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Effect of aerobic exercise on HS-CRP in rat with genomes 14848 and obese middle-aged men

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ABSTRACT

Today, the pattern of disease in developing countries, communicable to non-communicable diseases such changes, cardiovascular disease, diabetes, hypertension, multiple sclerosis and cancer has changed that much movement problems associated with poverty and poor living habits and other factors are related. Was shown to increase plasma levels of several markers of inflammation, plaque rupture risk prediction is next. However, most researchers a highly sensitive C-reactive protein (HS-CRP), and the strength of the most sensitive indicator of inflammation predicts future cardiovascular risk have been introduced. Overall, the increase in HS-CRP with increased blood pressure, increased body mass index, smoking, metabolic syndrome, diabetes, decreased HDL-c, increased triglycerides, infection and chronic inflammation are associated. So, the purpose of the present study was investigation of effect of aerobic exercise on HS-CRP in rat with genomes 14848 and obese middle-aged men.

Keywords: Rat, HS-CRP, Aerobic exercise, Obesity.

INTRODUCTION

Today, the pattern of disease in developing countries, communicable to non-communicable diseases such changes, cardiovascular disease, diabetes, hypertension, multiple sclerosis and cancer has changed that much movement problems associated with poverty and poor living habits and other factors are related. Cardiovascular disease is one that is likely to be the dominant disease in 2020. [1]. In the past decade, the idea of local and systemic inflammatory atherogenesis and the role of inflammation in atherosclerosis and its related problems in widely accepted [2,3].

Was shown to increase plasma levels of several markers of inflammation, plaque rupture risk prediction is next [5]. However, most researchers a highly sensitive C-reactive protein (HS-CRP), and the strength of the most sensitive indicator of inflammation predicts future cardiovascular risk have been introduced [4,5,6]. So that it increases two to five-fold increased risk of cardiovascular events has been associated with [3,5,7,8]. Several factors affect this indicator. In most studies, a direct correlation between inflammatory markers, particularly obesity [9,10,11,12,13], female gender [13,14], and high age [13,15] have reported. Also, other researchers inverse association between inflammatory markers and cardio respiratory fitness levels in men and women have reported [10,8].

Overall, the increase in HS-CRP with increased blood pressure, increased body mass index, smoking, metabolic syndrome, diabetes, decreased HDL-c, increased triglycerides, infection and chronic inflammation is associated [16]. The other hand, HS-CRP levels with increased physical activity, weight reduction, and taking certain medications such as statins, fibrates and niacin reduced [16] Given that more than 80 percent of cardiac events in

non- genetic origin and is associated with the lives of people, especially the poor mobility [17] energy expenses more from physical activity level is associated with significantly lower levels of serum HS-CRP [18].

Therefore, to determine the type of exercise, duration and intensity to provide proper model population can improve public health, reduce health care costs and thus contributed to many social problems. Research results indicate that human and other organisms tend to reduce their physical activity in old age. For example, mice that were allowed to run in the first months of his life, on average approximately 46 miles per week, but in the last months of life have only run 3 to 6 miles per week. In this case, humans and animals are very similar [19].

The results Holloszy et al (1997) also reduce the running distance per day with food limitation aging process in rats with and without food restriction show [20]. On the other hand, reports indicated that the reduction in deaths from heart disease and vascular Physical Activity current population is related to earlier work them [21].

The results showed that the values of the people who are initially activated and then deactivated, as has been inactive people. In contrast Pihl et al (2003), the research on athletes veteran least 15 years national and international experience in sport competition were to have found levels of hs-CRP and lipid profile athletes veteran worse than the control group of non –athletes [22].

Although investigators positive effects of aerobic exercise, especially compliance with these exercises, resulting in the reduction of inflammatory markers and cardiovascular events - diseases in different age groups have reported [23,24,25,26], some researchers have reported no change in inflammatory markers have followed aerobic exercise [27,28].

The results of several studies suggest that the risk of cardiovascular events in women after menopause compared with men increases with similar age [29,30,31]. However, toffee and colleagues have reported that HS-CRP levels in women 70 to 79 years less than men in the same [32]. On the other hand, the results of Rice and colleagues also showed that HS -CRP does not change according to gender [33]. Many researchers have studied the relationship between cardio respiratory fitness and HS-CRP levels in men and women who paid [3,10,29,34,35]. Charges, and colleagues in the research, an inverse correlation between the value of HS-CRP and prepared a report that the highest levels of HS-CRP (1.27 to 2.11 mg per liter) was observed in the lowest level of cardio respiratory fitness [35]. Other researchers have found similar results [34,35,36]. However, the research also no association between physical activity and HS-CRP [37,38] as well as body weight [37] reported . In contrast, the results of this study suggest that HS CRP levels of inflammatory markers especially after a session of prolonged exercise, such as marathon [39], as well as intense anaerobic exercise [40] increases finds.

The research report can be deduced from the position, the more research done on the impact of physical activity on HS-CRP was performed on human subjects , probably because of the lack of control of the various factors affecting the index of completely aligned clear is not. Therefore examined the effect of choice to determine the net effect of exercise training appears necessary. The special requirements of elderly people and the number of training sessions led to the possible effects caused by aerobic interval training with various sessions of training on the week of are verified inflammatory. Undoubtedly, scientific research in order to prescribe exercise control population plays a significant role in preventing and reducing health care costs are a lot of social problems.

According to the above research that had been done to address this issue:
The research was conducted by Dabidi Roshan et al (2010), 80 old wistar female rats of the same age , weight and condition of the genome with 14848 randomly selected and divided into three main groups: continuous , intermittent aerobic, and the controls and ten sub-groups - each group 8 mice - were divided . Protocol first 12 weeks of exercise a week, 5 speed and duration of each session was determined execute. The protocol was administered for 4 weeks detraining. Data using repeated measures ANOVA and post hoc test (Post Hoc) were analyzed. Preliminary results showed HS-CRP levels in both groups had significantly reduced activity in the first six weeks, but with continued training until the twelfth week, a significant decrease occurred. The main results of this study show a significant increase in non- HS-CRP was significantly increased in both training groups and the control group during the four weeks of detraining. ANOVA test showed that the difference between HS-CRP levels after 6 and 12 weeks and 4 weeks detraining training only between the two groups is not significant [41].

In another study , which was opened by Debidi Roshan et al (2009), 56 female wistar rats (aged 21 months , at least three months past the end of their reproductive period) were selected and divided into three groups including control , user groups of intermittence aerobic 3 and 5 training sessions , and the group pre-test , mid-test and post-test groups. Periodic training program for 12 weeks and 3 or 5 weeks of training with a progressive rate of 12 to 23 meters per minute and will run for 10 to 80 minutes. Blood at baseline and follow -up of 12 to 14-hour fast at pre -test, mid-test and post-test with the same conditions and HS-CRP levels and indices immunoturbidimetric method LDL-C and HDL-C also was measured by an enzymatic method. Data using repeated measures analysis of variance and shepheh and LSD tests were analyzed. The results showed that HS-CRP values within groups, the control group after 6 and 12 weeks were increased, while the first 6 weeks of exercise training in both groups there was a significant decrease in non- reducing end of the twelfth week in Group fifth periodic meeting was statistically significant. On the other hand, HS-CRP comparison three groups showed differences only between 3 and 5 periodic meeting with the control group following 12 weeks of exercise is meaningful. Similar changes in LDL-C and HDL-C levels were observed between the three groups [42].

In another study , again conducted by Debidi Roshan et al (2009), 56 female wistar rat genomes 14,848 (ages 21 months to complete at least three months were past their fertile period) were selected and were randomly assigned to the control group and training groups division were. Continuous training group training group was divided into three sessions, five times a week. Continuous exercise three to five times a week for 12 weeks running speed and duration were determined. Fasting blood sampling at pre -test was conducted, followed by six and twelve weeks. HS-CRP values in the control group after six and twelve weeks, there was a significant increase. While both continuous training in the first six weeks of training, non- significant decrease was observed that this reduction was statistically significant at the end of the twelfth week. On the other hand, HS-CRP changes between the three groups showed no significant differences between training groups 3 and 5 compared with the control group, there was a meeting. While this difference between training groups was not statistically significant [43].

In another study by the Gaeini et al (2008) in obese older female rats, wistar 14848 genomes (age 21.5 months and spent at least three months to the end of their reproductive period) to conduct a preliminary study on 64 rats and main and different groups were classified. First, a preliminary study was to determine differences between HS-CRP levels in young obese rats, young skinny, skinny older and older were obese. The primary study on the latter group (elderly obese) were randomly assigned to the following groups, which in turn pre-test, the control test, post-test control , test and training exercise between the test groups.

HS-CRP levels in obese older group pre- test to determine baseline values were used as controls and training. Exercise protocol for 12 weeks and 5 weeks of each session, 2 to 4 times the speed of 12 to 23 meters per minute and will run for 10 to 80 minutes. Blood samples from 12 to 14 hours fasting baseline (pre-test) and post tests at the same conditions and using immunoturbidimetric HS-CRP levels were measured. Analysis data using ANOVA with repeated measures and LSD post hoc test were analyzed. The results showed that HS-CRP levels in the first 6 weeks of exercise decreased, but this decrease was not significant (P=0.351). Despite this, the practice continued until the twelfth week, a significant decrease in the amount of HS-CRP at the end of the study compared with earlier values (P=0.001) was observed [44].

In another study by Choobineh et al (2007) in obese wistar female rats aged 21.5 months and at least three months past the end of their reproductive period, 56 rats in the control group, continuous and intermittent groups. Exercise protocol for 12 weeks and 5 weeks, each session will run with the speed and duration specified. Blood samples followed by 12 to 14-hour fast at pre -test, mid-test and post-test with the same conditions and values of HS-CRP were measured using immunoturbidimetric. Data were analyzed using repeated measures analysis of variance and shepheh and LSD tests were analyzed. Results showed values within a group HS-CRP both continuous and intermittent exercise in the first 6 weeks of training has declined, but the decline was not significant (P values respectively with 0.08 and 0.351). However, the reduction in these groups following 12 weeks was significant (P value of the order is equal to 0.000 and 0.003). On the other hand , different HS-CRP group showed the only difference between the two groups after 6 and 12 weeks of continuous and intermittent exercise-both-not significant (P-value of the order is equal to 0.936 and 0.427)[45].

In another study conducted by Moghadasi et al (2010) of up to 12 weeks corrected HS-CRP levels in central and peripheral fat volume was checked obese middle-aged men in the same order healthy middle-aged men, 16 with an average of 42 years old control groups (n=8) and exercise (n=8) groups. Walking on a treadmill workout program

includes 12 weeks of instruction in accordance with the CDC and the ACSM. Based on this instruction, as amended, which is called LAM activity in living subjects 2 miles 4 days a week for 30 minutes at a speed of 6.6 km/h treadmill walked. After completion of the training period, subjects took a week to avoid any vigorous physical activity lasting training effects should be studied. The results showed that weight , BMI , visceral and subcutaneous fat volume in central and peripheral areas of subcutaneous fat volume after 12 weeks LAM was significantly decreased compared to controls ($P<0.01$). Also, maximal oxygen uptake after 12 weeks LAM training, subjects increased compared to controls ($P<0.01$) and had a week of detraining effect change. On the other hand , after 12 weeks LAM training no significant difference in HS-CRP levels were observed between the two groups , but the level of HS-CRP levels after one week of exercise were significantly lower than the control group ($P<0.05$) . In addition, a significant relationship between the level of HS-CRP levels , weight , volume of the central visceral and subcutaneous fat were observed .effective levels of HS-CRP is not observed , but after a week of training and reduce inflammation caused by the last session , has decreased HS-CRP appears [46].

DISCUSSION AND CONCLUSION

Research report suggests that the prediction of cardiovascular disease, sensitivity reactive protein hs - CRP is stronger than LDL-C [4,6], the increase in the baseline values of these indicators to predict an independent and strong risk factor for subsequent cardiovascular events is [4,7].

The first study on the effect of 12 weeks of continuous and intermittent aerobic exercise on hs-CRP showed that the values of the index group, the control group, in various stages of training, significant has gradually increased, while values, hs-CRP in both training groups in the first 6 weeks, had significantly reduced, and the remainder, up to the twelfth week, a significant decrease in the values of these parameters were observed. On the other hand, significant differences between hs-CRP, showed that the difference between the exercise group and the control group after 6 and 12 weeks of training - both - were statistically significant, while the difference between training groups, in the process, is not significant.

Findings concerning the effect of 4 weeks of detraining on hs-CRP showed that during this period the index increased in both training groups had non- significant, while the increase was significant in the control group. On the other hand, the values change hs-CRP only between training groups was not statistically significant. This means that changes in the index values during detraining is looking both training methods were similar. Research literature suggests that the inflammatory response as a result of changes in inflammatory markers after regular exercise is inhibited [6,14]. Studies show that regular activity in a variety of ways, including increased hs-CRP may have anti-inflammatory effects and thus brought a protective role against cardiovascular disease [1,2,9,10,12]. In summary, the findings can be said that continuous and intermittent aerobic exercise inhibits the inflammatory response is based on a few points can be noted , the values of these of a significant difference between two groups, the first of lack exercise, it is, followed by each of the training methods are similar.

In the second study results demonstrate the value of hs-CRP groups at different stages of the pre-test, mid-test and post-test were significantly increased gradually. If the values of hs-CRP in both training groups were significantly reduced in the first 6 weeks and continued to practice until week 12 a significant decrease in the amount of hs-CRP Group, Period 5 sessions per week was significantly reduced in group 3 of the periodic There was no meeting.

Goldhammer et al (2005) reduced due to lower levels of hs-CRP levels decrease muscle damage, modulate cytokine production and regulation of body weight, improved insulin sensitivity, lower blood pressure, reduce LDL-C and increasing HDL-C, followed by regular physical activity and consistently reported [47]. Previous studies have demonstrated an inverse association between cardio respiratory fitness - values of respiratory and hs-CRP [48,49].

Huffman et al (2006) significant reduction of baseline hs-CRP and other inflammatory markers followed by aerobic exercise in athletes with cardiovascular fitness - upper respiratory tract have been reported [25].

In summary, we can conclude that, people can aerobic interval training, in order to prevent heart disease-cardiovascular benefit, and in this respect, according to their condition, they can exercise 5 sessions per week, and on a regular basis, to achieve the above objectives, the need to take advantage. The most important findings reaffirm and maintain training, with further training sessions, in the long term, the benefits of exercise and physical activity.

In the third study, the results showed that the levels of hs-CRP inactive group (control), in the difference pre-test, mid-test and post-test, gradually increase has been significant. If the values of hs-CRP in both training groups in the first 6 weeks had significantly reduced, and the practice continued until the twelfth week, significantly reduced levels of hs-CRP, it was observed that there is some concern over the effectiveness of the training by hs-CRP show. These findings, previous reports based on the reduction of inflammatory markers, which confirms the effectiveness of physical activity [12,26,50].

Lakka et al (2006) research has also confirmed this [26]. The researcher's quantities hs-CRP serum 652 sedentary men and women, white and black, after running for 20 weeks (3 sessions per week) on a bicycle ergometer training standards were reviewed. The results showed that the levels of hs - CRP serum CRP levels and the first 162 people who had high (greater than 3 milligrams per liter), after training 1.34 milligrams per liter was reduced.

Results of studies suggest there is an inverse relationship between fitness - cardio respiratory values of hs - CRP is (References 4 and 20 the highest). Huffman et al (2006) marked decrease levels of hs - CRP and other inflammatory markers in patients prepare report [25].

In summary, given the inflammatory hypothesis of atherogenesis and the role of exercise in reducing body fat levels and abdominal obesity, resulting in the inhibition of inflammation, it can be concluded that aerobic exercise to prevent heart disease-cardiovascular, is beneficial. According to the results, we can say that, although the overall effectiveness of the training session more than 5 exercises 3 times a week, but to inhibit the inflammatory response, duration of training is more important than the number of training sessions per week. In addition, training should always maintain the long period considered.

Quarter results showed a difference of hs-CRP four groups of lean and obese young and older groups, is significant. Preliminary findings of this study, the results of previous studies on the relationship between inflammatory markers and obesity [35,37,51] and age [29,30] confirms. However, results supervisors and colleagues [52] imply an increase in hs-CRP in individuals with high body mass index in obese individuals compared to normal weight individuals. However, a closer look at some of these can cause inconsistencies in research methodologies, subjects, the age and level of activity sought.

The results of the fourth study on the effect of aerobic interval training for 12 weeks, the most sensitive indicators of inflammation (hs-CRP), the values of these parameters at different stages in the control group (pre, mid and post-tests) has been gradually increasing significantly. While the values of hs-CRP group at 6 weeks of training that included the first decline is statistically not significant. Despite continuing training courses (twelve weeks), the values of hs-CRP reduction is significant. These findings, previous reports indicating that regular physical activity and cardio respiratory fitness with lower baseline hs-CRP is confirmed [32,33,36,39].

n summary, given the inflammatory hypothesis of atherogenesis, the association of physical activity with lower levels of inflammation, which hs-CRP has been measured-can be rooted in physical activity associated with lower body fat and obesity is. Based on the findings, regular aerobic activity, is associated with reduced inflammation and based on these findings, found that doing aerobic interval training also leads to significant health benefits, and hence can be said of those Elderly people who cannot constantly running to do, can be done to operate, several times in succession, the benefits of exercise for cardiovascular protection, take the necessary interest.

Fifth findings, the difference between hs-CRP showed that the difference between the two training groups and the control group after 6 and 12 weeks, a statistically significant, whereas the difference between the two exercise group after 6 and 12 weeks-both-not significant. On the other hand, the results of this study, the effects of 12 weeks of continuous and intermittent aerobic exercise on the most sensitive indicator of ongoing inflammation (hs-CRP), showed that the values of this index in the control group at different stages (pre, mid and post-tests) gradually has increased significantly. While the values of hs-CRP in both groups at 6 weeks of training that included the first decline statistically not significant. Delighted with the continuing training courses (twelve weeks), the values of hs-CRP reduction is significant. The findings, based on previous reports that regular physical activity and cardio respiratory fitness with lower baseline hs-CRP is confirmed [18,53,54]. The first six-week training period, reducing the amount of hs-CRP was not significant, which could have the effect of exercise duration; intensity and duration of exercise hs-CRP speak

Study by King and Carek (2003) as well as Donovan and Owen (2005) also confirmed the effect of exercise intensity and duration of inflammatory changes. On the other hand, the relationship between physical activity and hs - CRP has not been confirmed in several studies [53,55]. In summary, given the inflammatory hypothesis of atherogenesis, the association of physical activity with lower levels of inflammation - which hs-CRP has been measured - can be rooted in physical activity associated with lower body fat and obesity have. The most important finding is the existence of significant differences in the levels of hs-CRP continuous and intermittent aerobic exercise group and the control group after 6 and 12 weeks, confirms that the use of both continuous and intermittent exercise, can reduce inflammation, to be effective, based on the findings, regular aerobic activity, is associated with reduced inflammation.

The findings revealed that the sixth hs-CRP between the two groups after 12 weeks LAM training no significant differences. In support of these results, Ward (2006) also stated that this type of exercising, reduce levels of hs-CRP in overweight not in African-American women [56]. The Conservatives Murphy et al (2006) are also significant changes in the value of hs-CRP in overweight middle-aged men and women after 8 weeks of exercise, according to the CDC and ACSM guidelines apply where changes were not observed [57]. In some studies, decreased levels of hs-CRP after exercise changes in body composition, weight loss and fat loss are known [58,59], the weight will be reduced by at least 10% of all risk factors Cardiac - Vascular decreases [60] but because research Weight loss occurred in only 2.3, respectively, so it seems to be a slight amount of weight loss have failed in reducing the level hs-CRP contribute. Also Obisesan (2005), as has, however, decreased levels of hs-CRP after a career Vrrshy partly due to weight loss, but weight-loss best that can lead to lower levels of hs-CRP, only by doing intense exercise is caused because with moderate or low physical activity, fat mass and lean mass replace much weight loss is not the case [59].

other the results showed that although body weight, visceral and subcutaneous fat volume center, respectively, 2.3, 7.38 and 5.76% drop, but no significant association between hs-CRP, weight, and the central area of fat volume were observed. So it may be that such a change hs-CRP, independent of changes in body composition or irritation caused by this type of exercising that was not enough, not enough changes in body composition to reduce hs-CRP will apply. Some studies have shown that reducing levels of hs-CRP, independent of body weight and fat mass loss, and the increasing readiness and physiological effects caused by anti-inflammatory activity and exercise have been established [61,62,63].

Esposito et al (2005), which is essentially a ready physiological changes induced by exercise is a major factor in reducing the level of hs-CRP know, because weight loss and reduced body fat mass in response to a 6-month training program , in their study was small, but the level of hs-CRP was a significant decrease [64].
Ward (2006) has a low impact on the level of exercise intensity hs-CRP not be felt in this area requires further research [56].

In general, it seems, exercising LAM, a significant reduction in hs-CRP, immediately after the end of the last session, is not because this type of exercising is not a significant improvement in body composition, particularly fat abdominal subcutaneous be effective. On the other hand, seems to cause a significant reduction in hs-CRP after one week of practice due to reduced inflammatory Commons is a result of the latest training sessions. With this interpretation further investigation of effective mechanisms to reduce inflammation is felt to this factor.

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