The effect of aerobic exercise on IL6, CRP and TNFa concentration in elderly men

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Abstract: The purpose of this study was to study the effect of an aerobic exercise on IL6, CRP and TNFa concentration in elderly men. For this object 30 volunteer elderly men (60-80 yrs) were voluntarily selected. They were divided into two different groups: control and experimental group. Experimental group participated in an 8-week course of aerobic exercises; 3 sessions a week for half an hour per session. Forty-eight hours before and after exercising, some blood samples were collected from the individuals to evaluate their CRP, TNFa and IL-6 factors. T-test was used to identify the differences between pre-test and post-test values. The results showed that TNFa factor changed significantly by doing the exercises, that is, the aerobic exercises affected TNFa factor. However, there was no significance difference between CRP levels before and after aerobic activities.


Keywords: aerobic exercise, Interlocin-6, C Reactive protein, Tumor Necrosis Alfa, elderly men

1. Introduction

Although development and progress of sport science have progressed compared with other sciences, today human beings found sport various useful effects on different aspects of their life. So that, application of this science results were considered and adopted as an effective tool for health. In recent years, doctors considered it very important for prevention and tried to prevent illness occurrence and control and recognize health treating factors. Physical activities different aspects had various effects over inflammatory cytokins production and then body immunology system, and then it is considered that their recognition could assist us in more accurate interpretation of physiological mechanism and biological reactions (Bruunsgaard et al., 1997). Human body immunology system is an acquired and natural defense network that reacts against infectious factors and tried to decrease these factors. Immunological response decrease could lead to higher infection rate and chronic diseases such as AIDS, cancer, heart and vascular disease (Cohen et al., 1997) chronic disease occurrence among elderly people especially in people over 65 years elderly Increased (Gallistl & Sudi, 2001). That prevailed by increasing over 60 years elderly population and human lifetime increase which allocated very high percent of clinical charges to itself, therefore, finding non-medical and cheap methods considered in order to increase health in elderly people during life time and perhaps preventing occurrence of elderly diseases (Cohen et al., 1997). On one hand, agedness often accompanied with health and sickness increase (Shephard, 1998) which resulted from genetic and environmental factors (Wang et al., 1996). Therefore, genetic and environmental factors effect on life time increase which consisted of a light nutrition regime for obese people, No smoking, lower air pollution rate and doing high level of physical activities (Selvin et al., 2007). Healthy immunological system is a genetic factor which helps life time. Therefore, both factors of physical activity decrease and immunological cells agedness helps chronic disease increase and its severity (Yeo and Park, 2002). Different researches related to physical activity and weight loss in order to immunity improvement and inflammatory factors loss regarding to exercise severity (Vo2max) and subjects age, had different results. Evidenced data in elderly and young people showed high level of physical activity with low rate of CRP and IL-6 (Bruunsgaard et al., 1997) in addition, fewer studies, showed effects of aerobic exercise training effects on CRP, IL-6 and other factors lower rate among middle-aged and elderly people (Shephard and Shek, 2002; Ostrowski et al., 1998). Regarding to age increase and other related problems resulted in to disability among people and finally medical services charges rise according to sport science development and its useful effects on different aspects of life, it is necessary to use different kinds of exercises especially aerobic exercise on Immunological system function and inflammation factors in these group (elderly) of people. Also, according to studies, specially
internal ones related to aerobic exercise effect of cytokines as a factor of Immunological system solution which has an effective role on inflammation process and also short-term researches and its contradicted findings, researcher tries to study an aerobic exercise period on mentioned inflammation factors in elderly and accompanied with considerable results in the field of Immunology system function Improvement by using suitable physical activity for aged people. Therefore regarding to mentioned issues, some questions presented that if 8-weeks aerobic sport activity effects on elderly immunity function? If CRP, TNF α and IL-6 systemic concentration changes elderly? Therefore, in response to above questions, researcher considers to study aerobic selected practice period effects over inflammation factors in 60-80 years elderly men.

2. 2. Methods

Study method is semi-experimental and functional type. In this study, elderly men considered and divided into two groups, experimental group and control group and have given pre and post-test. Exercise period of subjects were 8 weeks that before and after this period, inflammation factors (TNFα, CRP, IL-6) Evaluated and measured. Present study statistical society formulated by 30 elderly men, who prepared voluntarily. They have given medical record questionnaire and preparation for physical activity start that after completing related forms and performing medical examination and medical health certificate issuance, 30 people selected which placed in two experimental and control (15 subjects) groups, randomly. Measurement tools consisted of health record form. In order to collect required information relating to elderly mental status, ensuring about their health and satisfaction of subjects participation in the study and a questionnaire with these contents has been used; cotton, alcohol, 5cc one-time using sterile syringe, syringe head for collecting blood, sterile test tube in order to collect and send blood to lab, Isolated laboratory kit, used for measuring CRP, TNFa and IL-6. In this study, in order to collect information library and field method have been used. In the library method, by using text-reading, voucher-taking, statistic –reading, tables, literature study, issue records and study matter, collected information and in the field method data collected by referring to the subjects and direct relation with them. In this study, Among two experimental groups and elderly men evidence, experimental group in an exercise program in addition to normal practices, participated for 8 weeks, this exercise program consisted of walking activity three times a week and any session considered 30 minutes with 60-65 storage heart rate severity any exercise program session consisted of 3 exercise stages: 1 warming up stage, subjects, initially, walked for 3 minutes very slowly and softly with 30-35% storage heart rate severity and then performed 5 minutes tensional 5 minutes tensional movements which extended totally 8 minutes. Aerobic exercise program performed about 20 minutes in the first week. Exercise period and severity in exercise program initiated from light style and increased gradually according to extra load rule, then rose to 30 minutes in the next weeks. After exercise ending, cooling stage begins that consisted of 3 minutes soft walking and 5 minutes tensional movements which have been taken 8 minutes. 48 hours before and after exercise, blood collected and exercise affects studies over these factors. T-test was used to get the difference between pre and post test results at p <0.05.

(4) 3. Results

Table 1. Statistical data related to aerobic exercise effects on elderly men IL6 factor

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean ± St dev</th>
<th>T</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>15</td>
<td>0.47±0.77</td>
<td>-3.72</td>
<td>14</td>
<td>0.02</td>
<td>Sig</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>23.22±23.69</td>
<td></td>
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</tbody>
</table>

As it is shown in table 1, test statistics obtained from elderly men equals t=-3.72. Elderly men IL-6 factor before and after aerobic exercise has significant difference with each other (P=0.02).

Table 2. Statistical Data related to aerobic exercise effects on elderly men TNFα factor

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean ± St dev</th>
<th>T</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>15</td>
<td>0.14±0.44</td>
<td>-2.62</td>
<td>14</td>
<td>0.02</td>
<td>sig</td>
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<tr>
<td>Post</td>
<td>15</td>
<td>74.27±109.4</td>
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As it is shown in table 2, elderly men test statistics equal t=-2.62. TNFα factor in elderly men was different before and after exercise (P=0.02).

Table 3. Statistical Data Related to aerobic exercise effects on elderly men CRP factor

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean ± St dev</th>
<th>T</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>15</td>
<td>3.33±1.04</td>
<td>0.61</td>
<td>14</td>
<td>0.55</td>
<td>No sig</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>3.13±0.83</td>
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As it is shown in table 3, elderly men test statistics equal t=0.61. There is no significant between CRP factor before and after exercise and had no difference with each other (P=0.55).

Discussion and Conclusion

4.1. IL-6 changes after exercise (Sport)
4.2. TNFa changes after sport:

Based on results of this study, there was a significance difference in TNFa factor among elderly men ($t=-2.62$ and $p=0.02$). Also based on correlative t-test results, average difference of control group scores to experimental group who performed aerobic exercise ($p=0.10$, $a<0.05$) was significant and this means 8-weeks aerobic exercise caused TNFa level changes. Kasiolima et al (2008) showed that elderly people's TNFa level with diabetes type 2 after exercise increased significantly. Also Pederson and Brunsgard (2003) in reviewing beneficial role of sport in decreasing low-grade inflammation of elderly people, stated that age rise related to low-grade inflammation and preliminary mediators of this inflammatory activity is IL6 and TNFa. In epidemiological study of both cytokines with obesity, related to insulin and atrosclerose strength. Also, stated that TNFa is a stimulator for Resistance to Insulin (Hosseini & Rabban, 2005; Petersen & Ostrowski, 2005)]. Yeo and Park (2002) by applying nutritional diet with sport and exercise in obese men after menopause found that cytokines level specially TNFa had significant decrease. Also in Vahdat research with the title of aerobic exercise period effects on liptin TNFa and IL6 level in thin and fat men found significant changes in variable concentration decrease specially TNFa in thin men (Cosio-lima, 2008). As implied about serum TNFa, severity, type and period of exercise subjects preliminary preparation level, age, place and time of sampling, heredity, drugs, features, measuring tools sensitivity are the factors for determining production (Nicklas, 2008; Petersen & Ostrowski, 2005; Sharif et al., 2000; Selvin et al., 2007; Wang et al., 1996) that could be a reason for study results such as present study with other ones.

4.3. CRP changes after exercise:

In the present study, performing aerobic exercise for 30 minutes in elderly men couldn't make significant difference in CRP level according to the time before exercise. Indeed, regarding to correlative t-test results and CRP scores average difference in experimental and control group ($p=0.62$, $t=0.49$), sport had no effects on CRP factor level. In Nicholas et al (2008) studies which investigated long-term exercise effects on IL-6 and CRP factor in 70-89 years elderly men and Men; there was no significant difference in CRP level (Pedersen & Brunsga, 2003). Also, Mile et al (2004) compared CK, CRP and IL-6 response of men and men in 20-miles race at altitude showed that remarkable difference has not been seen in CRP level of two groups (Ostrowski et al., 2000; Shephard and Shek, 2002) that is similar to present study findings. On the other hand, some studies found different results with present study findings Including Selvin et al (2008) findings. This researcher and his studies which investigated effects of weight loss
on CRP, reported significant decrease in CRP level. Okita et al (2009) studies which investigated sport with weight loss in apparently healthy men showed that sport caused lower CRP level. It seems that difference in sport activity severity and its duration, also weight loss and nutritional diet, heredity, using dietary supplements are the effective factors on inflammatory factors level, especially CRP. Which are the possible reasons for the difference of present study findings with above studies. Based on present study findings, an aerobic exercise period caused no sensible changes in elderly men IL6 factor level but changed their TNFα factor level, also had no effects on CRP factor level. Indeed, sport increased TNFα factor level after 8-weeks exercise and this was statistically significant. Totally, Results showed that performing long-term aerobic exercise with middle severity might create a potential for immunity responses increase by means of increasing t-cells production in elderly people. Therefore, performing long-term aerobic activities with average severity controls cytokines synthesis which are necessary for immunity responses regulation and improve immunity function which decreased due to agedness and resulted into elderly lifetime period Increase.

References