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Research Article

**INVESTIGATING THE EFFECT OF DIFFERENT DOSES OF
OMEGA-3 SUPPLEMENTATION ON PRE-INFLAMMATORY AND
POST-TRAUMATIC CPR INDEX SWALLOWING ONE SESSION OF
RESISTANCE TRAINING IN INACTIVE WOMEN**Shahla Hojjat^{1*}, Alireza Rahimi¹, Sahar Yadi²¹Department of Physical Education and Sport Sciences, Islamic Azad University, Karaj Branch, Iran.²M.Sc, Islamic Azad University, Karaj Branch, Iran.**Abstract:**

CPR inflammatory index is closely associated with the incidence of cardiovascular disease, which can affect the response to this indicator. The main objective of the present study was investigating the effect of different doses of omega-3 supplementation on pre-inflammatory and post-traumatic CPR index following one session of resistance training in passive women. In this study, 40 patients with inactive women in Karaj, with an average age of 28.16 ± 2.45 years, height 161.58 ± 3.45 cm and weight $59.97 \pm 4/30$ kg, randomly targeted in four groups of 10 patients (dose groups 2000, 3000, 4000 and placebo) were enrolled. Initially, the subjects participated in a place of resistance training and then practice immediately and 24 hours after their blood samples to estimate the rate of 5cc, CRP serum was used (pre-test). After a period of thirty days omega-3 supplementation in the form of two doses of thousand mg (for 2000), three doses of thousand mg (for 3000), and four doses of thousand mg (for 4000) per day received in capsule form. During this period, the control group received omega-3 free capsules. One day after the supplementation period, the test subjects were taken. For data analysis used from SPSS version 18. The results showed that omega-3 supplementation at a dose of 2000 no significant effect on the level of CRP in women, disabled, immediately after resistance exercise had ($P > 0.05$). But the effect of supplementation with doses of 3000 and 4000 had a significant effect on the level of CRP in non-active women immediately and 24 hours after a resistance training ($P < 0.05$). The effects of doses higher than the dose in 2000 was 3000 and 4000. According to the results, we can say that omega-3 supplementation for a month with a daily intake of 3000 or 4000mg/day for disabled women to be effective.

Key Words: Omega-3, CRP, Resistance Training, Untrained Women.**Corresponding author:**

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INTRODUCTION:

Movement and agility are characteristics of human life. The prohibition of human movement not only leads to the development of abnormal behaviors and loss of enthusiasm, but also increases the levels of fat in various areas of the body, resulting in overweight and obesity [1]. Cardiovascular diseases are the main cause of mortality in industrialized and developing countries; according to Iran's Ministry of Health, 38% of deaths occur due to cardiovascular disease in Iran [2] and 3% of deaths in European countries occur due to cardiovascular diseases; according to the American Heart Association, 32 million people suffer from a heart attack yearly [3, 4]. Studies have shown that high fat intake of saturated fatty acids, such as those found in Western diets, exacerbates the risk of cardiovascular disease and inflammation of the metabolic syndrome; so, reducing the amount of fatty acids in the diet may be an effective preventive and therapeutic treatment strategy for metabolic syndrome [5]. Omega 3 fatty acids are from the family of fatty PUFAs acids. There are three types of omega-3 fatty acids that play essential role in the body; 20: 3 alpha-linolenic acid: ALA is the only essential fatty acid that the body cannot synthesize; Eicosapentaenoic acid: EPA; 20: 5 and Docosahexaenoic acid: DHA; 22: 6, both of which are long chain fatty acids and can be used as a starting point for the synthesis of linoleic acid [6, 7]. Getting high levels of omega 3 fatty acid in your diet is known as a health donor in humans. Omega-3 fatty acid reduces blood lipids and has anti-inflammatory, anti-arrhythmic, and regurgitation properties. Regular physical exercise has a moderate positive effect on body function, maintaining well-being and preventing illness. All those who engage in a very intense physical activity for the first time, experience pain, burning, or local sensitivity to stress in the muscle and surrounding areas; so, there have always been, and will be, subjects who have stopped physical exercise because of bodily pain and muscle cramp [8]. Although most studies have shown that regular exercise activities have many benefits to the health of individuals, some reports suggest that a session of acute and intense exercise or prolonged vigorous exercises may result in damage to the immune system's responses and eventually lead to an increase in the subject's vulnerability and acute and severe inflammation; it has also been pointed out that acute and intense muscle activity increases levels of inflammatory markers significantly [9]. C-reactive protein was first identified in 1930 in patients with pneumococci. This protein has been reported very poorly in the body of the healthy people, with a normal amount of about 3.5 mg/L, and in this amount

is occasionally increased to 3,000 normal levels at 6 to 48 hours during inflammatory responses [10]. The main objective of the present study was Investigating the effect of different doses of omega-3 supplementation on pre-inflammatory and post-traumatic CPR index following one session of resistance training in passive women.

MATERIALS AND METHODS:

The present semi-experimental, applied study was conducted using pre-test and post-test steps. The subjects included non-active women in the city of Karaj, with a BMI of $20\text{kg/m}^2 < \text{BMI} < 25\text{kg/m}^2$ and an age range of 25 to 35 years old, who were non-smokers, without endocrine disease, diabetes, cardiovascular and immune system and blood pressure disorders, no alcohol, no excessive consumption of fish oil and omega-3 fatty acids, a history of recent tissue damage, and no history of taking suppressive drugs. The study subjects were categorized in four groups of 10, with various dosages of 200, 3000, 4000 mg/day, and placebo. All information about patients, including general condition, health and well-being, medical records and medications, drug use, diet and daily physical activity, was evaluated. Considering the age and sex of subjects as factors affecting the factor studied, the age and sex of subjects were selected in a homogeneous manner. Required information was collected through a researcher-made questionnaire; measurement of body weight was performed at least 3 hours apart from a meal. In order to familiarize the subjects with the instruments and devices used, the subjects were invited to the sports hall to get familiar with the proper method of weight lifting and proper breathing technique one month before the beginning of the study. In order to determine optimal maximal repetition, the training of footprints, knee bending, knee flattening, chest pain, armpit movement and abdominal movement were performed using Technology, Italy Body Building Machine, equipped with a computer system with special software; Brzycki formulation was used for the calculation of required equations. An intensive physical activity session includes knee flexion, chest press, armpit movement, and abdominal movement performed by the subject with a 70% repetition of each movement. The rest interval between stations was 2 minutes. Additionally, 5 cc blood samples of all tested subjects were collected 30 minutes before exercise (at rest and after 12 hours fasting) and, then, immediately, and 24 hours after intense exercise program. In the next stage, supplement-receiving groups received three days of recovery and, then, took omega 3 intakes with two 1000 mg dosages for the first group, three

1000 mg dosages for the second group, and four 1000 mg dosages for the third group. One day after the completion of supplement intake period, the subjects were tested again at the current test site and under the same conditions of pre-test step. Collected data was analyzed through SPSS18 and chi-square tests [11-13], and $P < 0.05$ was considered as significance level.

FINDING:

40 subjects were examined in the present study. The highest mean age and height were 29.42 ± 2.11 years and 162.5 ± 3.49 cm and the lowest mean weight and BMI turned out to be 58.94 ± 4.51 kg and 22.49 ± 2.74 kg/m^2 , which were related to the group receiving

4000 mg/day dosage; the highest BMI was related to the group receiving 3000 mg/day dosage (Table 1). The highest mean of C-reactive protein occurred immediately after exercise, associated with the group receiving 3000mg/day dosage, and at the end of the test, associated with the group receiving 2000mg/day dosage. The highest mean of C-reactive protein 24 hours after the exercise was related to the placebo group (Table 2). The results also showed that the effect of omega3 supplement with a dosage of 3000 mg/day was significant on the level of CRP in inactive women immediately after resistance exercise ($P < 0.05$) (Table 3).

Table 1: Information on the age, height, weight, and BMI of studies subjects

Groups	Age (year)	Height (cm)	Weight (kg)	BMI (kg/m^2)
Dose 2000	28.31 ± 2.19	161.29 ± 3.27	59.01 ± 4.19	22.77 ± 2.51
Dose 3000	27.83 ± 2.85	160.74 ± 3.14	60.70 ± 4.43	23.71 ± 2.12
Dose 4000	29.42 ± 2.11	162.5 ± 3.49	58.94 ± 4.51	22.49 ± 2.74
Placebo	27.08 ± 2.67	161.8 ± 3.90	61.23 ± 4.70	23.57 ± 2.80

Table 2: The level of CRP in groups with different doses of omega-3 and placebo

Test steps		CPR level with a dosage of 2000	CPR level with a dosage of 3000	CPR level with a dosage of 4000	Placebo
Immediately after training	Pre-test	2.97 ± 0.30	3.02 ± 0.27	2.91 ± 0.25	2.88 ± 0.34
	Post-test	2.91 ± 0.22	2.60 ± 0.21	2.54 ± 0.18	2.85 ± 0.30
24 hours after training	Pre-test	0.91 ± 0.16	0.95 ± 0.12	0.95 ± 0.18	1.03 ± 0.15
	Post-test	0.84 ± 0.12	0.71 ± 0.09	0.68 ± 0.11	1.10 ± 0.18

Table 3: Comparison of the difference between the mean CRP levels immediately after training in different groups

Index	Groups (I)	Groups (J)	Average Comparison	P-value
C-reactive protein	Dose 2000	placebo	0.03	0.215
	Dose 3000	placebo	0.39	0.001
	Dose 4000	placebo	0.34	0.002
	Dose 2000	Dose 3000	-0.36	0.002
	Dose 3000	Dose 4000	0.05	0.194
	Dose 4000	Dose 2000	0.31	0.002

DISCUSSION:

Cardiovascular Atherosclerosis disease is the main cause of the annual incidence of more than 19 million deaths in the world [14]. New medical results emphasize the key role of inflammation in the occurrence of atherosclerosis, from the early stages to the onset and the incidence of thrombosis. Nowadays, atherosclerosis is considered not only in terms of a lipid accumulation disease, but also as a chronic inflammatory process [15]. C-reactive protein, the level of which increases at the face of stress, injury, and illness, is the most sensitive and long-lasting inflammatory and anti-inflammatory indicator of cardiovascular disease and its relationship with coronary artery disease is highlighted [16]. Additionally, some studies have indicated a reverse relationship between CRP and physical education [17]. In fact, unsaturated omega3 fatty acids that are essential for the health of the body cannot be synthesized by body; therefore, they should be obtained through food or dietary supplements, the best source of which is fish, which contains more levels and groups of fatty acids [18]. The results of previous studies have shown that heavy physical activity may increase inflammatory parameters and muscle damage in athletes. In this regard, the recognition and presentation of a suitable method that can prevent the production of inflammatory and cellular injury indicators during severe physical activity is of paramount importance. The present study examined the effects, particularly pro-inflammatory and CRP-induced coronary syndrome, of different doses of omega-3 supplementation after a resistance exercise session in inactive women in Karaj. The results of this study showed that one session of severe resistance activity increased C-

reactive protein as the main indicator of cellular inflammation in the placebo practitioner group; however, supplementation of omega-3 fatty acid resulted in a modification and suppression of higher CRP concentrations in the groups receiving omega-3 supplementation at doses of 3000 and 4000 mg/day. According to Bizheh et al study 2014, entitled "The acute effects of strength training on inflammatory markers predicting atherosclerosis: a study on inactive middle-aged men", the level of hs-CRP increased significantly after a session of strength activity; they also stated that increased levels of CRP can be due to stimulation of the liver by IL-6, derived from muscle tissue, which acts as a signal for the stimulation of lipolysis and glycolysis [19]; this is thoroughly consistent with the findings of the present study. Additionally, according to Coffey et al study 2007, which was conducted to evaluate the effect of high-frequency resistance exercise on adaptive responses in skeletal muscle, a single session of high repeat resistance activates the inflammatory signaling cascade and, as a result, increases the inflammatory markers of skeletal muscle in soft muscles [20]. Based on the findings of Duzova et al study 2009, one session of intense activity increased the levels of inflammatory markers in exercise mice [21]. Among the possible mechanisms and theories through which resistance exercises can produce oxidative stress, it appears that the theory of "re-ischemic injuries" is indicative of the fact that severe muscle contractions may result in a temporary decrease in blood flow and the availability of oxygen and, resulting, finally, in ischemia. After contractions, re-injection of blood causes a large supply of oxygen and, as a result, the production of free oxygen radicals. Stress and mechanical stress can justify increased cell damage

following resistance exercises. Consequently, resistance exercises, especially extrinsic contractions, cause muscle tissue damage and, consequently, the onset of inflammatory processes and, finally, the production of free oxygen radicals and lipid peroxidation.

CONCLUSION:

The results of the present study showed that one session of resistance exercise is expected to increase the level of CRP in inactive women. However, the intake of omega-3 fatty acids with doses of 3000 and 4000 mg/day will prevent further increases in this index in supplemented athletes and, therefore, can be a good way to prevent inflammatory and cell-mediated reactions in inactive women. It is recommended that inactive women use an omega-3 supplement for one month, immediately and 24 hours after intense resistance, with a daily dose of 3,000 or 4,000 mg/day, to prevent inflammation.

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