

Original Research Article

Comparison of Effectiveness of Epley's Maneuver and Half-Somersault Exercise with Brandt-Daroff exercise in Patients with Posterior Canal Benign Paroxysmal Positional Vertigo (pc- BPPV): A Randomized Clinical Trial

Paramasivan Mani¹, Kiruthigadevi Sethupathy², Vivek Kamal Kumar³,
Yaseen Jassim Yaseen Aleid⁴

¹Teaching Faculty King Saud Bin Abdulaziz University for Health Sciences, Al-Ahsa Saudi Arabia

²Physiotherapy Specialist, Al-Ahsa Saudi Arabia

³Senior Physiotherapist, Bangalore, India

⁴Physiotherapy Specialist, Al-Ahsa Saudi Arabia

Corresponding Author: Paramasivan Mani

ABSTRACT

Objective: Comparison of Effectiveness of Epley's Maneuver and Half-Somersault Exercise with Brandt-Daroff exercise in reducing self perceived handicap among patients with posterior canal benign paroxysmal positional vertigo (pc- BPPV). Design: Randomized clinical trial setting. Physiotherapy and rehabilitation centre.

Subjects: This study was carried out with 20 patients, who had posterior canal benign paroxysmal positional vertigo (pc- BPPV).

Intervention: Group A (N=10) had received Epley's Maneuver with Brandt-Daroff exercise and Group B (N=10) had received Half-Somersault Maneuver with Brandt-Daroff exercise. All patients received treatment for a period of three weeks.

Outcomes: Dizziness Handicap Inventory Scale was used to measure the individual's reduction of self perceived handicap with the PC-BPPV patients at the end of three weeks.

Results: Both the Epley's Maneuver with Brandt-Daroff exercise and Half-Somersault Exercise with Brandt-Daroff exercise were found to be significantly effective in reducing self perceived handicap among patients with (pc- BPPV). Half-Somersault Exercise with Brandt-Daroff exercise Program resulted in greater improvement in comparison to those who received Epley's Maneuver with Brandt-Daroff exercise.

Conclusion: The results of this clinical trial demonstrate that the Half-Somersault Exercise with Brandt-Daroff exercise program may be the first treatment choice for therapist in reducing self perceived handicap patients with posterior canal benign paroxysmal positional vertigo (pc- BPPV).

Key Words: Posterior Canal Benign Paroxysmal Positional Vertigo (pc- BPPV), Epley's Maneuver and Half-Somersault Exercise with Brandt-Daroff exercise.

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is one of the most frequent vestibular disorders. Dizziness and vertigo

are among the most common symptoms causing to visit a physician. ⁽¹⁾ Vertigo is defined as illusion of movement which could be spinning, rocking, tilting or

dropping, ⁽²⁾ BPPV clinical findings agree with the hypothesis that semicircular canals with greater incidence in posterior canal, have floating particles or debris, which are heavier than the circulating endolymph. ⁽³⁾ BPPV is often associated with short vertigo spells at head movements making feel fear and as well as triggering head movements will limit their daily activities and also risk of falls. ^(4, 5) The physical, functional and emotional handicap makes this condition a major health problem for people of all ages. ^(6, 7) BPPV is easily diagnosed by typical history and Dix-Hall-pike's positional test and treated with Maneuver and medications. ^(8,9) There are treatments for PC- BPPV, each with its own use of indication.

Epley's Maneuver - Canal repositioning
Brandt-Daroff exercises - Habituation exercise

Half-Somersault Maneuver - Head position exercises attempt to reach central nervous system adaptation and compensation mechanisms, trying symptom recovery, simple Maneuver which can be used a home treatment in treating PC-BPPV. ⁽¹⁰⁾

AIM: The purpose of the study was to compare the effectiveness of Epley's Maneuver and Half-Somersault Exercise with Brandt-Daroff exercise in reducing self perceived handicap among Patients with Posterior Canal Benign Paroxysmal Positional Vertigo (pc- BPPV).

MATERIALS AND METHODS

A randomized clinical trial was conducted between April 2018 and September 2018 in an outpatient department, Physiotherapy and Rehabilitation Center, Alahsa, Saudi Arabia. Patients were referred by ENT, Neurology department, and also self-referral to the centre. Patients were included if they were between 25 to 50 years of age and had been diagnosed with Posterior Canal Benign Paroxysmal Positional Vertigo (pc- BPPV) and the duration of symptoms was more than 6 weeks, with Dix-Hallpike test or Nysten-Barany test, both males and females.

Inclusion Criteria

- Patients with PC-BPPV.
- Patients with recurrent episodes of vertigo.
- Age group 25-50 years.
- Dix-Hall-pike test positive.
- DHI Scale: 36-42 (moderate handicap)
- Both sexes.

Exclusion criteria

Dix-Hall-pike test- negative, DHI scale: 54+ (severe), Migraine related dizziness and Anxiety disorder. Other vestibular conditions are: Acoustic neuroma, Labyrinthitis, Vestibular hypofunction, Meniere's disease. Any cervical pathology, Visual impairment, CNS Pathology. Other pathologies like tabes dorsalis and neuropathies which may affect balance.

Treatment

BRANDT-DAROFF EXERCISE

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

⁽¹¹⁾ Lie on your left side with your nose pointed 45° upward (head turned toward the right). Wait 20 seconds. Sit upright, keeping your head turned to the right. Wait 20 seconds. Lie on your right side with your nose pointed 45° downward (head remains turned toward the right). Wait 20 seconds. Remain on your right side, but turn your nose to 45° above the horizontal (head now turned toward the left). Wait 20 seconds. Sit upright, keeping your head turned to the left. Wait 20 seconds. Lie on your left side with your nose pointed 45° downward (head remains turned toward the left). Wait 20 seconds. (10 minutes total) N 3 times a day. ⁽¹²⁾

HALF-SOMERSAULT MANEUVER

example: for right-sided BPPV.

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 15seconds. ⁽¹³⁾

While kneeling, the head is quickly tipped upward and back. The somersault position is assumed, with the chin tucked as far as possible toward the knee. The head is turned about 45° toward the right shoulder, to face

the right elbow. Maintaining the head at 45°, the head is raised to back/shoulder level. Maintaining the head at 45°, the head is raised to the fully upright position. Dark curved arrows show head movements. Lighter arrows near eyes show the direction one should be facing.

EPLEY'S MANEUVER

Instructions for the Epley's procedure for left ear posterior canal benign paroxysmal positional vertigo (PC-BPPV).⁽¹⁴⁾ For right ear BPPV, the procedure has to be performed in the opposite direction, starting with the head turned to the right side. Start by sitting on a bed with your head turned 45° to the left. Place a pillow behind you so that on lying back it will be under your shoulders.^(15,16) Lie back quickly with shoulders on the pillow, neck extended, and head resting on the bed. In this position, the affected (left) ear is underneath. Wait for 30seconds. Turn your head 90° to the right (without raising it), and wait again for 30 seconds. Turn your body and head another 90° to the right, and wait for another 30seconds. Sit up on the right side.⁽¹⁷⁾

Outcome measures. Outcome measures used in this study is Dizziness Handicap Inventory (DHI) Scale to assess the impact of dizziness on quality of life.⁽¹⁸⁾ The self-report questionnaire was originally designed to quantify the handicapping effect of dizziness imposed by PC- BPPV, which were recorded at the base line (pretest) and at the end of 3 weeks .An independent observer, who was blinded to the patient group allocation, assessed the outcome measures.⁽¹⁹⁾ Patient's functional status was assessed by completion of the (DHI SCALE) 25-item self-assessment scale designed to quantify the functional, emotional, and physical effects of dizziness and unsteadiness. The DHI Scale has been found to have high test-retest reliability (icc0.92) and moderate construct validity (Pearson's correlation coefficient 0.47).

Data Analysis

Data analysis was performed with SPSS version 16.0. Statistical analysis including mean and standard deviation was calculated for all measurement .The mean differences with standard deviation for outcome measures of Dizziness Handicap Inventory (DHI) Scale was calculated before the treatment and also the end of 3 weeks.

RESULTS

Pre-Post Test Comparison of DHI Scores in Group A

The intra group comparison of dizziness and functional status as measured by DHI at the end of treatment intervention in Group A, presented in the Table 1, shows that there was a definitive reduction in the dizziness at the end of 3 weeks of Epley's Maneuver and Brandt Daroff exercise.

TABLE 1.DHI SCALE-PAIRED 't' TEST - EPLEY'S MANEUVER AND BRANDT DAROFF EXERCISE - GROUP A

Mean	Pre- Test	Post- Test
	40.6	30.2
'p' value	12.49	
'p' Value & Significance	P<0.05 it is significant	

Pre - Post Test Comparison of DHI Scores in Group B

The intra group comparison of dizziness and functional status as measured by DHI at the end of treatment intervention in Group B, presented in the Table 2, shows that there was a definitive reduction in the dizziness at the end of 3 weeks of Half somersault Maneuver and Brandt Daroff exercise.

TABLE 2.DHI SCALE-PAIRED 't' TEST - HALF SOMERSAULT MANEUVER AND BRANDT DAROFF EXERCISE - GROUP B

Mean	Pre- Test	Post- Test
	41	21.2
'p' value	20.25	
'p' Value & Significance	P<0.05 it is significant	

Post Test Comparison of DHI Scores between the Groups

The results of the post test inter group comparison of dizziness as measured by DHI are presented in Table 3. Though both groups showed significant reduction in

dizziness when compared to the pretest score, the intergroup comparison of VAS scores showed a higher reduction in DHI

scores in Group A than Group B, which was statistically significant.

Table 3.DHI-Independent 't' Test -Between GROUP A & B

Mean	Pre- Test		Post- Test	
	Group A	Group B	Group A	Group B
	40.6	37.4	30.2	41
'p' value	1.65		7.15	
'p' Value & Significance	P>0.05 AND NOT SIGNIFICANT		P<0.05 AND NOT SIGNIFICANT	

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 status and confidence status of the clients by reducing the symptoms of dizziness through canal repositioning, and habituation exercises.

Statistical analysis of the data reveals that the clients of both the groups (A&B) have significant improvement in their symptoms and confidence level, based on the DHI scale at the end of three weeks when compared to day one. However the participants of group A who were treated with Epley's Maneuver with Brandt Daroff exercise showed lesser improvement than the participants of group B who were treated with half somersault Maneuver with Brandt Daroff exercise.

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. They are dissolved and reabsorbed by the dark cells of the labyrinth which are found in a zone adjacent to the utricle.

When the ears rocks (crystals) are displaced from the posterior semicircular canal which is rich in nerve supply, they do not send false signals to the brain about spatial movement. After the Epley's Maneuver, the post Maneuver instructions

include the usage of collar for one week, which helps to retain the debris within the labyrinth and does not allow it to move back into semicircular canal. The home exercises are taught to the participants after the Maneuver to keep the fluid within the inner ear moving and not allow anymore crystals to settle or build up.

These exercises teach the brain to compensate for the differences that have occurred in the balance system. It takes time for the adaptation to take place. So this might be the reason why the participants of group B improved much than the participants of group A.

Habituation is one of the simplest forms of plasticity. All exercises are started slowly and gradually progressed in speed. The rate of progression from the bed to sitting and then to standing exercises depends upon the dizziness of each individual participant. These exercises stimulate the plasticity of neural tissues in the floccular region of the cerebellum, which plays an important role in modifying signal processing in the vestibular ocular reflex pathway, so that images remains stable on the retina during head movement.

Our study shows that both exercises are efficacious when used as a home exercise for patients, but [Foster et al., 2012], The half somersault was as effective as the Epley's in reducing nystagmus intensity with two Maneuvers, an indicator of a reduction in particle burden in the posterior semicircular canal, and this difference was statistically significant.

This suggests that patients may have to perform more half somersaults than Epley's Maneuvers to resolve an episode of BPPV. However, the subjects reported more

dizziness during the Epley's than during the half somersault exercise and this difference was also statistically significant.

The Epley's group was significantly more likely to experience a treatment failure using home exercises for recurrences than the half somersault group.

These results suggest that patients prefer the less effective exercise because they experience less dizziness when applying it and experience fewer complications. They are then able to repeat the exercise enough to resolve symptoms and so may not need to return for treatment.

The half somersault can be performed on either the floor or in the centre 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 position, and so cannot be used by patients of excessive body weight, with knee, neck or back injuries, or with impaired flexibility.

Drs. T. Brandt and R.B. Daroff introduced Brandt Daroff exercises based on the cupulolithiasis theory of BPPV in 1980. The goal of these exercises was to loosen and disperse particles from the cupula of posterior semicircular canal. Brandt Daroff exercises were originally designed to habituate the CNS to the provoking positions, but they may act by dislodging debris from the cupula or by causing debris to move out of the canal. This way this exercise adjunct with half somersault exercise helps to resolve the problem in PC-BPPV patients.

Hence, half somersault exercise is an easy exercise to perform in home set-up and can be used to treat PC-BPPV. Brandt Daroff exercise has shown better results in patients with PC-BPPV. So by this study it states that the half somersault exercise and Brandt Daroff exercise is best exercise in reducing self perceived handicap patients among PC-BPPV.

Limitations and Suggestions

Since the study is of short duration a further follow up study of long duration.

The study was conducted in the age group of 25-50; age more than 50 years can also be concluded.

This study was conducted in PC-BPPV patients; other vestibular conditions can also be taken and compared.

The study can be conducted on all three semicircular canal of BPPV and also other peripheral vestibular disorders.

The study can be extended to quantify the subjective and objective measures of vertigo.

Some other scales can also be adopted for the future research.

This study was done only on two experimental groups, so in further studies control group can also be included.

The study can be done as individual treatment and also effect of it can also be concluded.

CONCLUSION

The subjects were divided into group 2 respectively. They were given home Epley's exercise with Brandt Daroff exercise and half somersault exercise with Brandt-Daroff exercise respectively. Dizziness handicap inventory scale is used as outcome measure for PC-BPPV patients. Result were analysed statistically by using both paired 't' test and independent 't' test. It suggested that half somersault exercise with Brandt Daroff exercise for 3 weeks showed significantly greater improvement in reducing self perceived handicap among Patients with Posterior Canal Benign Paroxysmal Positional Vertigo PC-BPPV patients.

Conflicts of Interests

The authors declare that there is no conflict of interests.

Ethics

The article was financed by self funding. Ethical approval was given by the Physiotherapy and Rehabilitation center Alahsa hospital. Each participant was given an information sheet and signed an informed consent form

REFERENCES

1. Radtke A, von Brevern M, Tiel-Wilck K, Mainz-Perchalla A, Neuhauser H, Lempert T. Self-treatment of benign paroxysmal positional vertigo: Semont maneuver vs Epley procedure. *Neurology*. 2004;63:150–152.
2. Hall SF, Ruby RR, McClure JA. The mechanics of benign paroxysmal vertigo. *J Otolaryngol*. 1979;8:151–8.
3. Appiani GC, Catania G, Gagliardi M, Cuiuli G (2005) Repositioning manoeuvre for the treatment of the apogeotropic variant of horizontal canal paroxysmal positional vertigo. *Otol Neurotol* 26: 257-260.
4. Baloh, RW, Honrubia V, Jacobson K: Benign positional vertigo: clinical and oculographic features in 240 cases. *Neurology*. 1987; 37:371-378.
5. Bárány R. Diagnose von Krankheitserscheinungen in Bereiche des Otolithenapparates. *Acta Otolaryngol (Stockh)* 1921;2:434-7.
6. Epley JM. Human experience with canalith repositioning maneuvers. *Ann N Y Acad Sci* 2001;942:179-91.
7. Beyea JA, Wong E, Bromwich M, Weston WW, Fung K. Evaluation of a particle repositioning maneuver web-based teaching module. *Laryngoscope*. 2008;118:175–180.
8. Beynon GJ, Baguley DM, da Cruz MJ. Recurrence of symptoms following treatment of posterior semicircular canal benign positional paroxysmal vertigo with a particle repositioning manoeuvre. *J Otolaryngol* 2000;29:2-6.
9. Parnes LS, Price-Jones R. Particle repositioning maneuver for benign paroxysmal positional vertigo. *Annals of Otolology, Rhinology and Laryngology*. 1993; 102:325–331.
10. Brandt T, Daroff RB. Physical therapy for benign paroxysmal vertigo. *Archives of Otolaryngology- Head & Neck Surgery*. 1980;106:484–485.
11. Brandt T, Dieterich M, Strupp M. Vertigo and dizziness - common complaints, 2nd ed. London: Springer.
12. Dix, M.R. and Hallpike, C.S. the pathology, symptomatology and diagnosis of certain common disorders of the vestibular system. *proc r soc med*. 1952; 45: 341–354 .
13. Seemungal, B.M. and Bronstein, A.M. A practical approach to acute vertigo. *pract Neurol*. 2008; 8: 211–221.
14. Schubert, M. C. (2007). Vestibular Disorders. In S. O'Sullivan & T. Schmitz (Eds.), *Physical Rehabilitation* (5th ed.) (pp. 999-1029). Philadelphia: F.A. Davis Company.
15. Epley JM. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg*. 1992;107(3):399-404
16. Gans RE, Harrington-Gans PA. Treatment efficacy of benign paroxysmal positional vertigo (BPPV) with canalith repositioning maneuver and Semont liberatory maneuver in 376 patients. *Seminars in Hearing*. 2002;23(2):129-42.
17. Hilton MP, Pinder DK. The Epley (canalith repositioning) manoeuvre for benign paroxysmal positional vertigo. *Cochrane Database of Systematic Reviews* 2014, Issue 12.
18. Krebs DE, Gillbody KM, Riley PO, Parker SW. Double-blind, placebo-controlled trial of rehabilitation for bilateral vestibular hypofunction-Preliminary report. *Otolaryngology- Head and Neck Surgery*. 1993;109:735–741.
19. Lanska DJ, Remler B (1997) Benign paroxysmal positioning vertigo: classic descriptions, origins of the provocative positioning technique, and conceptual developments. *Neurology* 48: 1167–1177.

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