



The Effectiveness of an Aerobic Exercise Program on Patients with Multiple Sclerosis with Decreased Walking Ability Secondary to Fatigue

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OEAE and SOM designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author RSTKE performed the design of statistical analysis, managed the analyses of the study. Authors RSTKE and SA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The purpose of this study was to determine the effectiveness of aerobic exercises program in patients with Multiple Sclerosis (MS) with main complaint of decreasing walking ability secondary to fatigue.

Study Design: Prospective non-randomized case study.

Place and Duration of the Study: This study conducted at Physical Therapy Department gem, Ahfad University for Women, Omdurman, Sudan 2016, between August 2016 till February 2017.

Methodology: Three patients with MS, their age ranges from 30-50 years were included in this study. They were evaluated by Six Minutes' Walk test and Fatigue assessment scale before and after 12 sessions of the treatment program. The aerobic exercise program was walking, its intensity and duration was individually adjusted according to each patient with warm up period of 10 minutes and 15 minutes cool down.

Results: The results showed a clinically meaningful improvement in walking speed of those

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patients without increasing in their fatigue. (Six Minutes' Walk test $p = 0.34$), (Fatigue assessment scale $P = 0.38$).

Conclusion: Aerobic exercises (walking) have greater impact on patients with multiple sclerosis which they work as an alternative strategy for the management of disease complications.

Keywords: Multiple sclerosis; fatigue; aerobic exercise.

1. INTRODUCTION

Multiple sclerosis is chronic inflammatory neurological disease of the CNS, its heterogeneous course characterized by progressively diminished physical and cognitive resources [1]. Its incidence ranging from 2 to 10 cases/100,000 persons/year [2]; the disease is more common in women than in men by a ratio of 2:1 and persons who lives in Canada are at high risk [3]. In most cases the signs and symptoms of multiple sclerosis usually develop slowly and over a period of time, although occasionally they may appear quite suddenly and be acute in nature [4]. The cause of the disease remains unknown, but it appears to involve a combination of genetic and environmental factors [5].

The signs and symptoms may include Vision problems, Pain, Numbness or tingling, Weakness, Dizziness and vertigo, Sexual problems, Emotional changes, Spasticity, Depression, Cognitive problems, Bowel and Bladder problems Walking (gait) difficulties, as well as fatigue [6].

Fatigue is the frequent symptom in multiple sclerosis that can interfere with a patient's daily functioning [7]. It is defined as an extreme physical and mental tiredness inadequate to the preceding demand [8]. Surveys and case control studies indicate that 75 to 95% of individuals with MS experience fatigue and 50 to 60% report fatigue as one of their worst problems [9]. In fact, fatigue is one of the two major reasons for unemployment among people with MS. The Social Security Administration responded in 1986 by adding fatigue to the list of causes of MS-related disability in the code for disability impairments [10], but its cause is remains un known [11].

Multiple sclerosis can be divided into six subtypes based on the course of the disease, Relapsing –remitting MS (RRMS) is the most common disease course, approximately 85% of people with MS are initially diagnosed with RRMS, it is an attack (relapse) is followed by a

remission during which disability does not progress [12]. Secondary progressive MS (SPMS) follows an initial relapsing- remitting course. Followed by a change in clinical course with progression to steady and irreversible decline with or without continued acute attack, affects 15% of the patients [13]. The third type is Primary progressive MS (PPMS) Is a form of MS with no history of relapse or remissions and a slow and insidious course [14]. Progressive Relapsing MS (PRMS) It is characterized by steadily progressing disease from the beginning and occasional exacerbations along the way [15]. The other types are Malignant MS Is an extremely aggressive form of MS and its consider very rare [16]. And Benign MS People who diagnosed with MS they can say they have a benign type after they have gone fifteen years or so without symptoms and they have little or no disability [17]. Management options range from pharmacological treatment which contain drugs that work only on the symptoms but not on the disease progression and conservative treatment as physiotherapy [18].

In addition to being essential to general health and well-being, exercise is helpful in managing many MS symptoms. A study published by researchers at the university of Utah in 1996 demonstrate the benefits of aerobic exercises as defined as" training or conditioning is augmentation of the energy utilization of the muscle by mean of exercise program" [19] for MS patients who got a better cardiovascular fitness, improve strength, have better bowel and bladder control as well as less fatigue and depression and a more positive attitude [20]. The intensity and duration of aerobic exercise program must individually adjusted according to the condition of each patient [21]. The aim of this study was to determine the effectiveness of aerobic exercises program in patients with Multiple Sclerosis with main compliant of decreasing walking ability secondary to fatigue.

2. MATERIALS AND METHODS

This is prospective non randomized case study conducted at Physical Therapy Department gem,

Ahfad University for Women, Omdurman, Khartoum, Sudan from August 2016 till February 2017. Three patients diagnosed with relapsing-remitting multiple sclerosis was included in the study.

We used two measurement scales ,the first one is fatigue assessment scale (FAS) which is used to assess fatigue it consist of 10 statements that the patient circle one of the five options that follow each statement the options are (1= Never 2=Sometimes 3=regularly 4=often 5=always) [22]. The second one was Six Minutes' walk test is one of the most popular clinical exercise tests The walking course must be 30 meters in length and its duration is six minutes. It's a useful measure of functional capacity [23]. Evaluation of the patients were done before and after 12 sessions of the treatment program [24]. Patients were received physical therapy treatment (Aerobic exercises) for 60 minutes daily for 12 sessions. The sessions were included warm up for 10 minutes before, walking inside the gym as the main exercise and cool down for 15 minutes after the session [25]. Data analysis was performed using SPSS and Excel software, two p values were reported. The significance level was set at ($p < 0.05$), using Excel table.

3. RESULTS AND DISCUSSION

Three patients were participated in this study. 66.6% of patients age (30-40 Y) where as 33.3% of patient's age (40-50 Y). The males represent 66.6% and females were about 33.3%.

3.1 Discussion

Demographic characteristics of patients in the current study show that predomination of male when compared to females with ratio of 2:1 (66.6versus 33.3%), But difference findings Were reported by Several studies showed that MS is most common in females more than males, in the

current study the reasons might be due to psychological, financial & cultural issues because four females patients refused to join in the study due to same previous reasons ,as well as most of them were in adult age 66.6 of them had age of 30-40 years, followed by patients in the age of 40-50 years who represented 33.3%.

Fatigue and walking ability were assessed to the all patients before start of treatment, and significant difference was reported in general (P value > 0.05). Outcome of treatment (an aerobic exercise) in all patients showed an obvious improvement which was revealed by significant difference before and after treatment.

Regarding walking ability which assessed by Six Minutes Walk Test showed a significant improvement with P value (0.038) for the whole group. The first patient walking ability improved in 6MWT from 280 up to 340 which is 21% of improvement, the second patient improved in 6MWT from 400 up to 420 and his improvement was 5%, the last patient improvement was from 420 up to 460 which considered 4%. Similar findings was reported by Kileff and their collage at 2005 who investigated the effect of aerobic exercise on people with moderate disability MS, they involved eight patients with multiple sclerosis for a period of 12 weeks that revealed a significant improvement in 6 MWT (P value =0.046) [26]. Other study done in 24 females had MS patients in the period two months physiotherapy program of two hours per week [8].

On the other hand Fatigue was assessed by Fatigue assessment Scale which showed a significant result regarding decreasing patients fatigue with p value (0.034) for the whole group, the first patient fatigue decreased from 60 to 25 which is 58% of improvement, the fatigue of the second patients was decreased from 62.5 to 17.5 which is 72% of the improvement and the third

Table 1. Fatigue assessment scale and six minute walk test results before and after the treatment for the whole group.

Assessment	Mean	STD		Sig =.05
		Upper	Lower	
fatigue assessment scale before treatment - fatigue assessment scale after treatment	34.16667	11.27312	6.50854	.034
six mint walk test before treatment - six mint walk test after treatment	-33.33333	11.54701	6.66667	0.038

SD: stranded deviation; Sig: significant

patient fatigue was decreased from 55-32.5 which is 42% of the improvement. This results is supported by randomized control trail study done by Dr Jack showed that aerobic training has a positive impact in improving fitness and other factors related to quality of life for patients with multiple sclerosis [27].

The results of the current study are farther supported by Shandrea in randomized control trail study about the Effectiveness of an aerobic exercise program as measured by the six minute walk test and subjective fatigue scales in patients with multiple sclerosis with a primary complaint of decreased walking ability secondary to fatigue which involved 15 patients with multiple sclerosis for a period of 12 weeks [28]. Other studies were also support the effectiveness of exercises on patients with MS such as the study done in 24 females with MS patients in the period of two months physiotherapy program of two hours per week [8], which showed an obvious improvement in their lifestyle. A study also done by Inez Wens about the effect of high intensity exercises in patients with Multiple sclerosis which included 34 of those patients for 12 weeks which proved that high intensity cardiovascular exercise combined with resistance training were safe and effective [29].

Moreover two randomized studies examined the effects of regular exercise in MS patients [30]. One of them used aerobic training under supervision as an intervention but their exercise period was longer than ours [31] the result of their research had positive effect of aerobic exercise in patients with MS.

4. CONCLUSION

The results of this non- randomized case study which were done for three patients showed that short-term exercise lead to significant and clinically meaningful changes in the walking speed of patients with mild to moderate MS. The results of aerobic exercises are effective and must be recommended for patients with MS.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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