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Beneficial effects of Omega3 fish oil On health of young adults

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Abstract: This study was aimed at describing the beneficial effects of Omega3 fish oil on health of young adults. The study included 40 young adult males that were divided to two equal groups. The control group (n=20) ingested placebo once daily for 8 weeks, experimental group (n=20) ingested 2000 mg Omega3 daily for 8 weeks. 10ml blood was withdrawn for analysis of clotting tests, lipograms, oxidant and antioxidant together with cortisol and serotonin hormones. Results indicated that Omega3 fatty acids induced positive results in clotting, hormonal, MDA and GSH, SOD, also lipograms variables. In conclusion:Omega3 may be useful in prevention of some cardiac disorders, improving clotting process, decrease stress, improving mood and induce beneficial effect on health, immunity of younger adults.

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Key words: Younger adults, Omega3, fish oil, general health, cortisol, serotonin.

1. Introduction:

Fish oil (Omega3) is a polyunsaturated fatty acids affecting many dangers diseases including atherosclerosis and may induced beneficial effect in some cardio vascular diseases such as myocardial infarction (Dewailly et al., 2002; Du et al., 2022) administration of cod liver oil induced important changes in fatty acid of plasma, and platelets (Lorenz et al., 1983), (Needleman et al., 1979) added that fish oil may induce replacement of Omega6 by Omega3 in platelets phospholipids.

Also, fish oils can treat Rheumatic arthritis, inflammation, immunity disorders and diabetes (Heller et al., 2002; Will 2020) reported the important action of Omega3 in health and disease.

Goodnight et al. (1981) recommended the dose of Omega3 fish oil 2000 mg contains: Omega3 1400mg, (DHA) 1000 mg + EPA 300 mg, one dose oral administration for 2 months, Omega3 benefits to improve general health, treatment of hypertension, heart diseases, hyper-cholesterol in the blood, arthritis, Rheumatoid, as a supplement for athletes and old ages and for menopause women (Zhu, et al., 2022). Also for mental health improvement. (Goodnight et al, 1981) also reported that Omega3 fish oil may induce side effects for those reported to have non-regular heart beat or those using drugs affecting bleeding, or during menstruation, Omega3 may induce headache, dry mouth or affecting those sensitive to fish, bleeding noses and gums.

Fish oils with ω-3 fatty acids (also known as n-3) come from a cod liver, whale blubber and seal blubber. There are two groups of ω-3 PUFAs, those with short chain length (18 carbon atom or less) and those with a long chain length (20 carbon atoms or more). This is an important difference because the body needs the long chain ω-3, but doesn't seem to have any direct use for the short chain versions. The body needs an outside source of ω-3 long chain version. Most of the long chain ω-3 poly-unsaturated is formed by algae, plankton and planktonic Crustacea located at the bottom of the marine food chain. They are the passed up the food chain into higher fish (Mason, 2000; Liu et al., 2022).

Moreover, fish oils are rich in EPA and DHA (long chain PUFAs), EPA also sometimes called timnodonic acid and considered the major ω-3 poly-unsaturates in most seafood. The second most abundant long chain ω-3 poly-unsaturate is DHA which is most abundant in certain fish, such as tuna, but in most fish it is present to a lesser extent than EPA. It has a role as a major structural component of the brain, the nerve and brain development (Mason, 2000).

Free radicals are atoms or molecule with at least one unpaired electron, under normal conditions, an equilibrium exists between reactive oxygen species and antioxidants. The over production of ROS in cells induce an imbalance between pro-oxidants and antioxidants (Jea and Shinde, 2005).

In case of glutathione (gSH), SH is the business part of the molecule and indicate the sulfhydryl group, and glutathione is an important defense mechanism against some toxic compounds, such as drugs and carcinogens. Glutathione has other important functions in cells, it participates in the decomposition of toxic hydrogen peroxide, and is an important intracellular

reductant, helping to maintain essential SH groups of enzymes in their reduced state (Abdel Rahman et al, 2006).

Aim of the study:

This study was aimed at describing the beneficial effects of Omega3 fish oil on Heath of young adults by the following:

- Blood clots for bleeding process.
- Lipograms as a marker of cardiac health.
- Oxidant and antioxidant for immunity.
- Hormones for stress and mood effects.

2. Materials and methods:

Subjects:

Forty participants of male young adults at Mansoura University ages 18 to 22 years.

Acted as the subjects of the study. They were free from diseases, healthy, they didn't receive medications or supplements. They were divided to two equal groups. Group (1) as control (n=20), they trained regularly for years and received placebo once daily for 8 weeks. Group (2) they trained regularly for years and received Omega3 fish oil 2000mg once daily for 8 weeks. Time of the study achievement from 01.07 to 31.08.2022.

Sample collection and assay: 10ml of venous blood were collected from all fasting subjects into a plain tube, let to stand to clot and serum was separated in aliquots after centrifugation, and stored at (-20°c) until analysis.

Methods:

- MDA assay according to (Deniz et a.l, 1997).
- Cholesterol assay using the method of Richmond's (1973).
- HDL assay using the method of (Brustein et al., 1970).
- LDL assay using the method of (Fruchart, 1982).
- TG assay usingn the method of (Fossati and Principle, 1982).
- Cortisol assay using the method of (Raff et al, 2003).
- Serotonin assay using the method of (Harenberg et al., 2000).
- gSH assay using the method of (Paglia and Valentine, 1967).
- SOD assay using the method of (Li, 2021).
- Platelets count using the method of (Ronlet et al. 1992).
- Prothrombin time using the method of (Moll and Ortel, 1997).
- Clotting time according to (Guyton, Hall, 2006).
- Bleeding time according to (Guyton, Hall, 2006).

Blood sample collection of the control (1) and the experimental group (2) pre and post experiment.

Statistics analysis:

The SPSS was used for data analysis; quantitative data were analyzed by the student tests for comparison between two groups. Data were represented as mean ±SD P values were significant $P < 0.05$.

3. Results

Table (1): show the basic characteristics of the control and experimental group.

Table (2) there is significant increased serotonin concentration, while cortisol significantly decreased post Omega3 fish oil administration compared to control.

Table (3) there is significant decreased MDA, while gSH, SOD increased significantly post Omega3 fish oil administration.

Table (4) there is significant decreased cholesterol, LDL, TG while HDL increased significantly post Omega3 fish oil administration.

Table (5) there are significant increased platelets, bleeding, clot and PT post Omega3 fish oil administration.

Table (1): Basic characteristics of the control and experimental group, N=40

Variables	Control	Experimental	Sig
	M±SD	M±SD	
Age (y)	20.3±2.9	19.9±3.6	NS
Weight (kg)	78.1±3.1	77.6±2.5	NS
Height (cm)	176.5±4.7	175.8±4.5	NS
BMI	22.1±1.3	22.3±1.4	NS

$P < 0.05$

Table (2): Serotonin and cortisol levels pre-post Omega3 and placebo ingestion

Variables	Control		Experimental	
	Pre	Post	Pre	Post
	M±SD	M±SD	M±SD	M±SD
Serotonin ng/ml	157.2 ±8.5	160.1 ±7.6	162.2 ±9.3	219.8 ±12.2*
Cortisol ug/dl	20.9 ±3.2	21.3 ±3.1	21.4 ±3.4	16.3 ±3.5*

$P < 0.05$

Table (3): Oxidant and antioxidants pre-post Omega3 and placebo ingestion

Variables	Control		Experimental	
	Pre	Post	Pre	Post
	M±SD	M±SD	M±SD	M±SD
MDA mmol/ml	2.24 ±0.18	2.5 ±0.16	2.21 ±0.17	1.2 ±0.13*
gSH ng/dl	23.1 ±1.16	22.9 ±1.13	24.1 ±1.15	41.3 ±3.4*
SOD mmol/ml	4.5 ±0.23	4.7 ±0.11	4.6 ±0.31	7.6 ±0.6*

$P < 0.05$

Table (4): Lipogram in control and experiment groups pre-post Omega3, placebo ingestion

Variables	Control		Experimental	
	Pre	Post	Pre	Post
	M±SD	M±SD	M±SD	M±SD
Cholesterol (mg/dl)	198.3 ±8.7	202 ±8.6	201 ± 8.8	178 ±10.3*
HDL (mg/dl)	44.1 ±7.3	44.8 ±7.6	45.6 ±6.8	53.4 ±8.3*
LDL (mg/dl)	175.3 ±11.7	177.2 ±10.2	173.2 ±10.5	158.1 ±8.3*
TG (mg/dl)	154.2 ±9.6	156.2 ±10.1	158.3 ±9.6	128.4 ±8.7*

$P < 0.05$

Table (5): Blood clot changes in control (G1) and experimental (g2) pre-post experiment

Variables	Control		Experimental	
	Pre	Post	Pre	Post
	M ±SD	M±SD	M ±SD	M±SD
Platelets (10^3/ul)	208.3 ±8.8	207.2 ±9.2	209.1 ±8.6	214.9 ±10.3*
Bleeding time (min)	2.30 ±0.2	2.5 ±0.4	2.35 ±0.5	4.6 ±0.6*
Clot time (min)	6.7 ±0.5	6.6 ± 0.5	6.5 ±0.6	7.8 ±0.7*
PT (sec)	13.2 ±0.1	13.6 ±0.2	12.9 ±0.6	14.8 ±0.8*

$P < 0.05$

4. Discussion

Sports supplements are part of the integrated nutrition approach, scientific studies show that in addition to the benefits of maintaining proper health, physical and mental performance can be enhanced with sports nutrition supplements.

Table (2) shows that Omega3 supplement significantly increased serotonin compared to control group. This indicates the impact of Omega3 on central nervous system leading to elevation of serotonin which in-turn induce improvement in mood and reduces the sensation of pain affecting young adults.

Researchers supported the view that Omega3 maintain mental and nervous health which relieves moderate depression, elevate mood (Hatfield, 2013).

The decreased cortisol post Omega3 indicated suppression of stress. (Murray et al., 2006) reported that cortisol is essential for adaption to severe stress and the change in concentration may be life straitening, and complications. But physiological increased cortisol may be beneficial to health and immunity.

Guyton and Hall (2006) added that cortisol stimulates gluconeogenesis, decrease glucose utilization, and cellular protein, mobilize fatty acid and shift the metabolic system of the body from glucose to fat utilization during stress.

Table (3) reported that there are significant changes expressed by significant decreased Malondialdehyde and significant increased superoxide dismutase meaning that fish oil administration for 8 weeks decreased.

Free radicals while increasing antioxidant and benefit health and immunity of the experimental group. This result is in accordance with that of (Yoshino, Ellis, 1987), (Kobyliak et al, 2018) and (Nutra, 2021). (Guyton and Hall, 2006) added that free radicals may be harmful to tissues due to stresses exercises or radiations.

Glutathione peroxidase (Table 3) showed a significant decreased concentration in case of the experimental group (Good Night et al, 1981) demonstrated that Omega3 may possess diverse pharmaceutical activities: included antioxidant and anti-inflammatory effect. (Chatter Jea, Shinde, 2005) added that Omega3 is used as a stimulant agent for the immune system, which might induce infection resistance.

Deniz et al. (1997) reported the mechanism of action of glutathione peroxidase in protecting RBCs against hemolysis, as oxidized glutathione (GSSG) is reduced to reduce glutathione (2G-SH) catalyzed by glutathione reductase, in turn reduced glutathione removes H2O2 from the RBCs in reaction catalyzed by glutathione peroxidase, the enzyme acting as natural antioxidant, that attack peroxides and H_2O_2, also glutathione peroxidase affect incidence of cancer due to its content of selenium.

The antioxidant superoxide dismutase can destroy the superoxide ions, and the function of SOD is to protect aerobic organism against the potential deleterious effects of superoxide anion, also SOD uses oxygen as a substrate converting it into H_2O_2, which can be used by antioxidants such as glutathione peroxidase. This denotes the beneficial action of fish oil as health promoter and immunity stimulant (Murray et al, 2006).

Table (4) revealed that the fish oil consumption induce a significant decrease in Lipogram, in the data measured, T. choleterol, LDL and TG, while HDL increased significantly compared with the control group. The reduction in tested lipogram help in weight control and may be beneficial to the cardiovascular system and may other organs in the body.

This result was also reported by other investigators including (Wong et al., 1985). Soha (1981) and Barbie (2020) using different methods such exercise, supplements and probiotic (Soha, 2018) added that the ingestion of special diets, low in calories with high fibers and exercise may decrease weight and other parameters of lipogram, she also indicated that the positive relation between the high levels of fat, especially triglyceride and cholesterol levels in the blood as the rise in body fat causes increased concentration of triglycerides, which leads to high cholesterol and thus increase the risk of

inducing cardiovascular diseases and the researchers recommended to limit the consumption of saturated fat to the unsaturated fat with some supplements such as Vitamins or Omega3 fatty acids.

The reduction of triglycerides observed in the study may be due to the suppression of hepatic fatty acids and triglyceride synthesis, and Omega3 fish oil can affect the secretion of VLDL from the liver and may enhances B-oxidation of fatty acids in the liver (Wong et al., 1985). While the reduction of LDL may be explained by alteration in the membrane lipid composition which enhanced hepatic LDL receptors function and clearance (Kuo et al., 1990). However, the increase in HDL Observed in the study may be related to variation in apolipo protein production. Rates and is seen as positive results (Fernandez et al., 1992).

The present study revealed a significant change in blood clot (Table 5) including platelets counts, bleeding time, clot time and prothrombin time (PT) after 8 weeks of fish oil ingestion, these results are parallel to the studied reported by Hornstra (1982) Heemsherk et al. (1995); Heller et al. (2002).

The prolongation of bleeding and clot times may be due to the increased levels of Omega3 fatty acids in plasma and platelets wall which compete with arachidonic acid and resulted in the formation of TXA and PG1, leading to decrease platelets ability to form thrombus (Lorenz et al., 1983).

While the prolongation of PT may be attributed to the reduction of some clot factors such as factor VIII and X (Le Ray et al., 2001).

The increased times reported in this study of PT and bleeding together with clot time was contradicted by (Niewen Huys et al, 1998,2001) following fish oil supplementation. Also (Lichtenstein and Chobanian, 1990) reported a reduction in platelets counts following fish oil consumption.

There are evidence that people like Eskimos have a lower incidence of thrombosis, coronary heart diseases and myocardial infraction compared with Europeans and Middle East people, as the content of n-3 PUFA's contained in fish oil, specially EPA was increased in thrombocytes of Eskimos until now, numerous studies have been carried out to clarify the anti-inflammatory properties of Omega3 (Roulet et al, 1997l; Shen et al., 2022). Sirois (1995 added that the hemostatic evaluations are necessary to detect the presence of any pathological changes in the hemostatic ability. The laboratory tests of clot, bleeding time, PT with platelets counts are very important to understand the incidence of clotting.

Conclusion

From the obtained results it could be concluded that long term Omega3 fish oil ingestion may be beneficial in some cardiac disorders, reduce weight as it reduces lipogram and increases HDL. And may be used postoperative as it decreases the risk of thrombosis, also Omega3 may decrease stress and elevate mood together with stimulate immunity and general health.

References

[1]. Abdel Rahman, A, El Deeb, A and Hussein, E, 2006. Elimination of toxic compounds and nutritional elevation On Jojoba meal protein. EJBMB, 24:583.

[2]. Barbie, C. 2020. The health benefits of Bifidobacterium. Very well health.com

[3]. Burstein, M., Scholinck, H., and Marfin, R. 1970. Determination of serum HDL. Lipid researc11:583

[4]. Jea, C. and M., Shinde, R., 2005. Text book of Medical Biochemistry JAYPEE

[5]. Deniz, S., Arzu, S., Figen, I., 1997. Lipid peroxidation and antioxidant status in experimental Animal effect of aging and hyper-cholesterol mic diet Clin chin Acta 265:77

[6]. Dewailly E., Blanchet, C., Gingras, S., 2002. Cardiovascular disease risk factors and n-3 fatty acids Status in adult population. Am. J. clin Nuti. 76:85.

[7]. Doaei, S., Gholami, S., Rastgoo, S. et al., 2021. The effect of omega-3 fatty acid supplementation on clinical and biochemical parameters of critically ill patients with COVID-19: a randomized clinical trial. J Transl Med 19, 128

[8]. Du, Q., Zhou, L., Li, M., Lyu, F., Liu, J., & Ding, Y., 2022. Omega-3 polyunsaturated fatty acid encapsulation system: physical and oxidative stability, and medical applications. Food Frontiers, 3, 239– 255.

[9]. Fernandez, M., Lin, E., Mc Namara, D., 1992. Differential effects of saturated FA on LD metabolism In Guinea pig. J lipid Res. 33:1833.

[10]. Fossati, P., and Prenciphe, L., 1982. Determination of serum triglycerides Clin chem 28:207.

[11]. Fruchart, J., 1982. Determination of serum cholesterol Rev. Fr. Des. Lab 103:7

[12]. Goodnight, S., Harris, W., Connor, W., 1981.The effects of dietary Omega3 fatty acids of platelet Composition and function in man blood 58:880

[13]. Guyton, A., Hall, J., 2006. Text book of Medical Physiology El Sevier, Saunders

[14]. Harenberg, J., Huhle, G., Giese, C., 2000. Serotonin using EIA in the diagnosis of thrombocytopenia Bri. J of Hematology 109,182.

[15]. Hatfiled, F., 2013. Fitness: the complete guide.ISSA, USA.

[16]. Liu, H., Feng Wang, Xiaosong Liu, Yulan Xie, Hui Xia, Shaokang Wang, Guiju Sun., 2022.

Effects of marine-derived and plant-derived omega-3 polyunsaturated fatty acids on erythrocyte fatty acid composition in type 2 diabetic patients. Lipids in Health and Disease 21:1

[17]. Heemskerk, J., Feige, M., Simonis, M., 1995. Effects of dietary fatty acids on signal transduction and cholesterol content in platelets Biochem. Biophysi Acta 1255.

[18]. Heller, A., Fischer, S., Koch, T., 2002.Impact of n-3 fatty acid supplementation on Hemostasis patterns after major abdominal surgery Br. J., Nutr 87:95.

[19]. Hornstra, G., 1982.Dietary fats, prostanoids and arterial thrombosis Nijhoff publ.

[20]. Kolyliak, N., Abenavoli, L., Dynnyk, O., 2018. Beneficial effects of probiotic with Omega3 fatty Acids in NAFLD Minerva Med. 109(6): 418.

[21]. Kuo, P., Weinfeld, M., Loselzo., J., 1990. Effect of membrane fatty acids composition On LDL in hepatocytes. Biochem. 29,6626.

[22]. Le Ray, C., Wiesel, M., Freund, M., 2001.Omega3 fatty acids affect rat coagulation factors Dependent on Vit K Arterioscler. Thromb. Vasc. Biol. 21:459.

[23]. Li, M., 2021.Brachyury engineers cardiac repair component stem cells Stem cells trans L Med. 10:385.

[24]. Lichtenstein, A., and Chobanian, A., 1990. Effect of fish oil on athero-genesis in hyperlipidemic rabbit Arterio sclerosis 10:597.

[25]. Lorenz, R., Spengler, U., Fischer, S., 1983. Platelet function, thromboxane formation and blood pressure during supplementation with cod liver oil 67:504.

[26]. Mason, P., 2000. Fish oil an update the pharm, J, 265:720.

[27]. Moll ,S and Ortel, l 1997, Monitoring wayfaring therapy in patients with lupus anticoagulant ANN.Int Med 127:177

[28]. Murray, R., Granner, D., Mayes, P., 2009.Harpers biochemistry A Lange medical book

[29]. Needleman, P., Raz, A., Sprecher, H., 1979. Prostacyclin and thromboxane biogenesis and unique biological properties Proc nat Acad Sci 76:944.

[30]. Nieuwenhuys, C., Beguin, S., Emeis, J., 1998 Hypocoegulant and lipid lower effects of n-3 with Unchanged platelets activation Arteriosiler. Thromb. Vasc. Boil. 18:1480.

[31]. Niew Wenbuys, C., Vermeer, C., Beguin, S., 2001. VIT K dependent and VIT K in0 independent hypo coagulant Effects of dietary fish oil in rats. Thromb res. 104:137.

[32]. Nutra, 2021. Probiotic and Ubi quinol: an immune support and heart health duo Nutra ingredients Asia.com

[33]. Paglia, D., Valentine, W., 1967. Quantitative and qualitative characterization of Glutathione peroxidase J lab clin med 70, 158

[34]. Raffi, H., Homar, P., Skoner, D., 2003. New enzyme in immune assay for salivary cortisol Clin chem 49:203.

[35]. Richmonds, W., 1973. Determination of serum cholesterol Clin chem 19:1350.

[36]. Roulette, M., Frasca Rolo, P., Chapuis, G., 1997. Effects of intravenously unfused fish oil on platelets Fatty acid phospholipid composition and on platelets Function in post operative trauma J par Ent Nutri. 21:296.

[37]. Shen S, Gong C, Jin K, Zhou L, Xiao Y, Ma L., 2022. Omega-3 Fatty Acid Supplementation and Coronary Heart Disease Risks: A Meta-Analysis of Randomized Controlled Clinical Trials.

[38]. Sirois, M., 1995. Clinical laboratory procedures Mosby, New York.

[39]. Soha, A., 2018 The role of metabolic genes (Leptin, adiponectin PPARY) In weight loss and athletic program phD in physical education, El Sadat Univ.

[40]. Will, C., 2020.Probiotic- Omega3-3 blend may tackle diabetes, other Inflammatory disorders Nutra ingredients.com

[41]. Wong, S., Reardon, M., Nestel, P., 1985.Reduced triglyceride formation from long Chain fatty acids Metabolism 34:900.

[42]. Yoshino, S., Ellis, E., 1987. Effects of fish oil on inflammation and immunity Arch allergy, appl. Immunol 84:233.

[43]. Zhu, G., Zhou, S., Xu, Y. et al., 2022. Mendelian randomization study on the causal effects of omega-3 fatty acids on rheumatoid arthritis. Clin Rheumatol 41, 1305–1312 .

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