

Investigating the effects of omega-3 on high-fat diet-induced lipid metabolism disorders and liver damage in rats.

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Outline

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2. The comparison of omega-3 and flaxseed oil on serum lipids and lipoproteins in hyperlipidemic male rats.
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Abstract

In recent years, the prevalence of obesity and metabolic diseases has steadily increased due to changes in dietary patterns, with high-fat diets (HFD) becoming a common feature of modern eating habits. HFD is considered a major risk factor for metabolic syndrome and lipid metabolism disorders. High-fat diets can induce alterations in serum TC, TG, and lipoprotein levels in rats, while simultaneously causing hepatic fat accumulation, cellular apoptosis, and impaired liver function. Omega-3 is a polyunsaturated fatty acid and possesses multiple physiological benefits. Previous studies have demonstrated that omega-3 can improve dyslipidemia and mitigate pathological changes such as thickening of the aortic collagen layer and enlargement of hepatic lipid droplets. This report integrates two selected studies to investigate whether omega-3 from different sources can alleviate HFD-induced dyslipidemia, liver injury, and functional impairment in rats. Experimental results show that flaxseed oil, as a plant-derived source of omega-3, effectively reduces serum TG, TC, LDL, and VLDL levels while increasing HDL, thereby improving lipid profiles. Fish oil not only reduces blood lipids but also ameliorates insulin resistance, decreases hepatic lipid droplet accumulation and cellular apoptosis, and modulates the expression of lipid metabolism-related molecules, including PPAR- α , PPAR- γ , SREBP1, INSIG1, adiponectin, leptin, as well as their receptors AdipoR1 and LEPR.

Reference

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- Siamak Shahidi, Monireh Sufi Mahmoodi, Alireza Komaki, & Reihaneh Sadeghian. (2022). The comparison of omega-3 and flaxseed oil on serum lipids and lipoproteins in hyperlipidemic male rats. *Heliyon*, 8(6), e09662. <https://doi.org/10.1016/j.heliyon.2022.e09662>**