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Effects Of Exercises On Different Systems In Multiple Sclerosis Patient- A Case Report

[1]DrArshiya Sayyed, [2]Dr Vishvnath Pawadshetty, [3]Dr. Gauri Sorty
[1]Assistant Professor Maharashtra Institute of Physiotherapy, [2]Professor Maharashtra Institute of Physiotherapy, [3]Postgrauate Student Department of Cardiovascular and Respiratory Physiotherapy
Department of Cardiovascular and Respiratory Physiotherapy,
Maharashtra Institute of Physiotherapy, Latur, India.

Abstract:

Context: Multiple sclerosis (MS) is a progressive demyelinating disease of the white matter of the central nervous system. The disorder is found more commonly in young adulthood, out of which women represent a huge stakeholder group, which is approximately 70% of the total affected population. Common symptoms usually represent general fatigue, muscular weakness, spasticity, ataxia, sensory disturbances, cognitive and autonomic dysfunctions, with a very low level of daily physical activity due to detraining and deconditioning. The study's objective was to determine the effect of the exercise training program as a part of an inpatient rehabilitation program on various systems of the body**.**

Study Designs and Settings: This case report was conducted in the OPD at the Maharashtra Institute of Physiotherapy, Latur, Maharashtra. Methods: A 30-year-old female who was diagnosed case of relapsing remitting multiple sclerosis was referred to our center for outpatient rehabilitation. The patient receives a Structured aerobic exercise programme, Treatment for low back pain, Progressive resistance exercises (PRE) for improving the strength of upper and lower limbs, Kegel's exercises for PFM strengthening, and Exercises to improve the strength of core muscles. The intervention was given 5 days a week for 8 weeks. Outcome measures was 6 minute walk test (6MWT), PFT, Peripheral oxygen saturation (SPO_2), fatigue severity scale, numerical pain rating scale NPRS, Heart Rate (HR), Systolic and Diastolic blood pressure (B.P), Berg Balance Scale for balance assessment, Multiple Sclerosis Quality Of Life(MSQOL)-54 Instrument.

Results: 6 minutes walking distance, which is increased by 60 meters. A MIC adjusted for improvement of 19.7 m (95%CI 9.8–30.9 m) was found in one study, improvement of 19.7 m (95%CI 9.8–30.9 m) was found in one study, There was no significant changes was observed in PFT FEV1:85 & FEV1/FVC RATIO:0.8 which was improved by FEV1:90 & FEV1/FVC RATIO:0.8, Fatigue severity scale score was increased by 16 points, NPRS 8 before intervention which was reduced to NPRS 3 after 8 weeks, MSQOL-54 score was increase from 20/30 to 25/30, Berg balance scale score was increased from 51/56 to 54/56, Pelvic floor muscle function would not show any significant improvement.

Conclusion: findings have concluded that managing the MS patient as a whole and considering every system can lead to significant improvement in as a therapeutic protocol to restore patient mental health, improve the general QoL, and fatigue that occurs in this patient.

Keywords **- Multiple sclerosis, Exercises, Aerobic exercises.**

I. INTRODUCTION

Multiple sclerosis (MS) is a progressive demyelinating disease of the white matter of the central nervous system. A prevalence rate of 110/100,000 confirms that this is one of the most frequent neurological diseases[4]. It is estimated that 2.1 million people are affected globally. The disorder is found more commonly in young adulthood, out of which women represent a huge stakeholder group, which is approximately 70% of the total affected population[1]. Common symptoms usually represent general fatigue, muscular weakness, spasticity, ataxia, sensory disturbances, cognitive and autonomic dysfunctions, with a very low level of daily physical activity due to detraining and deconditioning**[4].**

It is known that exercise assists in the prevention of circulatory problems and therefore, a comprehensive exercise programme could have the capability to enhance rehabilitation potential through improvements in both skeletal muscle and cardiorespiratory function[1].

Therefore, this study was designed to determine the effect of the exercise training program as a part of an inpatient rehabilitation program on various systems of the body.

II. MATERIALS AND METHODS

2.1 Study Design, Setting, and Ethical Considerations

The present study was a case report conducted in the IPD Physiotherapy unit in Latur, Maharashtra, India. The study duration was 8 weeks. Ethical clearance was obtained by the institutional ethical committee. Written informed consent was obtained from the participant prior to the commencement of the study.

2.1.1 Study participant:

A 30-year-old female who was diagnosed case of relapsing remitting multiple sclerosis was referred to our centre for outpatient rehabilitation. The patient is on medical treatment.

2.1.2 Procedure

Medical information regarding the MS was obtained from the medical records of the patient.
Demographic data, type, and stage of the MS were also obtained.
MMT grade was taken based on manual muscle testing.
The patient's main complaint was tiredness after walking some distance, which was not present earlier. And associated complaints were unable to descend stairs, LBP, which is radiating in B/L lower limbs, Difficulty in walking, and difficulty in holding urine.

2.1.3 Outcome measures

Outcome measures for different systems were taken at 2 timeframes: at baseline and after 8 weeks of intervention.

1) In Respiratory system:

To measure the cardiorespiratory endurance, a 6-minute walk test (6MWT) was performed according to the ATS/ERS guidelines[13] of the case report. Cardiorespiratory endurance was assessed using the 6MWT, which measures the distance covered in 6 minutes. A physiotherapist instructed the patient to walk as far as possible at their maximum for 6 minutes. The patients were encouraged to walk as fast as they could back and forth in a quiet hallway in a 30 m straight line. No encouragement was given during the test procedure, and rest was not allowed. The use of a walking aid, if needed, was recorded. The outcome was the distance walked. The 6MWT is a reliable and valid submaximal test for assessing functional capacity in patients with functional impairments.

Pulmonary function variables were measured by spirometry using a SP10BT spirometer. The spirometry was performed with patients in both a sitting and lying position. A nose clip was used, and measurements were performed as recommended by the American Thoracic Society (ATS)/European Respiratory Society (ERS). The highest value of the three technically satisfactory manoeuvres was retained. Slow vital capacity (VC) was obtained during an inspiratory manoeuvre, followed by measurement of forced vital capacity (FVC), forced expiratory volume in one second (FEV1), peak expiratory flow (PEF), and FEV% (FEV1/FVC). Predicted values for pulmonary function were related to age, sex, and height.

Peripheral oxygen saturation(SPO_2) was measured using a pulse oximeter device.

2) Under the musculoskeletal system:

Fatigue was assessed using the fatigue severity scale.
Low back pain was assessed using the numerical pain rating scale NPRS.

3) In cardiac system:

Baseline parameters were taken for Heart Rate (HR), Systolic and Diastolic blood pressure(B.P).

4) Neurological Assessment:

For balance Berg Balance Scale was used.
To assess coordination using equilibrium and non-equilibrium tests.
Quality of life was assessed using the Multiple Sclerosis Quality Of Life(MSQOL)-54 Instrument.

5) Gynaecological assessment:
The pelvic floor muscles (PFM) function was assessed using a PERFECT score.

2.1.4 Intervention

The exercise was performed at the physiotherapy department at CVRS OPD of the Maharashtra In Institute of Physiotherapy, Latur, Maharashtra, India. The intervention was given 5 days a week for 8 weeks.

Exercise Training:

Structured aerobic exercise programme:

Exercises were given for 5 days/week for 8 weeks. First, the patient's target heart rate was calculated using Karvonen's formulae. Each exercise session consisted of 5-10 minutes of warm-up exercise, 10-50 minutes of aerobic conditioning & 5-10 minutes of cool-down exercises.
Warm-up exercises: Active ROM exercises of all the peripheral joints of the upper limb and lower limb.
Aerobic conditioning programme: Treadmill & static cycle
Cool down exercises: Stretching exercises of the upper limb and lower limb.
The exercise protocol was given with the initial intensity of 40%-60% of VO2MAX for 20-30 minutes. Exercise duration was increased by 5-10% weekly to a maximum of 60 minutes. For progressing the aerobic exercise, resistance or speed of the aerobic training was adjusted to an intensity of "somewhat hard" on the Rating of Perceived Exertion (RPE) scale throughout the session.

Treatment for low back pain:

Moist hot pack (MHP) for 10-15 minutes of duration.
Trans cutaneous electrical nerve stimulation (TENS) for 15 minutes on burst mode was given.

Progressive resistance exercises (PRE) for improving the strength of the upper and lower limbs:

It is given to improve the strength of individual muscles using a resistance band in two exercise sessions per week. Subjects performed 2–3 sets, composed of 6–10 repetitions of each exercise per set. Subjects were instructed to have a minimum of 30–60 seconds rest between each exercise set. Progression through the resistance-exercise training programme was facilitated by increasing the resistance of the therabands and/or weights used on applicable exercises and by progressing through a series of exercises.

For improving PFM strength:

Kegel's exercises were given 10 repetitions, 3-5 seconds hold, 3 sets.

For improving the strength of core muscles:

Static abdominals, Pelvic bridging, abdominal curls, Modified planks, Leg raises

III. RESULT

After 8 weeks of intervention, the outcome measures were reassessed. There were significant changes in the 6-minute walking distance, which increased by 60 meters. Initially, the patient had completed only 10 laps, which covered the distance of 300 meters. This was improved after intervention by 12 laps, which covered the distance of 360 meters. A MIC adjusted for improvement of 19.7 m (95% CI 9.8–30.9 m) was found in one study.
There were no significant changes observed in PFT FEV1:85 & FEV1/FVC RATIO:0.8, which was improved by FEV1:90 & FEV1/FVC Ratio:0.8.The fatigue severity scale score was increased by 16 points. Which was previously30/63 improved to 46/63.
Low back pain had an NPRS 8 before intervention, which was reduced to an NPRS 3 after 8 weeks. MSQOL-54 score increased significantly from 20/30 to 25/30.Berg balance scale won't show any significant improvement as the score was increased from 51/56 to 54/56.Pelvic floor muscle function would not show any significant improvement.

IV. DISCUSSION

Patient completed the protocols with no side effects reported. The intervention was well tolerated and improved several parameters in patients with MS. As previously reported by the Elisa Grazioli et.al combined strength and aerobic training has shown improvements of lower limbs muscles through exercises, such as squats and lateral lunges, can restore the patient's ability to quickly respond to stimuli during the first walking meters, improving the patients' with MS autonomy. These positive results, interpreted in the context of the wider scientific literature, should help promote the use of exercise training in patients with MS as exercise training can improve physical and neurological symptoms and, in doing so, contribute to long-term disease management, decreasing disease severity, perception of fatigue, & improving QOL.

Unfortunately, to the best of our knowledge, there is scarce information on the effects of combined exercise training in people with MS. The present study, therefore, examines the effectiveness of 8 weeks Of Exercises On Different Systems In Multiple Sclerosis patients.

Various studies have demonstrated primary exercise benefits of improved balance and increased walking capacity, with secondary benefits of reduced fatigue, enhanced mood, improved QOL, and decreased perceived disability immediately following an 8-week strength-training program[3] and an aerobic exercise intervention.

Various studies have found that exercise tolerance is reduced for people with MS due to reduced cardiorespiratory fitness. Much of the literature has focused on the comparison of people with MS with healthy individuals, and researchers suggest the disparity in aerobic capacity is related to disease severity; aerobic capacity declines as physical impairment increases. The aim of an exercise is to increase overall physical activity and cardiovascular effort, prevent general muscular weakness, and reduce health risks due to deconditioning and disuse.

V. CONCLUSION

This case report's findings have concluded that managing the MS patient as a whole and considering every system can lead to significant improvement in as a therapeutic protocol to restore patient mental health, improve the general QoL, and fatigue that occurs in this patient.

It should help promote the use of exercise training in patients with MS as exercise training can improve physical and neurological symptoms and, in doing so, contribute to long-term disease management, decreasing disease severity, perception of fatigue, and improving QoL

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