CO-ACTION OF PROBIOTIC AND OMEGA-3 IN ESTIMATION THE INTEGRITY OF VITAL ORGANS OF FEMALE COLLEGE STUDENTS

RYEAAN A.M ABDEL RAHIM

Asst. Prof., Faculty of Specific Education, Department of Home Economics- Port-Said Univ. Egypt
E-mail: skyroad6@gmail.com

Abstract - Probiotics and Omega-3 fatty acids are supplements that are believed to provide health benefits. The use of both supplements make it possible to augment the health benefits. The object of the study is to access the co-action effects of Probiotics and Omega-3 fatty acids in estimation the integrity of vital organs of female college students. The study included 60 female college students divided to three groups. 20 female college students, aged between (19-21y.), administrated placebo once daily for 8 weeks, acted as control group (g1), Group2, included 20 female college students aged between (18-21y.) ingested Bifidobacterium in encapsulated tablets(CFus) 40 billion and Omega-3 fatty acids (1500 mg combined EPA and DHA) once daily for 8 weeks, Group3 included 20 obese female college students aged between (18-21y.) ingested Probiotics and Omega-3 once for 8 weeks to estimate the integrity of vital organs, some blood collection from venous blood for biochemical testing of blood cells, blood coagulation, MDA, SOD, liver function tests, glucose, CPK, cortisol, NO and lipogram.

Results: Revealed that Probiotics and Omega-3 fatty acids induced significant changes in blood clotting, and induced significant change in oxidant and antioxidant, liver function tests, lipogram glucose, cortisol level together with CPK and NO in case of healthy female college students and obese one.In conclusion: probiotic and omega_3 fatty acids have been shown to be immunostimulants that affect positively the vital organs namely, liver, heart, brain and included muscles, through elevating blood cell counts, enzymes activation, stimulation of blood flow and suppress stresses. Also, both supplements could be recommended as a feed additive for enhancing disease resistance, induce health vital organs, and help reduce obesity.

Keywords - Probiotics and Omega-3, Vital Organs, Lipogram, Female College Students.

I. INTRODUCTION

Omega(3) is a polyunsaturated fatty acid, these fatty acids affect risk factors related to atherosclerotic and thrombotic diseases (Connor, 2000), and beneficial in cardio-vascular diseases such arrhythmia, ventricular fibrillation, myocardial infarction, cardiac arrest and sudden death (Dewailly et al, 2002) also fatty acids Omega(3) may reduce the incidence of hypertension (Hornstra, 1982) also, Omega(3) administration may reduce hemostatic variables like platelets count, prolong bleeding time, (Tracy, 1999), and reduction in fibrinogen concentration (MC Intosh et al, 1985) . (Nathan Gray, 2015) reported that Omega-3 fatty acids and probiotic bacteria can induce a synergistic health benefits and such co-encapsulation contributes synergistically to the survival of bacteria and the oxidative stability of the Omega-3 fatty acids. bacterial cells provides better protection to the latter during the gastric simulation, as no viable cells of L-casei managed to reach the SGF when they were not protected. The co-microencapsulated bacterial cells survived better in SIF than the microencapsulated .The aim of the present study is to investigate the synergistic effect of probiotics and Omega-3 fatty acids in estimation the integrity of vital organs of female college students

II. MATERIAL AND METHOD- MATERIAL

1. Subjects

Sixty participants of female college students at Port-Said University aged 20.2±3.7 years were the subjects of the current study.

The participants were divided into three groups:

Group1: it included 20 female college students with age range (19-21y.), administrated placebo once daily for 8 weeks, acted as control group.

Group2: it included 20 female college students with age range (18-21y.), ingested Bifidobacterium encapsulated tablet (CFUs) 40billion and Omega-3 fatty acids (1500mg combined EPA and DHA) once daily for 8 weeks.

Group3: included 20 obese female college students (18-2y.) ingested probiotic and Omega-3 once daily for 8 weeks. BMI>30

2. Methods

Blood collection for coagulation experiments and biochemical assessment, 10ml of venous blood from fasting participants.

Pre-post experiment:

- Platelets count using hemo cytometer
- Bleeding time using disposable lancet to pierce the tip of the finger, assess the time of bleeding last (1-6 min
- Clotting time, collect blood in clean glass test tube, tip the tube back and forth every 30s until the blood clotted, average time of clotting 6-10 min.
- Prothrombin time (PT).
- Activated partial thromboplastin time (APTT).
- Malondialdehyde assessment
- Nitrite + Nitrate assessment
- Leucocyte, Neutrophil, Lymphocyte, monocyte determination using coulter counter.
- Super oxide dismutase detection colorimetric .
- AST and ALT using colorimetric method.
- Glucose assessment.
- Cortisol determination.
- Creatine phosphokinase determination .
- Varialbes determined in special lab .

III. STATISTICAL ANALYSIS

The data were analyzed using the statistical package for social science (SPSS), they are characterized by their mean and standard deviations. Students "t" test was used for statistical analysis of the results and value at 0.05 level is considered statistical significant

IV. RESULTS

Variables	Control Group (g1)		Exp. Group (g2)		Exp. Group (g3)	
	Pre	Post	Pre	Post	Pre	Post
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD
Ast (u/L.)	18.9 ± 5.1	19.2 ± 4.9	18.3 ± 4.7	16.2 ± 3.1*	23.9 ± 5.2	18.1 ± 3.5*
ALT (u/L.)	12.7 ± 2.5	13.2 ± 1.7	13.1 ± 2.6	10.5 ± 2.3*	22.9 ± 3.1	12.8 ± 2.4*
Glucose (mg/dl)	93.4 ± 2.6	91.9 ± 2.4	90.5 ± 2.3	78.5 ± 1.3*	99.7 ± 3.1	89.3 ± 2.7*
Creatine Kinase (u/L.)	158.4 ± 11.3	160 ± 10.4	163 ± 9.7	143 ± 9.1*	175 ± 10.3	163 ± 8.7*
Cortisol (ug/dl)	8.5 ± 0.8	8.2 ± 1.1	7.9 ± 1.2	6.3 ± 0.9*	19.8 ± 2.5	8.1 ± 1.7*
NO (u U)	28.3 ± 6.2	29.7 ± 5.1	31.5 ± 6.7	42.6 ± 7.7*	30.8 ± 8.1	37.5 ± 6.9*
B M I	25.6±2.1	25.3±1.9	26.4±2.2	24.7±2.4*	33.2±3.5	30.1±2.8*

Table(1) - Reported changes in some blood determinations of the control group(g1), experimental group(g2) and experimental group(g3) pre-post treatments of female college students.

Variables	Control Group (g1)		Exp. Group (g2)		Exp. Group (g3)	
	Pre	Post	Pre	Post	Pre	Post
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD
MDA (nmol/ml)	2.18 ± 0.18	2.3 ± 0.16	2.21 ± 0.15	1.1 ± 0.13*	2.25 ± 0.16	1.3 ± 0.14*
SOD (mmol/ml)	4.78 ± 0.17	4.6 ± 0.13	4.9 ± 0.22	6.13 ± 0.3*	4.8 ± 0.12	5.9 ± 0.2*

Leucocytes ($x10^3$ul)	5.2 ± 0.2	5.3 ± 0.3	5.4 ± 0.4	7.3 ± 0.6*	5.6 ± 0.5	6.8 ± 0.7*
Neutrophils($x10^3$ ml)	3.4 ± 0.3	3.5 ± 0.4	3.5 ± 0.5	5.4 ± 0.4*	3.6 ± 0.4	5.1 ± 0.3*
Lymphocytes($x10^3$ ml)	2.3 ± 0.09	2.4 ± 0.1	2.4 ± 0.2	3.6 ± 0.3*	2.5 ± 0.1	3.2 ± 0.2*
Monocytes($x10^2$ ml)	4.4 ± 0.2	4.6 ± 0.3	4.5 ± 0.5	5.8 ± 0.4*	4.6 ± 0.3	5.3 ± 0.4*

Table(2) - Changes in some immune variables of control group(G1), experimental group(G2), and (3) pre-post placebo and probiotics plus Omega-3 of healthy female college students and obese ones.

Variables	Control Group (g1)		Exp. Group (g2)		Exp. Group (g3)	
	Pre	Post	Pre	Post	Pre	Post
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD
Platelets count(10^3/ul)	212 ± 10.3	213 ± 9.8	215 ± 13.1	214 ± 14.6	214 ± 11.2	216 ± 15.4
Bleeding time(min)	2.4 ± 0.07	2.38 ± 0.09	2.39 ± 0.06	4.42 ± 0.05*	2.41 ± 0.08	4.42 ± 0.07*
Clotting time(min)	6.52 ± 0.06	6.56 ± 0.03	6.46 ± 0.04	8.5 ± 0.09*	6.48 ± 0.07	8.51 ± 0.08*
PT (sec.)	12.32 ± 0.14	12.4 ± 0.95	12.41 ± 0.96	14.5± 0.17*	12.35 ± 0.18	14.4 ± 0.98*
APTT(sec.)	18.3 ± 0.03	18.4 ± 0.24	18.2 ± 0.07	19.9 ± 0.26*	18.4 ± 0.25	20.5 ± 0.26*

Table(3) - Changes in some blood coagulation of the control group(1) and experimental group(2) and group(3) pre-post placebo and probiotic plus Omega-3 of female college students.

$P < 0.05$

PT= prothrombin time

APTT= activated partial thromboplastin time

V. DISCUSSION

Table(1) shows that transaminase levels (AST, ALT) significantly decreased following the combined probiotic and fish oil treatments. Aminotransferases enzyme are intracellular enzymes involved in amino acid or carbohydrate metabolism. They are present in high concentration in muscle and liver, there elevations are indication of disease in the tissues, and the decreased levels within physiological limit may be a benefit and healthy acting muscle and liver (Burns et al, 1996) and (Tawadrous et al, 2001) demonstrated that increased ALT, AST activities may be seen in case of diseases such obesity which indicated the increase risk of liver disease. This result is in accordance with that of obese students reported in table(1).(Abdel Rahman et al, 2006) reported that amino transfers catalyze the transfer of an amino group from anα – amino acid to an αKeto acid, this transfer is necessary for amino acid metabolism. They added that serum ALT and AST concentrations are low unless the organs that contain are harmed, in this case the contents of the damaged cells leaks to the plasma, the ALT and AST rise in liver and skeletal muscle and serve as indices of the integrity of the vital organs. In the same line, (Will, 2020) stated that combining probiotic – Omega-3 may tackle diabetes and other inflammatory disorders. These results are in accordance with the decreased glucose level post combined probiotic and Omega-3 (table1) treatments, which indicated a positive effects of the probiotic and Omega-3. and reported a decreases glucose concentration. Due to higher uptake of glucose by muscle, which is consistent with activation of the glycolytic path ways. Also, the decreased glucose concentration may be due to decreased cortisol level (table1) after combined probiotic and Omega-3 administration, which indicated also that the

administration induce a decrease stress and relaxed nervous system. Table(1) revealed a significantly decreased creatine phosphokinase enzyme post combined probiotic and Omega-3 treatments, which indicated that muscle and liver were subjected to less damage as both skeletal muscle and liver are rich in the enzyme. (Murray et al, 2009) interpreted that elevated CPK in the presence of muscle damage and in myocardial infarction and severe muscular exercise and jogging. Table(1) reported a higher CPK activity at rest in case of obese female students, which may be due to lesser activity of the obese students compare to healthy. The present study, in table(1) combined probiotic and Omega-3 treatments induced a significant elevation of nitric oxide compared to control which in turn induce a vasodilatation action, increased blood flow to the tissues and increase oxygen supply. So, Nitric oxide relaxes the blood vessels, which is fortunate because it increase the diameters of the upstream arterial blood vessels whenever micro vascular blood flow increases downstream. Without such a response, the effectiveness of local blood flow control should decreased, as a significant part of the resistance to blood flow is in the upstream. mall arteries. The immunological reaction was noted in table(2) as an elevation of superoxide dismutase which is an important antioxidant and its increased concentration denoted an increased immunity SOD is found in the mitochondria and cytoplasm and depend on copper, Zinc and manganese in its action which is mainly antioxidant that elevate the immunity and health of the body. Table(2) shows the significant changes in Malone dialdehyde, superoxide dismutase, leucocyte cells, neutrophils, lymphocytes and Monocyte counts after probiotic and Omega-3 treatments, while the control group shows non-significant changes after placebo.The results indicated the positive effect of probiotic plus Omega-3 fatty acid individually or combined together as stimulants of the immune system tested SOD, Leucocyte, neutrophils, lymphocyte and monocyte counts, thus the probiotic plus Omega-3 fatty acids act as immunostimulants. Table(2) shows that the combined treatments of probiotic and Omega-3 fish oil induced a significant increased Leucocyte, Neutrophils, Lymphocyte and monocyte counts, which indicated a positive response to the treatments, and elevation of the immune cellular substances of the blood, through immunostimulants. These results are in accordance with the data of (Bagheri et al, 2008) and, they reported that immunostimulants which include a wide range of chemical agents, probiotic, polysaccharides or plants extracts, nutritional factors or cytochines, may modulates the immune system by increasing host resistance to disease and facilitate the function of Leucocytes, neutrophils, Lymphocytes, and monocytes and increase their bacterial activities. Table(4) data revealed non-significant change in platelets counts post probiotic and Omega-3 fish oil treatments. This result is in agreement with the result of (Heller et al, 2002) in human injected with fish oil plus Soy bean oil (10%). Also, it was reported that supplementation with fish oil for short time or long time(18 weeks) (Hansen et al, 2002) did not produce any significant change in platelets counts, in control group non-significant change in platelets counts post placebo. Table(4) showed that the bleeding and clotting times produce significant changes following co-probiotic and Omega-3 fish oil treatments. These results are in accordance with prolongation of bleeding and clotting times findings by (Freeze and Mutanen, 1997). The prolongation in bleeding and clotting times were caused to the increased level of Omega-3 fatty acids in plasma and platelets wall which compete with arachidonic acid (AA) through cyclooxygenase pathway and led to formation of TXA_3 and PGI_3, hence decrease the ability of platelets to form clot . Table(4) revealed that probiotic and Omega-3 fatty acids administration induced significant changes in PT and APTT, while the prolongation in PT and APTT may be induced by the reduction in factor VII an X activities.

VI. CONCLUSION

Co-action of probiotics and Omega-3 fatty acids have been shown to be Immunostimulants that affect positively the vital organs namely liver, heart, brain and included muscles, through elevating blood cells counts, enzyme activation, stimulation of blood flow and suppress stresses. Also, both supplements could be recommended as a feed addictive for enhancing disease resistance, induce healthy vital organs, and reduce obesity to liwer than 30 B M I.

REFERENCES

[1] Abdel Rahman, A, El Deeb, A and Hussein, E. 2006. Elimination of toxic compounds and nutritional elevations on Jojoba meal protein E J B M B, 24:583.

[2] Bagheri, T., Hedayati, S., Yavari, V., 2008. Growth, survival and gut microbial load of rain low trout Supplemented with probiotic during 2 months. Turkish, J., of fisheries and Aquatic Sci. 8:43.

[3] Berg, R., 1996. The indigenous gastro intestinal tract micro flora Has profound effect on the Immunological Development of the host Trends in microbiology.

[4] Costantini,L.Molinari,RFarinon ,B,2017 Impact of Omega-3 fatty acids on the gut micto biota Int. J.Mol.Sci.18:2645. Freeze, R., Mutanen, M., 1997. Linolenic acid and Omega-3 fatty acids differ slightly In their effects on hemostatic factors in healthy subjects. Am. J. Clin. Nutr. 66:591.

[5] Heller, A.,Fischer, S., Koch, T., 2002. Impact of n-3 fatty acids supplementation on hemostasis patterns After major abdominal surgery. Br. J. Nutr. 87:95.

[6] Kobyliak, N., Abenavoli, L., Dynnyk, O., 2018 Beneficial effects of probiotic with Omega-3 fatty acids in N A F L D. Minerva. Med. 109(6):418.

[7] Kremer, J., 2000. n-3 fatty acid supplements in Rheumatoid arthritis Am. J clin. Nutrition 71:349.

[8] Murray, R., Bender, D., Weil, P., 2009. Harper's illustrated biochemistry. Lange, USA.

[9] Nathan Gray 2015. Better together? Co-encapsulation study shows potential for Stable Omega-3 and probiotic mix. J. of functional foods. Doi: 101016/JFF. 201501037.

[10] Tawadrous, G., El Keblawy, M., Fadia, S., 2001. Cholylglycine level virus liver function tests On obese female. Bull Egyp. Soc. Physiol. Sci. 21:343. Saunders company 444.

[11] Will, C., 2020. Probiotic – Omega3 blend may tackle diabetes, Other inflammatory disorders. Nutraingredients.com

★★★