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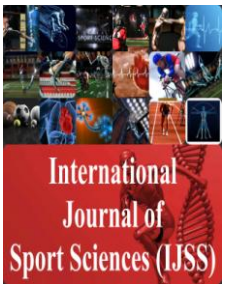

Can aerobic exercise in Water reduce the effort of fatigue in female with multiple sclerosis: a pilot study in Yazd

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ABSTRACT

Introduction: Multiple Sclerosis (M.S) is a chronic disease afflicting the nervous system and destroying the myelin sheath of the central nervous system (brain and spinal cord). Fatigue is the most common and weakening symptom of M.S. The present study aims at investigating the effects of 8 weeks of selected aerobic training (exercise in water) on fatigue severity in M.S patients. **Material and Methods:** The study is quasi-experimental and the findings are of practical value. From 100 female M.S patients, 40 participants aged between 20 to 50 years in Yazd City, with illness severity of 6 to 1 and mean illness duration of 4±1 years were selected to take part in this study. They were randomly assigned into two groups: a control group and an experimental group, each with 20 participants. The training program was implemented on the experimental group for 8 weeks, 3 sessions per week, at the intensity of 50-60% maximum heart rate. Descriptive statistics, dependent and independent t tests were run to analyze the data. **Results:** The posttest means fatigue severity in the experimental and control groups were 2.94±0.91 and 4.22. 0.96 respectively. There was no significant difference between the mean fatigue severity in the control and experimental groups (P=0.001). **Discussion and Conclusion:** Selected aerobic training (exercise in water) may reduce fatigue severity in the M.S patients. Based on the present finding, the therapists may use selected aerobic training as a supplementary treatment beside medications for the M.S patients.

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INTRODUCTION

Multiple sclerosis (M.S) is a progressive, autoimmune and chronic disease which afflicts the central nervous system including brain and spinal cord. M.S destroys the myelin sheath of neurons, creates scars [1] and disturbs the neural and electric currents [2]. Ranked beneath trauma, M.S is the second major cause of nervous disability during young age and adulthood. Yet the true causes of this disease is still unknown [3, 4]. M.S typically afflicts young adults aged 20-40 years with women twice as afflicted as men [5]. There is a population of 3 million M.S patients in the world of whom almost 40000 patients are Iranian [5]. The type of M.S symptoms depends on the afflicted locus in the central nervous system and consequently differs in different patients. The most common symptoms of M.S include loss of performance or senses in the limbs, fatigue, muscular weakness, numbness, gait disorders and loss of balance, muscle cramps, pain, depression, autonomic disorders, cognitive and disposition disorders, vision problems, stutter and tremor [6,7]. Fatigue is the most prevalent and weakening symptom of M.S [8,9]. Mollaoglu and Ustun (2009) reported that all M.S patients suffer from fatigue [10]. Quoting from the National Multiple Sclerosis Society of America, Stroud asserts that M.S patients' fatigue is due to the loss of physical and mental strength [9]. Fatigue negatively affects the individual's performance, attention and concentration, fulfillment of tasks and quality of life [10] and reduces the satisfaction of life [11]. Intensifying depression and limiting physical performance, fatigue also causes or deteriorates other symptoms of M.S [12]. There have been many studies on the effects of exercise on fatigue in M.S patients. Mostert and Keselring (2002) investigated the effects of a short-term exercise training program on fatigue in M.S patients. According to their findings, fatigue severity decreased in the patients following the training program [13]. There is still no certain cure for M.S and most of the current treatments are to repress the symptoms or lower the rate of progression; therefore, the early diagnosis and timely control of M.S may

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significantly prevent severe complications and uncontrollable progression of the disease to a great extent [13]. With regard to the positive effects of physical activity on M.S patients, the researchers were encouraged to investigate the effects of 8 weeks of selected aerobic training on fatigue severity in M.S patients as a supplement to medicinal treatments. In this regard, the following research question was posed: Does selected aerobic training significantly affect the reduction of fatigue severity in M.S patients?

MATERIAL AND METHODS

The design of research was quasi-experimental and the findings are of practical value. The population of the study consisted of 100 M.S patients whose affliction was approved by a neurologist. They were undergoing medicinal treatment and had medical files in private clinics in which they were receiving treatment. 40 patients were randomly selected as the participants and assigned into two equal groups (20 participants in the control group and 20 in the experimental group). The participants' mean affliction duration was 4±1 years and their age ranged from 20 to 50 years. To carry out the study, one day before the program was started, the patients came together. Then the researcher informed them of the exercise types, the intensity of exercises, and the number of repeats per session. Next, the experimental and control groups participated in the pretest whereby the fatigue severity test was administered and the results were recorded. The training program for the experimental group consisted of an 8-week aerobic training period, 3 sessions per week, at 50 to 60 percent maximum heart rate. The heart rate was measured during the exercise activity using Polar watch. At the end of the training program, the fatigue severity test was administered to the groups again as the posttest. Subsequently, the data was analyzed. It is notable to say that all the participants were taking medicines during the program. The fatigue severity questionnaire, developed by Krupp (a neurologist) *et al* (1989), was used to collect the data. The questionnaire is a self-report scale which examines the fatigue severity during the previous week. The scale is frequently used with M.S patients [14]. It consists of 9 items on a 7- point Likert scale ranging from strongly disagree (1) to strongly agree (7).

As to the total score, the participants' ratings of the items are summed up and mean scores are calculated. The scores on each item range from 1 to 7 [11]. Extreme fatigue is defined as the fatigue severity score of 4 and greater than 4. Low and moderate fatigue are defined as the fatigue severity score less than 4 [15]. The validity of the questionnaire has been approved in a study on the effects of selected training on the fatigue of M.S patients in Yazd City. The reliability of the questionnaire has been calculated in the same study both using test-retest method which yielded a correlation coefficient of 0.812 and using internal consistency method via Cronbach's alpha coefficient formula which yielded a coefficient of 0.91 [16-17].

Descriptive statistics were used to calculate the means and standard deviations and to draw figures and tabulate data. Besides, dependent and independent samples t-tests were run to examine the differences between the mean scores. The level of significance was set at 5%. SPSS software (version?) was used to do the statistical calculations.

Results:

The participants' mean age was 33.80 years. More specifically, the mean ages of control and experimental groups were 30.40 and 37.20 years, respectively. 36.7% of the participants were single, 53.3% were married and 10% were divorced. 37.5% of the participants were taking Avonex, 7.5% were taking Rebif and 55% were taking Betaferon. As to the level of education, 17.5% of the participants were under diploma, 50% had diploma, 12.5% had associate degrees and 20% had BA. In either group, the mean affliction duration was 7 years and the mean age of affliction diagnosis was 27.30 years.

The mean fatigue severity in the control group was 4.29±0.964 in the pretest and 4.22±0.964 in the posttest. The mean fatigue severity in the experimental group was 4.10±0.893 in the pretest and 2.94±0.913 in the posttest. As shown in table 1, the level of significance of fatigue severity of M.S patients in either group was 0.522 in the pretest, which shows no significant difference. However, the level of significance of fatigue severity in either group was 0.000 in the posttest, which shows a significant difference (see table 1).

Comparison of the difference between fatigue severity of M.S patients in either group in the pretest and posttest yielded a significance level of 0.001, which shows a significant difference (see table 1). Comparison of the difference between fatigue severity of M.S patients in the pretest and posttest yielded a significance level of 0.588 in the control group and a significance level of 0.001 in the experimental group, which shows a significant difference (see table 2).

Table 1: t test results of fatigue severity in the patients

Group F Covariance (P) Mean differences t df P value Sample size
Pretest in either group 0.224 0.639 0.19 0.647 38 0.522 2
Posttest in either group 0.137 0.713 1.28 4.308 38 0.001 20
Posttest difference 1.831 0.184 1.09 4.569 38 0.001 20 (between the groups)

Table 2: t test results of the differences of fatigue severity in M.S patients in the pre- and posttest.

Group	Mean difference	SD	t	df	Pvalue	Sample size
Control	0.07	0.568	0.551	19	0.588	20
Experimental	1.16	0.902	5.746	19	0.000	20

Discussion and Conclusion:

According to the mean fatigue severity which was the same in the pretest in either group but different in the posttest between the groups, we may conclude that aquatic aerobic training is beneficial to the patients. Consistent with Hadjimichael *et al* (2009), the present study considers the score 4 as the cutoff beyond which fatigue is regarded as extreme and beneath which fatigue is considered as low and moderate [15]. Moshtagh *et al* (2006) investigated the effects of aquatic aerobic training on fatigue in female M.S patients. They reported that aquatic training reduced the mean fatigue severity in the patients as much as 16.02% and this reduction has been statistically significant (P=0.002) [17]. This finding is consistent with the findings of the present study. However, the present findings do not match the findings of Kileff and Ashburn (2005) who studied the effects of aerobic training on fatigue severity of M.S patients. Their results showed that there was no statistically significant difference in patients' fatigue severity after, as compared to before the intervention (P=0.058) [16]. The inconsistency between this finding and that of the present study may be due to their small sample size (8 participants) as well as their type of intervention. McCullough *et al* (2008) investigated the long-term benefits of exercising on fatigue in M.S patients. Their results showed that aerobic training reduces fatigue severity in the patients (P=0.02) [17]. This is consistent with findings of the present study. The main difference between the present study and the study of McCullough *et al* (2008) may be the duration as well as the type of interventions. Reduction in the patients' fatigue severity in the present study may be attributed to aquatic aerobic training and the duration of training program for 8 weeks. Therefore, it may be necessary for M.S patients to participate in group aquatic exercises under therapists' supervision and consistent with overload rule, which conforms to the limitations of M.S patients. The individual's weight considerably decreases in water, which improves the quality of training exercises. Besides, the resistance of surrounding water helps the patients maintain their balance. One of the fundamental problems of M.S patients in physical activity is their increase of body temperature which disturbs the transmission of neural messages and increase inability. However, water avoids temperature increase in the patients. This may prevent lack of movement and increase physical strength in M.S patients. Therefore, hydrotherapy or aquatic training is considered to be the best types of aerobic exercises for M.S patients. It is recommended that therapists use these exercises as a supplementary treatment to medicinal treatments in M.S patients.

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