

## A Comparison between the Effect of Epley's Manoeuvre and Brandt-Daroff Exercise on Patient's Recovery Rate and Disability in Posterior Semicircular Canal Benign Paroxysmal Positional Vertigo

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### Abstract:

**Introduction:** Benign Paroxysmal Positional Vertigo (BPPV) is a prevalent vestibular disorder affecting 2.4% of the population, often leading to debilitating symptoms and impacting the quality of life. This study aims to compare the effectiveness of Epley's maneuver and Brandt-Daroff exercises in the recovery pattern and disability of patients with posterior semicircular canal BPPV.

**Methods:** A one-year prospective comparative study was conducted at the Department of Otorhinolaryngology in Government Kilpauk Hospital and Government Royapettah Hospital. A total of 69 patients (37 in Epley's maneuver group, 32 in Brandt-Daroff exercise group) between 18 to 50 years old with typical symptoms of posterior canal BPPV were included. The study assessed the participants using Visual Analog Scale (VAS) and Dizziness Handicap Inventory (DHI) scores before and after the procedures.

**Results:** Both groups demonstrated significant improvements in VAS and DHI scores post-treatment. Group A (Epley's maneuver) showed a more substantial decrease in VAS and DHI scores compared to Group B (Brandt-Daroff exercise). The recovery rate, defined as VAS <2 and DHI <10, was higher in the Epley's maneuver group.

**Discussion:** The study aligns with previous research indicating the effectiveness of Epley's maneuver in reducing symptoms and improving the quality of life in patients with BPPV. However, Brandt-Daroff exercises also showed significant improvements, suggesting its potential as a home-based alternative when access to medical care is challenging.

**Conclusion:** Epley's maneuver demonstrated superior outcomes in terms of recovery and reduction in disability compared to Brandt-Daroff exercises in the treatment of posterior semicircular canal BPPV. Brandt-Daroff exercises, while showing effectiveness, could serve as an alternative for patients facing barriers to immediate medical consultation, enabling self-management at home. Timely diagnosis and treatment of BPPV are crucial for alleviating symptoms, improving patients' well-being, and reducing unnecessary healthcare burdens in the community.

**Keywords:** Benign Paroxysmal Positional Vertigo (BPPV), Epley's Maneuver Brandt-Daroff Exercises Vestibular Disorders Visual Analog Scale (VAS), Dizziness Handicap Inventory (DHI), Prospective Comparative Study Posterior Semicircular Canal Quality of Life Otorhinolaryngology.

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### Introduction

It is very fortunate to see a disease which is diagnosed within a few minutes in an outpatient room, most of them can be successfully treated by non-invasive methods. It is a very gratifying situation to both the patient and the treating doctor.

It is a very good example of how good the doctor in his clinical observation and procedures which can

change the outcome of the patients. One such condition is BPPV.

Vertigo is a very frustrating symptom of the patients debilitating their day-to-day life. It affects their quality of life very badly so that they could not get out of their bed and home to do their daily activities. It creates fear of death. Vertigo is defined as perception of rotation or translational movement

subjectively without any external stimulus [1]. 17% to 42% of patients suffering from vertigo symptoms were diagnosed to have BPPV. [1,18,19]

Benign Paroxysmal Positional Vertigo (BPPV) is the most common cause of vertigo observed. It is also the most common peripheral vestibular disorder [1]. It is the most frequent disorder with lifetime prevalence of 2.4 % [4]. The high prevalence of BPPV poses a major impact on the burden of healthcare in the community. BPPV is characterized by

- **B - Benign** - not a serious condition, not progressive
- **P - Paroxysmal** – sudden, brief
- **P - Positional** – change in position of head triggers vertigo
- **V - Vertigo** – Dizziness

The two important features of BPPV are [8]

- 1) Dizziness for less than 15 seconds
- 2) Onset when turning in bed.

Of the BPPV, the most common canal involved is the posterior canal (p-BPPV) (81.97%) [20]. Though the diagnosis is straightforward, there is a delay in the diagnosis of the condition thereby delaying the treatment, posing a great impact on the quality of life and financial condition.

Only 10 - 20 % of the patients are getting proper treatment for BPPV. [1] Therefore, it is inevitable to have a clear knowledge about this condition in view of correct diagnosis and for appropriate treatment.

During covid pandemic, we received more BPPV cases. Due to quarantine, patients found difficult reaching tertiary care centers for the correct diagnosis of their vertigo condition.

Particle repositioning maneuvers are used for the treatment of p-BPPV. As this procedure needs consultation with the doctor in person, it gives us an insight to search for any other options for p-BPPV.

Hence, a home-based treatment of Brandt Daroff exercises can be tried by the patients on phone consultation and can do the exercises at their homes relieving the symptoms. It gave us an insight to compare the Epley's maneuver (canal repositioning maneuver done by the doctor) Vs Brandt Daroff exercise (exercise done by the patient at home) in the treatment outcome in terms of VAS (Visual Analog Scale) and DHI (Dizziness Handicap Inventory).

Aim of this study was to compare the effectiveness of Epley's manoeuvre and brandt –daroff exercises on recovery pattern and disability in patients with posterior Semicircular canal benign paroxysmal positional vertigo.

## Materials and Methods

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**Study Design:** Prospective Comparative Design.

**Study Center:** Department Of Otorhinolaryngology in Government Kilpauk Hospital and Government Royapettah Hospital.

**Study Period:** 1 Year.

**Sample Size:** 80 Participants (40 in Each Group) Included in the Study.

Lost To Follow Up Is 11. So, There Were 69 Patients in The Study.

Group A - 37 Group B - 32

## Inclusion Criteria

- Age between 18 To 50.
- Typical Symptoms (Diagnostic Criteria of P-BPPV). (13)
- Positive Dix Hallpike Test.
- Patient Willing for The Study.

## Exclusion Criteria

- Age Less Than 18 Years
- Age More Than 50 Years
- Negative Dix Hallpike Test
- Patients Having Cervical Spine Injury
- Previous Epley's Manoeuvre Done
- Patients With Multiple Canal Symptoms
- CNS Disease 66
- Bilateral BPPV
- Patient With Acute Illness Like Fever, Hypoglycemia
- Patient With Other Causes of Vertigo
- Patient Not Willing for the Study.
- Patient Took Labyrinthine Sedatives Drugs

## Materials

- 1) Couch
- 2) Stopwatch
- 3) Visual Analogue Scale
- 4) Dizziness Handicap Inventory Questionnaire
- 5) Pencil

## Group A - Epley's Manoeuvre

### Steps of Epley's Manoeuvre

1. patient is sitting on the couch with both legs in extended position of the couch.
2. patient head is turned to 45 to the affected side which is diagnosed by Dix- Hallpike test.
3. Patient head is supported by the examiner in each step. The patient is brought to the supine position with head hanging by the side as shown by Dix-Hallpike test. Kept in this position for 2-3 minutes for the nystagmus to disappear fully making time for moving of the debris to the sloping part of canal.
4. After the disappearance of nystagmus, the patient's head is turned towards the unaffected side 90 degree for 30 secs. (3 - 4 movement in above figure). The otolith debris moves close to common crus.

5. The patient’s entire body and head turned towards the unaffected lateral position with head facing the floor which is another 90-degree rotation. Chi-Tam Nguyen et al. documented that 135 degree from supine position or 225 degrees from the starting position. (60). the position is maintained for 2-3 minutes.
6. After the patient is made to sit with lower limbs extended with head turned towards 45 degrees to the unaffected side-the otolith goes into the utricle via the common crus. When the nystagmus of the same direction in Dix-Hallpike test noticed in the 5th and 6th position of Epley’s manoeuvre, the manoeuvre done in a correct manner and the displaced otoconia went from the ampullary end to common crus to the utricle correctly.

1. Patient is asked to sit in the center of the couch.
2. He is made to lie in the supine position of the challenging position (the side producing vertigo and dizziness) with face facing upwards (nose 45-degree upwards position) without moving the head with the pinna touching the bed. The patient remains in this position until the vertigo stops and then further 60 seconds after the remission of the symptoms.
3. Then the patient is asked to sit in the center of the couch for 30 seconds
4. The same is repeated on the opposite side with head in lateral and nose up position of 45 degree for a period of 30 seconds.
5. Patient to be seated in the center of the couch. This is a completed 1 cycle it is repeated morning and night. [14]

**Group B - Brandt Daroff Exercise**

**Steps**

**Results:** There was a total of 69 patients included in this study.

**Table 1: Duration of Illness**

			Group		Total	P Value
			Epleys Manoeuvre	Brandt Daroff Exercise		
Duration (Weeks)	<1	Count	20	13	33	0.113
		% Within Group	54.10%	40.60%	47.80%	
	1-4	Count	13	12	25	
		% Within Group	35.10%	37.50%	36.20%	
	04-08	Count	2	7	9	
		% Within Group	5.40%	21.90%	13.00%	
	>8	Count	2	0	2	
		% Within Group	5.40%	0.00%	2.90%	
Total	Count	37	32	69		
	% Within Group	100.00%	100.00%	100.00%		

The p- value in terms of distribution of duration of giddiness between the two groups was O. 113 which shows lack of significance.

**Group A- Epley’s manoeuvre - VAS score pre and post procedure comparison.**

**Table 2: Descriptive Statistics**

VAS	Mean	Std. Deviation	p value
pre	8.27	1.35	
24 hours	3.05	2.63	
1 week	1.54	2.16	<0.0001
2 weeks	0.73	1.52	
1 month	0.43	1.19	

GROUP A = EPLEY'S MANOEUVRE

The p value between the pre-procedure and post procedure VAS of Group A - Epley's maneuver is <0.0001, which is significant so that there is a significant improvement in this group of patients done with Epley's maneuver.

**Group B- Brandt Daroff exercise- VAS score pre and post procedure comparison.**

**Table 3: Descriptive Statistics**

VAS	Mean	Std. Deviation	P value
Pre	8.47	1.02	<0.0001
24 hours	6.81	2.8	
1 week	4.47	2.81	
2 weeks	2.53	2.42	
1 month	1.59	1.95	

B GROUP = BRANDT DAROFF EXERCISE

The p value between the pre-procedure and post procedure VAS of Group B - Brandt Daroff exercise is <0.0001, which is significant so that there is a significant improvement in this group of patients done Brandt Daroff exercise.

#### Group A- Epley's manoeuvre - DHI score pre and post procedure comparison.

**Table 4: Descriptive Statistics**

DHI	Mean	Std. Deviation	P value
pre	79.19	10.42	
24 hours	29.24	29.74	
1 week	17.84	24.37	
2 weeks	8	16.9	
1 month	4.81	13.93	<0.0001

A GROUP = EPLEY'S MANOEUVRE

The p value between the pre-procedure and post procedure DHI of Group A - Epley's manoeuvre is <0.0001, which is significant so that there is a significant improvement in this group of patients done with Epley's manoeuvre.

#### Group B- Brandt Daroff exercise- DHI score pre and post procedure comparison

**Table 5: Descriptive Statistics**

DHI	Mean	Std. Deviation	P value
Pre	77.94	9.12	<0.0001
24 hours	60.94	29.41	
1 week	39.63	30	
2 weeks	23.81	25.52	
1 month	14.75	19.39	

B. GROUP = BRANDT DAROFF EXERCISE

The p value between the pre-procedure and post procedure DHI of Group B - Brandt Daroff exercise is <0.0001, which is significant so that there is a significant improvement in this group of patients done Brandt Daroff exercise.

**Table 6: Comparison of VAS between 2 Groups**

Vas	Group				P value
	Epley's Manoeuvre		Brandt Daroff Exercise		
	Mean	Standard Deviation	Mean	Standard Deviation	
Pre	8.27	1.35	8.47	1.02	0.497
24 hours	3.05	2.63	6.81	2.8	<0.0001
1 week	1.54	2.16	4.47	2.81	<0.0001
2 weeks	0.73	1.52	2.53	2.42	<0.0001
1 month	0.43	1.19	1.59	1.95	0.003

**Table 7: Comparison of DHI between the Groups**

DHI	Group				P value
	Epley's Manoeuvre		Brandt Daroff Exercise		
	Mean	Standard Deviation	Mean	Standard Deviation	
pre	79.19	10.42	77.94	9.12	0.6
24 hours	29.24	29.74	60.94	29.41	<0.0001
week	17.84	24.37	39.63	30	0.001
2 weeks	8-00	16.9	23-81	25-52	0.003
1 month	4.81	13.93	14.75	19.39	0.016

**Table 8: Recovery in Both the Groups**

	Group				p value
	Epley's Manoeuvre		Brandt Daroff Exercise		
	Count	Column N %	Count	Column N %	
Recovery At 24 Hr	25	67.60%	7	21.90%	<0.0001
Recovery At 1 Week	28	75.70%	14	43.80%	0.007
Recovery At 2 Week	31	83.80%	18	56.30%	0.012
Recovery At 1 Month	35	94.60%	20	62.50%	0-001

The recovery rate is considered as VAS <2 and DHI<10.

## Discussion

In Group A, the mean value of VAS in pre procedure is 8.27 which is decreased to the mean value of 3.05 in the first 24 hrs, mean value of 1.54 at end of 1st post procedure week, 0.73 at end of 2 weeks and 0.43 at end of 4 weeks post procedure. Toupet et al., documented that in particle repositioning manoeuvre group VAS score drastically reduced post procedure thus improving their quality of life. Thus, in our study also, VAS score significantly reduced from pre procedure to post procedure In Group A. The pre-procedure VAS mean value of group B is 8.47 which is reduced to mean of 6.81 at 24 hrs, 4.47 at end of 1st week, 2.53 at end of 2

weeks and 1.59 at end of 1 month. Thus, VAS score value is significant in group B also post procedure.

Devangi s et al., demonstrated the mean DHI at week 1 was 37.53 and 33.88 at the end of 1 month in group with Epley's manoeuvre. In our study for group A, we found that the DHI value was 29.24 at the end of 1 week and 4.81 at the end of 4 weeks.

In our study the DHI value reduced more at the end of 4 weeks. Hanapi et al., also concluded that there is significant improvement in DHI scores within the groups but not between the groups. But our study had significant improvement in DHI scores within the group and between the groups also.

**Table 9:**

Group	Mean Difference				
	Vijayaraj et al.,		Our study		Hari Priya et al
	VAS	DHI	VAS	DI-II	DHI
Group A	6.6	54.66	7.84	74.38	48.65
Group B	4.4	42.8	6.88	63.19	40

In this table we compared the mean difference value of VAS and DHI of our study with the vijayaraj et al., which shows that group A is a more significant value when compared with group B the same is demonstrated in our study.

HariPriya et al., proposed significant improvement in each group but not significant between the groups, but our study shows group A having significant improvement in DHI value.

## Conclusion

In our study, we conclude that Epley's manoeuvre gave more positive impact on the quality of life in terms of physical, functional and emotional aspect of life by improving the pre and post procedure VAS and DHI Score.

When comparing with Brandt-Daroff exercise, Epley's manoeuvre gave significant results.

Brandt - Daroff exercise can also be used as an alternative to the person who could not reach the hospital and the doctor on time, being done by the patient as a home-based program. it shows significant improvement pre and procedure score in terms of VAS and DHI score.

As p-BPPV is a clinical diagnosis, proper diagnosis of this condition in time reduces the symptoms of the patient and improving their quality of life and well-being.it also reduces the unnecessary fear of the patient, unnecessary tests, expenditure for doing the tests, unnecessary hospital visits thus improving the health care in the community.

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