



Research Article

## Comparative study on the effect of oil extracted from flaxseed and omega-3 on local female rabbits exposed to high blood lipids

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### Abstract

The study of the effect of oil extracted from flaxseed and omega-3 on lipid levels in female adult rabbits was (40) local rabbits with an average range of (1500-800) g. The animals were division randomly assigned to four groups The second control group induced by high fat, omega-3 group, oil extracted from flax seed) and 5 rabbits per group. Digestion of the animals after giving a high-fat diet, which consisted of cholesterol at 1% concentration and egg yolk and saturated fats for one month in order to develop the status of high blood fat. The animals were orally fed with two concentrations of flaxseed oil and Omega-3, 150,300 mg/daily with the diet and for a month. Biochemical tests included cholesterol, triglycerides, high-density lipoproteins, lipoproteins, low-density lipids, and indications of harvest. The results showed a significant decrease in the level of cholesterol, triglycerides, high-density lipoproteins, lipoproteins, density Also the significant difference between C1 and C2.

**Keywords** High-fat food, omega-3, oil , flax seeds, Digestion, Lipoproteins

### Introduction

Fats have been an essential component of human food for more than two million years, and historically we cannot determine the beginning of man's knowledge of oils and fats, but it is believed that they were known in ancient times as a source of food and a means of lighting, and the oldest vegetable oil known to man is olive oil, and the oldest animal fat known Human is Butter, but at the present time, man has been able to extract oils from different seeds and fruits, and from the livers of whales and fish (Murray et al., 1996). Fats are very important food components, not only because of the high energy they provide to the body, but because they contain biologically effective substances such as hormones. Steroids, bile acids and prostaglandins, in addition to fats having important functional structures such as sphencosin and vitamins (Laker et al., 2011) Most of the fats and oils consumed daily are a mixture of triglycerides with small amounts of the rest of the fats such as cholesterol,

phospholipids and free fatty acids (Prasad et al., 2010). The nutritional oils and fats found in nature are triglycerides resulting from the interaction of fatty acids with glycerol, and fats do not contain one type of fatty acid. Oil is stored in intracellular structures called oil bodies. The characteristics of an oil or fat depend on the fatty acids it contains in terms of chain length and degree of unsaturation (Chen et al., 2009).

### Methods and Materials

#### *Animals in the experiment*

In this study uses (40) rabbits, which ranged in age from (3-5) months, it was (1500-800) g. The animals were dosage with oil extracted from flax seeds and omega 3. For one month, the animals were placed in metal cages, Wood-sawing for the care of the cages for the replacement of floor (Chen et al., 2009) The animals were fully and regularly fed daily with high-fat diets to develop hyperlipidemia (high-cholesterol diet was given for 10 days to develop hyperlipidemia). The animals

were randomly divided into six equal groups of five animals per group. All groups dosaged except the first control group (C) high-fat diet in order to raise the level of fat in blood and at the same time has been dosage to animals every 24 hours and for a month according to division given below.

**The control group (C)**

Water and plain food.

**The control group (Cch)**

The diet was given high-fat and water only.

**Group 1 G1**

(150 mg) dosage orally administered from C1 (omega-3).

**Group II G2**

Dosed given (300 mg) orally from C2 (omega-3).

**Group G3**

Dosed given (150 mg) orally from (C1) oil extracted flaxseed.

**Group IV G4**

Dosed given (300 mg) orally (C2) extracted from the flaxseed oil.

**Feeding components (Toutouzias et al., 2011).**

1. Wheat, barley and corn in equal proportions.
2. free cholesterol 1%.
3. 3-egg yolks 1%
4. 4-animal fat 1%

**Preparation flooding**

The components of the diet were taken from the markets, consisting of wheat, barley, and corn, with 1% egg yolk and saturated animal fat extracted from sheep's lamb tissue by heating these tissues in an electric oven at 250 ° C for 5-6 hours. . After the cooling and then clean the cholesterol with continuous flipping until the homogeneity of the feed was moistened prepared with suitable quantities of water for easy to be formed and cut in the form of fingers Pellets length of 1-2 cm and 1 cm diameter using a manual meat chopping machine with a special filter with removal Cut knife then dry the feed at room temperature Keep away from dust and insects with constant stirring and complete drying using hot air oven at 55 ° C and keep in clean, dry polyethylene bags in a dry and cool place. The control feed consists of wheat, barley and corn. After the end of the period of dosing, the animals starved for 12 hours, after which were collected (4.3 ml) of direct blood and in a way stab heart and then obtained blood serum by device centrifuge and save serum at 20 C for the purpose of biochemistry tests.

**Estimate lipid levels**

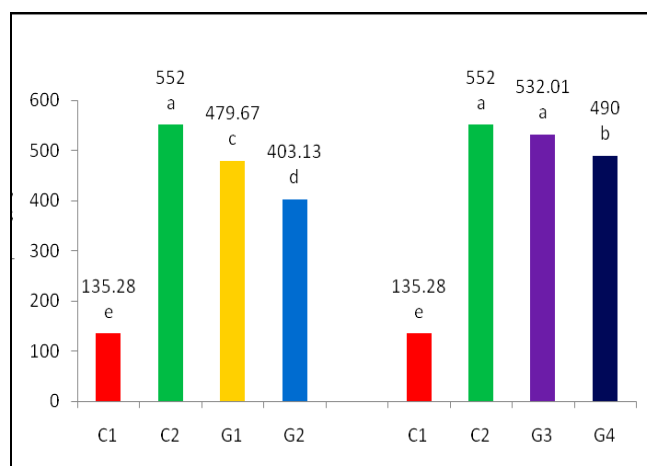
1. Determination of total cholesterol
2. 2-level Determination of triglyceride level
3. Determination of the level of high density lipoproteins
4. Determination of low density and low density lipoprotein (LDL).

**Results and discussion**

**Determination of cholesterol level**

The mean ± stander deviation of the first control group C1 and the second control group C2 and the G1 and G2 groups by omega 3, G3 and G4 treatment with flaxseed oil treatment were 135.28 ± 8.4 mg / ml, (552.01 ± 31.8 mg / (± 31.5 mg / 100 ml) and (498.72 ± 25.11 mg / 100 ml respectively). There was a significant decrease in the level of cholesterol at the level of probability (0.05≥P)for G3 and G4 compared with C1, while the results showed a significant increase in G3 compared to C2 and significant increase of G4 compared to C2. The results showed a significant decrease between G3 and G4, As in Figure (1).

Fig. 1 shows the levels of total cholesterol (mg / 100 ml) in local rabbits exposed to hyperlipidemia and treated with omica-3, flaxseed oil.



**Fig. 1 Total cholesterol concentration (mg/100ml) in the blood sera of local female rabbits exposed to hyperlipidemia and treated with (Omega-3, oil extracted from flax seeds).**

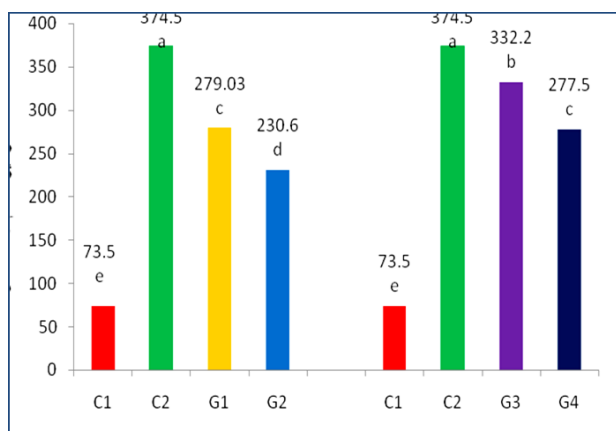
The effect of the high concentration of T.C on the effect on the composition of the intestinal monolayer is consistent with the study conducted by (6) on ZnSo4 in male rabbits where they were given a high-fat diet containing 1% cholesterol Body weight for two months), which led to a significant increase in fat in blood. It may be due to a structure that increases the absorption of cholesterol through the intestines or possibly due to an imbalance in lipid metabolism, which leads to inhibition of the release of steroids and bile salts (Miljanovi et al., 2009) especially regarding the absorption of cholesterol affecting beta cells and catalysis of Cholesterol Acyl Transferase Responsible for the absorption of cholesterol in the intestine, which stimulates when the rate of insulin secretion drops (Burr et al., 2009). The reason for the low cholesterol levels of the groups that were extracted from the flaxseed oil is that linseed contains a high proportion of omega-3 fatty acids because they are essential fatty acids that play an important role in lowering the cholesterol level by acting, Is done by inhibiting the effectiveness of the enzyme

3-methyl gluteryl reductase HMG CoA reductase (Storlien et al., 2010). This group can increase HDL-C and reduce LDL-C by limiting its manufacture. Statins interact in a competitive manner with HMG-COA on the enzyme activity mentioned above, Its effect on increasing the number and efficiency of LDL-C receptors in liver cells

### Effect on tri glycerids

The Mean  $\pm$  1 (C), 2 C, G2, G2, Oma-3, G3, G4 and flaxseed were  $73.5 \pm 9.7$  mg / 100 ml and  $374.5 \pm 24.8$  mg (100 ml) and  $(7.12 \pm 03.29)$  mg / 100 ml and  $10.59 \pm 230.6$  mg / 100 ml respectively.

The results of the statistical analysis showed a significant decrease in the level of triglycerides at the level of probability ( $0.05 \geq P$ ) for the G1 and G2 groups in comparison with C1 and C2. The results showed a significant decrease between G1 and G2 and a significant decrease between G3 and G4 compared to C1 and C2. Shown in Figure (2)

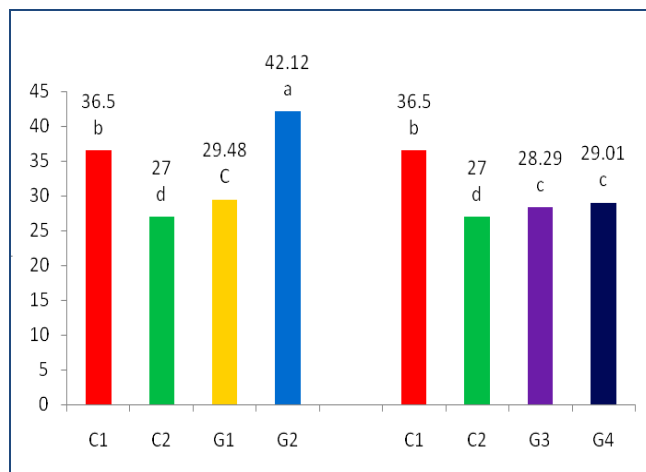


The role of fatty acids is unsaturated, especially omega-3 fatty acids, which reduce cholesterol esters by stimulating the lipoprotein lipase, increasing the metabolism of VLDL-C and cylonmyrone, and lowering the level of LDL-C by stimulating metabolism in the liver. The cholesterol molecules are very low-density lipoprotein (C) (VLDL), which is rich in TG and thus reduced its production in the liver, thus reducing its concentration in blood (4-7). The results of this study are consistent with the study conducted by researcher (Galli et al., 2009) on meat breeds exposed to thermal stress High-density lipoprotein concentration and significant reduction in cholesterol and triglycerides and protein concentration of low density.

### Effect on (HDL-C)

The mean  $\pm$  stander deviation of C1, the second control group C2, the G1 and G2 groups, the omega-3 treatment, the G3 and G4 groups, and the flaxseed oil treatment were  $36.5 \pm 4.2$  mg / 100 ml and  $27.0 \pm 1.3$  mg / (Mg / ml) and amalgam (mg / ml) and mg / ml respectively (respectively).

The results showed a significant increase in the level of high-density lipoprotein at the level of probability ( $0.05 > P$ ) of the group G1 and compared to C1 and a significant decrease compared with C2 and the G2 group showed a significant increase compared to C1 C2 and the results showed a significant difference between G1 and G2 . There was a significant increase in the probability level ( $0.05 \geq P$ ) for G3 and G4 compared to C1. The results showed no significant difference between G3 and G4 as Fig.3

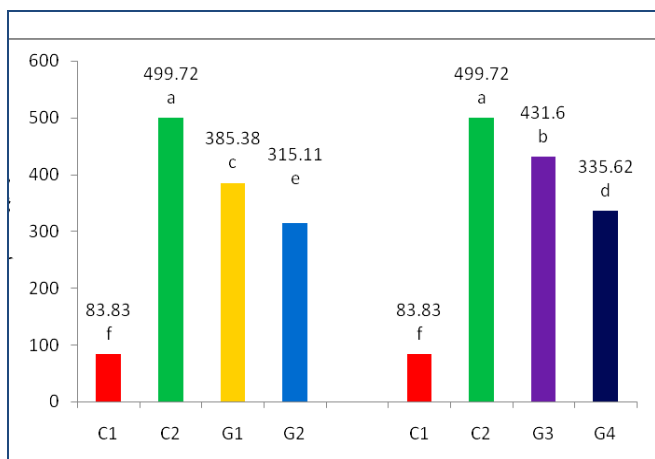


The low concentration of total HDL in animals fed high-fat diets in group C2 is due to lipid imbalance, which inhibits the production and efficacy of insulin, which in turn leads to decreased efficacy of lipoprotein lipase and increased hepatic lipase activity (Storlien et al., 2010; Galli et al., 2009; Al-Musawy et al., 2008; Shaima et al., 2011) Because HDL-C is rich in TG, it will become the target of the hepatic enzyme . The latter works to break down HDL-C and rapidly remove it, thereby lowering serum HDL-C concentration<sup>1</sup> Increases the concentration of LDL-C) and the speed of oxidation, leading to a lower HDL-C concentration in the serum. The role of omega-3 fatty acids is to regulate fat metabolism and increase and improve the concentration of HDL-C, which has the ability to stimulate liver and bowel cells to build molecules (HDL-C), which increases their concentration and reduces the risk of heart disease (Jalal et al., 2009; Carol, Ann Rinzler, 2006). Consistent with the study conducted by (Schutz et al., 1992). on meat breeds exposed to thermal stress, which led to a significant increase in the concentration of high-density protein and a significant reduction in total cholesterol and tripartite glycerides and concentration of low-density protein (Bradbury et al., 2010).

### Effect on (LDL-C)

The (Mean  $\pm$  SD) of the first control group C1 and the second control group C2 and the G1 and G2 groups and the omega-3 treatment and the G3 and G4 groups and the flaxseed oil treatment were  $83.83 \pm 10.7$  mg / (Mg / ml),  $385.38 \pm 13.39$  (mg / 100 ml),  $315.11 \pm 11.9$  mg / 100 ml,

(431.6 ± 11.69 mg / 100 ml and 9.3.35.62 ± 9.3), respectively.



The results showed a significant decrease in the level of total protein and low density at the level of probability (0.05≥P) for the groups G1 and G2 compared to C1 and C2 and showed that there was a significant difference between G1 and G2 and a significant decrease in the level of total protein and low density at the level Probability 0.05 (PP) for G3 and G4 compared to C1 and C2

The high-cholesterol diet resulted in liver LDL-C receptor abnormalities (de Goede et al., 2011; Kris et al., 2011; Digiacoimo et al., 2012) increasing the concentration of VLDL-C in the liver, which translates into LDL-C, leading to high concentration and leading to serious complications such as sclerosis and 70% of the cholesterol is LDL-shaped so when given high cholesterol diets lead to high LDL-C (Aben et al., 2009; Jone et al., 2009; Sjovall et al., 2010)

The role of unsaturated fatty acids is to regulate fat disorders by reducing the concentration of cholesterol and (TG) and reduce the oxidation of LDL-C) and thus reduce the production of (VLDL-C) in the liver and reduce its concentration in serum (Sjovall et al., 2010) Consistent with the study conducted by (Leeu et al., 1997) on meat breeds exposed to thermal stress, which led to a significant increase in the concentration of high-density protein and a significant reduction in cholesterol and triglycerides and the concentration of low-density protein (Leeu et al., 1997).

### Conflict of Interest

The author hereby declares no conflict of interest.

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The author declares that they have no funding support for this study

### Ethical Considerations

The study was approved by the institutional ethical committee

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