A Comparative Study on The Effectiveness of Vojta Therapy Versus Conventional Balance Training to Improve Postural Balance in Patient with Multiple Sclerosis-A Randomised Controlled Trial

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ABSTRACT: Postural balance impairment along with other disabilities with Multiple sclerosis which results the increased high risk of falling and fall-related injuries. The purpose of the study is to determine the efficacy of Vojta therapy versus conventional balance training to improve postural balance in multiple sclerosis patients. 30 patients met the inclusion and exclusion criteria and assigned into 2 groups. Group A (Vojta therapy) consisting of 15 patients. Group B (conventional balance training) consisting of 15 patients. prior to the starting of the treatment program pre-assessment was done by using outcome measures of BBS, TUG test and MSWS -12 item. The treatment was given 6 weeks. Group A received Vojta therapy and Group B received conventional balance therapy. After the treatment period, post test assessment was taken by using outcome measures of BBS, TUG test and MSWS-12. Statistical analysis of the data showed both the Group A and B showed equal effectiveness of treatment. The results suggest that all participants in both groups achieved a significant improvement almost equally in dynamic postural balance with Vojta therapy and conventional balance therapy.

KEYWORDS: Multiple Sclerosis (MS), Berg Balance Scale, Timed Up and Go Test, Multiple Sclerosis Walking Scale-12, Postural Balance, Vojta Therapy, Conventional Balance Training

INTRODUCTION:
Multiple Sclerosis is a chronic inflammatory disease of the central nervous system(CNS)1-4. MS affects the myelinated axons in the CNS1-4. It is characterized by the disseminated demyelination of the white matter of spinal cord and brain5. It is a two stage disease i.e. in the early stage, inflammation causing relapsing –remitting disease. In the late stage, neuro degeneration responsible for non-relapsing progression. It can be primary and secondary progressive MS6-7. It is divided into 4 categories7.
1) RELAPSING-REMITTING MS 2) PRIMARY PROGRESSIVE MS 3) SECONDARY PROGRESSIVE MS 4) PROGRESSIVE-RELAPSING MS

It can be seen in 2.5 per 1 lakh globally, approximately .3 million people wide. The incidence of MS in India is low. Indian MS patients has no significant family history of MS. It attacks mostly in young and middle aged adults i.e., aged 18 to 50 years. Women to men ratio is (3:1)8. MS affects all socioeconomic groups. It usually occurs in young adults continues throughout life with periods of relapses and remission. In MS, injury to the myelin blocks conduction and function resulting in neurological signs and symptoms are seen in multiple sclerosis10. Viral infection trigger the production of T-cells, B-cells and macrophages, which produce cytotoxic effects within the CNS destructing the oligodendrocytes and myelin sheath caused by the reactive astrogliosis. Demyelination slows transmission of impulses and become fatigue rapidly. Blockage of conduction and function impairment occurs with severe disruption. Edema, local inflammation and infiltrates surrounds the acute injury of fibers causing demyelination affecting the white matter and lesions in grey matter arisen in advanced stage10. Partially demyelinated axons accounts for unpleasant sensation. The causes may be low serum of vitamin – D, smoking, early obesity, infection caused by Epstein – Barr virus, exposure to UV rays, genetic susceptibility, environmental factors12. Clinically, MS presents with symptoms like balance, posture, motor and sensory deficit, cognitive disorder, sexual problems, behavior and communication dysfunction, dizziness, depression, dysphagia, tingling, numbness, bladder and bowel dysfunction, loss of hearing, fatigue, muscle weakness, spasticity, Lhermitte sign12. Multiple sclerosis can be diagnosed with visual and sensory evoked potentials, neuroimaging (MRI) and examination of CSF13. Postural balance impairment along with other disabilities with multiple sclerosis which results the increased high risk of falling and fall-related injuries14. Imbalance as inter related issues are decreased ability to maintain a position, late response to postural perturbation, difficult to control stability, walking impairment15. Decline in integration of CNS has been identified as a major factor for falls16-21. Multiple sclerosis causes damage to the areas of CNS including cerebellum and spinal cord which impact postural responses to maintain balance2. Inco-ordination, tremors, ataxia and dysmetria that become exaggerated with movement in trunk and all the extremities23. MS affects to the many areas of the CNS that can impact postural response to maintain balance which involves the spinal cord and cerebellum24. Spasticity may lead to pain, poor posture, interfere with mobility and also have...
contractures\textsuperscript{25}. During ambulation, patients will display a wide based gait with worsening balance when changing direction or initiation of gait with the trunk and proximal muscles involved\textsuperscript{26}.

Complication of multiple sclerosis are poor posture, pain and spasticity, muscle atrophy and contractures leading to dependency\textsuperscript{27}. A multidisciplinary approach is the key to limiting the disabilities\textsuperscript{28}. The outcome measures such as berg balance scale (BBS), time up and go test (TUG) and multiple sclerosis waking scale-12 (MSWS) item have acceptable concurrent validity in testing the static and dynamic stability in individual with multiple sclerosis\textsuperscript{29}.

In physical therapy, Vojta therapy is defined as reflex locomotion. It is a dynamic neuromuscular approach and based on the development of kinesiology. It is coordinated, rhythmic activation of the CNS and skeletal system\textsuperscript{30,31} and can be applied to any age groups. It has 10 different zones for the stimulation of motor patterns of reflex locomotion\textsuperscript{31,32}. Conventional balance training given for balances including static holding different weights for few seconds, joint approximation techniques and PNF techniques involves rhythmic stabilization, mobility activities, Swiss ball exercise, series of postural progression, strengthening exercises, visual cues, frenkel's exercises\textsuperscript{33}. Including fall prevention and modification and home evaluation with an exercise regimen has been shown to be beneficial\textsuperscript{34}. The primary aims of the therapy are preventing disabilities, preventing new attacks and returning functions after an attack. The study focus to evaluate the effects of Vojta therapy and balance retraining in patients with multiple sclerosis.

**MATERIALS AND METHODOLOGY:**

- **Study design:** Randomized experimental study design.
- **Study setting:** MNR Sanjeevani college of physiotherapy, OPD (out patient department). Ucchvas rehabilitation Centre.
- **Sample size:** 30 subjects satisfying inclusion and exclusion criteria allotted into two groups, 15 members into each group.
- **Ethical Clearance:** The Ethical Clearance Was Given By The Ethical Committee of MNR’S Sanjeevani College Of Physiotherapy, Sangareddy
- **Intervention period:** 4 days a week for 6 weeks.
- **Study period:** from June 2022 to December 2022.

**OUTCOME MEASURES:**

- Berg balance scale (BBS)
- Time up and go (TUG) test
- Multiple sclerosis waking scale-12 (MSWS)

**INCLUSION CRITERIA:**

- Both males and females.
- Aged between 18 to 55 years.
- Patients with only multiple sclerosis.
- Multiple sclerosis with posture and balance problems.
- Ability to stand independently for shorter period.
- Ability to walk at least 6-10 meters.
- Ability to follow the commands.
- Ability to participate in 30 minutes physiotherapy session at least.

**EXCLUSION CRITERIA:**

- Non-cooperative.
- Medically unstable patients.
- Severe sensor impairment.
- Skeletal deformities.
- Diabetes mellitus.
- Visual dysfunction.
- Inner ear dysfunction.
- Pregnant women.

**MATERIALS USED:**

- Couch
- Soft mat
- Thera bands
- Chair
- Objects like pen, book, ball, toys etc.
- Weighted sandbags
- Parallel bar

**TREATMENT PROCEDURE:**

**GROUP – A (Vojta therapy)**

Vojta therapy is dynamic neuromuscular treatment and is defined as the reflex locomotion. which is explained as the rhythmic activation of the CNS and musculoskeletal system. Vojta has 10 different reflex zones that available to stimulate the motor patterns. The 3 main positions are prone lying, side lying and supine lying. Vojta therapy is performed by activation of cortical and subcortical areas in the brain. A light pressure is applied on the particular zone to activate the patient’s involuntary motor response and to perform a particular movement patterns. It has 2 phases:- reflex creeping and reflex rolling.

**REFLEX CREEPING:**

The main position is prone lying. Head rotated to one side and resting on the bed. The therapist keep minimum resistance against the patients incipient head rotation. It activates the muscles of body especially pelvic floor muscles, respiratory and abdominal muscles. It is also known as cross pattern.
REFLEX ROLLING:
It can be done in two positions i.e. in supine position and side lying. It is transitions from supine to side lying posting and these results in crawling. In supine position, rotation of the head by the physiotherapist, arms and legs extended. Stimulation in the 7th-8th ribs in the breast zone. In side lying, the movements present is rolling, crawling and lateral movement spontaneously. These improves the posture and movement.

In the Vojta therapy group 4 sessions per week will be conducted for a duration of 6 weeks. 15 subjects will be taken in this group. Each session will consist of 30 minutes. Vojta therapy based on three exercises, 10 minutes for each exercise – crawling reflex (10 minutes), 1st phase rolling reflex (10 minutes), 2nd phase rolling reflex (10 minutes).

GROUP – B: (Conventional balance training)
Conventional balance training targeted on mild stretching, strengthening exercises, coordination exercises, core stability, controlled mobility exercises and parallel bar (biofeedback mirror) training. 15 subjects will be taken in the group.

30 minutes a day for 4 days a week for duration of 6 weeks.

STATISTICAL ANALYSIS
Statistical analysis was done by using SPSS software version 23.0 and Microsoft Excel-2021. Statistical data was presented in the form of mean +/-standard deviation and mean difference percentages were calculated and presented.

Between the groups:
Independent student “t test” was used to assess the statistical significant difference in mean value between the groups Vojta therapy and conventional balance training.

Within the groups:
Independent student “t test” was used to assess the statistical significant difference in mean value between the groups Vojta therapy and conventional balance training.

Table 1: Comparision Of Pre And Post Test Means Of Group A On BBS, TUG, MSWS

<table>
<thead>
<tr>
<th>Test</th>
<th>Group A Pre Test</th>
<th>Group A Post Test</th>
<th>t value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBS</td>
<td>20.07 ± 9.83</td>
<td>34.07 ± 13.70</td>
<td>8.097</td>
<td>.000</td>
</tr>
<tr>
<td>TUG</td>
<td>20.27 ± 5.84</td>
<td>11.40 ± 3.52</td>
<td>11.842</td>
<td>.000</td>
</tr>
<tr>
<td>MSWS</td>
<td>45.56 ± 12.53</td>
<td>83.49 ± 8.88</td>
<td>19.450</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 2: Comparision Of Pre And Post Test Means Of Group B On BBS, TUG, MSWS

<table>
<thead>
<tr>
<th>Test</th>
<th>Group B Pre Test</th>
<th>Group B Post Test</th>
<th>t value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBS</td>
<td>19.00 ± 8.79</td>
<td>35.07 ± 12.49</td>
<td>8.067</td>
<td>.000</td>
</tr>
<tr>
<td>TUG</td>
<td>20.93 ± 4.59</td>
<td>11.67 ± 2.99</td>
<td>14.571</td>
<td>.000</td>
</tr>
<tr>
<td>MSWS</td>
<td>43.65 ± 11.37</td>
<td>88.73 ± 8.42</td>
<td>23.620</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 3: Comparision Of Post Test Means Of Group A and B On BBS

<table>
<thead>
<tr>
<th>Test</th>
<th>Group Statistics, N=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>TESTS</td>
<td>BBS</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>PRE TEST</td>
<td>GROUP A</td>
</tr>
<tr>
<td></td>
<td>GROUP B</td>
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<tr>
<td>POST TEST</td>
<td>GROUP A</td>
</tr>
<tr>
<td></td>
<td>GROUP B</td>
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</tbody>
</table>
Table 4: Comparison of Pre and Post Test Means of Group A and B on TUG

<table>
<thead>
<tr>
<th></th>
<th>GROUP-A</th>
<th>GROUP-B</th>
<th>GROUP-A</th>
<th>GROUP-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE TEST</td>
<td>20.27</td>
<td>20.93</td>
<td>11.40</td>
<td>11.67</td>
</tr>
<tr>
<td>POST TEST</td>
<td>11.40</td>
<td>11.67</td>
<td>83.49</td>
<td>88.73</td>
</tr>
</tbody>
</table>

Table 5: Comparison of Pre and Post Test Means of Group A and B on MSWS

<table>
<thead>
<tr>
<th></th>
<th>GROUP-A</th>
<th>GROUP-B</th>
<th>GROUP-A</th>
<th>GROUP-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE TEST</td>
<td>45.56</td>
<td>43.65</td>
<td>83.49</td>
<td>88.73</td>
</tr>
<tr>
<td>POST TEST</td>
<td>83.49</td>
<td>88.73</td>
<td>83.49</td>
<td>88.73</td>
</tr>
</tbody>
</table>
RESULTS:
Both the group A and B showed significant difference from pre and post intervention. On comparing mean values of Group A and B, both groups A (Vojta therapy) and B (conventional balance training) showed equal improvement.

DISCUSSION:
This study was designed to compare the efficacy of Vojta therapy versus conventional balance therapy in improving balance in patients with multiple sclerosis, which is chronic inflammatory disease of the CNS. MS affects the myelinated axons in the brain and spinal cord. In the early stage, the inflammation causing relapses and remissions. In the later stages, neurodegeneration responsible for non – relapsing progression and an unpredictable course. 6,7,8

30 patients with multiple sclerosis patients who met the inclusion and exclusion criteria were selected and randomly divided into group A and group B. In each group. The 30 minutes session was given 4 days a week for 6 weeks. The BBS, TUG test and MSWS -12 are used to assess the balance during mobility of the patients with multiple sclerosis. 9

The results showed that there is a statistically significant improvement in both groups (group A and group B). In group A, the results were significant with the t value of 8.109 and p value of .000 on Berg Balance Scale; on timed up and go test, t value of 11.842 and p value of .000; on MSWS – 12 showed substantial improvement with t value of 19.450 and p value of .000. In group-B, the results showed that there is a statistically significant improvement on BBS with t value of 8.067 and p value of .000; on TUG test the substantial improvement with t value of 14.571 and p value of .000; on MSWS – 12 showed significant improvement by the t value of 23.620 and p value of .000.

JUNG, M.W LANDENBERGER et al., suggested the use of Vojta therapy and neurodevelopmental treatment in children with infantile postural asymmetry. LUIS PERALESN LOPEZ, et al, 2021, the result suggests that patients with MS showed improved balance for a short time in day to day activities with Vojta therapy measured on BBS. G LAUEBS et al, 1998, Vojta therapy produces a greater immediate effect than 2 successive units of treadmill training in most of MS patients. D.CALLANEO, JONSDOTTIR et al, and ALON KALRON, et al, 2016, balance rehabilitation appeared to be useful tool in reducing the fall rate and improving balance skills in subjects with MS.

CONCLUSION:
Results of the study shows the both groups i.e., group A (vojta therapy) and group B (conventional balance training) have shown statistically equal significant effects on improving dynamic postural balance with patients in multiple sclerosis patients and better improvement of all outcome measures in both treatments.

REFERENCES:
27. Podsiadlo D, Richardson S, the timed up and go a test of basic functional mobility for frail elderly persons. JAM Geriatrsoc 1991; 39:142-8.