EFFICACY OF HIGH INTENSITY INTERVAL TRAINING IN CHRONIC NON-CIRRHOTIC ACTIVE HEPATITIS C PATIENTS

By

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B.Sc in Physical Therapy (2009)
تأثير التمرينات عالية الشدة المتقطعة على مرضى الالتهاب الكبدي المزمن غير المتليف لفيروس سي
INTRODUCTION
• Hepatitis C virus (HCV) infects 130–170 million people worldwide. It causes severe liver disease, ranging from chronic hepatitis to cirrhosis and even hepatocellular carcinoma (Francisco M. Averhoff, et al 2012).
• T-helper (Th) lymphocyte cytokine production may be important in the immune pathogenesis of hepatitis C virus (HCV) infections. T-helper 1 (Th1) cytokines such as; interleukin-2 (IL-2), and interferon gamma (IFN-gamma) are necessary for host antiviral immune responses (Masoomeh Sofian, 2012).
• Aerobic exercise had a potent effect on the immune system in patients with chronic HCV. Its effect was clear on cytokines which are immune mediators and affect the activity of all immune cells, it had also a significant effect on liver enzymes alanine aminotransferase (ALT) and aspartate aminotransferase (AST) (Chalamalasetty Sreenvasa Baba, 2006 & Soher Shehata, 2008).
low-volume HIT can also stimulate physiological remodeling comparable to moderate-intensity continuous training despite a substantially lower time commitment and reduced total exercise volume. Such findings are important given that ‘lack of time’ remains the most commonly cited barrier to regular exercise participation (Martin Gibala, et al 2012).
Hypotheses:

It was hypothesized that:

• Interval training on a treadmill had no significant effect on the level of circulating Th1 cytokines (IL-2 and INFγ).
• Interval training on a treadmill had no significant effect on liver enzymes (ALT and AST).
Statement of the problem:

Does high intensity interval training have an effect on liver enzymes (AST and ALT), and level of circulating Th1 cytokines (IL-2 and IFN-γ) in patients with chronic non-cirrhotic active HCV?
Purpose of the study:

• To investigate the effect of high intensity interval training on liver enzymes (ALT & AST) and level of circulating Th1 cytokines (IL-2 and IFN-γ) in patients with chronic non cirrhotic active HCV.
Significance of the study:

- Exercise training is a clinically proven, cost-effective, primary intervention that delays and in many cases prevents the health burdens associated with many chronic diseases. (Martin Gibala, et al 2012).
High-intensity interval training (HIT) can serve as an effective alternate to traditional endurance-based training, inducing similar or even superior physiological adaptations in healthy individuals and diseased populations (Martin Gibala, et al 2012).
SUBJECTS AND METHODS
I- Subjects:

• Forty patients diagnosed with active HCV by physician from both genders received high intensity interval training for eight weeks, three times per week. Their ages were ranged from 40-60 years old.
II-: Equipment:

A-Evaluative equipment:

• ELISA test for quantification of INFγ.

• ELISA test for quantification of IL2.
• Blood sampling for liver enzymes (AST and ALT):
Height weight scale
(BMI = weight/height)
B-Treatment equipment:

Electronic Treadmill apparatus

Electronic treadmill apparatus
III-Procedures:

A- Evaluative procedures:

Blood sampling:

5 ml of blood were taken from each subject after 12 hours of fasting from the brachial vein and reserved.
B- Therapeutic procedures:

(1) The warming up phase:

warming up (30% HRmax) intensity
(2) The main exercise phase:

Recovery period (40-60% HRmax) intensity
HIT period (75-85% HRmax) intensity
RESULTS
Results of patients demographic data

Figure shows means of Age, Height and Weight

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Weight</th>
<th>Height</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52.10</td>
<td>86.60</td>
<td>168.30</td>
<td>30.48</td>
</tr>
</tbody>
</table>
Results of ALT

Figure Shows pre- and post-ALT means

Pre: 75.05
Post: 60.90
Results of AST
Figure shows pre- and post- AST means

![Bar chart showing pre and post AST means](chart.png)

- Pre: 61.07
- Post: 46.50
Results of Interleukin 2

Figure shows pre- and post- Interleukin 2 means

Pre: 11.30
Post: 16.75
Results of Interferon gamma

Figure shows pre- and post- Interferon gamma means
Correlation coefficients between percentage of improvement of liver enzymes and IL2

Figure shows high positive correlation of improvement percentage of ALT and IL2
Figure shows high positive correlation of improvement percentage of AST and IL2
DISCUSSION
A study of systemic inflammatory response induced by High-intensity interval training in active, young men which analyze inflammatory cytokine concentrations in the blood at multiple time points during the acute recovery period after exercise (immediately post, and 15-, 30-, and 45-minutes post).
The inflammatory cytokine response to an acute bout of HIIT was consistent with the typical inflammatory response to prolonged, continuous aerobic exercise, So HIIT inhibits the release of the pro-inflammatory cytokines and stimulates the secretion of the anti-inflammatory cytokines. Kevin A Zwetsloot, et al., 2014.
Furthermore, HIT is superior to MCT for decreasing resting oxidative stress and elevating ratio of IFN-γ/IL4. because of successive exercise phases at high intensity and interspersed with moderate-intensity exercise periods, as a form of intermittent ischemic preconditioning protect individuals against oxidative damage Tzu- Pin, et al. 2013.
• According to the research results, the percentage of improvement of ALT, AST was (18.85%, 23.87%); it figures out as combining the low volume high intensity interval training to pegylated interferon (IFN) and ribavirin, it shorten the recovery period by 11-30 days in average.
• Thus combination of HIIT with drug therapy may fasten the recovery and enhance immunity. Beside that it avoids psychiatric side effects which associated with drug therapy. Also this type of exercise is time efficient compared with traditional endurance exercise.
CONCLUSION

Low volume high intensity interval training had a potent effect on immune system in patients with chronic active HCV. It had a significant increase in the level of circulating Th1 cytokines (IL2, IFN$_\gamma$) and significant decrease in the liver enzymes (ALT, AST) which means protection of hepatic cells and restoration of its function.
RECOMMENDATIONS

FOR PHYSICAL THERAPIST:

It is favorable to all physical therapists in outpatient clinics and hospitals to use the low volume high intensity interval training in the program when dealing with hepatitis C patients.
FOR FURTHER RESEARCH:

1. Investigate the effect of other types of exercise; strengthening exercise on immune system in HCV patients.

2. Compare the effect of low volume high intensity interval training with the effect of interferon therapy on immune response in chronic HCV.
3. Investigate the effect of low volume high intensity interval training on propagation in HCV patients.

4. Investigate the effect of Th2 cytokines (IL4, 6 and 10).
5. Compare the effect of traditional endurance exercise with the effect of low volume high intensity interval training on immune response in chronic HCV patients.

6. Compare the time expected when adding the low volume high intensity interval training with interferon therapy with that using interferon therapy only.
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THANK YOU