

Original Research Article

Long term effect of different exercise intensities on serum cortisol level in osteoarthritis patients.

Abstract

Purpose: to compare between the effect of different intensity of aerobic exercises training on serum cortisol level, knee pain, stiffness and difficulty performing ADL activities in over weight osteoarthritic patients. **Methods:** forty overweight, knee osteoarthritic patients were selected between Jan and Mar 2016 from Elmenia University Hospitals their ages ranged from 45- 50 years. Patients were assigned randomly into two equal groups. Serum Cortisol level and WOMAC questionnaire were assessed before the study and after 4 weeks of training. All groups received aerobic exercises for 30 min / 3 sessions/week for 4 weeks with different intensities. Group A received aerobic exercises intensity 45% to 60% of maximum heart rate (MHR) Group B received aerobic exercises intensity 65% to 75% of MHR **Results:** Serum Cortisol level after training in comparison to before training significantly decreased in Group A (P=0.000) and significantly increased in Group B (P-value = 0.000). Also WOMAC questionnaire about pain, stiffness and difficulty performing daily activities (ADL) sections show statistically significant decrease after 4 weeks of training in both groups (P-value = 0.000). There was no significant

$$\text{HR}_{\text{max}} = 220 - \text{age}$$

TF= training fraction, it was 60% to 65% in low training intensity

The pre- and post-intervention assessments were the serum cortisol level, TUG test and the self-reported WOMAC aspects of functionality, pain, and stiffness. The assessment was carried out before **stat** of training and after 4 weeks at the end of training program.

Blood sample and Cortisol Level evaluation method:

Blood samples was collected using a 3-cc syringe for all subjects at 8:00 am (time of measurement is affixed time). Total serum cortisol concentrations was measured with immunoassay method and using Cortisol Im 1841 RIAKIT REF made in the Czech Republic. It is important to determine reference values and be aware that they vary depending on collection time. When collected at 8:00 am, the proposed value ranges between 5.0 and 25.0 µg/dl, at 4:00 pm cortisol values should decline by more than 35% of the morning value, while at 6:00 pm the drop should be greater than 50% [9].

Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

The WOMAC questionnaire contains 17 questions regarding the degree of difficulty to perform daily activities, such as stair use, to assess the physical function of patients. Patients are asked to rank the degree of difficulty in the last 72 hours in a scale from 0 (none) to 4 (severe). The individual score for the 17 questions is added up to a score that can range from 0-68. The greater the score, the worse the function. The WOMAC questionnaire also includes questions about pain, stiffness and difficulty performing daily activities (ADL). In this study, the WOMAC scores of pain, stiffness, and difficulty performing ADL activities were analyzed separately [10].

Figure. (2): Mean $\pm$ SD values of serum cortisol level of pre test and post test in both groups.

WOMAC scores of pain, stiffness, and ADL:

As indicated at table (3) and illustrated at figure (2) "Paired t test" at group A revealed that there was a significant reduction in Pain (t-value= 12.964, $P < .001$), stiffness t-value= 10.239, $P < .001$) and difficulty performing ADL activities (t-value= 13.307, $P < .001$). In addition, "Paired t test" at group B revealed that there was a significant reduction in Pain (t-value= 8.510, $P < .001$), stiffness t-value= 8.510, $P < .001$) and difficulty performing ADL activities (t-value= 13.307, $P < .001$). Comparison between both groups pre treatment and post treatment, "unpaired t test" revealed that there was no significant differences in pain pre treatment (t-value= -0.54, $P = .59$) or Pain post treatment (t-value= -1.07, $P = .29$), stiffness pre treatment (t-value= -0.47, $P = .64$) or stiffness post treatment (t-value= 0.34, $P = .73$) and Difficulty performing ADL activities pre treatment (t-value= 0.68, $P = .50$) or difficulty performing ADL activities post treatment (t-value= -1.00, $P = .32$).

11

Discussion

This study investigated the effect of different aerobic exercise intensities on serum cortisol level and WOMAC scores of pain, stiffness, and function in overweight with knee OA adult people.

12

This study also, came in contradiction with Yazdanparast, Azarbayjani [18] who examined the effect of different exercise intensity (low, medium and high) on the salivary concentration of Cortisol in elite 10 young female swimmers. The subjects participated in a 6-week exercise program. The exercise program was divided into three time segments: the basic endurance session during the first two weeks, special endurance session during the second two weeks and hard exercise session during the last two weeks. Saliva samples were collected at the end of each two weeks before and immediately after exercise from the study group. The findings of the research show that exercise with low, medium and high intensity does not have a significant effect on the concentration of cortisol level of elite girl swimmers.

The result of this study came in contradiction with the three previously mentioned studies may be due to differences in subject characteristics (younger age or normal or elite subjects) and longer training period (more than 4 weeks)

Also the results for WOMAC scores of pain, stiffness and Difficulty performing ADL activities showed significant improvement in both groups in comparison to pre treatment values with no significant difference between both groups pre or post treatment.

So the results of our study also came in accordance with Kovar, Allegrante [19] compared the effects of 8 weeks of fitness walking with a usual-care intervention in a sample of 102 older adults. The exercise intervention involved 90-min sessions of supervised walking and psychoeducational training performed three times per week. Participants walked for up to 30 min during each of the three weekly exercise sessions. Pain was assessed using the arthritis-pain

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Conclusion

The results of current study showed that both low and high intensity aerobic exercises are effective in improving Knee OA symptoms weight patients but low intensity exercises had a reducing effect on serum cortisol level while high intensity exercises had an increasing effect on serum cortisol level after 4 weeks of training.