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## Effectiveness of home epley's Maneuver versus half somersault Maneuver on dizziness in posterior benign Paraxysmal positional vertigo patients

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### Abstract

**Background:** Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo. BPPV is due to the displacement of otoconia in which small crystal of calcium carbonate from the maculae of the inner ear into the fluid filled semicircular canals. The posterior canal is most commonly affected site, but the superior and horizontal canals can be affected as well. Almost 85% to 95% of cases of BPPV arises in the posterior semicircular canal [PC-BPPV]. Benign paroxysmal positional vertigo is the most common vertiginous disorders in the community. It most often occurs spontaneously in 50 to 70 years of age group. In younger individuals it is the commonest cause of vertigo following head injury. The Home Epley's Maneuver works by allowing free-floating particles, displaced otoconia, from the affected semicircular canal to be relocated by using gravity back into the utricle. The Brandt Daroff exercise was to loosen and disperse particles from the cupula of posterior semicircular canal. Half Somersault Maneuver that can clear the detached particles from the posterior semicircular canal, with fewer side effect.

**Objectives:** The study's objective was to compare the effectiveness of Home Epley's Maneuver with Brandt Daroff exercises and Half Somersault Maneuver with Brandt Daroff exercises on dizziness in Posterior Benign Paroxysmal Positional Vertigo patients

**Subjects and Methods:** The study was a comparative study. Benign paroxysmal vertigo patients with dizziness were selected for this study. This study was conducted at Ashwin multispecialty hospital and outpatient department of PPG College of physiotherapy. 30 subjects were selected based on the selection Criteria. The selected adolescents were divided into two groups by using random sampling technique by lot method. GROUP A consisted of 15 subjects and they received home epley's Maneuver with Brandt Daroff exercises. GROUP B consisted of 15 subjects and they received half somersault Maneuver with Brandt daroff exercises. Both the groups received the interventions for 5 days in a week for 4 weeks, 1 session per day and totally 20 sessions in 4 weeks. The period of study was 6 months. Before starting the session, the instructions were given to the older age group. The Pretest score, score and post score values of dizziness were measured by using Dizziness Handicap inventory scale and the values were recorded.

**Results:** The statistical analysis showed that the calculated 't' value using the paired 't' test for DHI scale in group A and group B was 15.98 and 8.08 which was the greater than the table value of 2.145 with  $p < 0.05$ . when comparing between the group used unpaired 't' test DHI scale showed calculated 't' value of pre comparison of 0.025 and post comparison of 5.24 which was greater than the table value of 2.145 with  $p < 0.05$ .

There is significant difference in each group in pre and post intervention and significant difference in comparison of two groups. Thus, the result showed statistically significant improvement with Home Epley's Maneuver with Brandt Daroff Exercise and Half somersault Maneuver with Brandt Daroff Exercise when compared to Home Epley's Maneuver with Brandt Daroff Exercise only to reduce the Dizziness in PC-BPPV subjects.

**Conclusion:** That study concluded that subjects in both the groups A and B shown improvement in reduction of dizziness whereas the subjects in Group A Who received Home Epley's Maneuver with Brandt daroff exercise showed more significant effect when compared to subjects in Group B who received Half Somersault Maneuver with Brandt Daroff exercise.

**Keywords:** Posterior benign paroxysmal positional vertigo, dizziness, home epley's maneuver, brandt daroff exercise, half-somersault maneuver, dizziness handicap inventory scale

### Introduction

Benign Paroxysmal Positional Vertigo is the most common vertiginous disorder in the community and also it is the most common cause vertigo and it was first described by the

BARANY.R in 1921. It is clinically characterized by recurrent vertigo spells and nausea usually triggered by certain head movements or subjects change in posture <sup>[1]</sup>. The cardinal symptom is sudden vertigo induced by a change in head position: turning over in bed lying down in head position <sup>[2]</sup>. BPPV is due to the displacement of otoconia which is a small crystal of calcium carbonate from the maculae of the inner ear into the fluid filled semicircular canals <sup>[3]</sup>. In worldwide incidence of BPPV is approximately 107 cases per 1, 00,000 individuals and the prevalence of BPPV is approximately 65 cases per 1, 00, 00 <sup>[4]</sup>. In population based study, BPPV accounted for 8% of individual with moderate or severe dizziness/vertigo. The lifetime prevalence of BPPV was 2.4% the 1 year prevalence was 1.6% and 1 year incidence was 0.6% <sup>[5]</sup>. The posterior canal is most commonly affected site, but the superior and horizontal canals can be affected as well. Almost 85% to 90% of cases of BPPV arises in the posterior semicircular canal. It most often occurs spontaneously in the 50 to 70 years age group. In younger individuals it is the commonest cause of vertigo following head injury <sup>[6]</sup>. The most common cause of BPPV is idiopathic. The secondary causes of BPPV are Vestibular Neuritis, Head Trauma, Viral Labyrinthitis, Prolonged bed rest, Meniere's disease, Migraine, Ear surgery <sup>[7]</sup>. The internal ear or labyrinth lies in the petrous part of the temporal bone. It consists of the bony labyrinth within there is a membranous labyrinth. The membranous labyrinth is filled with a fluid called endolymph. The bony labyrinth consists of Cochlea Vestibule.

### Semicircular canals

The utricle and saccule make up the vestibule. The utricle detects linear motion primarily in the horizontal plane (like an elevator moving up or down). Each otolithic organ has hair cells embedded in a gelatinous material (like jelly) with calcium carbonate crystals called otoconia, attached to the surface.

Many refers to otoconia as "ear rocks", which are responsible for a very common condition known as benign paroxysmal positional vertigo (BPPV). In ear rocks fall off the jelly and into one of the semicircular canals with changes in head position causing vertigo, dizziness, nausea and sometimes vomiting <sup>[8]</sup>.

### Cupulolithiasis theory

### Canalithiasis theory

### Vestibulolithiasis theory

Harold et. al., stated that basophilic particles or densities that are adherent to the cupula. He postulated that the posterior semicircular canal was rendered sensitive to gravity by these abnormal dense particles attached to or impinging upon the cupula which leads to BPPV.

Epley's stated that symptom of BPPV were much more consistent with free floating densities (canalithiasis) in posterior semicircular canal rather than fixed densities attached to the cupula.

It is a hypothetical condition in which debris is present on the vestibule-side of the cupula, rather being on the canal side. There is loose debris on the either side, close to but unattached to the cupula of the posterior canal, possibly in the vestibule or short arm of semicircular canal <sup>[9]</sup>.

The most common symptoms are rotational vertigo, nausea, dizziness, vomiting, imbalance, fear of falling, Turning over

in bed causing vertigo, Oscillopsia, Falls due to head movement, Precipitating head movement <sup>[10]</sup>.

The BPPV is diagnosed by, Auditory evaluation, Vestibulonystagmography test (VNG), Post urography. The Physical diagnostic test are: Side lying test, Head pitch test, Horizontal roll test <sup>[11]</sup>.

### DIX-Hallpike test

The most commonly used test is dix-hall pike which assesses involvement of the posterior canal (the most commonly affected semicircular canal.)

### Patient position – Long sitting

### Therapist position- Behind the patient

The patient head rotated approximately 30degree to 45 degree. The therapist stand behind the patient with one hand supporting the head/neck and other hand supporting trunk.

The patient is then assisted into a supine position with the patient's head slightly below the horizontal plane, and the position is maintained for 30 seconds. The test is performed with the head rotated to both sides starting with the unaffected side. Signs of dizziness and nystagmus are considered a Positive sign <sup>[12]</sup>.

Home Epley's Maneuver is most common method to treat the Posterior Benign paroxysmal positional vertigo subjects. Half somersault Maneuver is also an effective intervention which produces a significant improvement in treating the Posterior Benign paroxysmal positional vertigo subjects. Brandt daroff exercise is by habituating the CNS to the provoking positions by giving repetitive stimulus to the brain which reduces the brain response to it. There are limited studies only which compares the improvement in dizziness by using home epley's Maneuver and half somersault Maneuver. So, the study is to compare the effectiveness of home epley's Maneuver with brandt daroff exercises versus half somersault Maneuver with brandt daroff exercises on dizziness in posterior benign paroxysmal positional vertigo subjects.

### Methodology

**Study design:** A pre-test, post-test comparative study design was used with two different intervention groups to assess the effectiveness of home epley's Maneuver with brandt daroff exercises versus half somersault Maneuver with brandt daroff exercises on dizziness in posterior benign paroxysmal positional vertigo subjects.

**Subjects:** All those patients complaining of dizziness in PC-BPPV visiting the PPG College of physiotherapy and Ashwin multispecialty hospital formed the population for this study. Among them, those patients (N=30) whose having dizziness were recruited using random sampling technique. The criteria adopted to include the subjects with dizziness in pc-bppv consist of: (i) both genders aged between 50 and 70 years; (ii) Patients with PC-BPPV (3 to 6 months); (iii) Dizziness handicap inventory scale grading 36-52(moderate handicap)

**Methods:** After obtaining the informed consent, subjects were randomized into two groups of 15 each using a simple random technique before applying the planned therapeutic interventions. The demographic characteristics of the subjects are shown in table 1. All the subjects (N=30) were identical before the application of selected therapeutic interventions ( $p > 0.05$ ) (Table 2). Subjects assigned to group-A were exposed to home epley's Maneuver with

brandt daroff exercise, whereas those assigned to the group-B were given half somersault Maneuver with brandt daroff exercises. Both the groups were advised to continue a common set of home advice that they have to adopt after applying the treatment. Subjects in both groups were not given any medications during the period of the study. All the therapeutic interventions were given for 4 weeks, excluding weekends. In order to study the effectiveness of the therapeutic interventions, Dizziness handicap inventory scale (DHI) was chosen as a outcome parameters.

**Description of Interventions**

**Epley’s Maneuver**

**Total treatment duration:** 5 sessions in a week, totally 20 session for 4 weeks. Each repetitions is given with time interval of 1 minutes (rest period); 1 repetitions: 4 minutes totally 15 minutes for total session; 1 session: 3 repetitions

1. Patient starts in long sitting, head rotated 45 degree to affected side
2. Patient rapidly reclined to supine position with neck slightly extended. Hold position for 30 seconds, or until nystagmus and dizziness is subside
3. Rotate head 90 degree to opposite side. Hold position for 30 seconds, until nystagmus and dizziness subside.
4. Patient rotated 90degree from supine to side – lying. Hold position for 30 seconds, or until nystagmus and dizziness subside.
5. Bring patient up into short-sitting may need to complete this Maneuver 1to3 visits complete resolution of symptoms.

**Half somersault Maneuver**

After each position change, any dizziness is allowed to subside before moving into the next position; if there is no dizziness, the position should be held for 30 sec.

- a) Kneel down and look up at the ceiling for a few seconds.
- b) Touch the floor with your head, tucking your chin so your head goes toward your knees. Wait for any vertigo to stop (About 30 seconds)
- c) Turn your head in the direction of your affected ear (i.e. if you feel dizzy on your left side, turn to face your left elbow). Wait 30 seconds
- d) Quickly raise your head so it’s level with your back while you’re on all fours. Keep your head at the 45 degree angle. Wait 30 seconds
- e) Quickly raise your head so it’s fully upright, but keep your head turned to the shoulder of the side you’re working on. Then slowly stand up.

**Brandt-daroff exercise**

Perform these on a sofa or a bed where you can fully lie down in a horizontal position.

- a) Have the patient sit on the edge of the bed and turn their head 45degree to one side.
- b) Quickly have the patient lie down on the opposite side that their head is facing.
- c) Have the patient hold this position for 30 seconds.
- d) Return to the sitting position.

**Statistical analysis**

Related ‘t’ test (i.e., paired t-test) was used to compare each group's pre and post-test scores separately. Unrelated ‘t’ test (i.e., unpaired t-test) was utilized to compare the outcome

measures (i.e., pre-test scores and post-test scores) between the two experimental groups. A p-value <0.05 was considered ‘significant’.

**RESULTS**

The demographic presentation of subjects is shown in Table1.

**Table 1:** Demographic characteristics of the subjects

Variables	Group a	Group b
Age	50-60 years: 5	50-60 years: 6
	60-70 years: 10	60-70 years: 9
Gender	Males : 10	Males : 8
	Females: 5	Females :7
Duration	6 months	6 months

The outcome measures' pre-treatment scores were subjected to statistical treatment using an unrelated t-test, and the obtained t value is less than the required t table value at 0.05 levels [Table 2]. Hence it is inferred that the mean scores of all the dependent variables identical at the Preintervention stage before being subjected to the selected therapeutic interventions.

**Table 2:** Comparison of PC-BPPV subjects in both group A and group B during the preintervention stage

Outcome Parameter	Groups	Mean	SD	T-value*
Dizziness handicap Inventory scale	Group-A	44.2	2.37	0.0025
	Group-B	44.53	2.44	

\*Non-significant at 0.05 levels (p>0.05)

Further, a significant difference is observed between the two groups while analysing the effect of 4 weeks of therapeutic. Group-A is better than the Group-B

**Table 3:** Comparison of PC-BPPV subjects in both group A and group B during the post-intervention stage

Outcome Parameter	Groups	Mean	SD	T-value*
Dizziness handicap inventory scale	Group-A	22.6	2.17	5.24
	Group-B	29.86	1.51	

From table 4, it is inferred that the Group A, which was exposed to the treatment combinations of Home epley’s Maneuver with Brandt daroff exercises showed a better reduction in dizziness (mean difference 22.6) than the group-B that was exposed to the treatment combinations of half somersault Maneuver with Brandt daroff exercises at 0.05 levels of significance.

**Table 4:** Comparison of Dizziness in PC-BPPV subjects among the both groups between pre and post-intervention stage

Dependent Variable	Groups	Pre-intervention Stage		Post intervention Stage (At the end of 4weeks)		T-value
		Mean	SD	Mean	SD	
+Dizziness handicap inventory scale	Group-A	44.2	2.37	22.6	2.17	15.98*
	Group-B	44.53	2.44	29.86	1.51	8.08*

**Discussion**

BPPV is a self-limiting condition characterized by episodic



vertigo and nystagmus of brief duration. The most common cause of dizziness is a biomechanical disorder. BPPV is believed to occur via one of the two mechanisms namely canalithiasis and Cupulolithiasis. The physical therapy measure aims at improving the functional and confidence status of the clients by reducing the symptoms of dizziness through canal repositioning and habituation exercises. This present study compares the efficacy of home Epley's Maneuver with Brandt daroff exercise and half somersault Maneuver with Brandt daroff exercise in treating PC-BPPV patients. Statistical analysis of the data reveals that the clients of both the group A and group B have significant improvement in their symptoms and confidence level, based on the DHI scale at the end of third weeks when compared to day one. However the participants of group A who were treated with Epley's Maneuver with Brandt daroff exercise showed greater improvement than the participants of group B who were treated with half somersault Maneuver with Brandt daroff exercise. The significant positive outcome of Group A intervention might be due to the following mechanisms.

Epley's Maneuver is based on the canalithiasis theory of free floating debris in the semi-circular canals. The subject head is moved into different positions in a sequence that will move the debris out of the involved semicircular canal into a harmless location back in the vestibule. The Half somersault can be performed either the floor or in the center of a large bed, and so does not require that the patient be able to arise from the floor. However, it requires that the patient be able to assume the initial half somersault positions, and so cannot be used by patients of excessive body weight, with knee, neck or back injuries, or with impaired flexibility. Brandt daroff exercise is a kind of home exercise intended to speed up the compensation process and reduces the symptoms of PC-BPPV. The mode of action of Brandt daroff exercise is by habituating the CNS to the provoking positions by giving repetitive stimulus to the brain which reduces the brain response to it. It may also act by dislodging debris from the cupula (or) by causing debris to move out of the canal. The Brandt daroff exercise has shown better results in patients with PC-BPPV. So the exercises states the home Epley's Maneuver and Brandt daroff exercise is best exercise to treat PC-BPPV. Many researches on posterior canal BPPV using Epley's manoeuvre, Half somersault Maneuver and Brandt Daroff exercises also showed same effects which is stated below.

Shahanawaz SD, *et al.*, (2017) the study is to find the additional visual and proprioceptive exercise will show the variation in dizziness caused by BPPV. 20 subjects were divided into 2 group A control group was received the Brandt daroff exercise group B experimental group was received the Brandt daroff exercise positive visual and proprioceptive exercise after that patient received design treatment protocol for seven days. After that all subject has to outcome measure with dizziness handicap inventory 20 subjects were taken both male and female it mean age group A and B is 48.2 and 46.8 Sushil Gaur, *et al.*, (2015). His study is on efficacy of Epley's Maneuver in treating BPPV patients: a prospective observational study. In his study BPPV is common among the elderly with a sex predilection for women affecting the left side in majority of patients. 50 study participants with positive positional test were divided into two groups each consisting of 25 patients. One group of 25 patients who received medical therapy with Epley's

Maneuver were considered as the cases and the other group 25 patients who received only medical therapy were considered as the controls. Epley's Maneuver was more effective than medicines alone not only treating the condition but also prevents recurrence. Studied on 'short term effects of vestibular rehabilitation on symptom, disability. Balance and postural stability in chronic vestibular dysfunction'. Group 1 were treated with customized exercise program for 4 weeks, group 2 did not receive any treatment. Pre and post treatment assessment done with respect to symptoms (visual analogue scale), disability (dizziness handicap inventory) balance (berg balance scale) and postural stability (sensory interaction). Significant improvement in all parameters were obtained in group 1 whereas showed no improvement. The study concluded significant improvement seen in symptom, disability, balance, postural stability in chronic vestibular dysfunction after an exercise programme.

Amrshisaxena, *et al.*, (2013) He did a study on performance of DHI score as a predictor of benign Paroxysmal positional vertigo: a cross sectional study. In this study all consecutive geriatric outpatients with dizziness/vertigo patients, 19(22%) and 69 (78%) cases respectively were attributed to BPPV and non- BPPV group. He concluded that DHI score is a useful tool for the prediction of benign paroxysmal positional vertigo (BPPV).

In this study 30 subjects were selected based on the selection criteria. They were divided into two groups by using a lot method. Group A consisted of 15 subjects treated with home Epley's Maneuver with Brandt daroff exercise. Group B consisted of 15 subjects treated with half somersault Maneuver with Brandt daroff exercise.

This study was conducted over a period of 4 weeks. The pre-test and post-test values of Dizziness handicap inventory scale were recorded.

The statistical analysis of paired t test and unpaired t test shows that there was significant improvement in the Dizziness handicap inventory scale after the application of interventions in both groups but comparatively Group A [home Epley's Maneuver with Brandt daroff exercise] showed significant improvement than Group B [half somersault Maneuver with Brandt daroff exercise] in patients PC-BPPV patients.

### Limitations

1. The study was limited to particular age group.
2. Posterior semicircular canal BPPV subjects were only included.
3. The study was conducted in short duration.
4. The study did not include a control group.

### Suggestions

Further studies can be done with different age groups. The same study can be done with longer group. Dizziness handicap inventory scale was used for this study, further study can be done with motion sensitivity scale. Having a control group is desirable.

### Conclusion

The study concluded that both the groups showed statistically improvement in dizziness handicap inventory scale after the application of home Epley's Maneuver with Brandt daroff exercises [Group A] and half somersault Maneuver with Brandt daroff exercise [ Group B] for a

period of 6 months. But, Group A [Home Epley's Maneuver with Brandt exercise] showed significant improvement than Group B [half somersault Maneuver with Brandt daroff exercise] in patients PC-BPPV.

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