

# The effect of regular exercise and vitamin C on hs-cTnT & TNF- $\alpha$ levels in obese boys students

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## Abstract

This study aimed to determine the effect of regular exercise and vitamin C on hs-cTnT and TNF- $\alpha$  levels in obese boys Students. In this regard, 28 Students aged 10-13 years, targeted sampling and available, were randomly divided into control, exercise, supplementation, exercise + supplement. The training protocol for group exercise and submaximal aerobic exercise + supplement includes eight weeks of growing at 50 to 70 percent of maximum heart rate, core exercise 30 to 45 minutes per session, 3 sessions per week. Also, subjects in the exercise group and exercise + supplement tablets of vitamin C (500 mg) after taking food, ate every other day for 8 weeks. Blood samples were collected after 12 hours of fasting in pre-test and post-test (48 hours after the last exercise). Serum levels of hs-cTnT and TNF- $\alpha$  by Electro-Chemiluminescence and ELISA (respectively) were measured. The results showed that 8 weeks of aerobic exercise, vitamin C and combination of the above interventions have an impact on hs-cTnT levels in obese boy's students, but TNF- $\alpha$  levels decreased significantly. Furthermore, the effect on the reduction of TNF- $\alpha$  combined intervention of vitamin C was significantly higher. Therefore the use of non-pharmacological methods, exercise, vitamin C and combination of the above interventions may lead to a reduction of inflammation in obese boy's students.

**Keywords:** Cardiac troponin, obese boy's students, regular exercise, TNF- $\alpha$ , vitamin C.

## INTRODUCTION

Obesity is a chronic disease that causes concern over a billion people is mature. It is estimated that the number of those affected with the disease will double by 2030. In this respect, the obesity epidemic has become the biggest problem of this century (10). Epidemic of obesity affecting developed countries, one of the main causes of type 2 diabetes, high blood pressure, stroke, heart attack and other cardiovascular diseases. The alarming obesity and its complications, especially among pediatric population has increased in the past three decades. Obesity can be hereditary factors, nutritional disorders, internal stress, taking certain medications and inactivity noted. But eating habits and lack of physical activity have contributed to this condition (11). Adipose tissue as an endocrine organ Adipokine range of proinflammatory including TNF- $\alpha$  increases (14). On the other hand weight gain

and obesity with macrophage accumulation and increased expression of inflammatory cytokines adipose tissue are associated (4). TNF- $\alpha$  through interaction with signaling pathway the insulin receptor, Activation of lipolysis and inhibits lipoprotein lipase tends to induce insulin resistance and due to the nature of paracrine regulators of insulin resistance in tissue (1). However, the Cardiac Troponin T is a marker of cardiac damage. Cardiac Troponin release into the blood marker for myocardial necrosis, which can be a factor for acute myocardial infarction is detected (6,7). In addition, the researchers reported that childhood obesity is associated with the development of pathophysiological risk of cardiovascular disease. Also, cTnT observed no differences in obesity and normal subjects, suggested that the risk of developing atherosclerosis may be still in the preclinical stage for

teenagers and children overweight or obese, but not for young people to be healthy. Also participating in sports activities due to optimum effect on the levels of inflammation are recommended. The results of human studies suggest the effect of exercise in reducing inflammation and a significant reduction in TNF- $\alpha$  receptor levels in children and adolescents is obese (12). People with diabetes in middle-aged and elderly women are obese. In this regard, Molnar et al. (8) stated that antioxidant vitamin to reduce the concentration and reduced antioxidant capacity of the characteristics of childhood obesity be considered while vitamin C as an antioxidant, can reacts with hydroxyl radicals, superoxide, hydrogen peroxide and radical Hydroperoxile. Considering the aforementioned factors and the fact that no effect of vitamin C combination a period of aerobic exercise and what impact on levels of TNF- $\alpha$  and cTn in obese student's boys did not examine. This study intends to answer the following questions: 8 weeks of aerobic training or no effect on TNF- $\alpha$  and cTnT levels in obese student's boys? 8 weeks intake of vitamin C and cTnT impact on the levels of TNF- $\alpha$  in obese student's boys? And the combined effect of aerobic exercise interventions and vitamin C levels above variables would be?

## MATERIALS & METHODS

Twenty-Eight disabled student's boys of Minagar primary school in Babol city with an age range of 10-13, After a Required examinations and confirmed to enter the research, For Purposeful and available sampling were selected. The exercising protocol for exercises and exercises + Supplement groups 8 weeks of aerobic exercise Submaximal increasing with intensity of 50 to 70% of maximum heart rate, 30 to 45 minutes per session, 3 sessions per week Each exercise session consisted of 10 minutes of warm-up exercises ,the main exercises and 10 minutes cool down. The main exercise in the first and second week With intensity 50% -55% of maximum heart rate for 30 minutes was performed And to achieve 65% to 70% intense of maximum heart rate and continued for 45 minutes at the end of the eighth week (With an increase of 5, the intensity exercise every two weeks) And include sets of 10 minutes with 2 minutes rest between sets. The main exercise different sets in each session including walking, running, jumping rope, playing sports school and some basic skills.

Blood samples of the subjects, followed by 12 hours of overnight fasting (Dietary ingestion light in the night before blood collection), In two stages of pre-test and post-test (48 hours after the last exercising session) of the brachial vein left hand in a sitting position and after 15 minutes of rest, Were collected in the morning (5 cc).For separate plasma blood samples (After poured into the tubes containing EDTA) At a speed of 3,000 rpm for 15 minutes was centrifuged. Then the plasma was poured into micro tube and frozen at -80° C and to analyze the levels of hs-cTnT and TNF- $\alpha$ , was used. TNF- $\alpha$  levels using commercial kits Special (ELISA Kit Human BDNF), Measured by ELISA according to the manufacturer's instructions (R&D Systems, Minneapolis, MN).

Levels of hs-cTnT using commercial kits for Electro-Chemiluminescence method according to manufacturer's instructions (R & D Systems, Minneapolis, MN) were measured using 2010 ELISA. Kolmogorov-Smirnov and Levine tests in order to check the normality of data distribution and homogeneity of variances was used. In addition, the paired t test (to check for changes within the group) and one-way analysis of variance (to check for changes between the groups) was used. And if you see a significant difference between the groups, to locate significant difference post-hoc Tukey test at  $P < 0.05$  was used. All statistical analyzes were performed using SPSS 22.

## RESULTS

Figure 1 shows the changes in hs-cTnT before and after eight weeks and Figure 2 corresponds to no change in serum levels of TNF- $\alpha$  in the pre-test and in Figure 3 is related to changes in the experimental group.

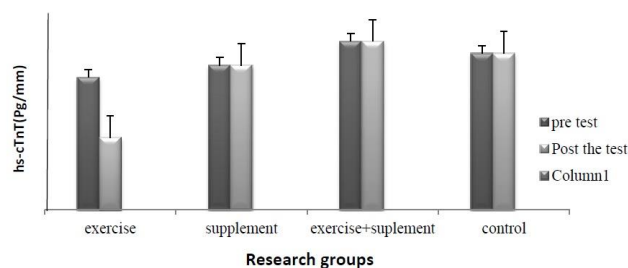


Figure 1: compares within the group levels of hs-cTnT in research groups

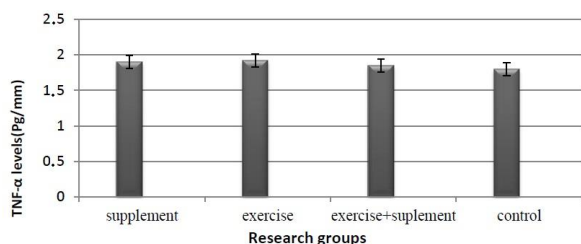


Figure 2: Serum levels of TNF-α in group pre-test research

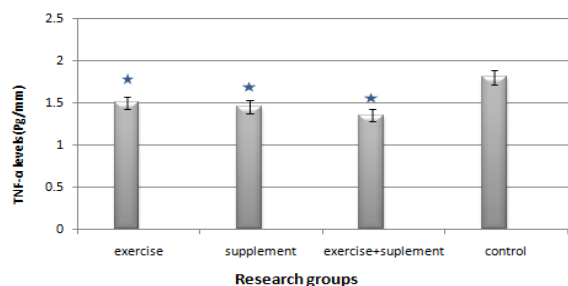


Figure 3: TNF-α level in the post-test research groups: significant Difference of the ratios to control

## DISCUSSION

In this study, the effects of 8 weeks of aerobic exercise and vitamin C supplementation on serum levels of hs-cTnT and TNF-α in obese student's boys were examined. Based on research findings 8 weeks of aerobic exercise, vitamin C and combination of the above interventions in obese boys had no effect on levels of hs-cTnT. The results showed no effect of antioxidant vitamin C supplementation on aerobic activity or hs-cTnT levels in obese children. In this regard, Sirvov et al. (12) in a study of obese and normal teenagers and children (5 to 17 years) showed that between BMI and cTnT in these subjects, there was no communication. That shows atherosclerosis risk may still be in pre-clinical stage for this age group were overweight or obese, but not for young people to be healthy. Also Fu et al. (5), the effects of the intensity and duration sports action (for 45 and 90 minutes in 50% or 100% intensity of ventilatory threshold on treadmill) teenage runners were studied on cTnT levels (mean age, 14.8 years) (5). Based on these results increased levels of cTnT was associated with an intense training that increases with increasing time, also increased. Accordingly, although the time and intensity of exercise are the main factors for the release of cTnT in endurance exercise, However, it seems time to increase exercise intensity compared to more prominent in the cTnT levels In the present study had moderate-intensity exercises obese boys. So

it seems that the intensity of cardiac damage in obese children not been accompanied And the indicators of heart damage despite being obese children was low But another important finding of the present study a significant reduction in serum TNF-α levels after 8 weeks of aerobic exercise, vitamin C and the combination of the above interventions. But the impact of the above interventions combined with significant synergy effects compared to vitamin C was associated, Although no significant difference between the percentage changes and supplements were observed TNF-α in exercising and supplement groups That it could be possible causes small samples (small sample size) is concerned. The results of this study showed a significant reduction of the inflammatory cytokines TNF-α non-drug treatment methods after each workout and supplement vitamin C is an antioxidant. In this regard, Azizi et al. (2) showed that supplementation with vitamin - mineral by reducing oxidative stress and TNF-α after a period of heavy swimming in girl's elite swimmers. Moreover, Tayyebi-Khosroshahi et al. (13) also reported that 2 months supplementation with vitamin C with lower levels of TNF-α and C-reactive protein in hemodialysis patients was similar to this have been that; But no change in the level of TNF-α, C-reactive protein and interleukin-6 in older men, after taking a combination of vitamin C and E by three years, Brown et al. (3) was observed that the contradiction may be due to the older age of subjects and the dose of vitamin C related. In examining the mechanisms of antioxidant levels of inflammatory factors has been shown to inhibit the priesthood oxidant can be generated and TNF-α gene expression in blood mononuclear cells circulating through a dose dependent manner by adjusting the nuclear factor of kappa (NF-κβ) (9). Although in this study the effect of non-medicinal ways both aerobic exercise and intake of vitamin C was associated with a significant reduction in TNF-α levels. The synergistic effects of these two methods, only considerably was higher than complementary way. Therefore, it can be suggested that the combined effect of these two methods to achieve stronger impact, with a dose of vitamin C or more and for longer used.

In summary, the findings of this study showed that eight weeks of aerobic exercise, vitamin C and combination of the above interventions in obese student's boys had no effect on levels of hs-cTnT, but

was associated with a significant reduction in TNF- $\alpha$  levels. The results showed no effect of non-medicinal aerobic exercise, vitamin C and combination of the two hs-cTnT levels and improve the inflammatory mediator TNF- $\alpha$  levels in obese student's boys.

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