

**COMPARING THE EFFECTS OF MODIFIED EPLEY'S MANEUVER AND CAWTHORNE-COOKSEY EXERCISE WITH BRANDT –DAROFF EXERCISE IN BENIGN PAROXYSMAL POSITIONAL VERTIGO****S. DIVYA ^{*1}, R. ARUNACHALAM ¹, A. KUMARESAN ¹ AND S. KIRUTHIKA ¹**¹ *Department of Physiotherapy, Saveetha University, Chennai, India***ABSTRACT**

Benign Paroxysmal Positional Vertigo (BPPV) is the most common cause of vertigo constituting 20% - 40% of all patients with peripheral vestibular disease in which the posterior canal is usually affected. To determine and evaluate whether the effect of combined therapy will improve the balance confidence in posterior canal Benign Paroxysmal Positional Vertigo. In this experimental design a total of 30 subjects with an average age of 35 – 65 years of females those who had dizziness and balance disorder were assessed with Activities–Specific Balance Confidence scale (ABC) and Dizziness Handicap Inventory (DHI). 30 subjects were randomly allocated into Experimental group (15 Subjects) who received Modified Epley's maneuver and Cawthorne–Cooksey exercise with medications and Control group (15 subjects) Brandt –Daroff exercise with medications. At the end of the treatment, ABC scale and DHI scale on comparison within and between the experimental group revealed extremely statistically significant result with pre-test and post-test mean of *p* value < 0.0001 whereas the control group revealed not statistically significant result with pre-test and post-test mean of *p* value 0.30 and 0.15 respectively.

KEYWORDS: BPPV, Modified Epley's Manuever, Cawthorne–Cooksey, Brandt Daroff, Balance Confidence, Dizziness.**S. DIVYA**

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INTRODUCTION

According to World Health Organization (WHO) the number of individuals aged 60 years and above will be 37% by 2050 in most of the developing countries. It has been estimated that in the last ten years 50% of individuals experience Benign Paroxysmal Positional Vertigo (BPPV), 85% of the individuals experience vertigo and balance dysfunction due to inner ear defect. The prevalence of Benign Paroxysmal Positional Vertigo 2.4% all over the world.^{1,2} It is the most common cause of vertigo constituting 20 – 40% of all patients with peripheral vestibular disease. Mean age of onset ranging between 4th and 5th decades, women outnumbering men by 2:1.³ Benign Paroxysmal Positional Vertigo is caused by dislodged otoconia that move within the semicircular canal whenever head position is changed. The resulting endolymph flow activities hair cell receptors, causing short-lasting vertigo and a mixed torsional / upbeating nystagmus.^{4,5} A diagnosis-specific maneuver is performed to relocate the otoconia back into the utricle where it belongs. In addition to the maneuvers, the participants were instructed to perform a simple daily program (Cawthorne –Cooksey exercise) designed to ensure clearance of the otoconia and facilitate full resolution of vertigo symptoms.^{5,6,7} Most of the studies up to date have compared only the maneuvers. Very few studies have included the home treatment and office treatment. Modified epley's maneuver had been specially designed to reduce symptoms in Posterior Canal Benign Paroxysmal Positional Vertigo and addition of home exercises could achieve higher quality of life sources. The Dix-hallpike test is the standard form by which the posterior semicircular canal BPPV can be made. Modified epley's procedure effective for self treatment of Benign Paroxysmal Positional Vertigo.

METHODOLOGY

A total of 63 participants suffering from Benign Paroxysmal Positional Vertigo were recruited from the Physiotherapy Outpatient Department of the Saveetha University Hospital 2012. From that 30 patients were eligible for the study those who meet the inclusion criteria. Before being tested, participants were divided into 2 groups (experimental and control) according to a simple randomization sampling.

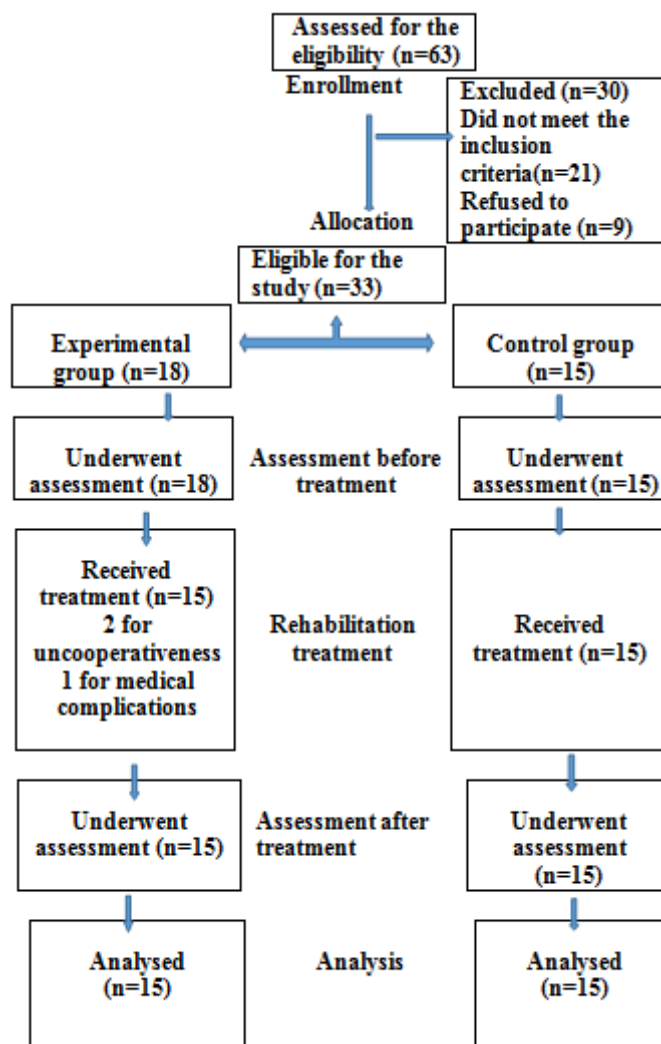
Criteria for inclusion and exclusion

The selection criteria includes participants with age 35 – 65 years, recurrent episodes of vertigo, no improvement after 2 weeks of medications, positive Dix-Hallpike test, ABC scale <50%, Posterior Canal Benign Paroxysmal Positional Vertigo. Patients with negative Dix-Hallpike test, ABC scale >50%, anxiety disorder, anterior or Lateral Canal Benign Paroxysmal Positional Vertigo, CNS pathology were excluded. All patients read and signed the informed consent form approved by the Saveetha University Ethics Committee for Research on Human Subjects.

TREATMENT PROCEDURE

Participants were explained about the safety and simplicity of the procedure. Patients in experimental group received Modified Epley's maneuver and Cawthorne-Cooksey exercise with medication whereas patients in control group received Brandt–Daroff exercise with medications. Experimental group received 3 sessions per week (20 minutes per session) for a period of 3 weeks. The Dix-Hallpike test or Nylen-Barany test was a diagnostic maneuver used to identify Benign Paroxysmal Positional Vertigo (BPPV). The Dix-hallpike test was performed with the patient sitting upright with the legs extended. The patient's head was then rotated by approximately 45 degrees. The patient lies down backwards quickly with the head held in approximately 20 degrees of extension. This extension may either be achieved having the clinician supporting the head as it hangs off the table or by placing a pillow under their upper back. The patient's eyes were then observed for about 45 seconds as there is a characteristic 5–10 seconds period of latency prior to the onset of nystagmus. If rotational nystagmus occurs, then the test was considered positive. During a positive test the fast phase of the rotatory nystagmus was towards the affected ear, which the ear was closest to the ground. The direction of the fast phase was defined by the rotation of the top of the eye, was either clockwise or counter-clockwise. If the test is positive latency of onset (usually 5-10 seconds); torsional nystagmus, if no torsional nystagmus occurs but there was up-beating or down-beating nystagmus, a central nervous system dysfunction is indicated; up-beating or down-beating nystagmus, indicates that the vertigo is present in the posterior semicircular canal of the tested side. If the test is negative: it makes benign paroxysmal positional vertigo a less likely diagnosis and central nervous system should be considered. Repositioning manoeuver, "particle repositioning manoeuver" are very effective in treating posterior canal BPPV and can be done for about 15 minutes.

Flow chart: Profile of the clinical trial



Currently, BPPV is managed by reposition manoeuvre that in case of canalithiasis use gravity to move canalith debris out of the affected semicircular canal and into the vestibule. For posterior canal BPPV, the maneuver developed by John Epley's effective. Epley's maneuver is performed by placing the head of the patient in the Dix-hallpike position that evokes vertigo. The posterior canal on the affected side was in the vertical plane when the head in in this position. After the cessation of nystagmus, the head was rolled to 180 degrees (this is done in two 90 degree increments, stopping in each position until the nystagmus resolves) to which the offending ear was up. The patient was then brought up to the upright sitting position. This procedure was likely to be successful when nystagmus of the same direction continues to be elicited in each of the new position. The Cawthorne–Cooksey exercises were used to encourage and hasten restoration of balance in every days conditions and also eventually to reduce episodes of vertigo. Patient is made to lie in supine only if patient cannot sit up. Otherwise, patient made in sitting position without arm rest.

- A. Eye movements; head immobile; at first slow; then quick
 1. Up and down
 2. Side to side
 3. Repeat (1) and (2), focusing on finger

- 4. Focusing on finger, moving about 3 feet to 2 inches away and back

- B. Head mobile: head movements at first slow, then quick; later with eyes closed
 1. Bending forward and backward
 2. Turn from side to side

Patient was made in sitting position without arm rests
Repeat as in A and B of previous section

- C. Shrug shoulders and rotate
- D. Bend forward and pick up objects from the ground
- E. Rotate head and shoulders slowly, then fast; first with eyes open, then close
- F. Rotate head, shoulders, and trunk with eyes open, then close

Patient was made in standing position
Repeat as in A, B, then E

- G. Change from a sit to a stand position with eyes open, then shut
- H. Throw ball from hand to hand (above eye level)
- I. Throw ball from hand to hand under knees
- J. Change from sitting to standing and turn around in between
- K. Repeat F

Patient was made to walk

- L. Walk across the room with eyes open, then closed
- M. Walk up and down slope with eyes open, then closed
- N. Do any games involving stooping or stretching and aiming, such as bowling, shuffleboard, etc.
- O. Stand on one foot with eyes open, then closed
- P. Walk with one foot in front of the other with eyes open, then closed.

In Brandt-daroff exercise, the patient sits upright, turns her head 45 degrees to the left, then lies down quickly on her right side for 10 seconds. After returning to an upright seated position, the patient turns her head 45 degrees to the right, lies down quickly on her left side for 10 seconds, then returns to an upright seated position. All exercises are started in exaggerated slow time and gradually progress to more rapid time. The rate of progression from the bed to sitting and then to standing exercises depends upon the vertigo of each individual case. It has been found that group exercises encourage a more steady rate of progress. Home exercise program should be performed 3 times a day.

OUTCOME MEASURES

Patients were evaluated before and after the treatment procedures using Activities-specific Balance confidence (ABC) Scale and Dizziness Handicap Inventory (DHI). In post-test, confidence level of balance and Dizziness Handicap Inventory (DHI) after intervention. The subject's telephone number will be obtained for follow-up. They were instructed to do their exercises at home.

Comparison within the group

After a period of three weeks subjects will be called up for follow-up through the telephone and asked to come to the physiotherapy OP. Their intensity of dizziness will be assessed.

RESULTS

Data collected from both group subjects were analyzed to measure the changes of pre-test and post-test values of activities specific balance confidence scale and Dizziness Handicap Inventory within the group using paired 't' test and independent 't' test to measure the changes between the groups. From statistical analysis made with the quantitative data, revealed statistically significant difference between experimental than control group with a mean difference of groups and standard deviation quoted. 'P' value is <0.0001. Activities-specific balance confidence scale on comparison within group, experimental group revealed extremely statistically significant result with pre-test mean of 42.57, S.D of 5.91 and post-test mean of 75.57, S.D of 11.97 and with 'P' value of <0.0001 (Table:1) whereas control group revealed not statistically significant result with pre-test mean of 42.02, S.D of 7.78 and post-test mean of 37.26, S.D of 12.03 and with 'P' value of 0.2964 (Table:2). On comparison between the groups, experimental group revealed extremely statistically significant result with mean of 75.57, S.D of 11.97 and 'P' value of <0.0001 and control group mean of 37.26, S.D of 12.03 (Table:3).

Table 1
Experimental group

Measures	Pre test	Post test
Mean	42.57	75.57
SD	5.91	11.97
't' value	9.6171	
'p' value	< 0.0001	

Comparison of pre-test and post-test differences in ABC scale for Experimental Group

Table 2
Control group

Measures	Pre test	Post test
Mean	42.02	37.26
SD	7.78	12.03
't' value	1.0846	
'p' value	0.2964	

Comparison of pre-test and post-test differences in ABC scale for Control Group
Activities – specific Balance Confidence scale: Comparison within the Group

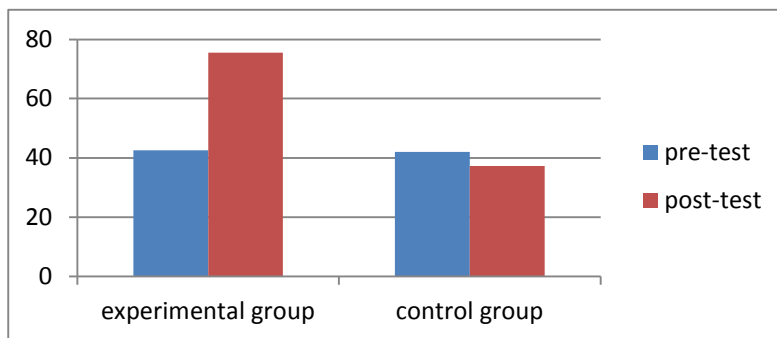


Figure 1
The graph showing the pre-test and post-test differences for ABC scale within the Experimental and Control

Table 3
This table shows the Comparison differences between the groups for ABC scale

Measures	Experimental Group	Control Group
Mean	75.57	37.26
SD	11.97	12.03
't' value	8.7430	
'p' value	< 0.0001	

Dizziness handicap inventory on comparison within group, experimental group revealed extremely statistically significant result with pre-test mean of 68, S.D of 5.01 and post-test mean of 30. S.D of 5.35 with 'P' value of <0.0001(Table:4) whereas control group revealed not statistically significant result with pre-test

mean of 76, S.D if 9.35 and post-test mean of 74.67, S.D of 8.71 with 'P' value of 0.1551(Table:5). On comparison between groups, experimental group revealed extremely statistically significant result with mean of 30, S.D of 5.35 and 'P' value of <0.0001 and control group mean of 74.67 and S.D of 8.71(Table:6).

Comparison within the group

Table 4
Experimental Group

Measures	Pre Test	Post Test
Mean	68	30
SD	5.01	5.35
't' value	56.20	
'p' value	< 0.0001	

Comparison of pre-test and post-test differences in DHI scale for Experimental Group

Table 5
Control Group

Measures	Pre Test	Post Test
Mean	76	74.67
SD	9.35	8.71
't' value	1.5027	
'p' value	0.1551	

Comparison of pre-test and post-test differences in DHI scale for Control Group

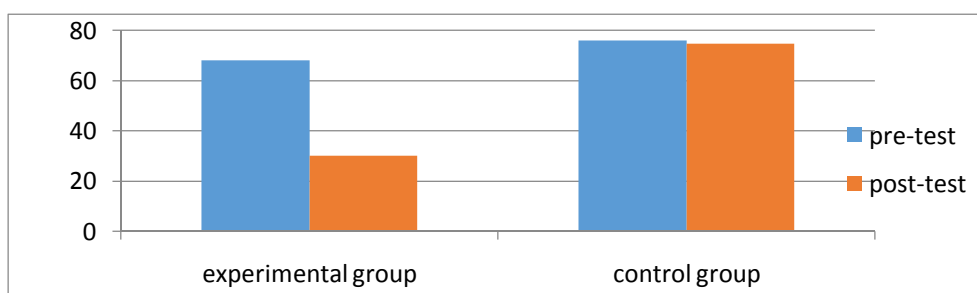


Figure 2
Dizziness Handicap Inventory: Comparison within the Group

Table 6

Measures	Experimental Group	Control Group
Mean	30	74.67
SD	5.35	8.71
't' value	16.8986	
'p' value	< 0.0001	

This table shows the Comparison differences between the groups for DHI scale

DISCUSSION

This study compared the effects of two treatment strategies. In regard to the main objective of the study, the result showed that the experimental group could improve the balance confidence and reduce the dizziness while performing daily activities and reduce the symptoms of vertigo. The main outcome in our study was that a specific rehabilitative training led to an improvement in posterior canal benign paroxysmal positional vertigo patients. We determined that Modified Epley's Maneuver with Cawthorne-Cooksey exercise was more effective as compared with the Brandt Daroff exercise. Benign paroxysmal positional vertigo is a most common disorders of the inner ear vestibular system which is the vital part of maintaining the balance. Benign paroxysmal positional vertigo produces a sensation of spinning called "vertigo" that is both paroxysmal and positional meaning it occurs suddenly and with a change in head position.⁸ The goal of modified epley's maneuver is to restore equilibrium of the vestibular system more specifically to the semicircular canals to treat the symptoms associated with benign paroxysmal positional vertigo. There is compelling evidence that free floating otoconia, probably displaced from the otolithic membrane in the utricle of the main cause of this equilibrium.⁹ The improvement in this study by

Cawthorne Cooksey exercises aims; To loosen up the muscles of the neck and shoulders in order to overcome the protective muscular spasm and tendency to move "in one piece"; independent of the head and eyes movement were trained to reduce giddiness that gradually overcome the disability. This encourage the restoration of self-confidence and easy spontaneous movement.¹⁰ The purpose of these exercise is to build a tolerance mechanism in the brain which compensates for the unequal balance of the two ears and particularly helpful for the dizziness. This study has some limitations, like small sample size and the duration of the study was short. We recommend additional research to further investigate current guidelines and close supervision for people with vertigo in this self - management behavior.

CONCLUSION

The study concluded that the modified epley's manoeuver and Cawthorne – Cooksey exercise had statistically significant improvement in balance confidence and reduction in the intensity of dizziness of posterior canal benign paroxysmal positional vertigo participants.

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