

ORIGINAL RESEARCH ARTICLE

**THE ROLE OF VESTIBULAR REHABILITATION THERAPY IN  
MANAGING RECURRENT BENIGN PAROXYSMAL POSITIONAL  
VERTIGO (BPPV)**

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**ABSTRACT**

**Background:** Benign Paroxysmal Positional Vertigo (BPPV) is the most common cause of recurrent vertigo, particularly in the elderly population. Despite its benign nature, BPPV significantly impairs quality of life due to frequent recurrences and the associated imbalance. **Vestibular Rehabilitation Therapy (VRT)** has been suggested as an effective, non-invasive treatment for managing recurrent BPPV.

**Objectives:** This study aims to assess the efficacy of VRT in managing recurrent BPPV and analyze improvements in symptom relief, recurrence reduction, and quality of life enhancements.

**Methodology:** A prospective study was conducted involving 100 patients diagnosed with recurrent BPPV. Participants were enrolled in a structured VRT program for six months, with outcomes assessed based on the **Dizziness Handicap Inventory (DHI)** and recurrence rates. Data were analyzed using **SPSS**.

**Results:** Significant symptom relief was observed in 85% of patients post-VRT. Recurrence rates dropped significantly, and improvements in balance and daily functioning were noted. The DHI scores reflected marked improvements in functional, emotional, and physical aspects of life.

**Conclusion:** VRT is an effective intervention for managing recurrent BPPV, significantly reducing symptom recurrence and improving patients' quality of life.

**Keywords:** **Benign Paroxysmal Positional Vertigo (BPPV), Vestibular Rehabilitation Therapy (VRT), Recurrent BPPV, Dizziness Handicap Inventory (DHI), Balance Function, Gaze Stability, Vertigo, Fall Prevention, Quality of Life, Neuroplasticity, Statistical Package for the Social Sciences (SPSS)**

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**INTRODUCTION**

**Benign Paroxysmal Positional Vertigo (BPPV)** is a disorder of the inner ear that leads to brief episodes of vertigo, typically triggered by changes in head position. It is the most prevalent vestibular disorder, accounting for up to 42% of all vertigo cases<sup>[1]</sup>. The primary cause of BPPV is the displacement of otoconia (calcium carbonate crystals) into the semicircular canals, which results in inappropriate stimulation of the vestibular system during head movements<sup>[2]</sup>. Although BPPV is not life-threatening, it can significantly affect a patient's quality of life due to the sudden onset of vertigo, fear of falling, and reduced functional capacity. Recurrent BPPV is particularly common in the elderly, with recurrence rates as high as 50% within the first year of treatment<sup>[3]</sup>.

Traditionally, BPPV is managed through canalith repositioning maneuvers such as the **Epley maneuvers** or the **Semont maneuvers**, which aim to reposition the dislodged otoconia<sup>[4]</sup>. While these maneuvers are generally effective, some patients experience persistent symptoms or frequent recurrences despite initial success. For these patients, **Vestibular Rehabilitation Therapy (VRT)** has emerged as an adjunct or alternative treatment<sup>[5]</sup>.

**VRT** is a specialized form of physical therapy that focuses on exercises designed to improve gaze stability, enhance balance, and promote vestibular compensation<sup>[6]</sup>. Through neuroplasticity, the central nervous system adapts to the vestibular dysfunction, reducing symptoms of dizziness and imbalance<sup>[7]</sup>. VRT also emphasizes habituation and substitution exercises that help the brain recalibrate its response to altered sensory input, allowing patients to regain control over their balance and daily activities<sup>[8, 9]</sup>.

This study explores the role of VRT in managing recurrent BPPV and its impact on symptom relief, recurrence rates, and functional outcomes.

## MATERIALS & METHOD

**Study Design:** This was a prospective, observational study conducted over six months, involving 100 patients diagnosed with recurrent BPPV at a tertiary care centre. Participants underwent a structured VRT program, with outcomes assessed at the end of the study period.

### Inclusion and Exclusion Criteria

- **Inclusion Criteria:** Patients aged 18-75 years, diagnosed with recurrent BPPV (posterior canal involvement), with at least two episodes of vertigo in the past 12 months.
- **Exclusion Criteria:** Patients with other vestibular disorders (e.g., **Meniere’s Disease**), neurological conditions, or prior surgical interventions for vertigo were excluded from the study.

**Intervention:** Patients underwent a structured VRT program over six months. The program consisted of gaze stability exercises (**VOR x1 exercises**), balance training, and habituation exercises, tailored to individual patient needs. The initial two months included twice-weekly sessions, followed by once-weekly sessions for the remaining four months.

### Outcome Measures

The primary outcomes were:

- **Symptom Severity:** Assessed using the **Dizziness Handicap Inventory (DHI)**, a 25-item tool that evaluates the functional, emotional, and physical impact of dizziness.
- **Recurrence Rate:** Measured as the occurrence of BPPV episodes during the study period.
- **Quality of Life:** Evaluated through patient-reported outcomes regarding daily functioning, mobility, and psychological well-being.

### Statistical Analysis

Data were analyzed using **SPSS version 26**. Paired t-tests were applied to compare pre-and post-intervention scores, while chi-square tests were used for categorical variables. A p-value <0.05 was considered statistically significant.

## RESULTS

**Table 1- Patient Demographics:** A majority of patients in the study were female, and the average duration of BPPV was 2.5 years, indicating a chronic and recurrent nature of the condition.

Demographics	N = 100
Mean Age (years)	58.2 ± 10.4

Female (%)	65
Male (%)	35
Duration of BPPV (years)	2.5 ± 1.1

**Table 2 - Pre-VRT Dizziness Handicap Inventory (DHI) Scores:** Baseline DHI scores indicated significant impairment across functional, emotional, and physical domains before the VRT intervention.

DHI Category	Mean ± SD (Pre-VRT)
Functional	45.2 ± 6.3
Emotional	30.5 ± 5.8
Physical	25.8 ± 4.9
Total DHI Score	101.5 ± 10.4

**Table 3 - Post-VRT Dizziness Handicap Inventory (DHI) Scores:** Following the VRT program, significant improvements were observed across all categories of the DHI score.

DHI Category	Mean ± SD (Post-VRT)
Functional	30.2 ± 5.1
Emotional	20.3 ± 4.7
Physical	15.7 ± 3.8
Total DHI Score	66.2 ± 8.9

**Table 4 - Recurrence Rates Pre- and Post-VRT:** A significant reduction in recurrence rates was observed after the VRT program, decreasing from 45% to 15%.

Outcome	Pre-VRT (%)	Post-VRT (%)
Recurrence of BPPV	45	15

**Table 5 - Improvement in Balance Function:** Patients showed marked improvements in balance as evidenced by better **Timed Up and Go (TUG)** test times and higher **Berg Balance Scale** scores post-VRT.

Test	Pre-VRT (Mean ± SD)	Post-VRT (Mean ± SD)
Timed Up and Go (sec)	18.5 ± 3.2	12.3 ± 2.7
Berg Balance Scale	41.2 ± 6.1	49.5 ± 4.8

**Table 6 - Patient-Reported Quality of Life Improvement:** Significant improvements were reported in mobility, daily functioning, and psychological well-being.

Domain	Pre-VRT (%)	Post-VRT (%)
Mobility Improvement	40	75
Daily Functioning	35	80
Psychological Well-being	45	70

**Table 7 - Reduction in Symptoms Post-VRT (Self-Reported):** Post-VRT, a significant reduction in symptoms like vertigo, nausea, and fear of falling was reported by the patients.

Symptom	Pre-VRT (%)	Post-VRT (%)
Vertigo	90	25
Nausea	75	20

Imbalance	80	30
Fear of Falling	65	25

**Table 8 - Improvement in Gaze Stability:** Gaze stability improved significantly post-VRT, with 85% of patients able to maintain gaze stability compared to 55% pre-VRT.

Test	Pre-VRT (%)	Post-VRT (%)
Ability to Maintain Gaze	55	85

**Table 9 - Satisfaction with VRT:** The majority of patients reported high satisfaction levels with VRT, with 80% rating their experience as highly satisfactory.

Satisfaction Level	Post-VRT (%)
Highly Satisfied	80
Satisfied	15
Dissatisfied	5

**Table 10 - Adverse Effects of VRT:** Adverse effects were mild and transient, with a small percentage of patients reporting temporary dizziness, headaches, and fatigue.

Adverse Effect	Number of Patients (%)
Mild Headache	10
Fatigue	8
Temporary Dizziness	5

**DISCUSSION**

This study highlights the efficacy of **Vestibular Rehabilitation Therapy (VRT)** in managing recurrent **Benign Paroxysmal Positional Vertigo (BPPV)**, particularly in patients who experience frequent recurrences or incomplete resolution with traditional repositioning maneuvers<sup>[10]</sup>. The significant reductions in **Dizziness Handicap Inventory (DHI)** scores, recurrence rates, and symptom burden post-VRT suggest that VRT effectively addresses the functional, emotional, and physical impairments caused by recurrent BPPV<sup>[11, 12]</sup>.

BPPV is primarily caused by the displacement of otoconia within the semicircular canals, which triggers inappropriate vestibular responses during head movements<sup>[13]</sup>. Although canalith repositioning maneuvers like the **Epley** and **Semont maneuvers** are typically effective, some patients continue to experience recurrent episodes due to incomplete otoconia relocation or delayed central compensation<sup>[14, 15]</sup>.

VRT offers a complementary mechanism by promoting neuroplasticity and facilitating central vestibular compensation<sup>[16]</sup>. Exercises like **gaze stabilization** and **balance training** retrain the brain to adjust to abnormal vestibular input, enhancing functional outcomes and reducing the risk of recurrence. This study corroborates previous findings that VRT can reduce BPPV recurrence and improve overall balance, especially in elderly populations prone to falls<sup>[17]</sup>.

The significant improvements in **Timed Up and Go (TUG)** and **Berg Balance Scale** scores indicate that VRT not only reduces vertigo but also enhances physical stability and mobility, mitigating fall risks<sup>[18]</sup>. The reduction in **fear of falling** among patients further reflects the therapy's impact on psychological well-being, which is critical for elderly patients who may have developed a fear of movement due to previous vertigo episodes<sup>[19]</sup>.

Furthermore, the low incidence of adverse effects and the high satisfaction rates reported by patients underscore VRT's value as a safe and non-invasive treatment option. Given the high

recurrence rates of BPPV and the limitations of repositioning maneuvers alone, incorporating VRT into the management plan for recurrent BPPV is a logical and effective approach<sup>[20]</sup>.

## CONCLUSION

Vestibular Rehabilitation Therapy (VRT) is a highly effective treatment for managing recurrent BPPV. It provides substantial symptom relief, reduces recurrence rates, and improves overall functional and psychological outcomes. Given its non-invasive nature and minimal side effects, VRT should be considered a key component in the management of recurrent BPPV, particularly in patients who experience persistent symptoms or are at high risk of recurrence.

## REFERENCES

1. Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngol Head Neck Surg.* 2017 Mar;156(3\_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.
2. Evans A, Frost K, Wood E, Herdman D. Management of recurrent benign paroxysmal positional vertigo. *J Laryngol Otol.* 2024 Jun;138(S2):S18-S21. doi: 10.1017/S0022215123002244. Epub 2024 May 23. PMID: 38779897.
3. Alashram AR. Semont maneuver for posterior canal benign paroxysmal positional vertigo: a systematic review of randomized controlled trials. *Eur Arch Otorhinolaryngol.* 2024 Aug;281(8):3985-3999. doi: 10.1007/s00405-024-08586-0. Epub 2024 Mar 26. PMID: 38530461.
4. Smith RM, Burgess C, Beattie J, Newdick A, Tahtis V, Sahu B, Golding JF, Marsden J, Seemungal BM. Treating benign paroxysmal positional vertigo in acute traumatic brain injury: a prospective, randomised clinical trial assessing safety, feasibility, and efficacy. *BMJ Neurol Open.* 2024 May 28;6(1):e000598. doi: 10.1136/bmjno-2023-000598. PMID: 38818242; PMCID: PMC11138307.
5. Hoseinabadi R, Pourbakht A, Yazdani N, Kouhi A, Kamali M, Abdollahi FZ, Jafarzadeh S. The Effects of the Vestibular Rehabilitation on the Benign Paroxysmal Positional Vertigo Recurrence Rate in Patients with Otolith Dysfunction. *J Audiol Otol.* 2018 Oct;22(4):204-208. doi: 10.7874/jao.2018.00087. Epub 2018 Jul 19. PMID: 30016856; PMCID: PMC6233938.
6. Bhattacharyya N, Baugh RF, Orvidas L, Barrs D, Bronston LJ, Cass S, Chalian AA, Desmond AL, Earll JM, Fife TD, Fuller DC, Judge JO, Mann NR, Rosenfeld RM, Schuring LT, Steiner RW, Whitney SL, Haidari J; American Academy of Otolaryngology-Head and Neck Surgery Foundation. Clinical practice guideline: benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg.* 2008 Nov;139(5 Suppl 4):S47-81. doi: 10.1016/j.otohns.2008.08.022. PMID: 18973840.
7. Smith RM, Marroney N, Beattie J, Newdick A, Tahtis V, Burgess C, Marsden J, Seemungal BM. A mixed methods randomised feasibility trial investigating the management of benign paroxysmal positional vertigo in acute traumatic brain injury. *Pilot Feasibility Stud.* 2020 Sep 16;6:130. doi: 10.1186/s40814-020-00669-z. PMID: 32944278; PMCID: PMC7493395.
8. Banfield GK, Wood C, Knight J. Does vestibular habituation still have a place in the treatment of benign paroxysmal positional vertigo? *J Laryngol Otol.* 2000 Jul;114(7):501-5. doi: 10.1258/0022215001906237. PMID: 10992929.
9. Vaduva C, Estéban-Sánchez J, Sanz-Fernández R, Martín-Sanz E. Prevalence and management of post-BPPV residual symptoms. *Eur Arch Otorhinolaryngol.* 2018

- Jun;275(6):1429-1437. doi: 10.1007/s00405-018-4980-x. Epub 2018 Apr 23. PMID: 29687182.
10. Wolf JS, Boyev KP, Manokey BJ, Mattox DE. Success of the modified Epley maneuver in treating benign paroxysmal positional vertigo. *Laryngoscope*. 1999 Jun;109(6):900-3. doi: 10.1097/00005537-199906000-00011. PMID: 10369279.
  11. Kumar S, Singh R, Dutta A, Yadav MK. Enhancing BPPV Treatment Outcomes: A Comparative Study of the Epley Maneuver with and without the Dizzy-Fix Training Device. *Indian J Otolaryngol Head Neck Surg*. 2024 Aug;76(4):3424-3430. doi: 10.1007/s12070-024-04710-y. Epub 2024 Apr 23. PMID: 39130324; PMCID: PMC11306911.
  12. You P, Instrum R, Parnes L. Benign paroxysmal positional vertigo. *Laryngoscope Investig Otolaryngol*. 2018 Dec 14;4(1):116-123. doi: 10.1002/lio2.230. PMID: 30828628; PMCID: PMC6383320.
  13. Gurberg J, Tomczak KK, Brodsky JR. Benign paroxysmal vertigo of childhood. *Handb Clin Neurol*. 2023;198:229-240. doi: 10.1016/B978-0-12-823356-6.00004-4. PMID: 38043965.
  14. Achard S, Champion M, Parodi M, MacAskill M, Hochet B, Simon F, Rouillon I, Jonard L, Serey-Gaut M, Denoyelle F, Loundon N, Marlin S. Recurrent Benign Paroxysmal Positional Vertigo in DFNB16 Patients with Biallelic STRC Gene Deletions. *Otol Neurotol*. 2023 Apr 1;44(4):e241-e245. doi: 10.1097/MAO.0000000000003825. Epub 2023 Feb 10. PMID: 36764706.
  15. Jeong SH. Benign Paroxysmal Positional Vertigo Risk Factors Unique to Perimenopausal Women. *Front Neurol*. 2020 Oct 16;11:589605. doi: 10.3389/fneur.2020.589605. PMID: 33178127; PMCID: PMC7596253.
  16. Chen G, Li Y, Si J, Zhao X, Zhang T, Dai X, Yu G. Treatment and recurrence of traumatic versus idiopathic benign paroxysmal positional vertigo: a meta-analysis. *Acta Otolaryngol*. 2019 Sep;139(9):727-733. doi: 10.1080/00016489.2019.1632484. Epub 2019 Jul 3. PMID: 31268396.
  17. Messina A, Casani AP, Manfrin M, Guidetti G. Italian survey on benign paroxysmal positional vertigo. *Acta Otorhinolaryngol Ital*. 2017 Aug;37(4):328-335. doi: 10.14639/0392-100X-1121. PMID: 28872163; PMCID: PMC5584106.
  18. Di Cesare T, Tricarico L, Passali GC, Sergi B, Paludetti G, Galli J, Picciotti PM. Traumatic benign paroxysmal positional vertigo: personal experience and comparison with idiopathic BPPV. *Int J Audiol*. 2021 May;60(5):393-397. doi: 10.1080/14992027.2020.1821253. Epub 2020 Sep 22. PMID: 32959692.
  19. Kim H, Ha J, Lee JH, Jang JH, Park HY, Choung YH. Early management for traumatic benign paroxysmal positional vertigo in traumatically injured patients. *Injury*. 2022 Jan;53(1):198-203. doi: 10.1016/j.injury.2021.07.042. Epub 2021 Jul 31. PMID: 34366105.
  20. Vadlamani S, Dorasala S, Dutt SN. Diagnostic Positional Tests and Therapeutic Maneuvers in the Management of Benign Paroxysmal Positional Vertigo. *Indian J Otolaryngol Head Neck Surg*. 2022 Aug;74(Suppl 1):475-487. doi: 10.1007/s12070-020-02292-z. Epub 2021 Jan 2. PMID: 36032928; PMCID: PMC9411440.