

Effect of *Oryctes Rhinoceros* Larva Oil Supplementation on Serum Lipid Profile and Inflammatory Markers in Mice Fed a Cholesterol-Based Diet

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Key Words

C-reactive protein; Cholesterol-based diet; Interleukin-6; Oil; *Oryctes rhinoceros* larva; Tumor necrosis factor

Abstract

A cholesterol-enriched diet has been shown to adversely have an effect on conjugated protein profiles and increase disorder risk. Dietary cholesterol plays a crucial role in modulating inflammatory responses concerned in induration of the arteries. Within the gift study, the impact of *Oryctes perissodactyl* mammal creature oil (ORO), associate unsaturated fatty acid-rich fat, on humor lipid profile and a few unhealthy markers in mice fed a cholesterol-based diet (CBD) was investigated. Forty male Swiss anomaly mice were willy-nilly assigned to four teams consisting of management (normal diet) and 3 experimental teams fed traditional diet supplemented with ORO, CBD solely and CBD supplemented with ORO, severally. Humor lipide profile, malondialdehyde, CRP, interleukin-6 and neoplasm mortification factor-alpha levels were evaluated before and when diet treatment. Humor triacylglycerol, total cholesterol and lipoprotein cholesterol levels were considerably reduced ($P < 0.05$) in mice fed a CBD diet supplemented with ORO compared with those fed CBD while not ORO. Additionally, humor malondialdehyde, CRP and interleukin-6 levels were considerably lower in mice fed CBD supplemented with ORO compared with those fed CBD solely ($P < 0.05$). These results recommend that consumption of ORO improved the humor lipid profile and, additionally, could mitigate the attendant adverse inflammatory processes in induration of the arteries.

Introduction

Humans and animals have been reported to show consistency in the response of their serum lipid levels to fat-modified diets. A significant factor underlying the high continuing incidence of coronary artery disease is a typical diet high in saturated fat and cholesterol, both of which contribute to elevated serum cholesterol levels. A serum cholesterol level >240 mg/dL (>6.216 mmol/L) is considered to be high risk and is referred to as hypercholesterolemia. Hypercholesterolemia often appears intractable and represents the primary cause of death in patients with the condition. Significant elevation in serum lipid levels, which predisposes to atherosclerosis, is easily monitored using early lipid profiles. Chronic low-grade inflammation has been shown to be associated with increased risk for cardiovascular and several other chronic degenerative diseases. Atherosclerosis, a chronic inflammatory disease, is usually characterized by cholesterol deposition, recruitment and activation of monocytes, macrophages

and lymphocytes, and inflammation and fibrosis. Interplay among lipid and cholesterol metabolism, cytokines and cellular activity within arterial walls plays a crucial role in atherosclerosis. Interleukin (IL)-1 β , IL-6, IL-8 and tumour necrosis factor-alpha (TNF- α) have been reported to affect lipid metabolism and have been implicated in the development of atherosclerotic lesions. Dietary fats have been shown to play an essential role in modulating immune and inflammatory responses, with both quantity and quality of fats having been shown to affect these processes. Findings from some observational studies reveal that dietary intake of very long-chain n-3 polyunsaturated fatty acids ≥ 100 mg/day in Western countries were associated with low concentrations of inflammatory cytokines including C-reactive protein (CRP), IL-6, and intercellular and vascular adhesion molecules. In addition, alteration in cholesterol levels or metabolism by dietary fat can result in changes to immune and inflammatory responses. In Africa, insect consumption is a traditional and culturally acceptable way by which low-income individuals supplement the meagre protein content of their high-carbohydrate diets. Interest in the use of insects as food has been expressed in several reports. These insects are usually eaten as part of a meal or a complete meal. Fat is the chief form of energy stored in insect larvae. It is usually present in greatest amounts in the mature insect larva before metamorphosis. Some species of insects are eaten as a delicacy in Nigeria, while some are used for traditional medical practice. Among the commonly consumed insect species in Nigeria is *Oryctes rhinoceros* larva (ORL). A report by Ekpo and Onigbinde showed that ORL contained 38% (by dry weight) oil with a high degree of unsaturation (65%). Although the nutritional potential of ORL oil (ORO) has been reported by several authors, there is very little information regarding the attendant effects of its consumption in vivo on serum lipid profile. The aim of the present study was to evaluate the effect of dietary inclusion of ORO on alteration in serum cholesterol fractions and selected inflammatory markers in mice fed a cholesterol-based diet (CBD).

Blood collection and serum preparation

At the end of the feeding experiment, mice in each group were weighed, anesthetized (in a chloroform-saturated chamber) and euthanized by jugular puncture. Blood was collected from the jugular vein into plain, sterile bottles for serum enzyme assays. The blood was allowed to stand for 30 min to clot and subsequently centrifuged at $3000 \times g$ for 10 min at room temperature to separate the serum. The serum samples were collected by aspiration using a Pasteur pipette into sterile bijoux bottles and stored frozen until required for analysis, which was performed within 72 h.

Conclusion

The results of the present study suggest that consumption of ORO may help improve serum lipid profile and, in addition, positively mitigate the attendant adverse inflammatory process in atherosclerosis following a high-fat diet, thus improving cardiovascular health.