

Modulatory effect of cod liver oil on bone mineralization in ovariectomized female Sprague Dawley rats

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Abstract

Osteoporosis represents a major public health problem through its association with fragility fractures, primarily of the hip, spine and distal forearm. The risk of osteoporosis increased in postmenopausal women due to decline in estrogen levels. Replicable hormone therapy is associated with undesirable side effects. Cod liver oil (CLO) is a rich source of docosahexaenoic acid eicosapentaenoic acid linolenic acid and vitamins A, E and D. In this study, the effect of CLO will be tested in the prevention of bone loss in the ovariectomized (OVX) female rats. One group of OVX rats ($n = 12$) received an estrogen implantation at the time of operation and the second group was supplemented orally with CLO (200 $\mu\text{l}/\text{kg}$ body weight) daily for 8 weeks. At the end of the experiment, blood was analysed for serum calcium, phosphorous, bone-specific alkaline phosphatase, osteocalcin and estrogen and femur for calcium determination. Estrogen implantation as well as CLO supplementation in OVX rats increased the calcium level in femur as compared with sham rats ($p < 0.05$). It is concluded that supplementation of CLO have a positive effect on bone mineralization in rat, and this could offer a new strategy to avoid the side effects of replaceable hormonal therapy.

Keywords

Cod liver oil, OVX rats, osteoporosis

Introduction

Osteoporosis represents a major public health problem through its association with fragility fractures, primarily of the hip, spine and distal forearm (Buck et al., 1994). Some risk factors for fragility fracture are associated with bone mineral density (BMD), gender, low dietary calcium intake and vitamin D deficiency (Lapasata, 1995). However, a number of other factors such as, age, high bone turnover, neuromuscular disorders, glucocorticoid therapy, family history of hip fracture, low body weight, cigarette smoking and excess alcohol consumption contribute significantly to the risk of fracture (Horrobin and Manku, 1990).

Ovariectomized (OVX) female rats shows a marked reduction in endogenous estrogen concentrations and induces bone remodeling abnormalities that augment bone loss and increase the risk of developing osteopenia (Simopoulos, 1991).

The biological and physiological effects of dietary lipids on human health remain a primary focus of nutrition research as consumption recommendations are continually updated in response to new information obtained through epidemiological, clinical and animal investigations.

Essential fatty acids (EFAs) cannot be synthesized by the body and therefore necessitate dietary intake. They are polyunsaturated fatty acids (PUFAs) that occur in the *cis*-configuration including linoleic acid

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