significant level is not yet achieved.¹¹ Genetic factors, life style, and dietary habits are responsible for the geographical variations in serum lipids. Most of the time, the concern regarding the dietary oil begins after the occurrence of a cardiac event or being diagnosed as having CAD.

1.1. Cooking oil media

CAD prevalence and risk factors are significantly high in the state of Kerala among the Indian states due to various reasons.^{12,13} One of the contributing factors is proposed to be the saturated fatty acids contained in coconut oil which is the most commonly used cooking oil media. Sunflower oil rich in polyunsaturated fatty acids have become the second preferred cooking oil media over last few years. Polyunsaturated fatty acids in sunflower oil affect the lipid metabolism in a favorable manner. The oil and fat usage in a given population is influenced by the tradition, availability, and socioeconomic status and to certain extent the awareness.

1.2. The medium chain fatty acids and CAD

The medium chain fatty acids metabolism is different from the long chain fatty acids present in other fats and oil.^{14,15} There are only epidemiological data and small short-term interventions with the coconut oil and its association with CAD.^{16–18} Previous work from our institution showed that there were no differences in lipid profile (serum total cholesterol, triacylglycerols, and cholesterol in lipoprotein fractions) between persons taking coconut oil or sunflower oil.¹⁹ Higher intake of coconut oil did not cause any significant increase in the concentration of lauric acid in blood among coconut oil consumers. Moreover, serum lipid values did not show significant variation between animals fed with coconut oil or sunflower oil. Coconut oil intake did not cause hypercholesterolemia or oxidative stress in rabbits.²⁰ In another study, the fatty acid content of the coronary plaque (endarterectomy specimen) did not show any difference between coconut oil consumers versus sunflower oil consumers.²¹ Since these studies were done in free living subjects, many compounding factors like eating outside, quantity of oil, duration of consumption, and physical activity could not be assessed correctly.

In this context, a study evaluating the impact of coconut oil on cardiovascular events and risk factors as a cooking oil media in the community is warranted. In this study, we evaluated the impact of coconut oil and sunflower oil as a cooking medium on the cardiovascular events and risk factors in patients with stable coronary heart disease receiving the standard medical care.

2. Materials and method

2.1. Design

Randomized single blinded clinical trial.

2.2. Sample size

Since this is the first of this kind of study with cooking oil media, no publications could be located in the existing literature and hence this was taken as a pilot study. A total of 200 patients satisfying the criteria for recruitment were randomly allocated to two groups. Block randomization was done with 5 blocks each having 40 cases for allocation. This was done just to avoid the non-availability of required sample size and to keep randomization live with the available number of patients. However, 200 patients were available at the end of study.

2.3. Subjects

The subjects were selected from the patients attending the outpatient department of our hospital as per the selection criteria. CAD was diagnosed by various methods like coronary angiogram, Echocardiography, ECG evidence of myocardial infarction, stress perfusion scan, and multidetector coronary angiogram. Subjects were included in the study if they achieve optimal control of diabetes and lipid levels. Patients with uncontrolled hypothyroidism, renal failure creatinine >2 mg/dl and liver failure, and other illness limiting the life expectancy <2 years were excluded.

Approval from scientific committee and institutional ethic committee was obtained as per guidelines. All subjects signed informed consent before randomization.

The funding agencies were (1) Coconut development board – India and (2) Amrita Institute of Medical Science and Research Center. None of the sponsors had any role in the study design and data analysis.

2.4. Anthropometric measurements

2.4.1. Body mass index

Height was measured with subjects in bare foot using standardized extendable measuring rod. Weight was measured with an electronic Dura weighing machine during empty stomach.

2.4.2. Percentage body fat

Skin fold thickness was measured with a Harpenden skin fold caliper by using a three-site system in this study. For men it was triceps, subscapular and chest whereas in women triceps,

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