



**EFFECTS OF BALANCE AND VESTIBULAR TRAINING IN PERSONS
WITH SUB-CLINICAL MOTION SENSITIVITY**

*Tharani G., Rajalaxmi V., Ramachandran S., Kamatchi K. and Naong Mung A. Chang

Faculty of Physiotherapy, Dr. MGR Educational and Research Institute, Vellapanchavadi, Chennai- 6000077.

*Corresponding Author: Tharani G.

Faculty of Physiotherapy, Dr. MGR Educational and Research Institute, Vellapanchavadi, Chennai- 6000077.

Article Received on 10/01/2019

Article Revised on 01/02/2019

Article Accepted on 21/02/2019

ABSTRACT

Subclinical motion sensitivity is an illness that break beneath the apparent of clinical detection. A subclinical motion sensitivity has no detectable clinical findings. It is distinct from a clinical disease, which has signs and symptoms that include nausea, vomiting and sweating. The ability to maintain balance is essential for Activities of Daily Living (ADL). Balance is the ability to maintain equilibrium and orientation in a space. Balance is a complex process requiring central processing of peripheral sensory inputs. These peripheral sensory inputs include the visual, somatosensory and vestibular systems working together to maintain postural control. Sensory input and processing conflict, particularly between the visual and vestibular systems, can result in disturbance of postural control leading to disequilibrium and motion sensitivity. Thus the aim of the study was to analyse the effects of balance and vestibular training on persons with sub-clinical motion sensitivity. 30 subjects meeting the inclusion criteria were considered for the study. The subjects performed the balance and vestibular exercises for 30-40 minutes twice a day for three weeks. Vestibular Rehabilitation Benefit Questionnaire and Berg balance scale were used to assess the pre and post intervention scores. The study showed significant reduction of symptoms in persons with motion sensitivity due to the physiological adaptation of the multisensory system after balance and vestibular training.

KEYWORDS: subclinical motion sickness, Vestibular Rehabilitation Benefit Questionnaire and Berg balance

INTRODUCTION

Sub-clinical motion sensitivity, also known as kinetosis and travel sickness is a condition in which a lack of co-ordination between visually perceived movement and the vestibular system's sense of movement exist. Dizziness, fatigue, and nausea are the common symptoms of motion sickness.^[1]

The prevalence of motion sensitivity among Northeast Indians (28%) is slightly higher than Northwest Indians (26%). Generally, females (27.3%) are more susceptible than males (16.8%).^[2] Essentially all humans are susceptible to motion sensitivity on exposure to unfamiliar motion of sufficient intensity and duration. Several studies proved that females have increased frequency and severity of symptoms and pregnant women are much more susceptible to motion sensitivity.^[3]

Motion sickness or motion sensitivity is stimulated by abnormal spatial orientation and is a common symptom related to dizziness and postural instability. The main cause of the motion sickness is abnormal sensory input from the visual, vestibular, and somatosensory systems.^[4] The sense of balance originates in the

labyrinth. The labyrinth is a system of tunnels in the inner ear that contains the sensors for the auditory and vestibular system. The vestibular system is responsible for maintaining balance of an individual.^[5]

Vestibular Rehabilitation therapy is an exercise based programme for reducing the symptoms of disequilibrium and dizziness.^[6] It is an alternative treatment involving specific exercises that can eliminate or significantly reduce symptoms by decreasing dizziness and visual symptoms, increasing balance and improving general activity levels.^[7] Visual-Vestibular rehabilitation is an exercise-based programme for reducing the symptoms of disequilibrium and dizziness associated with vestibular pathology.^[8]

Balance exercise helps in the maintenance of balance and confidence at any age. Balance exercises can help prevent falls and improved co-ordination.^[9]

Since there is dearth of literature on the effects of balance and vestibular training in persons with sub-clinical motion sensitivity. This study was intended to find the effects of balance and vestibular training on persons with sub-clinical motion sensitivity.

METHODOLOGY

A total of 30 adult subjects both male and female between the age group of 18-25 years were selected according to the inclusion criteria. The subjects were selected using Motion Sickness Susceptibility Questionnaire, Vestibular Rehabilitation Benefit Questionnaire and Berg balance scale scoring 54-90, 33-108, and 41-56 respectively. Normal healthy persons without motion sickness and subjects with neurological syndromes which lead to problems in gait and posture were excluded from the study. Vestibular Benefit Questionnaire and Berg Balance Scale were used as an outcome measures. Balance and visual-vestibular training was given to the subjects meeting the inclusion criteria from both the sexes for 3 weeks with the symptoms of motion sensitivity. The procedure and technique of the exercise were explained to the subjects. The exercises were performed for 30-40 minutes twice a day for three weeks. After 3 weeks of intervention sessions, post-test measurements were taken using VRBQ and Berg balance scale.

Turning in Places to Improve Balance

1. Stand with a chair in front and wall behind. Chair and wall can be used as a support in case of fall.
2. Stand with feet slightly apart and arms at the sides.
3. Turn one half circle (180 degree).
4. Stop for 10 seconds or if dizziness occurs, wait till it goes away.
5. Repeat it 5 times, the first time to the right and the second time turn to the left. Concentrate on turning the direction that makes it dizzier.

Comparison of VRBQ and BERG Balance Scale in Pre and Post Tes.

Group	N	Mean	Std. deviation	p-value	Significance
VRBQ pre-test	30	77.833	9.006	0.0001	0.05
Post-test	30	-37.2	9.247		
Berg balance scale Pre-test	30	46.433	3.58	0.0001	0.05
Post-test	30	49.3	3.32		

The above table reveals the mean, standard deviation, paired t-test and p-value of the VRBQ and Berg balance scale.

This table shows there is significant difference in between pre-test and post-test values of VRBQ and Berg balance scale ($p < 0.05$).

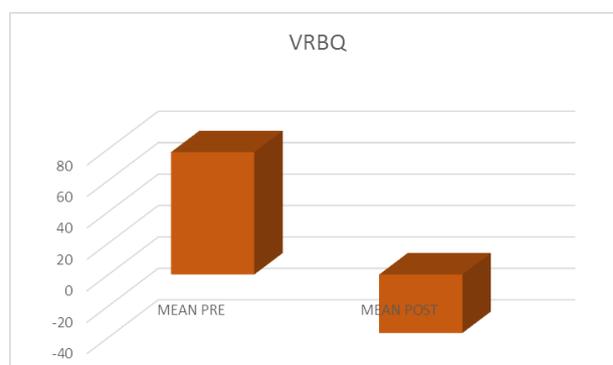
6. Repetition of the exercise twice a day. Effort to make the patient able to turn to full circle with eyes closed.
7. This exercises was repeated on foam mat (soft surfaces) after the patient attained an ease on floor.

Visual-Vestibular Exercises

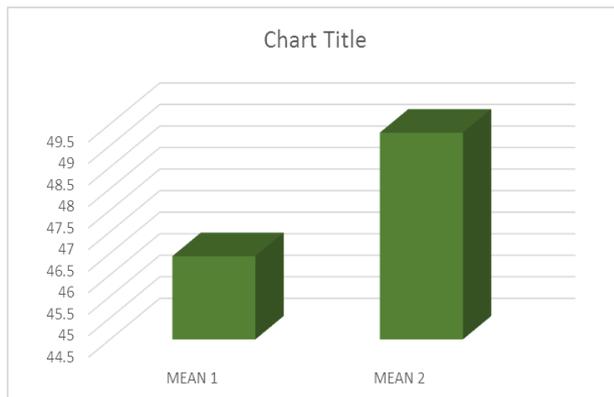
1. Seated on chair, hold the card with letters at arm's length in front of the patient's eye level. Move the card from left to right repeatedly as the patient maintains fixation on the letters. Identify maximum speed.
2. Repeat the same activity, except the patient hold the card in up and down direction, centred in front of the patient.
3. Seated ask the patient to turn from left to right, keeping his arm and card steady and centered in front.
4. Repeat step 3, with movement of head in up down direction.
5. Repeat step 4, ask the patient to tilt his head side to side.

DATA ANALYSIS

The collected data was tabulated and analysed using inferential statistics. Mean and Standard deviation were used to assess all the parameters of the data using Microsoft excel 2013. Paired t test were used to find out the significant difference in improvement between pre and post- test values for VRBQ scale and Berg Balance scale.



Graph. 1: Comparison of Vrbq in Pre and Post Test Values.



Graph. 2: Comparison of BERG Balance Scale IN Pre and Post Test Value.

RESULTS

On comparing the mean and standard deviation of pre-test and post-test values of VRBQ and Berg balance scale. The result of the study showed significant improvement. Symptoms were reduced after balance and vestibular training.

DISCUSSION

Subclinical motion sickness is a contemporary area of research in the field of physiotherapy. There is dearth of literature on the effects of Balance and Vestibular training on persons with subclinical motion sickness. Hence the purpose of the study was to analyse whether Balance and Vestibular training has a greater impact on reducing the symptoms of subclinical motion sickness. 30 persons with subclinical motion sickness were recruited for the study, Balance and Vestibular training was given for 3 weeks. This study was focused on Balance and vestibular training with gradual increase in difficulty was followed by reduction in symptoms and improvement of function on these patients with debilitating motion sickness. The treatment was based on sensory conflict theory. The inability of the vestibular system to adapt and function under varying sensory situations resulted in motion sickness⁽¹⁰⁾. Intervention was focused first on habituation and training of balance and vestibular function.

Although time may have resulted in reduction of symptoms, the samples were able to return to the improved level of symptoms. Few samples showed a greater reduction in symptoms and ease in ADL's. Further the study suggests that patients follow-up through the exercise program is important. The patients who reduced the amount of exercise intensity showed minimal progress which was similar to the work done by Rose Marie Rine et al Oct (1999).

The Balance and Vestibular training exercise in this study focussed on the multisensory and multisystem demands which helped in improving the ability to adapt and function under varying sensory situation in persons which sub-clinical motion sensitivity.

In this study the VRBQ mean value decreased from 77.833 to 35.933, Berg balance scale mean increased from 46.433 to 49.3 statistically. The subjects also experienced less motion sickness after vestibular and balance training. Thus, Balance and Vestibular training is an effective intervention in reducing the symptoms of motion sensitivity.

REFERENCES

1. Jeltly E. Bos et al. "A theory on visually induced motion sickness". Displays, 2008; 29.
2. James R. Lackner (2005). "Motion sickness: More than nausea and vomiting". Experimental brain research 232.8 (2014).
3. Laurence R. Young. "Adaptation of the vestibulo-ocular reflex, subjective tilt, and motion sickness to head movements during short-radius centrifugation". Journal of vestibular research, 2003; 13.2, 3.
4. Danah Alyahya et al "Effect of vestibular adaptation exercise on chronic motion sensitivity: a randomized controlled trial". Physical Therapy and Rehabilitation, 2016; 3(1).
5. Fowler CG, et al. "Effects of motion sickness on the vestibular-evoked myogenic potentials". Journal of the American Academy of Audiology, 2014 Oct; 25(9).
6. Rose Marie Rine et al (Oct 1999). "Visual-vestibular habituation and balance training for motion sickness". Physical Therapy, Volume79, Number 10, October 1999.
7. Gilles Clement et al. "Effects of vestibular training on motion sickness, nystagmus, and subjective vertical disorientation". Journal of Vestibular Research 17.5, 6 (2007).
8. Byung In Han et al. "Vestibular rehabilitation therapy: Review of indications, mechanism and key exercises". J Clin Neuro 2011 Dec; 7(4)
9. Susan B. O'Sullivan et al (2014) Physical rehabilitation, 6th edition, section II,
10. Jelte E. Bos. "Nuancing the relationship between motion sickness and postural stability." Displays 32 (2011)