

The Effect of the Aerobic Selected Exercise in Water on the Cortisol level, IL-10, IL-6 and TGF β in the Patients with Multiple Sclerosis

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ABSTRACT

Background and purpose: Multiple sclerosis or M.S. is a chronic and nervous system unable disease, which damages the central nerve system myelin (brain and Spinal cord). The most prevalent symptoms are fatigue, spasm, tremor, squint, imbalance and walking disorder. The purpose of this research is to investigate the effect of the aerobic selected exercise in water on the Cortisol level, IL-10, IL-6 and TGF B in the serum of the female patients with M.S. **Method:** The research type is the practical and the research method is the semi-empirical. Thus it was selected 30 individuals as the sample out of 120 female patient with M.S. which they had a disease degree 1 to 4 with the disease duration average of 5 years and the age average 20 to 50 years; and randomly they were split to the experimental group and the control group which each were 15 individuals. The exercise program was implemented to the experimental group with the intensity of 50 to 60 percents of the maximum heart-beat, Due to investigate the bridling factors of immune system, was sent the examinable blood samples, before and after exercise to the special laboratory after to specify the data normality, was performed, their analysis using the descriptive statistics and the dependent and independent t test. **Results:** It is obtained the significant difference on the Cortisol level in the examinable of the experimental group after and before the exercise. It is not detained significant difference on the examinable TGF_{β} ($p=0.271$), IL-10 ($p=0.167$), and IL-6 ($p=2/824$) level. **Conclusion:** Although, we observed the changes with the measured variables, but these changes were not significant. The lack of significant of the variables can be because of the low statistics samples, low duration exercising program and the cytokines changes amplitude.

KEYWORDS: aerobic exercise, multiple sclerosis, Cortisol, IL-10, IL-6, TGF_{β} .

1. INTRODUCTION

Nowadays, it has been accepted that not to perform the physical activities is a very dangerous factor to give the diseases such as the heart disease, hypertension, osteoporosis, and diabetes this disease are considered as the main factor of mortality and disabling in the developing countries. (2)

In this context, immune system has a key role to spoil. the minatory factors of these diseases, but also it may damage to the body tissues the tissue damage is created by immune system, due to the ruinous effects of the immune cells on the body tissues, which it is obvious long-term, and harmful.

Normally, it is inhibited to the incidence of such damages; by to adjust the immune system to waste the regulatory sucrose's is caused to activities the immune system against with the body insider tissues and chronic inflammation or self-immune disease. It seems that the exercise with average and regular intensity can be a fundamental way to inhibit the incidence of this state and to counteract the effect of its inability. (3)

In general, it has been specified the exercise importance on immune system, especially in the light and short duration activities which in long duration can reinforce the individuals immune and create the resistance to the types of allergies and the infectious diseases. (13)

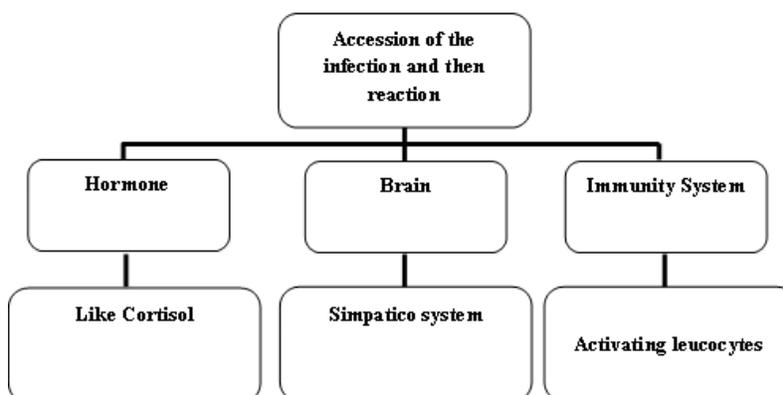
MS is one of the developing symptoms in the world that it is known as the Century Disease, which Lead to create the influence in the parts of the central nervous system and involve the brain and Spinal cord. By wasting the myelin, it is caused to create the disorder with conduction of the electrical and neurotic flow, and by flowing it lost gradually it's the muscular ability. Some researchers believe that this disease may be the result of accession the Epstein-Barr [EBV] virus to the immune system.

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This virus creates a defect within the immune system that in contrast with the immune maintenance, it leads to act reversely by this system. (4)

The effects of this damage are the lose balance, infirmity with movement, physical disability, vision disorder, and while individual was not treated, aggressively he/she are paralyzed. (1) It is thought that MS disease has had the most neurological researches during past two decades, which it is transformed from a not-remedy disease into the remedy disease in future. Certainly, MS is the best example to the World mobility and movement into its remedy. The statistic researches have indicated that their population in the world is about 3/5 M. persons and those who live in Iran is 40000 persons. (3) Now this disease is for persons less 20 ages, which its prevalence is three-times more in males than females. (2)

Accession the infection into body lead to the reaction with the immune system, brain and hormones. Among the exercise physiologic effects on the patients is the blood factors changes. (1)



The immune system transmit the battle message with the infection into the tissues by activating the leucocytes, brain through sympatric system and hormones such as Cortisol and this is caused to create the stimulus in some cytokines such as bridled cytokines (TGFP) IL-10, IL-6.(3) That it is caused to stimulate IL-6, then Cortisol and IL-10. Manipulation with IL 6 level resulting with exercise may decrease the low grade inflammation and the self-immune diseases and improve their symptoms. (3) The research was started on the patients with M.S since 1887 by Sharkot. (1) Many studies have been conducted about the effect of the aerobic exercise on Multiple Sclerosis and the effect of the exercise on the cytokines of the patients with M.S. which including: in 2003, Hessen concluded after one year exercise over the patients with MS that Inter-Locin-10 has been decrease slightly and the Cortisol concentration has been increased. (9)

Hessen (2003) by eight-week aerobic exercise, concluded that the Cortisol concentration has been increased, but there is not any considerable change in IL-10 of the patients with M.S. (9) White Lisly (2006) by 12-week endurance exercise concluded that IL-10 and IL-6 levels will not change in the patients with M.S. (11) Mokhtarian by four weeks exercise over the with MS, concluded that the inflammatory cytokines production will be increased.(15)

DiDi (2000) by investigate the effect of injection interferon, showed that IL-10 and IL-6 levels in the patients with MS won't change.(8) Donloud (2001) stated that the effects of 2-weeks aerobic exercise on the patients with MS are uncertain. (7) Venkatramen (2000) by 16-week endurance exercise, concluded that IL-6 level will be increased. (22) Schalz (2004) found that the eight week biking aerobic exercise will not created any important change on the Cortisol level.(20) Castlano (2007) concluded that the eight-week biking aerobic exercise is caused to decrease the IL-6 level in the patients with M.S.(6) Niculti (2001) by investigation the relationship between M.S. and TGF β concluded that the circulation TGF β in the healthy group is 2 to 3 times lower than the patients with M.S. (16) Henmir (2003) by the five days running exercise over the thirdmill, concluded that the exercise may cause to increase the TGF β concentration.(10) Karir (2007) concluded that TGF β has a considerable role to preserve the body immune environment.(5) Mirshafie (2009) investigated the relationship between TGF β and M.S. and concluded that TGF β has a strong role to control the self-immune diseases such as M.S.(14) Carly (2009) by the eight-week exercise, concluded that the exercise has a positive effect on immune. Power and healthy in the patients with M.S. (4)

The supplementary studies indicate explicitly deficiency information and knowledge.

In this context, for this purpose identification with the elements related to the effect of the aerobic exercise on cytokines in M.S. patients, can be caused the remedial important and useful result. Now, it

is introduced a question whether the aerobic selected exercise effect on Cortisol IL-10, IL-6 and TGF β in ms patients?

2. Research Methodology:

The research type is the practical and the research method is the semi-empirical. Thus it was selected 30 individuals as the sample out of 120 female patient with M.S. which they had a disease degree 1 to 4 with the disease duration average of 5 years and the age average 20 to 50 years; and randomly they were split to the experimental group and the control group which each were 15 individuals.

In this research, the independent variable is the aerobic selected exercise it water. For this purpose the hydrotherapy or the watery exercise are the best type of implementation with the aerobic exercise to M.S. patients. Because, the patient balance improve in the respect with the physical limitations and not having balance, due to the decrease the patient weight in water. It is selected to the exercise duration period with eight-week by considering to the present limitation and the research literature.

Since body temperature is one of the main problems in these patients during the activity, and this enhancement create the disorder over transmission of the nervous message and it cause to increase their disability, water has this property that it inhibit to enhance the body temperature and also it cause to increase the body balance. Due to decrease the body weight in water and finally causes to decrease the physical limitation.(21) Therefore are decided that use the hydrotherapy to the research purpose.

It is designed to details of the exercise program in M.S. patient by considering to their physical limitation, researching histories and the viewpoints of the specialists. In the pre-test stages were measured the following items:

1. Interlocane six IL -6
2. Interlocane ten IL-10
3. Beta tumor growth factor: TGF β
4. Cortisol

The exercise intensity was determined according to the amplitude 50-60 percent's with the maximum heart-beat using the (220-age) method and was measured by the polar stethoscope.

3. The measure method and tools

1. The laboratory kit to measure the dependent variables to apply ELIZA method with specification BENDERMOD USA.
2. The Krutzke developed physical disability scale questionnaire this questionnaire is scaling the different function and states of the nerve system. This questionnaire gives a score between 0-10 to M.S. patients (depending to the content of damage inducted to the nerve system). Whatever this damage content gets more, the obtained score is more. Justifiability of the developed physical disability test has been supported by Krutzke. (2)
3. Polar stethoscope

After finishing the exercise period, the examinables of both group referred to bleed into the laboratory. Then, their blood was frozen in standard temperature that the considered cytokines be preserved and not be wasted. Finally, information was compared after and before the exercise period and then they were concluded. Descriptive statistics is used to show the percentages, average, standard deviation and being normal data through kolomograph-Smirnoff method; and deductive statistics is used to compose with the pre-test and post-test of two groups, and the independent and dependent with %5 Alfa limit.

4. Result

Obtained findings from both group in the pre-test and post-test stages are shown in 2-table. Although the exercise program has created a changes with IL-6 (1-2 table), IL-10 (2-2 table), TGF β (3-2 table) and Cortisol (4-2 table), but these changes are not significant.

Table -1 – Descriptive statistics of statistic sample

Group	Age		Ms disease duration		Age of string for disease		EDSS average	Number
	Standard deviation	Average (years)	Standard deviation	Average (years)	Standard deviation	Average (years)		
control	6.22	29.20	3.45	5.60	5.26	24.20	2	15
experimental	9.87	32.26	3.76	6	8.02	27.20	2.5	15

Table 2-1: IL-6 difference comparative test

Group	Average difference	Scale Difference deviation	T statistics	Freedom Degree	P-Value	Sample Number
Control	-0/371	0/562	-2/555	14	0/023	15
experimental	0/827	1/412	0/227	14	0/824	15

Table -2-2- IL- 10 difference comparative test

Group	Average difference	Scale Difference deviation	T statistics	Freedom Degree	P-Value	Sample Number
Control	0/472	2/403	0/762	14	0/459	15
experimental	-0/892	2/372	-1/457	14	0/167	15

3-2 TGF β difference comparative test

Group	Average difference	Scale Difference deviation	T statistics	Freedom Degree	P-Value	Sample Number
Control	56/93	266/468	0/827	14	0/422	15
experimental	-2071/33	6995/883	-1/147	14	0/271	15

4-2 Cortisol difference comparative test

Group	Average difference	Scale Difference deviation	T statistics	Freedom Degree	P-Value	Sample Number
Control	-1/47	4/259	1/344	14	0/20	15
experimental	-17/84	29/955	0/307	14	0/037	15

5. Discussion and conclusion:

Many studies have shown that the exercise with triggering the inflammatory cytokines such as IL-4, IL-6 and TNF α , is caused to increase the Cortisol hormone level, (20,13) of the enhancement time or their amount to the base level in all cases are uniform. Cortisol against catecholamines has a slower drops and gradients, and they influence the body physiology a few days. (18,19)

These research findings indicate that the aerobic selected exercise in water don't create any significant difference on the Cortisol level. IL-6 IL-10, TGF β in the difference of pre-test and post-test in the control and experimental group. (9) The researchers such as Hessen (11) (2003) White Lisly (2006), (20) Corlschalz (2004), (20) Costeralo (2008) and (4) Lee Carly (2009) are agreement and the researcher such as (22) Voncatramen is disagreement the lack of result significance may be to being low the number of person's, repetition, intensity and duration of exercise, the previous studies support, highly these research results this research show that the aerobic exercise with 50-60 percents intensity of maximum heart-b is caused all drops and gradients of the measured variables in both the control and experimental groups. Carl Schalz (2004) conducted a research with title. Investigation the effect of the eight week aerobic exercise on the immune in six patients with M.S. And then scaled the exercise effect control on the Cortisol, nor epinephrine, and lactate. The result showed that the exercises have not any effect on the Cortisol in the trained patients and not-trained patients group, and are caused to decrease lactate due to high overtime levels .

Schalz considered these result for itself research limitations, such as:

1. The rather small sample and consequently to limit the statistic power to identify the effect of exercise on the patients.

2. The most participants were from the being patient group.

3. Furthermore, %30 patients retreated in the half of the exercise program because they thought that they have not any ability to finish the period. (20)

Lee Carli (2009) the exercise lead to stimulate the anti-inflammatory cytokines such as IL-10, which it is increased after eight week exercise in MS patient. In this research, it has been said from other researchers such as Castcanlo that after the eight-weeks endurance exercise over 28 MS females patients, concluded that these exercises decrease the inflammatory cytokines, also Schultz after the eight-week interval exercises, stated that the exercise has not any effect on Cortisol and immune parameters, which it can be, due to the type of exercise. (4)

White Lisly (2006) scaled the response of cytokines within M.S. patients in the respect to the endurance. In this research, 10 M.S. female patients participated to 12-weeks in the exercising

program. The result showed that IL-6 concentration in the blood, remain the unchanged. He stated that the aggressive endurance exercises may effect on the cytokines concentration in M.S. patients which it depends on the patients general situation, but to remain unchanged, can be due to the low number individuals, limited design, the potential dominance of disease patterns and change and diversity with the participated factors in the utilized patterns by patients, that by considering to the high complicate role of cytokines. With the immune system function in MS patients, it is difficult to comment the findings. (11)

Castlono (2008), investigated the eight-week aerobic exercise with %60 intensity VO_{2max} . He concluded that the exercise cause to increase %7 IL -6 in the MS patients group, but in the rest state (without exercise) it has not any change. He knew these change because the exercise intensity and duration. (20)

Venkatramen (2002): the exercise may change the immune system function directly and indirectly through improving stress and the nervous-gland factors that maybe play a considerable role to preserve the M.S. immune situation. He investigated the effect of the endurance exercise on the cytokines in M.S. patients. After 16 weeks the endurance exercise with 13 patients, he concluded that IL-6 level in these patients has been increased to improve the immune system function.

Castcanlo (2007) investigated the effect of the aerobic exercise on the cytokine plasma to eight-week with %60 intensity VO_{2max} on II patients and II healthy individuals. His research result was the decrease of IL -6 in both groups. (6)

Hessen (2003) conducted the research namely the effect of the physical pressures on cytokines in MS patients. His exercises more performed to eight weeks with %60 intensity VO_{2max} in three groups. He concluded that the epinephrine and nor epinephrine in the trained M.S patients have been increased that they influence on the bridled cytokines and its comment need to the more strong statistics power that is same the samples number and the ongoing results from response of cytokines. (9)

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