EFFECT OF OMEGA 3 AND FISH OIL ON SOME PHYSIOLOGICAL AND ANTIOXIDANT PARAMETERS IN MALE RABBITS

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Abstract: The current study aimed to investigate the effects of Omega 3 and fish oil on some physiological and antioxidant parameters in Male rabbits. Twelve male rabbits adult and divided into two groups, group 1 (G1) received 0.2 ml/kg B.W Omega 3 orally for 4 weeks and group 2 (G2) revived 0.2 ml/kg B.W fish oil orally for 4 weeks. Blood collected from G1 in pretreated period and served as control for G1 and G2 also blood collected in zero day of the experiment and used as control for G2 (pretreated period). The blood collected without anticoagulant and serum separated for biochemical and antioxidant parameters measurement. The results showed a significant (P ≤ 0.05) decrease in Superoxide dismutase (SOD), Glutathione peroxidase (GPX) and Malondialdehyde (MDA) in Omega3 treated group as compared with control (pretreated period). The current results clarified there was no-significant (P ≤ 0.05) difference in Catalase (CAT) and significant (P ≤ 0.05) increase in Glutathione (GSH) in Omega 3 treated group as compared with control group. The vitamin C decreased significantly (P ≤ 0.05) in Omega 3 group as compared with control with no-significant (P ≤ 0.05) increase or decrease in vitamin E concentration. There was no-significant (P ≤ 0.05) increase or decrease in total protein concentration, Albumin and globulin in Omega 3 treated group as compared with control. The rabbits received fish oil orally daily for four weeks clarified a significant (P ≤ 0.05) decrease in SOD, GPX, MDA, and Vitamin C as compared with control. While there was significant (P ≤ 0.05) increase in GSH as compared with control and there was no-significant (P ≤ 0.05) change in CAT activity and Vitamin E concentration as compared with control. Also the fish oil treated group revealed that there was no-significant (P ≤ 0.05) change in total protein concentration, Albumin and globulin as compared with control.

Keywords: Omega 3, Fish oil, MDA, GSH, SOD, total protein

I. Introduction

Omega-3 is a long-chain of Polyunsaturated fatty acids (PUFA), including Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA), are dietary fats had an important health benefits (1). They are incorporated in many parts of the body including cell membranes (2). It is play a role in anti-inflammatory and in viscosity of cell membranes (3, 4). The EPA and DHA are essential for proper fetal development and healthy aging (5). Omega 3 had important role in key antioxidant enzymes and pro inflammatory mediator antioxidants (6). Fish oil and omega 3 had cardio protective roles including anti-inflammatory, vaso-dialating, anti arrhythmic and antioxidant properties (7, 8). The fish oil are an effective diet for patient with
ulcerative colitis, prevent the accumulation of leukotriene on the colon, useful in treating arthritis in cancer people chemotherapy treatment and effective in improving quality of life. Fish oil is one of the best sources of essential EPH, DHA (9).

Essential vitamins that cannot be synthesized within our body lack enzymes required to make them so they must be acquired through diet from plant or animal sources small quantities for heath benefit cellular metabolism and normal physiological functions (10, 11).

The phospholipids in the brain the main PUFA derived from Lenolic acid, α Linolinic acid, Archidoric acid and DHA. So that it is important in neural function (12).

Fish oil and Omega 3 is very useful for pregnancy, it help in the development of eye and brain and the women with insufficient EPA and DHA in their diet suffer from depression after birth. There is a probable role of free radicals in development and progress of many disorders including rhomatoid arthritis diabetes, cancer and Asthma (10).

The current study aimed to explain the effect of Omega3 and fish oil on antioxidant status and measurement of total protein albumin and globulin concentration in Omega 3 and fish oil treated animals.

II. Materials and Methods

The fish oil was prepared from valamugil seheli known as Mullet fish where fish cleaned and removed the scales then it was put in oven at less than 60°C to get oil. Oil was collected into test tubes, while Omega3 was purchased from local pharmacy of Vitex pharmaceutical in Australia (1000mg/tablet).

Experimental Animal

Twelve male rabbits adult (1400-1800g) were kept in the animal house of department of biology at the college of science for women, university of Baghdad. The animals were housed for two weeks for adaptation. They were housed in cages in a room with controlled temperature and humidity and under hygienic conditions. Animals were maintained on natural 12h light and 12h dark cycle, received a balanced diet pallets water adlibitium throughout the experimental period. Rabbits were divided into Two groups, group one (G 1) and group two (G 2). Before starting the experiment blood collected from G1 and G2 groups without anti-coagulant and serum separated for biochemical study. G 1 intubated orally Omega 3 in a dose 0.2 ml/kg B.W. G 2 intubated orally fish oil in a dose 0.2 ml/kg B.W. The experiment continued for four weeks and at the end of the experiment the blood collected after overnight fasting from G 1and G 2.

Blood Sampling

Blood samples was collected kept in gel clot activator tubes and then serum was separated from coagulant blood centrifugation at 5000 rpm for 10 minutes and stored at -20°C for study the following parameters, antioxidant parameters including SOD according to (13), GPX according to (14), CAT according to (15), MDA according to (16), GSH according to (17), Vitamin E according to (18), Vitamin C according to (19), total protein measured according to (20) Albumin measured according to (21) and globulin measured by the ( Total protein – Albumin = globulin concentration).

Statistical Analysis

The statistical analysis system (22) was used to compare the effect of Omega 3 with control and fish oil with control with significant (P ≤ 0.05) for the studied parameters.
III. Results and Discussion

The results of our study explained that there was a significant (P ≤ 0.05) decrease in SOD, GPX, MDA concentration and there was significant (P ≤ 0.05) increase in GSH in omega 3 treated animals as compared with control, Which proved antioxidant activity of Omega 3 that there was no-significant (P ≤ 0.05) increase or decrease in Vitamin E and Catalase in Omega3 treated animals as compared with control. As shown in table (1).

| Table 1. The effect of Omega 3 on antioxidant parameters in male rabbits |
|--------------------------|----------------|-----------------|----------------|-----------------|-----------------|
|                         | µ / L µ / ml µ / ml µ m µ M Nano mole/L Nano mole / L | | |
| Groups                  | SOD GPX CAT GSH MDA Vit C Vit E | |
| Control                 | 2.16 ±0.09 A 1.86 ±0.07 A 0.753 ±0.03 A 8.26 ±0.12 B 0.435 ±0.20 A 20.13 ±0.82 A 8.53 ±0.27 A |
| Omega 3 treated group   | 1.77 ±0.05 B 1.21 ±0.01 B 0.670 ±0.02 A 9.03 ±0.10 A 0.176 ±0.01 B 17.76 ±0.86 B 8.93 ±0.20 B |
| LSD value               | 0.239 * 0.172 * N.S 0.365 * 0.056 * 2.216 * N.S |

- Values expressed as mean ± SE.
- N = 6 rabbit in each group.
- C=Control, SOD = Super oxide dismutase, GPX = Glutathione peroxidase, CAT = Catalase, GSH = Glutathione, MDA = Malondialdehyde, Vit C = Vitamin C, Vit E = Vitamin E and N.S Non-significant.

The results explained that Omega 3 have antioxidant activity in animals receiving Omega 3 as compare with control. The decrease in SOD is a good indicator that Omega 3 hat antioxidant activity because SOD activity act as cancer promoter if it is increased (23), also there was increased in GSH in Omega 3 treated animals because Omega 3 recently documented to suppress pro oxidant activity by up regulating genes encoding for protective antioxidant important in maintaining redox homeostasis and also GSH is also involved in apoptosis detoxification and modulation in cell proliferation and essential in the antioxidant activity (24 , 25).

Also decreased in the Malondialdehyde concentration which is an indicator of oxidative stress (Lipid peroxidation) significantly that proved antioxidant activity of Omega 3. There was no-significant (P ≤ 0.05) increase or decrease in serum total protein, albumin and globulin concentration in Omega 3 treated animals as compared with control as explained in table (2).
Table 2. The effect of omega 3 on total protein, albumin and globulin concentration

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total protein</th>
<th>Proteins</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T.P</td>
<td></td>
<td>Albumin</td>
<td>Globulin</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>7.86 ±0.06</td>
<td>4.20 ±0.11</td>
<td>3.66 ±0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omega 3 treated</td>
<td>8.03 ±0.04</td>
<td>4.15 ±0.07</td>
<td>3.96 ±0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD value</td>
<td>0.184</td>
<td>0.303</td>
<td>0.387</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Values expressed as mean ± SE.
- The different letters in the same column are significantly different.
- N.S = no-significant.

The results explained that fish oil treated animals was decreased significantly (P ≤ 0.05) in SOD, CAT and significantly (P ≤ 0.05) decrease of oxidative stress that was represented in lipid peroxidation malondialdehyde (MDA), but there was significantly (P ≤ 0.05) increase in GSH and Vit E concentration, while there was no-significant (P ≤ 0.05) changes in GPX as compared with control. As explained in table (3).

Table 3. The effect of fish oil on antioxidant parameters in male rabbits

<table>
<thead>
<tr>
<th>Groups</th>
<th>SOD</th>
<th>GPX</th>
<th>CAT</th>
<th>GSH</th>
<th>MDA</th>
<th>Nano mole /L Vit C</th>
<th>Nano mole /L Vit E</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3.50</td>
<td>2.06</td>
<td>0.836</td>
<td>8.98</td>
<td>0.393</td>
<td>20.10 ±0.41</td>
<td>8.53 ±0.21</td>
</tr>
<tr>
<td>Control</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Fish Oil treated</td>
<td>2.60</td>
<td>1.84</td>
<td>0.700</td>
<td>10.63</td>
<td>0.150</td>
<td>17.76 ±0.94</td>
<td>9.30 ±0.10</td>
</tr>
<tr>
<td>group</td>
<td>±0.24</td>
<td>±0.07</td>
<td>±0.02</td>
<td>±0.25</td>
<td>±0.01</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>LSD</td>
<td>0.74 *</td>
<td>N.S</td>
<td>0.254</td>
<td>0.074 *</td>
<td>0.952 *</td>
<td>0.039 *</td>
<td>2.295 *</td>
</tr>
</tbody>
</table>

- Values expressed as mean ± SE.
- The different letters in the same column are significantly different.
- N.S = no-significant.

The fish oil was considered unique fats because they are rich sources of PUFA, EPA and DHA which had beneficial health effects including anti-inflammatory and antioxidant properties by decreasing Malondialdehyde an indicator for oxidative stress of Lipid peroxidation. Also decreased significantly of SOD that was a cancer promoter (23) and the antioxidant activity by increasing glutathione concentration that play an important role in protecting cells from oxidative stress (25, 26).
There was no significant (P ≤ 0.05) increase or decrease in total protein, albumin and globulin concentration. As shown in table (4).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total protein g/dL</th>
<th>Albumin g/dL</th>
<th>Globulin g/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>7.87 ± 0.59</td>
<td>4.36 ± 0.21</td>
<td>3.74 ± 0.25</td>
</tr>
<tr>
<td>Fish Oil treated group</td>
<td>8.36 ± 0.04</td>
<td>4.26 ± 0.17</td>
<td>4.10 ± 0.17</td>
</tr>
<tr>
<td>LSD Value</td>
<td>1.339</td>
<td>0.599</td>
<td>0.680</td>
</tr>
</tbody>
</table>

- Values expressed as mean ± SE.
- The different letters in the same column are significantly different.
- N.S = no-significant.

References

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