Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 4 No. 12 (2023): December 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i12.988
Original Article

A PROSPECTIVE STUDY OF EPLEY MANOEUVRE'S EFFICACY IN ENHANCING THE QUALITY OF LIFE OF SUBJECTIVE BENIGN PAROXYSMAL POSITIONAL VERTIGO PATIENTS.

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Abstract

Objectives:

The study aimed to assess the impact of Epley maneuver and oral betahistine on the Dizziness Handicap Inventory (DHI) scores in subjective benign paroxysmal positional vertigo (sBPPV) patients, comparing them with those treated with betahistine alone. The objective was to evaluate the 10-day post-treatment improvement in the quality of life for sBPPV patients.

Methods:

A prospective study with 60 participants assessed vertigo complaints using otological examinations, Pure Tone Audiometry, Dix-Hallpike maneuver, and Supine roll test. Participants showing no observable nystagmus were randomly assigned to a Study group receiving Epley maneuver and oral Betahistine or a Control group receiving oral Betahistine alone. The study aimed to compare outcomes in both groups.

Results:

In this study involving 60 patients, the study group exhibited a significant improvement in total functional score, total emotional score, total physical score, and total score from baseline to 10 days post-treatment (p value < 0.05). The mean ± SD of baseline total functional score, total emotional score, total physical score, and total score was 20.93 ± 4.83, 15 ± 4.23, 17.87 ± 5.14, and 53.8 ± 9.60, respectively, significantly higher than the values after 10 days.

Conclusion:

The study demonstrates a significant improvement in Dizziness Handicap Inventory scores, indicating enhanced quality of life in subjective BPPV patients treated with the Epley maneuver and oral betahistine. These findings support the combined therapy as an effective approach in managing subjective BPPV.

Recommendation:

The study recommends considering the combined treatment of Epley maneuver and oral betahistine for subjective BPPV patients to enhance their quality of life. Further research could explore the long-term efficacy and broader applicability of this intervention.

Keywords:
Subjective Benign Paroxysmal Positional Vertigo, Epley Maneuver, Betahistine, Dizziness Handicap Inventory, Vestibular Disorders
Submitted: 2023-12-30 Accepted: 2023-12-30

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Introduction

Dizziness, vertigo, and balance issues are common concerns among the elderly, leading to reduced mobility and limitations in daily activities [1, 2]. These conditions, particularly dizziness, pose a significant risk for morbidity related to falls and serious injuries in this population [2]. While dizziness can stem from either peripheral vestibular disorders or central neurological problems, advancing age makes peripheral causes more prevalent [3]. The incidence of dizziness rises with age, ranging from 36% to 45% in the elderly [4, 5]. Notably, benign paroxysmal positional vertigo (BPPV) emerges as a primary culprit, accounting for 42% of peripheral dizziness cases in the elderly [6].

Diagnosing BPPV involves assessing patient history and observing characteristic nystagmus through provocation tests [7]. However, in some instances, patients with a known BPPV history may not exhibit nystagmus during the Dix-Hallpike maneuver. Under such circumstances, suggestions involve performing the maneuver on multiple occasions and integrating the supine roll technique to evaluate horizontal canal benign paroxysmal positional vertigo (h-BPPV) [7]. Another phenomenon known as 'subjective BPPV' (S-BPPV) is characterized by the lack of nystagmus and the occurrence of vertigo during the

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provoking maneuver, even in the presence of a positive BPPV history [8].

Subjective BPPV (S-BPPV) constitutes 12% to 48% of all BPPV cases, and the recommended treatment for both S-BPPV and observable posterior canal BPPV (p-BPPV) is the Epley maneuver [8-11].

The primary objective of the current study is to analyze the impact of the Epley maneuver on individuals with subjective benign paroxysmal positional vertigo (sBPPV) by comparing their Dizziness Handicap Inventory (DHI) scores before and after treatment. Furthermore, this study evaluates the impact of combining the Epley maneuver with oral betahistine on the quality of life in sBPPV patients, compared to those treated with betahistine alone, offering insights into the effectiveness of dual treatment strategies for enhancing well-being in individuals with sBPPV.

Materials and Methods

Study design

A prospective interventional randomized comparative study was conducted.

Study setting

The study was conducted in the Department of ENT of Vardhman Mahavir Medical College and Safdarjung Hospital in New Delhi, India, spanning 18 months (December 2021 to June 2023) and involving a sample size of 60 participants.

Inclusion and exclusion criteria

This study included individuals aged above 18 years and diagnosed with anamnesis of vertigo or rotatory dizziness triggered by the position of the head, lasting <1 minute, and no association with cochlear or neurologic symptoms. The absence of observable nystagmus during the Dix-Hallpike maneuver signalled the presence of Subjective BPPV (S-BPPV). Exclusions involved cochlear symptoms, prior BPPV diagnosis, positive supine roll test, abnormal ear findings, vertebrobasilar insufficiency, CNS diseases, abnormal MRI, limited head movements, uncontrolled systemic diseases, communication challenges, or cervical neurological symptoms.

Study size

The study included 60 patients who met the specified inclusion criteria were enrolled.

Study setting

The study was carried out in the Department of ENT for an 18-month period, involving a sample size of 60 participants. Approval from the institutional ethical committee was obtained before commencing the prospective interventional randomized comparative study. All enrolled individuals, aged 18 and above, underwent thorough otorhinolaryngological examinations, including baseline Pure Tone Audiometry, in adherence to specified inclusion and exclusion criteria. The study setting involved the random allocation of eligible participants into two groups, with interventions performed and outcomes assessed at the department.

Data collection

The study commenced with a comprehensive collection of detailed medical history and thorough general physical and otorhinolaryngological examinations. Patients with vertigo complaints underwent an otological examination and baseline Pure Tone Audiometry to rule out any other abnormal ear findings. Subsequently, the Dix-Hallpike manoeuvre and Supine roll test were conducted, first on the right side and then on the left. Among the 60 patients who exhibited no observable nystagmus on Frenzel glasses and showed no subjective symptoms during the supine roll manoeuvre, random division into two groups occurred.

The participants were grouped into 2 cohorts- the study group and the control group. The study group underwent the Epley manoeuvre, complemented by oral Betahistine at 16 mg thrice a day. In contrast, the control group received only oral Betahistine at the same dosage. The assessment using DHI was conducted before therapeutic intervention, with a follow-up assessment performed 10 days later for both groups.

Bias

The study may have selection bias due to the exclusion of individuals with certain conditions, and performance bias as the intervention involves both a manoeuvre and medication, making it challenging to isolate their individual effects.

Randomization and Allocation

True randomization was ensured by employing a computer-generated random numbers table. Each participant was assigned a unique identification number upon enrollment. The numbers were then input into the system, which randomly allocated participants to either the treatment or control group in a 1:1 ratio. This method ensured that the allocation of participants to treatment groups was completely random and free from investigator bias.

Allocation Concealment

Allocation to treatment groups was concealed using sealed, opaque envelopes containing the group assignments. These envelopes were numbered sequentially and opened only after the enrolled participants completed all baseline assessments and it was time to assign them to their respective groups. This procedure ensured that neither the participants nor the researchers knew the group assignment until after a participant was entered into the study.

Baseline Similarity

Baseline characteristics of participants in both treatment and control groups were collected and compared using

statistical tests. Age, gender, duration of disease, and baseline severity of vertigo symptoms were among the variables compared to ensure that the groups were similar at the start of the study.

Blinding

Participants were blinded to the treatment by being uninformed of which treatment group they were in. To maintain blinding, the Epley manoeuvre and the administration of oral Betahistine were conducted in separate, similar-looking rooms by different team members. Those delivering treatment were also blinded to treatment assignment. The individuals administering the Epley manoeuvre did not know whether a participant would also receive Betahistine or not, and vice versa.

Blinding of Outcome Assessors

The outcomes assessors, who measured the severity of vertigo symptoms and other outcomes at specified time points, were different from those who delivered the treatments and were blinded to treatment assignment. They were not privy to which group any participant belonged, ensuring unbiased assessment.

Treatment Uniformity

Apart from the intervention of interest (Epley manoeuvre), treatment groups were treated identically. Both groups received oral Betahistine at the same dosage. Any additional care or intervention was standardized and documented across both groups.

Follow-up Completeness

The study aimed for complete follow-up of all participants for the duration of the study. In cases where follow-up was incomplete, the reasons were documented and analyzed to determine if there were any systematic differences between the groups in terms of follow-up.

Analysis

Participants were analysed in the groups to which they were randomized (intention-to-treat analysis), regardless of adherence to the treatment protocol. This approach provides a more unbiased estimation of the treatment effect.

Outcome Measurement

Outcomes were measured in the same way for both treatment groups using the Dizziness Handicap Inventory (DHI) before the intervention and at a follow-up 10 days later. The reliability of this measurement was ensured by training the outcomes assessors thoroughly and using a standardized protocol for assessment.

Ethical consideration

The study adhered to ethical standards by obtaining written informed consent from all participants before the intervention, following clearance from the institutional ethical committee. Ethical guidelines were strictly followed to prioritize participant autonomy and uphold the principles of informed consent in research.

Statistical Analysis

The data collected were analysed using percentages for categorical variables and mean for continuous variables. The comparison of groups was performed using Fisher's exact test, Chi-squared test, and unpaired t-test, as appropriate. The level of statistical significance was established at $p \leq 0.05$. Any missing data or deviations from the protocol were reported and handled according to predefined statistical methods.

Results/Outcomes

Participants

Among the 60 patients enrolled for this investigation, in the study, the treatment for each group was distinctly defined. The study group, comprising 30 patients, underwent the Epley manoeuvre, a physical therapy technique used to treat vertigo, and additionally, they received 16 mg of oral Betahistine three times a day. This combination aimed to assess the effectiveness of both the manoeuvre and the medication in treating vertigo. On the other hand, the remaining 30 patients, who formed the control group, received only 16 mg of oral Betahistine thrice a day, without the Epley manoeuvre. This setup allowed for a comparative analysis of the additional effect of the Epley manoeuvre when combined with standard medication treatment. The study revealed a significant difference in improvement scores, including functional, emotional, physical, and total scores, between the two cohorts (p value < 0.05). In the study group, the median (25th-75th percentile) improvement in functional, emotional, physical, and total scores was 4 (4-8), 4 (2-4), 4 (2-8), and 14 (10-20), respectively, showing a substantial increase in contrast to the control group (2 (0-4) (p value < 0.0001), 2 (0-2) (p value = 0.0007), 2 (2-4) (p value = 0.012), 6 (2-8) (p value < 0.0001)) (Fig. 1, Table 1).

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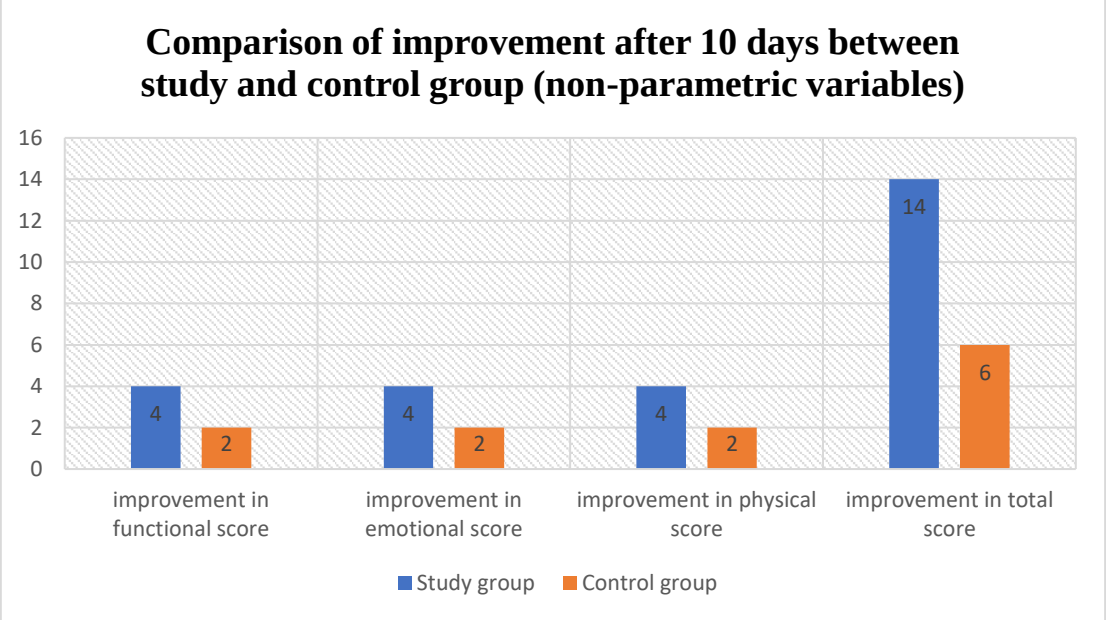

Figure 1: Comparison of improvement after 10 days between study and control group.(non-parametric variables

Table 1: Comparison of improvement after 10 days between study and control group

Improvement after 10 days	**Study group (n=30)**	**Control group (n=30)**	**Total**	**P value**
Improvement in functional score				
Mean ± SD	5.87 ± 4.64	1.73 ± 2.50	3.8±4.24	<.0001§
Median(25th-75th percentile)	4 (4-8)	2 (0-4)	4 (2-6)	
Range	0-24	-6-6	-6-24	
Improvement in emotional score				
Mean ± SD	3.93 ± 3.04	1.53 ± 1.94	2.73 ± 2.8	0.0007§
Median(25th- 75th percentile)	4 (2-4)	2 (0-2)	2 (0-4)	
Range	0-12	-4-6	-4-12	
Improvement in physical score				
Mean ± SD	5.2 ± 4.6	2.33 ± 1.9	3.77±3.77	0.012§
Median(25th- 75th percentile)	4 (2-8)	2 (2-4)	2 (2-6)	
Range	-2-18	-2-6	-2-18	
Improvement in total score				
Mean ± SD	15 ± 6.90	5.6 ± 4.25	10.3±7.40	<.0001§
§ Mann Whitney test				

Furthermore, a noteworthy difference was observed in the total functional, emotional, physical, and overall scores within the study group before and after 10 days (p value < 0.05). The mean ± SD of total functional score, total emotional score, total physical score, and total score at baseline was 20.93 ± 4.83, 15 ± 4.23, 17.87 ± 5.14, and 53.8 ± 9.60, respectively, significantly decreasing after 10 days (15.07 ± 5.96 (p value < 0.0001), 11.07 ± 4.35 (p value < 0.0001), 12.67 ± 4.99 (p value < 0.0001), 38.8 ± 9.15 (p value < 0.0001)) (Fig. 2, Table 2).

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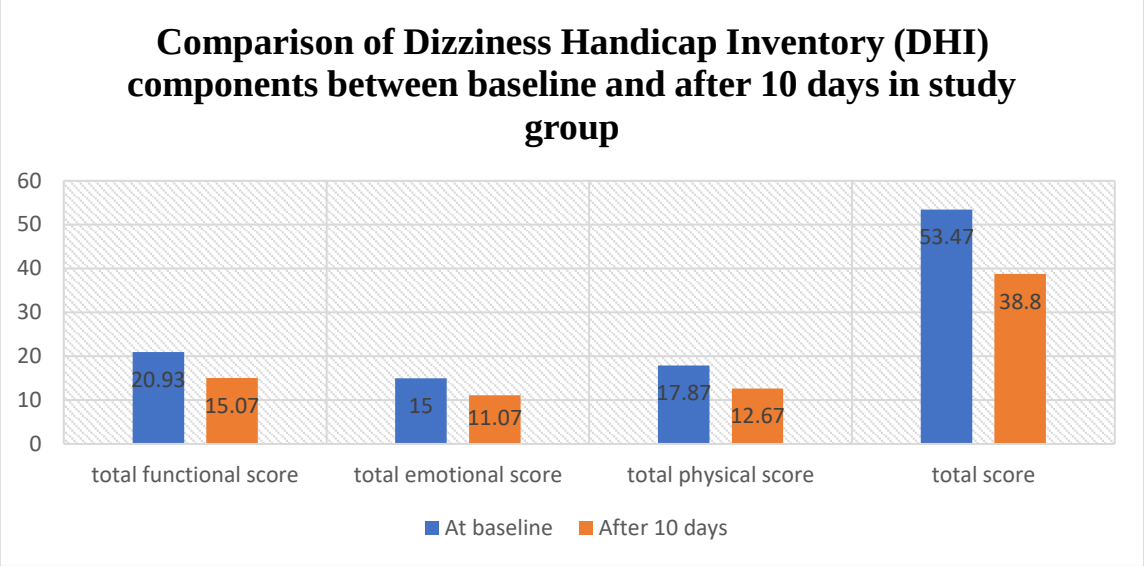

Figure 2: Comparison of Dizziness Handicap Inventory (DHI) components between baseline and after 10 days in study group

Table 2: Comparison of Dizziness Handicap Inventory (DHI) components between baseline and after 10 days in study group

Dizziness HandicapInventory (DHI) components	At baseline (n = 30)	After 10 days (n = 30)	P value
Total functional score			
Mean ± SD	20.93 ± 4.83	15.07 ± 5.96	<.0001¶
Median(25th-75th percentile)	20 (16.5-24)	14 (12-20)	
Range	10-30	2-26	
Total emotional score			
Mean ± SD	15 ± 4.23	11.07 ± 4.35	<.0001¶
Median(25th-75thpercentile)	14(12-17.5)	10(8-14)	
Range	8-24	4-20	
Total physical score			
Mean ± SD	17.87 ± 5.14	12.67 ± 4.99	<.0001¶
Median(25th-75thpercentile)	18(14-23.5)	12(10-14)	
Range	8-24	6-22	
Total score			
Mean ± SD	53.8 ± 9.60	38.8 ± 9.15	<.0001¶
Median(25th-75thpercentile)	55(46-62)	40(34.5-46)	
Range	30-68	18-54	

Similarly, in the control group, a significant difference emerged in total functional, emotional, physical, and overall scores between baseline and after 10 days (p value < 0.05). The mean ± SD of total functional score, total emotional score, total physical score, and total score at baseline was 20.87 ± 5.42, 13.33 ± 5.42, 18.6 ± 4.67, and 52.8 ± 12.24, respectively, which was markedly higher than after 10 days (19.13 ± 5.75, 11.8 ± 4.8, 16.27 ± 4.48, 47.2 ± 12.44) (Fig. 3, Table 3)

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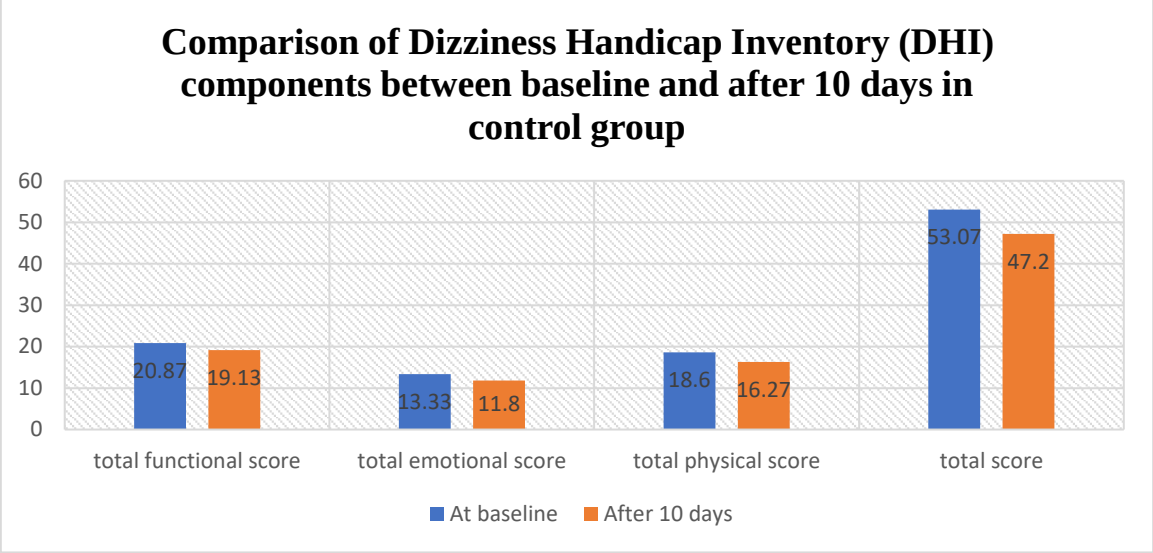

Figure 3: Comparison of Dizziness Handicap Inventory (DHI) components between baseline and after 10 days in control group

Table 3: Comparison of Dizziness Handicap Inventory (DHI) components between baseline and after 10 days in control group

Dizziness Handicap Inventory (DHI) components	At baseline (n = 30)	After 10 days (n = 30)	P value
Total functional score			
Mean ± SD	20.87 ± 5.42	19.13 ± 5.75	0.001¶
Median(25th-75thpercentile)	22 (18-24)	20 (16-23.5)	
Range	10-30	6-28	
Total emotional score			
Mean ± SD	13.33 ± 5.42	11.8 ± 4.8	0.0002¶
Median(25th-75thpercentile)	12(10-16)	12(8-14)	
Range	4-24	4-22	
Total physical score			
Mean ± SD	18.6 ± 4.67	16.27 ± 4.48	<.0001¶
Median(25th-75thpercentile)	20(16-22)	16(14-20)	
Range	10-24	6-24	
Total score			
Mean ± SD	52.8 ± 12.24	47.2 ± 12.44	<.0001¶
Median(25th-75thpercentile)	55(46.5-62)	49(42-57.5)	
Range	26-72	18-64	

Discussion

Our study contributes to addressing a gap in research by specifically delving into the realm of 'Subjective' BPPV and scrutinizing the advantages of augmenting conventional oral Betahistine therapy with the Epley maneuver.

In the present study, the average age of the participants of the study cohort (42.57 ± 14.19 years) and the control cohort (44 ± 12.67 years) aligns with reported BPPV incidence patterns, showcasing a prevalence of 38% across each decade of life and impacting 9% of the elderly population [12]. Age-related factors, such as diminished adaptability of reflexes and alterations in peripheral sensory receptors, contribute to the heightened prevalence of dizziness in the elderly [13, 14].

The Brazilian DHI, validated through multiple studies, was selected for its effectiveness in quantitatively assessing shifts in quality of life among subjective BPPV patients [13, 15]. Our study revealed a higher incidence of

vertigo in females (60% in the study cohort and 56.67% in the control cohort), a finding substantiated by existing literature and linked to hormonal fluctuations [13, 16, 17].

Quality of life assessment using the DHI underscored that physical functions bore the brunt of dizziness, followed by functional and emotional dimensions- a consistent observation in earlier studies emphasizing the necessity of addressing all three facets [16, 17]. Emotional symptoms, encompassing anxiety and depression, were prevalent in BPPV patients, and our study showcased a notable reduction in emotional scores post-treatment, particularly when the Epley maneuver was integrated with Betahistine therapy.

Despite the challenges posed by the ongoing COVID-19 pandemic, our study implemented a singular Epley maneuver at the initial contact, showcasing its efficacy in enhancing quality of life within a condensed timeframe. While the existing literature comprehensively covers BPPV [18, 19], there exists a dearth of studies honing in on subjective BPPV and its treatment strategies. Our study aligns with findings suggesting that the Epley maneuver can yield benefits even in patients lacking observable nystagmus, emphasizing its efficacy in addressing the underlying pathology of subjective BPPV [17-20].

Understanding the factors influencing the quality of life in subjective BPPV patients holds paramount clinical significance, guiding clinicians in the judicious selection of treatment regimes. The inclusive approach of integrating repositioning maneuvers, such as the Epley maneuver, alongside vestibular suppressants underscore their user-friendly application and potential to elevate overall quality of life across physical, emotional, and functional dimensions.

Generalizability

The study's generalizability is constrained by its single-center design and relatively small sample size, urging caution in extrapolating the findings to broader populations. Multi-center trials with larger and more diverse cohorts would enhance the external validity of the results.

Conclusion

The present study demonstrates the efficacy of the Epley maneuver in enhancing the quality of life for elderly patients with subjective benign paroxysmal positional vertigo (sBPPV), even in the absence of observable nystagmus. The integration of the Epley maneuver with oral Betahistine significantly improves functional, emotional, and physical scores, addressing the multifaceted impact of sBPPV on patients' daily lives. These findings underscore the importance of considering repositioning maneuvers as an integral component of the treatment approach for subjective BPPV, contributing to a comprehensive and improved management strategy.

Limitations

The study is constrained by its relatively small sample size and short follow-up period of 10 days. This limits the ability to assess long-term outcomes and sustained effects of the interventions. Additionally, the single-center design may introduce institutional biases, warranting caution in extrapolating the results to broader populations.

Recommendations

The study recommends further investigations with larger and diverse cohorts to confirm the efficacy of the Epley maneuver in subjective benign paroxysmal positional vertigo cases. Additionally, long-term follow-up studies and comparative research on varied treatment modalities for subjective BPPV are suggested for a more comprehensive assessment.

Acknowledgement

To all the participants for their cooperation and patience.

List of Abbreviations

BPPV - Benign Paroxysmal Positional Vertigo

sBPPV - Subjective Benign Paroxysmal Positional Vertigo

DHI - Dizziness Handicap Inventory

pBPPV - Posterior Canal Benign Paroxysmal Positional Vertigo

Source of funding

No source of funding.

Conflict of interest

No conflict of interest.

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