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Research Paper

Comparing Plasma Levels of C-Reactive Protein, Interleukin-10 and -15 in Physically Active and Sedentary Postmenopausal Women

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ABSTRACT

Objectives Lower levels of inflammatory cytokines and higher levels of anti-inflammatory cytokines are associated with increased life expectancy. However, the effects of regular physical activity on these cytokines in postmenopausal women have not been investigated very well.

Methods & Materials Fifteen active and 15 inactive postmenopausal women (aged between 50-60 years) were recruited randomly. The exclusion criteria included chronic diseases, smoking, and surgeries in the past year. Also, more than a year should have passed since all subjects experienced natural menopause. Active postmenopausal women should have regular physical activity included walking, jogging, and resistance exercises and they should have performed these exercises three times a week within the past 6-12 months. After 12 hours of fasting, blood samples were taken in rest. Blood sample was centrifuged at 4000 rpm for 5 minutes, and the serum was frozen and stored at -80°C until biochemical analyses were performed. Independent t test was used to compare quantitative variables, and α level for statistical significance was set at P≤0.05.

Results Regular physical activity brings about a significant decrease in C-reactive protein, significant increase in IL-15 and non-significant increase in IL-10 in active postmenopausal women in comparison to inactive postmenopausal women.

Conclusion Regular physical activity may result in lower incidence of chronic diseases in postmenopausal women via decreased inflammatory cytokines and increased anti-inflammatory cytokines and could, therefore, play a role in higher life expectancy.

Extended Abstract

1. Objectives

Chronic diseases, including cardiovascular diseases, cancer, lung diseases, and diabetes mellitus are the leading causes of death in the world. Research has shown the relationship between inflammation and chronic diseases [1].Aging leads to slight chronic inflammation, and the proinflammatory cytokine levels of Interleukin-6 (IL-6), tumor necrosis factor-α and C-reactive protein (CRP) among the elderly are increased by 2-4 times compared with young people [2]. Evidence indicates that increased inflammatory cytokines associated with aging is higher in postmeno-

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pausal women [3]. Cytokines of IL-10 and IL-15 may contribute in reducing the risk of disease and increasing longevity among the elderly. Given that little or contradictory research has been carried on the effect of regular exercise on cytokines, the present study aimed to study the resting cytokine levels of CRP, IL-10 and IL-15 in physically active postmenopausal women and compare it with sedentary postmenopausal women.

2. Methods & Materials

This study was approved by the Ethics Committee of Qazvin Islamic Azad University. In order to select physically active postmenopausal women, the sports clubs and gyms in Karaj were visited, and notifications and questionnaires were distributed for the purpose of cooperation in research. About 89 questionnaires were completed; of them, 22 subjects were in the age range of 50-60 years and were thus excluded from the study. Some notifications were distributed in the gathering places of old women and public places in order to select sedentary postmenopausal women. Finally, 52 people volunteered out of which 17 were eligible. The exclusion criteria were having chronic diseases, smoking, and surgeries in the past year. Also, more than a year should have passed since all subjects experienced natural menopause. Active postmenopausal women should have regular physical activity, including walking, jogging, and resistance exercises and they should also have performed these exercises three times a week within the past 6-12 months.

Finally, 15 active and 15 sedentary postmenopausal women were selected out of the qualified individuals through simple random sampling method. The exercise performed by the active group was a combination of hiking, jogging, and strength exercises.The subjects participated in the briefing one week before the study, and their height, weight, body mass index, and body fat percentages were measured. The subjects were asked to refrain from strenuous physical activity 48 hours before blood sampling and take dinner before 9 PM before measurement. On the measurement day, after 12 hours of fasting, blood samples were taken from left-hand vein in sitting and resting positions. Serum was separated from the blood by a centrifuge at 4000 rpm for 5 minutes and then used to measure IL-10, IL-15, and CRP. Independent t test was used to compare the results between two groups. All statistical analyses were performed at a significance level of 0.05.

3. Results

The Kolmogorov-Smirnov test results showed that all data variables were normally distributed. Also, according to Levene's test results, the variance of the groups was homogeneous. Thus, there was the presumption of using parametric tests. The average age was 54.20 years in the active group and 54.06 years in the sedentary group while the mean height was 163.43 cm in the active group and 161.36 cm in the sedentary group. The average weight was 63.41 kg in the active group and 65.20 kg in the sedentary group. The mean body mass index was 23.72 kg/m^2 in the active group and 25.02 kg/m^2 in the sedentary group, and finally the average percentage of body fat was 20.86% in the active group and 23.06% in the sedentary group. Independent t test was used to study the homogeneity of the groups in terms of anthropometric indices, and the results showed that the groups were homogeneously divided for the index of age (P=0.896), weight (P=0.371), height (P=0.154) and body fat percentage (P=0.153). There was a significant difference between the groups with regard to the index of BMI (P=0.046).

Table 1 shows independent t test results on fasting plasma levels of CRP, IL-10, and IL-15 in physically active and sedentary women. As seen in the Table, fasting plasma levels of the cytokine IL-10 are higher in active postmenopausal women but not statistically significant (P=0.228). Therefore, regular exercise insignificantly increased the cytokines IL-10 in active postmenopausal women.

Also, as shown in Table 1, fasting plasma levels of the cytokine IL-15 are higher in active postmenopausal

Table 1. Intergroup comparisons of CRP, IL-10 and IL-15 values (mean±SD) in active and sedentary postmenopausal women

Variable	Active Postmenopausal Women	Sedentary Postmenopausal Women	df	t	Significance
CRP (mg/l)	51.02±2.1	25.86±3.0	28	2.147	0.041
IL-10 (pg/ml)	72.41±1.0	51.52±10	28	1.233	0.228
IL-15 (pg/ml)	70.52±3.0	60.64±2.0	28	2.213	0.035

women (P=0.035). This indicated that regular exercise significantly increased the cytokine IL-15 in active postmenopausal women. As can be seen in Table 1, fasting plasma levels of CRP are significantly lower in active postmenopausal women (P=0.041). So, regular exercise significantly decreased CRP in active postmenopausal women. The results suggest that regular exercise leads to a significant decrease in CRP, significant increase in IL-15 and insignificant increase in IL-10 among active postmenopausal women compared to sedentary postmenopausal women.

4. Conclusion

Regular exercise fights against chronic diseases, in all probability, by reducing inflammation and increasing anti-inflammatory cytokines in postmenopausal women and may thereby increase the effective life expectancy. Studies taking into account large populations and people with an average age of over 60 years have suggested an inverse association between physical activity and inflammatory biomarkers [4, 5]. The effects of physical exercise on systemic inflammation occur through weight loss and adipose tissue loss [6], and it is likely that the difference between groups is due to the higher body mass index and body fat percentage in the sedentary group. Changes in immunological parameters because of exercises depend on age, sex, physical fitness, duration, intensity, and the type of activity [7]. Cytokine secretion mechanisms in relation to exercise are very complex and poorly understood. Interpretation of results in this area requires further studies.

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Conflict of Interest

The authors declared no conflicts of interest.