

Effect of Semont maneuver and Brandt-Daroff exercises on Benign Paroxysmal Positional Vertigo

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ABSTRACT

Objective. This study aimed to examine the efficacy of single session of Semont maneuver and Brand Daroff exercises in treatment of BPPV.

Methods. This controlled single blinded randomized control trial (RCT) approved by "IEC, GJUS&T, Hisar" on vide letter no. PTY/2022/155 dated on 21/04/2022. 30 patients (18 years of age and above) of posterior semicircular canal BPPV divided into two groups; Group 1 (N=16) was intervention group treated with Semont maneuver & Brandt-Daroff exercises and Group 2 (N=14) was control group in which Brandt-Daroff exercises were given. Subjects were diagnosed with the help of Dix-Hallpike maneuver, visual vertigo analysis scale, questionnaire for self-diagnosis of BPPV and dizziness handicap inventory score. Paired t-test was used to compare data within groups and unpaired t-test was used to compare data between intervention and control group.

Results. VAS and total DHI scores at the start of the study were not statistically significant ($p=0.28$, $p=0.80$, respectively) between the treatment group and control group. VAS and DHI scores statistically significantly improved after the intervention in group 1 (VAS 6.75 ± 0.68 , $p<0.001$; Total-DHI $=42.87 \pm 8.69$; $p<0.001$). On the other hand, in the group 2, no significant difference was observed (VAS 1.21 ± 0.68 , $p=0.56$; Total-DHI $=2.29 \pm 8.69$; $p=.67$). In addition, significant improvements were observed in VAS and total DHI scores in patients who underwent the Semont maneuver and Brandt-Daroff compared to those in the group 2 ($p<0.01$, $p<0.01$, respectively).

Conclusion. Semont maneuver and Brandt Daroff exercises are safe and more effective in treatment of BPPV in majority of patient.

Keywords: canal repositioning procedure, vertigo, vestibular rehabilitation

INTRODUCTION

"Benign paroxysmal positional vertigo" (BPPV) is communal associated with vertigo in sufferers attending ENT department OPD. 50% of cases of peripheral vestibular dysfunction are BPPV. It affects people of all age groups but the prevalence of BPPV increases as age increases and most common in people over the age 50. Females are more affected than males and right side is more effected in comparison to left side. Some authors generally consider that the population has that side affected on which side they usually sleep. Causes of BPPV are generally unknown in most of the patients. Traumatic BPPV is generally bilateral as in comparison to idiopathic type and in young patients, head trauma is common cause of BPPV [1,2].

BPPV is episodes of dizziness in short bursts and a sensation of spinning with certain head movements [3]. It is concept to of the displacement of small calcium carbonate crystals called otoconia from the maculae of the internal ear into the fluid-stuffed semicircular canal [4].

Any change in head or body position that is moving neck upward and downward, going from seating to lying or seating to standing etc. leads to displacement of otoconia. That result in stimulating the vestibulocochlear or balance nerve i.e., 8th cranial nerve causing symptoms like spinning movements, dizziness, nausea, vomiting, jumping eyes (nystagmus) etc. arise [5]. The advanced and horizontal canals may be affected but posterior canal is maximum and generally affected site due to gravity and body movements [6,7]. BPPV can be as cupulolithi-

asis and canalithiasis. Canalithiasis is when the otoconia are unrestricted moving in the canal, while cupulolithiasis is when the otoconia are stick to the cupula [8].

Diagnosis of BPPV is done by physical examination of symptoms like vertigo, dizziness related to head movements and Dix-Hallpike positioning test. The Dix- Hallpike positional test is beneficial for the diagnosis and prognosis of posterior canal BPPV [1]. DHI assist in screening of BPPV and the component included in DHI diagnose quality of life of BPPV patients in terms of various parameters [9]. Most of the patients are effectively treated with various repositioning procedures like “Epley’s maneuver, Semont liberatory maneuver and Brandt-Daroff exercises” [10]. Brandt and Daroff provided mechanism based on habituation and adaptation to treat BPPV by promoting loosening of cupula otolith debris and detached them from the cupula [11]. While the others maneuvers work on “freeing” the otolith debris or crystal from the cupula or moving these debris from involved canal, to the sac of utricula [12,13]. Because of safety of the maneuvers, repetition of application in the subsequent sessions may be recommended for recurrent attack of BPPV in patients or they did not get relief from the first treatment. Therefore, the study was planned to examine the efficacy of single session of Semont maneuver and Brandt-Daroff exercise in treatment of PSC (posterior semicircular canal)-BPPV in comparison with control group.

METHODS

It was an experimental study design, single blinded study approved by “Departmental ethical

committee, Guru Jambheshwar University of Science and Technology, Hisar” on vide letter no. PTY/2022/155 dated on 21/04/2022.30 patients randomly selected from various hospitals of Hisar city including government and private health centers for study by random table method and divided into two groups. Patients of both sexes above 18 years of age with posterior semicircular canal BPPV with presenting symptoms like vertigo and nystagmus, vomiting, nausea, disequilibrium, ringing in ears. Patients with lateral semicircular canal BPPV and vertigo of primary origin, with continual suppurative otitis media and labyrinthitis, Meniere’s ailment, vestibular neuronitis and other differentially diagnosed disease, Pregnant ladies. The present study followed the principles of the Declaration of Helsinki. A written informed consent was obtained taken from the subjects.

Subjects were diagnosed by the evaluation of Dix-Hallpike maneuver [14], score of visual vertigo analysis scale [15], and questionnaire for self-diagnosis of BPPV and by scoring of dizziness handicap inventory [16]. Patients who were diagnosed with posterior semicircular canal BPPV were questioned about their age, gender, weight, height, BMI, frequency of symptoms, duration of symptoms, relieving factors, aggravating factors and whether they had been diagnosed with BPPV before. Patients of group 1 were treated with Semont maneuver & Brandt-Daroff exercise and patients of group 2 were asked to perform only Brandt-Daroff exercises.

In the group 1, ask patient to take a seat down at the brink of the desk with the legs placing down. Ask patient to turn their head around 45° towards unaffected side, the affected person then quickly moved



FIGURE 1. Demonstration of various steps of Semont maneuver

to lying position towards affected side and face up function maintained for 30 seconds to 2 minutes (time variations depend on symptoms of vertigo appears). The patient turned into then quickly moved to the other side keeping head in identical position, and hence face down function maintained for 30 seconds to 2 minutes. The affected person then turned again to a sitting position. Then look for the sign of nystagmus and ask patient for presence of vertigo and severity of symptoms. Then Brandt-Daroff exercises was given to patients in group 1 [17-19].

Brandt-Daroff exercises were given to the patients of group 2. Ask patient to sit straight on the edge of the couch with legs hanging. Patient lay down on one side with head turned to opposite side along with nose to 45° and hold this position for 30 seconds. Then ask patient to sit upright along with head tilt to right at the edge and hold this position for 30 seconds while looking forwards. Further patient lie on right side and head turned to left side with 45° nose upwards, wait in this position for 30 seconds. Then again ask patient to sit upright while keeping head tilt to the left side. Wait in this position for 30 seconds. Then patient sit straight and look forward and wait for 30 seconds [19].

DATA ANALYSIS

“The data were analyzed and processed using a statistical software (SPSS for Mac v.20.0; SPSS Inc., Chicago, IL, USA)”. We enrolled 32 patients for both groups (at least 18 to each group including 5% drop-outs) to gain 85% power with significance less than or equal to 0.05. Measuring variables were written

as mean \pm SD. Data were found normal so we used parametric analysis. Paired t-test and unpaired t-test was used to compare data within groups and between groups respectively.

RESULTS

16 patients (mean age of 45.19 and varies to 12.89) diagnosed with posterior canal BPPV remitted group 1, 7 males and 9 females and 14 patients (42.79 and varies to 13.65) diagnosed with posterior canal BPPV remitted in group 2, 6 males and 8 females. Demographic details of patients are as shown in Table 1.

Both outcome variables (VAS and total DHI scores) at first visit of the study were not statistically significant ($p=0.28$, $p=0.80$, respectively) between the treatment group and control group. Table 2 shows that the VAS and DHI scores statistically significantly improved after the intervention given in group 1 (VAS 6.75 ± 6.8 , $p<0.001$; Total-DHI= 42.87 ± 8.69 ; $p<0.001$). Contrary to the group 1, in the group 2, insignificant difference between group was noted (VAS 1.21 ± 6.8 , $p=0.56$; Total-DHI = 2.29 ± 8.69 ; $p=.67$). Moreover, significant improvements were noted in VAS & DHI scores who underwent the maneuver in group 1 as presented in below cited table ($p<0.01$, $p<0.01$, respectively).

DISCUSSION

This ongoing study aimed to assess the efficacy of Semont maneuver & Brandt Daroff exercises in BPPV patients. 80–90% cases of BPPV occurred due to involvement of PSC (Posterior Semicircular Ca-



FIGURE 2. Demonstration of Brandt-Daroff exercises

TABLE 1. Descriptive statistics of participants

VARIABLES	Group 1 (min to max)	Group 2 (min to max)
Age (Years)	45.19±12.89 (26 to 76)	42.79±13.66 (22 to 63)
Height (cm)	171±10.27 (155.4 to 185.9)	168.23±11.09 (152.3 to 182.8)
Weight (Kg)	70.19±13.52 (51 to 90)	66.71±12.84 (51 to 90)
BMI	23.81±2.69	23.38±2.28
Duration of symptom (days)	15.81±10.07 (5 to 35)	26.71±26.9 (5 to 90)
Frequency of symptoms (times per week)	2.75±.86 (1 to 4)	3.07±.917 (2 to 5)

Data is shown in Mean ±SD

TABLE 2. Paired T-test for outcome variable in both group

Variables	Group 1			Group 2		
	PRE Mean ± SD	POST Mean ± SD	P-VALUE	PRE Mean ± SD	POST Mean ± SD	P-VALUE
VVAS	7.19±1.11	.44±.63	0.00*	6.71±1.27	5.50±.76	0.56 ^{ns}
DHI	50±10.3	7.13±3.34	0.00*	42.86±11.36	40.57±3.94	0.67 ^{ns}

Data is shown in Mean ±SD; *Significant at P≤0.05; ^{ns} Non-significant as p-value≥0.05

TABLE 3. Comparison of outcome variable in both groups

Variables	Group 1	Group 2	P-Value
PRE VVAS	7.19±1.11	6.71±1.27	.28 ^{ns}
POST VVAS	.44±.63	5.50±.76	.00
PRE DHI	50±10.3	42.86±11.36	.80 ^{ns}
POST DHI	7.13±3.34	40.57±3.94	.00

Data is shown in Mean ±SD; *Significant at P≤0.05;

^{ns}: Non-significant as p-value≥0.05

nal) which is the most commonly involved. Others LSC (lateral semicircular canal) which is less involved in 5–15% cases of BPPV and only 2% cases BPPV associated with SCC (superior semicircular canal) pathology. Literature evidence showed rare involvement of bilateral and multi-canal occurred [20]. Various types of evidence-based rehabilitation or intervention options had been present in literature to treat the clinical presentation and associated symptoms of BPPV in some session, or immediately following single session. These treatment option based on mechanism to remove or dislodge debris from the semicircular canals by highly organized movements in different positions [21,22]. To the best of knowledge, no study was conducted to assess the combining effect of both maneuvers. For the purpose, this study was conducted on 30 patients to assess the combined effect of single session of Semont maneuver and Brandt-Daroff exercises. Follow-up were taken after one session and one month, no patient showed any symptoms in group 1 but group 2 patients had symptoms. Patients were considered cure when vertigo cured within 30 days and patients had negative DHI. Leural et al., 2003 did a retrospec-

tive study on 278 patients presenting symptoms of unilateral BPPV diagnosed with Dix Hallpike maneuver and repeated during follow up visits, performed at weekly intervals, Semont maneuver was applied until the symptoms diminished, Study showed that more than 90% patients almost 250 were cured after a maximum of 4 maneuvers and 83.5% after 2 maneuvers and thus Semont maneuver is highly effective in treatment of BPPV [23]. But there is no study which showed the effectiveness of Brandt-Daroff exercise after one session. On contrary to Brandt-Daroff Habituation exercise, the Semont Liberatorary Maneuver typically requires only one treatment session in most of cases [23,24]. But no one study had done till date which assessed the 100% efficacy of Semont maneuver for BPPV after single session. In our study, participants of control group did not feel much recovery after one session but showed resolution of symptoms after follow up of 1 month.

CONCLUSION

In our study Semont maneuver and Brandt Daroff exercises are safe and effective in treatment of BPPV in majority of patient but Brandt-Daroff exercises had not effective after single session. Furthermore, study findings suggested that this treatment option not only improve the quality of life in patients but also prevent BPPV-related recurrences.

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