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EFFECTIVENESS OF CODUSE EXERCISE PROGRAMME ON BALANCE AND GAIT IN SUBJECT WITH MULTIPLE SCLEROSIS

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ABSTRACT

Background: *Multiple sclerosis (MS) is a chronic autoimmune disease that affects the central nervous system. People with frequently report balance and walking impairments and a consequence being restricted in activities and in performing daily task.*

Objectives: *The study's primary objective was to find out the effectiveness of CODUSE exercise programme on balance and gait in subject with Multiple sclerosis.*

Subjects and Methods: *A pre-test, post-test single case study design was used.*

A 30 year old female noticed her symptoms in 2 months ago, She experienced blurred vision, excessive fatigue ,numbness and tingling .She was diagnosed with Relapsing remitting Multiple sclerosis. She had eventually affected her daily activities and difficulty in balance and walking. She was given CODUSE exercise to improve balance and gait. The study duration was 3 months. The pre-test and post-test values were taken using Berg balance scale and TUG test. The exercise given for total 8 weeks with 1 session per day in alternative days in a week. The total treatment duration was 45 min per day. Data was collected and analysed.

RESULTS: *An increase in balance and gait was observed before and after exercise. In post-test value the balance grade is 41 and gait value is 15. There is significant improvement in Berg balance and TUG test from the post-test taken.*

CONCLUSION: *From the study it is concluded that there was statistically significant improvement in balance and gait after application of CODUSE exercise.*

CLINICAL IMPLICATION: *CODUSE exercise is found to produce significant effect on improving balance and gait among multiple sclerosis subject.*

KEYWORDS: *Multiple sclerosis, core stability, dual task, sensory strategies, erg balance scale, TUG test.*

Article History

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INTRODUCTION

Multiple Sclerosis (MS), a progressive autoimmune disease is characterized by episodes of inflammation and degradation of the fatty myelin sheath surrounding the axons of the brain and spinal cord. Attacks of MS may lead to inflammation and injury to the myelin sheath resulting in blocked or slowed nerve signals that may leads to difficulty in controlling vision, muscle coordination, strength, sensation, and other bodily function. It causes both acute and chronic symptoms and can result in significant disability and impaired quality of life. The locomotion of the patients is often impaired by poor muscle activation, poor weight bearing capacities and poor balance. The causes of multiple sclerosis is unknown.

Worldwide, approximately 2.1 million people are affected .Particularly in southern India, neuro epidemiological studies demonstrate that the prevalence of MS has doubled in the past thirty years (1.33 vs 3 cases/100,000). Relapsing remitting MS (RRMS) was the most common type of MS when compared to the PPMS type that are seen in India. The onset of MS typically occurs between ages 20 and 40 years. The disease is more common in women that in men by a ratio 2:1 to 3:1.

T cells enter the brain via disruption in the BBB. T cells recognize myelin as foreign and attack it.Attack of myelin start inflammatory processes which release. Cytokines and antibodies which interact macrophages. B cells make antibodies that mark the myelin& macrophages will use these antibodies engulf the oligodendrocytes and the myelin. Without oligodendrocytes there is no more demyelination to the axon. In MS immune attack happen in and out that means after an attack regulatory I cell will inhibit another immune cell. On early stages of disease oligodendrocytes will heal and demyelination the axons but over time re-myelination will stop and the damage will become irreversible with loss of axons.

It is the most common subtype, affecting 85% of people with MS and is characterized by short attacks to the CNS with either full or partial recovery in subsequent weeks to months. The periods between relapses are characterized by lack disease progression. The stable patient may have local inflammation activity that is clinically silent.

It is a subgroup characterized by an initial relapsing-remitting course followed by a change in clinical course with progression to steady and irreversible decline with or without continued acute attacks. May be the results of progressive axonal loss rather than new lesions. Before newer treatment, majority of patients with RRMS progressed to SPMS.

It is the progression of the disease where a steady decline in function experienced from the onset of the disease. PPMS is an associated with later onset (mean age 40 years) and more equal gender distribution. Affects approximately 10%m…n of patients with MS.

It is characterized by a steady deterioration in disease from onset (similar to PPMS) but with occasional acute attacks. Intervals between attacks are characterized by continuing disease progression. Affects approximately 5% of patients with MS.

The complications of MS range from mild to severe. They can range from fatigue to the inability to walk. Other problems include loss of vision, balance, and bowel or bladder control. Depression can result from the difficulty of living with a chronic condition.

The clinical features are Muscle weakness, Numbness and tingling, fatigue, dizziness, bladder problems, spasticity, tremor, vision problems.

Investigations are MRI,ECG, lumbar puncture, visual evoked potentials Physiotherapy management are Core strengthening exercise, Balance training ,Aerobic exercise, Treadmill CODUSE Core stability Dual tasking Sensory strategies) is a group exercise programme improves balance and reduces fall in people with Multiple Sclerosis. Exercise to improve the body ability to maintain balance and stability while performing two tasks simultaneously. This type of exercise typically involves challenging the body sensory system, include the visual, proprioception and vestibular system and spatial orientation. Overall, core stability dual tasking sensory strategies exercises can help improve balance, stability and coordination and may be particularly useful for individuals who need to perform multiple tasks while standing or moving.

METHODOLOGY

Study Design

This study design was a single case study.

Case History

A 30-year-old female first noticed her symptoms in 2 months ago, she experienced blurred vision, excessive fatigue, numbness, and tingling. The symptoms persisted for few days, eventually affected her daily activities and prompting to visit her family physician They advised for MRI and the findings revealed the presence of demyelination and plaques formed in the areas of cerebrum and brainstem. The physician classified it as a clinically isolated syndrome of MS and difficulty with balance and walking. Then the physician recommended to the physiotherapy department of Ashwin Multi speciality hospital Coimbatore and the physiotherapist underwent physiotherapy assessment and physiotherapy management was done with CODUSE exercise for 8 weeks, and the treatment duration was 4 days a week for 1 hour per session and 10 mins relaxation.

Methods

The need and objective of the study was clearly explained to the ethical committee of PPG COLLEGE OF PHYSIOTHERAPHY, and permission was obtained. After obtaining the permission the study was conducted at ASHWIN MULTISPECIALITY HOSPITAL Coimbatore Tamil-Nadu. The entire procedure and technique of the study was explained to the patient and written consent form was obtained prior to the study.

Prior to the exercise programme subject underwent Berg balance scale and TUG test which were repeated for pre and post test and result are recorded after the completion of 8 week exercise programme. The patient received CODUSE exercise which include Core strengthening dual task and sensory strategies. The total study duration was 3 months.

Before starting the study pre score values of berg balance scale and TUG test were measured.

After the 8^{th} week post test score was measured and the data was recorded.

DESCRIPTION OF TECHNICAL INTERVENTIONS

Core Stability

Core stability can be defined as the capacity of the lumbar-pelvic-hip muscle complex to control lower trunk movement and maintain stability of the vertebral column after skeletal perturbation.

Dual Tasks

- The patient will be asked to pass a ball from one hand to another while walking.
- Single leg balance with one ball passing from one hand to other hand.
- Patient asked to repeat the alphabets commanded by the therapist while walking to and fro.

Sensory Strategies

- Introduce relaxation techniques like deep breathing exercise progressive muscle relaxation or mindfulness to help patients reduce anxiety and promote overall relaxation.
- Educate patient about the importance of good sleep hygiene as proper sleep can help reduce sensory symptoms and promote overall health.
- Assist patients in making environmental modifications to minimize sensory triggers. This may involve adjusting lighting, reducing noise levels, or creating quiet and comfortable spaces.
- Promote regular physical activity tailored to the individual's capabilities, as exercise has been shown to improve sensory processing and overall well-being in individuals with MS.
- Teach stress management techniques as stress can exacerbate sensory symptoms. This may include practices like stress reduction exercises, time management strategies, or engaging in enjoyable activities.

RESULTS

An increase in balance and gait was observed before and after exercise. In posttest value the balance grade is 41 and gait value is 15. There is significant improvement in Berg balance and TUG test from the post-test taken.

Demographical Data

Table 1

SI.NO	PATIENT DESCRIPTION	MEASURES
1	AGE	30
2	SEX	FEMALE
3	WEIGHT	74

Descriptive Analyses of Pre-Test and Post Test Values Balance Using Berg Balance Scale

Table 2

BERG BALANCE SCALE	PRE-TEST	END OF 2nd WEEK	END OF 4th WEEK	END OF 6th WEEK	POST-TEST
SCORE OUT OF 50	27	30	34	37	41

Descriptive Analyses of Pre-Test and Post Test Values for Walking Using Tug Test

Table 3

TIME UP ANG GO TEST (TUG)	PRE-TEST	END OF 2nd WEEK	END OF 4th WEEK	END OF 6th WEEK	POST-TEST
SCORE OUT OF 40	35	30	25	20	15

DISCUSSION

The majority of subjects with multiple sclerosis develop progressive functional disability and poor quality of life. Impairment of static and dynamic balance is the most disabling symptoms of MS, and it affects about 75% of patients over the course of the disease.

In this study, a 30-year-old female was presented to the outpatient department of Ashwin Multispecialty Hospital with complaints of difficulty in balance, weakness during walking due to multiple sclerosis. The subject received the CODUSE exercise program about 8 weeks. The pre-test and post-test were recorded by Berg balance scale and TUG test: that improve balance and walking.

These are the following reviews that support the study. Banefshehamiri et al (2019) they conducted study at the Bahonar University of Kerman. They did study on the effect of 10-week core stability training on balance in women with multiple sclerosis according to EDSS. It is the single blind randomized control study in which 72 consecutive women with relapse remitting MS patients The majority of subjects with multiple sclerosis develop progressive functional disability and poor quality of life. Impairment of static and dynamic balance is the most disabling symptoms of MS, and it affects about 75% of patients over the course of the disease.

In this study, a 30-year-old female was presented to the outpatient department of Ashwin Multispecialty Hospital with complaints of difficulty in balance, weakness during walking due to multiple sclerosis. The subject received the CODUSE exercise program about 8 weeks. The pre-test and post-test were recorded by Berg balance scale and TUG test: that improve balance and walking.

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When contracting, the primary role of the core stability muscles is to raise the intraabdominal pressure and to increase tension in the thoracolumbar fascia. The increase in the intra-abdominal pressure stiffens and strengthens the relevant structural support around the spine, compacts the atherogenic structures and in combination with abdominal contraction, it can encourage a rigid cylinder and stiffness to occur around the spine. Those contractions produce the anticipatory force control throughout the body.

Core muscles are derived from slow twitch fibres. The muscles which are responsible for the maintenance of good posture contains more of type I muscle fibres. During, the stability training, the strength and resistance of the muscle is increased in core muscles by the stimulation of type I slow twitching muscle fibres through the increasing actin and myosin filaments. This results in increasing ability to generate force with proper posture. So, Core stability can facilitate the neuromuscular re- education and train the muscles in the pelvis, lower back, hip, abdomen to work in harmony. There are 3 systems in the body that helps to control the balance, the visual, vestibular and proprioceptive. Proprioceptive system is one that involves the core.

Proprioception nerves are sensory nerves that situated throughout the body. Inner core muscles attached to spine. Outer core muscles work in conjunction with inner core whenever need to move from one point to other. Hence, there is a core balance relationship through proprioception system.

In the present study, the training focuses on the core muscles. The data analysis obtained has significant difference between pre-test and post-test values and found better result in static and dynamic balance. There was a statistically significant improvement in static and dynamic balance, hence null hypothesis is rejected, and the alternate hypothesis is ace

LIMITATIONS

- This is a single case study.
- The study duration was 3 months.

CONCLUSION

Finally, the study concluded that there was statistical improvement in effectiveness of CODUSE exercise programme on walking and balance in subjects with multiple sclerosis.

CONFLICTS OF INTEREST

No potentials conflicts of interest was reported by the authors.

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AUTHORS CONTRIBUTIONS

Ms. MEGHA NAIR conducted this study and collected data, and reviewed the final manuscript draft Mr V.S VIBIN has carried out of the data curation and prepared the original draft.

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