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The comparison of WHR and Hs-CRP inflammatory marker in active and inactive middle-aged women

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ABSTRACT

Cardiovascular diseases and its relationship with physical inactivity have been of interest for many years. Waist-to-hip ratio (WHR) and high-sensitivity C-reactive protein (Hs-CRP) are from independent and warning strong factors of cardiovascular diseases. The purpose of this study was comparing the WHR and Hs-CRP as a predictor of cardiovascular disease in active and non-active middle-aged women. The present research is causal-comparative. 30 women with mean of age: 41/34±3/51 year, height: 158/89±5/136cm, weight: 76/69±4/749 kg, BMI: 27/61±1/96 kg/m^2 were participated in this research. They were randomly divided in two groups (active group, n=15, non-active group, n=14). Active group of women who had regular physical activity for one year and non active group who didn`t have any physical activity in last year. In this study, the Kulumogr of-Smirnoff test to assume normality of data and also independent groups T-test was used to compare means (p<0.05).Data analysis showed that there are significant differences in WHR (P=0/003) and the level of serum Hs-CRP (P=0/001) in active and inactive women. Regular physical activity reduces the risk of cardiovascular disease due to its anti-inflammatory effects in middle-aged overweight women.WHR index is also influenced by physical activity, so middle-aged women with weight control and regular exercise can keep the it`s in the normal range.

Keywords: Active, Inactive, HS-CRP, Middle-aged Women, WHR
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INTRODUCTION

The prevalence of over-weightiness and immobility and the negative impacts it has on people's health in different countries is increasing rapidly(1).Over-weightiness increases the risk of cardio-vascular diseases, diabetes type II, hypertension, hyperlipdemia, hyperglycemia, arthritis, asthma and some specific types of cancer(2). Meanwhile, the cardio-vascular diseases and coronary vessels are of great significance. The most important cause for coronary vessels diseases is Atherosclerosis. Atherosclerosis pathological changes begin in childhood and appear in several stages in later ages. In fact we can say that the Atherosclerosis pathogenic changes progress as the age increases and this will eventually lead to disability and death in the old age(3).Several factors influence the emergence of cardiac-vascular diseases. (4) reviewing the previous studies stated that the risk of cardio-vascular diseases has a direct relationship with the level of cholesterol in blood. A research showed that, 45% mortality in men is for coronary diseases and 47% of mortality in women is due to increase in levels of cholesterol in blood(5).Considering the great significance of blood lipid in emerging cardio-vascular diseases, it should be pointed out that half of myocardial

infractions have occurred in people with natural lipid blood. Although the rate of some of inflammatory markers has been reported as very high, many researchers believe that the inflammatory processes (even in general form) are among the main factors and initiators of Atherosclerosis and cardio-vascular diseases. Therefore, within the last decade, the researchers' attention has been attracted to inflammatory markers which predict cardio-vascular diseases with more care and sensitivity(6,7).A few inflammatory markers influence the prediction of cardio-vascular diseases. Among them, High-Sensitivity C-reactive protein or Hs-CRP has been introduced as the most sensitive and most powerful one(6).CRP is the main matter of a process marker called "Acute phase response" in blood which is considered as body's response against any type of inflammation. Based on available evidences, the high rate of this marker as the general feedback of Atherosclerosis is accompanied with 2 to 5 times increase in the risk of cardio-vascular incidents. Generally, the total lipid tissue in women is higher than the men .strong evidences show that blood levels of inflammatory markers are accompanied with total overweight and dyslipidemia (8).This problem can make women more vulnerable to chronic inflammation. On the other hand, WHR assessment is a factor of significance as another risk factor of cardio-vascular diseases in middle-age overweight women determining a point in WHR in which the chance of having a risk factor for cardio-vascular diseases increases. Many researchers have recommended using WHR as a simple Anthropometric index for evaluating dyslipidemia. The results of studies show that a high amount of lipid around the abdomen is related to cardio-vascular riskfactors. Over weightiness and the way lipid is distributed in the body especially in middle parts of the body (waist and abdomen) is a suitable predictor for getting the diseases in future. Considering the increase in prevalence of over-weightiness in middle-aged women and diseases related to it, the prevention especially dyslipidemia has to be regarded as one of the most significant priorities in public health. Enough knowledge of this marker can have an affecting role in determining the chance of emerging cardio-vascular diseases in women. The major question is that whether this Anthropometric index is affected by physical activity and can we keep WHR index in normal range by having a regular physical activity(9).Considering the significance of the variables in this study, few studies have been made on the effect of physical activity on WHR and Hs-CRP in 35-45 year old middle-aged women and thus not so much data is available in this regard. These studies also have some limitations in the capability to be generalized as most of them have been done in very fat and old men or women communities (6,10).That is why the researchers in the present study try to find an answer to the question of whether we can gain an index by determining the rest level of Hs-CRP and WHR in active and inactive middle-aged women by the help of which we can do any required act to prevent cardio-vascular diseases in the community of middle-aged women.

MATERIALS AND METHODS

After distributing a call among women active in Sarabi aerobic gym in Mashhad, 100 active middle-aged women filled out the forms for medical history and physical activity .Among 47 participants who were qualified for the study, 15 individuals were randomly selected as active group. 14 volunteers were also selected from among qualified middle-aged housewives as inactive group. The criteria for entering the study included general health, age range between 35-45 years ,BMI range between 25-30 Kg./m^2 (Overweight),non having a special diet or food complement, not using drug or tobacco, not being menopause, not showing any outward signs or clinical symptoms of cardio-vascular diseases, diabetes and hypertension, not having physical exercises(for inactive group) and having regular physical exercises-aerobic exercises in gym ,three days a week at least for one year (for active group).After selecting the samples, the anthropometric parameters were recorded and body compositions were measured: height, weight, BMI by tape measure, analogue height meter and digital scale. The blood sample of active group were tested in Sarabi aerobic group by laboratorist and at the same time the blood sample of inactive group was tested in Kian laboratory between 8 to 9 a.m. while they were fasting. 5 ml. blood NK samples were taken while they were resting. While observing the points special to the tests, the samples were taken to the laboratory. 2.5 ml. blood samples were placed in room temperature for 15 minutes to form blood clot. After the clotwas gathered, it was centrifuged by 2500 rpm for 10 minutes .The resulting serum was stored in -20^0C. The CPR was measured by Immuno-tournidimetrics method with high sensitivity using laboratorial kit of Pars Azmoon Company. The active group had three days a week regular aerobic exercises at least for one year. Each session of their exercise lasted about 60 minutes and included: warming up with exercises(10 min.) Harmonized aerobic movements (30 min.) running (10 min.)and the last stage was cooling up including slow movements with breathtaking and stretching movements (10 min.)

Statistical Methods: Kolmogrov-Smirnov was used to analyze the data for assumption of normality and T-test in independent groups to compare the average of the two groups($p \leq 0/05$).The statistical computing was done using SPSS/PC^{++}, version 17.

RESULTS

In table 1,the statistics of dependant variables are presented. Considering the value p,it was found that there is a significant difference between Hs-CRP in active and inactive women .This means that the average Hs-CRP level in active women was about 2.176 mg/dl. Lower than inactive women (P=0.001).The data analysis also showed that there is a significant difference in WHR of active and inactive women .This means that the WHR in active women is lower than inactive women.(P=0.003).

Table1. Analyzes of variables in two groups (df=27)

Variables	Groups	M±SD	d	t	p
Hs-CRP (mg/dl)	Active	1.76±0.315	-2.176	-15.93	***0.001***
	Inactive	3.94±0.416			
WHR	Active	0.78±0.066	-0.068	-3.268	***0.003***
	Inactive	0.85±0.042			

DISCUSSION

The study aimed to compare the riskfactors of cardio-vascular diseases including Hs-CRP and WHR in middle-aged active and inactive women. The research findings indicated that there is a significant relationship between Hs-CRP and WHR levels in active and inactive women. This means that the Hs-CRP and WHR levels of active women was lower than inactive women(P<0.05).The intervening and experimental studies about the role of physical activity on inflammatory indexes specially Hs-CRP show consistent and inconsistent results with the findings gained in the present study. The findings of this study are consistent with the studies made by Arikawa(11),Arikawa (2011)Studying the value of HS-CRP in aligned studies showed a significant and reverse relationship between regular physical activity and inflammatory markers (3,9,12).The studies reported that the individuals who are more physically active and have a better physical preparation, have a lower level of inflammatory markers .It is probable that less activities in the past and less physical preparation is the reason for increase in HS-CRP in inactive group compared to active group(13).Although the present study does not aim to investigate the mechanisms causing probable changes in inflammatory markers ,it seems that based on the suggestions made in previous studies , strengthening cardio-vascular system caused by aerobic exercises ,metabolically changes and strengthening lipolysis process manifested through weight reduction and reduction in lipid percentage, cause reduction in lipid tissue which is one of the producers of inflammatory cytokines .The result is direct or indirect decrease in HS-CRP production in liver (14).Several studies indicate a strong negative relationship between Hs-CRP and aerobic preparation (15).

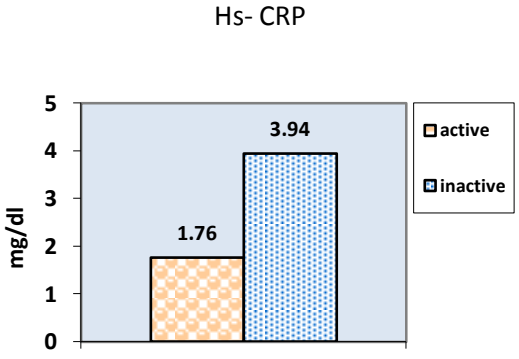

Figure1. serum means of Hs- Crp (mg/dl) in two groups

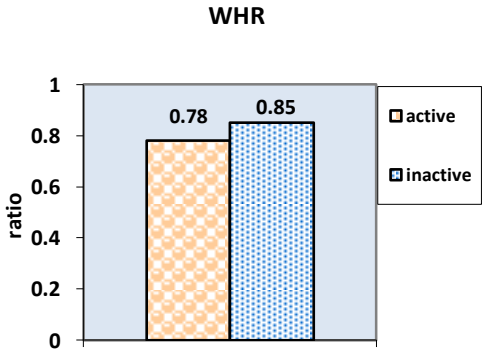

Figure2. Subject`s WHR mean in two groups

On the other hand, there exist studies which are inconsistent with the finding gained in the present study about Hs-CRP, reporting that physical activity does not have any effect on the rate of CRP (5, 6,10,16).Christian (17) have stated that lack of reduction in CRP is because of absence of change in lipid tissue and inadequate time for exercises to change CRP. Meanwhile Nicklas *et.al*(1) believed that ignoring the differences in gender and race are among the

reasons for no change in reactive C-protein .The findings of this study indicate that regular and constant physical activity can have a positive impact in preventing cardio-vascular diseases in overweight active middle-aged women in age group of 35-45 years old due to reduction in Hs-CRP serum. It was also revealed that there is a significant relationship between WHR in active and inactive women .In other words, WHR in active women was less than inactive women(P+0.003).Average WHR in active women was 0.78±0.066 cm and 0.85±0.042 cm in inactive women and finally WHR of middle-aged women was estimated at 0.81. Azizi gained the WHR norm in Iran and Tehran as 0.78<WHR<0.92 in 2003 which conforms to the average of the present study (WHR=0.81).Over-weightiness can increase the risk of tearing in athromia plaques through hyperlipidemia and increase in inflammation. It can also accelerate and intensify the formation and development of intravascularcoagulation after plaque tearing through increase in plaque activity and the plasminogen activator inhibitor. It increases the probability of cardiac ischemia by creating cardiac hypertrophy(18).An inverse significant relationship between this anthropometric index and physical activity shows that the higher rate of the norm in inactive women is due to low movements, inactivity and over weightiness (19). Therefore paying considerable attention to body composition, having athletic activity, knowledge of risks caused by fatness and over-weightiness are essential factors for middle-aged women.

CONCLUSION

According to the research findings indicating Hs-CRP serum and WHR in active middle-aged women as privative indicators in cardio-vascular disorders ,we can cautiously conclude that regular physical activity probably cause reduction in the risk of cardio-vascular diseases in overweight middle-aged women due to its anti-inflammatory effects and improvement in the status of WHR index. Therefore an inactive lifestyle is probably accompanied with a higher risk of cardio-vascular diseases. However, considering the main limitation of this study, it is recommended that the same study is done on a larger community of active and inactive women.

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