Assessing Effect of selected exercise program in Water on reduce of perceived fatigue in women with M.S patient in Yazd

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Abstract

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 assessing the effects of 8 weeks of selected exercise training (in water) on perceived fatigue in M.S patients. 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. 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).

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.

Keywords: Exercise in water, Perceived Fatigue, Multiple Sclerosis, Female.

Introduction

Multiple sclerosis (MS) is a disorder that affects the central nervous system (CNS), specifically the brain and spinal cord. A fatty tissue called myelin surrounds and protects the nerve fibers of the CNS. Myelin insulates the nerves and allows them to transmit electrical impulses from the brain to other parts of the body. In MS, myelin is lost in multiple areas, and sometimes the nerve fiber itself is damaged or broken. When myelin or the nerve fiber is destroyed or damaged, the nerve’s ability to conduct electrical impulses to and from the brain is disrupted; therefore, nerve signals cannot be transmitted. The disruption of the electrical impulses causes the symptoms associated with MS. There is no cure for MS at present, but research is ongoing. If you or a family member has been diagnosed with MS, talk with your doctor and specialists about the most current treatment and management options. A comprehensive care plan should be reviewed often as symptoms change over time and new treatments become available. Support organizations are a good source of information and may help connect you with specialists as well as other families living with MS. (Khan and Pallant, 2008) and disturbs the neural and electric currents (Soltani, 2008). The performance of everyday movements, motor skills, appears to be
influenced by the drive to minimize metabolic energy expenditure. This is observed during normal walking, with individuals selecting comfortable walking speeds (CWS) that coincide with the lowest energy (oxygen) cost on the oxygen cost-walking speed curve (Valko and Bassetti, 2008). Gaits altered by disease are mainly linked to increased costs, fatigue and restricted capacity. People with multiple sclerosis (MS) present with a range of symptoms, but reduced mobility and fatigue are key problems, with up to 85% of people with MS reporting difficulty walking (Stroud and Minahan, 2009).

In individuals with MS, walking effort as measured by oxygen cost (CW: mL/kg per metre), has been shown to be up to four times greater than in healthy individuals (Hadjimichael et al., 2009). Even mildly-impaired people with MS are found to have sedentary lifestyles, low cardiovascular fitness and muscle characteristics typical of disuse (Mollaoglu and Ustun, 2009). 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 are still unknown (Stroud and Minahan, 2009; Soltani, 2011). M.S typically afflicts young adults aged 20-40 years with women twice as afflicted as men, and although there is a population of 3 million M.S patients in the world of whom almost 40000 patients are Iranian (Soltani, 2009). 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 (Putzki, 2008; Motle, 2008). Fatigue is the most prevalent and weakening symptom of M.S (Mollaoglu and Ustun, 2009; Stroud and Minahan, 2009). Fatigue is one of the most common and disabling symptoms of multiple sclerosis (MS). It is apparently related to central mechanisms of the disease (Soltani and et al., 2008) and loosely related to depression (Valko, 2008) and sleep disturbances (Putzki and Katsarava, 2008).

The pharmacological approach to treating fatigue in MS with amantadine (Lerdal et al., 2003), L-caratine or modafinil has rendered rather frustrating results. The non-pharmacological approach for treatment includes effective energy conservation programs, consisting of simplifying activities, resting and adjusting priorities, although such programs may be difficult for patients with large families when housework is not done by other persons (Matuska et al., 2007). Mollaoglu (2009) reported that all MS patients suffer from fatigue. 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 (Minahan, 2009). Fatigue negatively affects the individual's performance, attention and concentration, fulfillment of tasks and quality of life (Johnson, 2008) and reduces the satisfaction of life (Matuska and et al., 2007). Intensifying depression and limiting physical performance, fatigue also causes or deteriorates other symptoms of M.S (Mostert, and Kesselring, 2002). There have been many studies on the effects of exercise on fatigue in M.S patients. Mostert and Keslering (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. 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 significantly prevent severe complications and uncontrollable progression of the disease to a great extent (Valko and et al., 2008). 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 (Hadjimichael, 2008). 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 (Matuska, 2007). 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 (Lerdal, 2003). 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 (Kileff and Ashburn, 2005; McCullagh, 2008). 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%. SPSS18 software 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>
<thead>
<tr>
<th>Group size</th>
<th>F</th>
<th>Covariance (P)</th>
<th>Mean differences</th>
<th>t</th>
<th>df</th>
<th>P value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest in either group</td>
<td>0.224</td>
<td>0.639</td>
<td>0.19</td>
<td>0.647</td>
<td>38</td>
<td>0.522</td>
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<tr>
<td>Posttest in either group</td>
<td>0.137</td>
<td>0.713</td>
<td>1.28</td>
<td>4.308</td>
<td>38</td>
<td>0.001</td>
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<tr>
<td>Posttest difference (between the groups)</td>
<td>1.831</td>
<td>0.184</td>
<td>1.09</td>
<td>4.569</td>
<td>38</td>
<td>0.001</td>
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</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean difference</th>
<th>SD</th>
<th>difference</th>
<th>t</th>
<th>df</th>
<th>P value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.07</td>
<td>0.568</td>
<td>0.551</td>
<td>19</td>
<td>0.588</td>
<td>20</td>
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<tr>
<td>Experimental</td>
<td>1.16</td>
<td>0.902</td>
<td>5.746</td>
<td>19</td>
<td>0.000</td>
<td>20</td>
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</tbody>
</table>

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. 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). A recent study which examined perceived outcomes in people with MS following a progressive resistance programme found that participants, in addition to reporting perceived positive outcomes of physical improvements and improved psychological well-being, also reported a perceived reduction in fatigue. In addition, perceived improvements in fatigue appeared to be linked to both psychological and physical improvements (Valko, 2008). However, no study to date has examined, in depth, the way in which exercise participation influences fatigue in people with MS. One qualitative study examined changes in fatigue in people (n=23) undergoing chemotherapy treatment for cancer over a six week exercise program. Results from this study indicated that participants were able to differentiate between a healthy tiredness which induced relaxation and improved sleep and an unhealthy tiredness, associated with the chemotherapy, characterized by extreme tiredness and flu like symptoms (Motle, 2008). In addition participants felt that exercise-induced healthy tiredness ameliorated unhealthy tiredness, increased energy levels and provided a strategy to increase perceived control over undesirable symptoms. An individual’s ability to achieve this state of healthy tiredness seemed dependent upon the strategy ‘listening to your body’, the utility of which appeared related to the level of perceived control over fatigue (Motle, 2008). It is of interest to note the similarity of these results with induced fatigue and MS-related fatigue.

Fatigue is part of the clinical spectrum of MS, affecting up to 87% of patients (Soltani, 2008). Their weakness, disability and fear of aggravating their clinical condition may lead these chronically ill patients, who already suffer from fatigue, to an even higher degree of this symptom. In a continuous cycle, the inactivity leads to worse physical conditioning, more fatigue and less activity. The asthenia (fatigue at rest) and pathological fatigability (fatigue on physical loading) typical of MS may be due to both central and peripheral mechanisms (Motle, 2008) and may be translated into a sensation of increased effort to perform even the slightest activity. Such feelings, in themselves, may be a deterrent for patients to join physical activity programs. When presenting our physical activity program to deal with fatigue in MS patients, during their regional monthly meetings, many patients decided not to join in the program because of the fatigue itself. Their lack of motivation to participate was due to the very same symptom that we had intended to treat, and after the initial results with nine patients, more MS patients are now seeking to join in the program. The present work suggests that, according to theories of social support, the positive results experienced by patients may become the motivation for others to participate in such programs (Mollaoglu, 2009).

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) F16. 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).

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. Positive influences on fatigue may include perceived physical improvements in strength, stamina, balance, as well as better sleep quality; and positive feelings, including achievement, confidence and relaxation. In contrast, negative influences on fatigue may include perceived physical deterioration such as unsteady gait and reduced balance; and negative feelings of failure, anxiety and loss of safety. Healthcare professionals therefore, need to be cognizant of strategies which may enhance ‘perceived control over fatigue’ and promote ‘listening to your body, in order to maximize the benefits of exercise intervention for individuals with MS-related fatigue. 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.

Conflict of interest
The authors declare no conflict of interest
References


