



EFFECT OF EPLEY'S MANEUVER AND SEMONT MANEUVER VERSUS BRANDT-DAROFF EXERCISE ALONG WITH CAWTHORNE COOKSEY EXERCISE IN BENIGN PAROXYSMAL POSITIONAL VERTIGO: A COMPARATIVE STUDY

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ABSTRACT

Benign paroxysmal positional vertigo (BPPV) has been recognized as the most common vestibular disorder. It may be characterized by the symptom of rotating dizziness caused by sudden changes in the position of the head. In the present study, an attempt has been made to investigate the effect of Epley's Maneuver and Semont Maneuver versus Brandt-Daroff exercise along with Cawthorne Cooksey exercise in BPPV. A total of 30 purposively selected confirmed cases of BPPV aged 25-55 years were considered for the present study. The subjects were further divided into two groups for intervention. Group-A consisted of 15 subjects who were to perform exercises on Epley's Maneuver and Semont Maneuver. Group-B consisted of 15 subjects who were to perform exercises on Brandt-Daroff exercise along with Cawthorne Cooksey exercise. When the comparison of post-treatment DHI scores between Group-A and B were made, highly significant differences ($t=8.887$; $p<0.000$) were found between Group-A and B. So far the percent decrement of DHI scores were concerned, patients treated with Group-B had the higher value (69.21%) than the patients treated with Group-A (41.13%). It might be concluded from the present study that, Brandt-Daroff exercise along with Cawthorne Cooksey exercise had significant effect to reduce the DHI scores in BPPV than the Epley's Maneuver and Semont Maneuver.

KEYWORDS: Epley's Maneuver and Semont Maneuver Brandt-Daroff Exercise along with Cawthorne Cooksey Exercise. Benign Paroxysmal Positional Vertigo.

INTRODUCTION

Vertigo is the perception of motion in the absence of movement, which may be described as a sensation of swaying, tilting, spinning, or feeling unbalanced (Radtko et al., 2004). Benign paroxysmal positional vertigo (BPPV) has been recognized as the most common vestibular disorder. It was first described by Barany in 1921 and the term was coined in 1952 by Dix and Hallpike. BPPV is easily diagnosed by typical history and Dix-Hallpike's positional test (Dix and Hallpike, 1952). BPPV is one of the most common causes in patients with vertigo of vestibular disorders (Hall et al., 1979). BPPV may be characterized by the symptom of rotating dizziness caused by sudden changes in the position of the head (Parnes et al., 2003; von-Brevern et al., 2007), such as lying down on one or both sides, looking right or left side (Pereira et al., 2010; Soto-Varela et al., 2013). BPPV may be divided into 3 types

based on the canal involvement, i.e. posterior, horizontal and anterior semicircular canal BPPV. Out of these three categories, posterior canal BPPV (PSCBPPV) is the most common, almost 80% of the cases, lateral canal BPPV is about 20% of cases, and anterior canal BPPV is very rare as it is self-treated due to gravity (Soto-Varela et al., 2013).

The most common cause of BPPV in people under the age of 50 years is head injury. In older people, the most common cause is degeneration of the vestibular system of the inner ear. The treatment of BPPV requires a surgery like stapedectomy, where the cause is the combination of prolonged period of supine positioning or ear trauma – mainly trauma to inner ear (Alghwiri et al., 2012).

In fact, it is a self-limiting condition which can be

resolved spontaneously within 3 to 6 minutes but patients suffer from this condition intermittently for years. Patients with BPPV tend to avoid certain provoking position which decreases their functional ability and their activities of daily living. The physical therapy for dizziness and imbalance is called vestibular rehabilitation (VR). Estimated 2.4% of all people experience it at some point of their lifetime. BPPV occurs mostly in older people and both the sexes are affected. The most common symptoms are distinct triggered spells of dizziness, disorientation, losing of balance and nausea. Subtypes of BPPV are distinguished by the particular semicircular canal involved and whether detached otoconia are free floating within the affected canal (canalithiasis) or attached to the cupula (cupulolithiasis). BPPV is typically unilateral, meaning it occurs either in the right or left ear, although in some cases, it is bilateral (Froehling et al., 1991).

In Epley's Maneuver, canal repositioning with Brandt-Daroff exercises are 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 as a home treatment in treating PC-BPPV (Brandt and Daroff, 1980; Hilton et al., 2014).

Cawthorne Cooksey exercises were introduced in the 1940's by Sir Terence Cawthorne, an otolaryngologist and FS Cooksey a physical therapist, and are being used to treat patients with vestibular dysfunction (Cohen, 2006).

In the present study an attempt has been made to investigate the effect of Epley's Maneuver and Semont Maneuver versus Brandt-Daroff exercise along with Cawthorne Cooksey exercise in BPPV.

MATERIALS AND METHODS

Subjects

The present study was based on purposively selected 30 confirmed cases of BPPV aged 25-55 years. The samples were collected from the Shri Guru Ram Rai University, Dehradun, Uttarakhand, India. The subjects were further divided into two groups for intervention. Group-A consisted of 15 subjects who were to perform exercises on Epley's Maneuver and Semont Maneuver. Group-B consisted of 15 subjects who were to perform exercises on Brandt-Daroff exercise along with Cawthorne Cooksey exercise.

Intervention given to the subjects

Both groups had to perform various types of exercises for 2 times per day for 3 days per week for 6 weeks. Patients of Group-A were treated with Epley's Maneuver and Semont Maneuver. Whereas, the patients treated with Group-B had Brandt-Daroff exercise along with Cawthorne Cooksey exercise. Patients in both the groups were assessed for vertigo on DHI scale.

Dizziness Handicapped Inventory (DHI)

Jacobson and Newman (1990) developed the Dizziness Handicapped Inventory scale using 25 questions comprising of functional, physical and emotional to assess the disability scores.

Epley's Maneuver

In the Epley's maneuver, the patient was seated on examination table and head was rotated 45° toward affected side and the patient was asked to quickly move in supine position with head extended 30° causing movement of debris, inducing an attack. Then patient's head was rotated about at 45° towards unaffected side, then trunk was rotated towards unaffected side in such a way that patient's nose will be pointing towards floor, causing further movement of the debris downward toward the exit to the canal, resulting in more vertigo and nystagmus. Each position should be maintained for 2 min or at least until the provoked vertigo and nystagmus subsides.

Semont Maneuver

In Semont maneuver patient was asked to seat on examination table with legs hanging then head was rotated 45° horizontally toward the unaffected ear. After that, patient was tilted 105° so that the patient was lying on the side of the affected ear with patient's head hanging and nose pointed upward. Patient remained in this position for around 3 min - allowing debris to move to the apex of the ear canal. Then patient was asked to move quickly from the seated position, holding patient's head in place, until patient was lying on the side of the unaffected ear with patient's nose pointed to the ground. Patient remained in this position for 3 min, allowing the debris to move toward the exit of the ear canal. Then patient was asked to move slowly back to the seated position. The debris should fall into the utricle of the canal, where it would no longer cause vertigo sensations (Epley, 1979).

Brandt-Daroff Exercises

These exercises were done in the following manner. The subject was asked to move quickly from sitting into the side lying position that produced vertigo. The subject then stayed in that position until the vertigo stopped plus an additional 30 sec and then did sit up again. The subject remained in the upright position for 30 sec and then moved rapidly into the mirror-image side lying position, stayed there for 30 sec and then did sit up. The entire maneuver was repeated five times for 10 min twice a day.

Cawthorne Cooksey Exercises

Exercises were started slowly and gradually the speed was increased. The exercises were progressed in the following manner: In bed or sitting, eye movement - at first slow, then quickly, up and down, from side to side, focusing on finger moving from 3 feet to 1 feet away from face, head movements at first slow, and then quick, later with eyes closed, bending forward and backward. and turning from side to side.

In sitting: eye movements and head movements as above, shoulder shrugging and circling, bending forward and picking up objects from the ground. In standing: eye, head and shoulder movements as before, changing from sitting to stand position with eyes open and shut, throwing a small ball from hand to hand (above eye level), changing from sitting to standing and turning around in between, moving about: walk across room with eyes open and then closed, Walk up and down slope with eyes open and then closed. walk up and down steps with eyes open and then closed., any game involving stooping and stretching and aiming such as bowling and basketball.

Statistical Analysis

This study dealt with the statistical analysis of the outcome measure - DHI between group A and group B. The data were analysed using SPSS (Statistical Package for Social Science) version 20.0. Standard descriptive statistics (mean $\pm$ standard deviation) were determined

for directly measured variable. The paired t-test was used for the comparison of DHI between patients treated with Group-A and B as well as with the group (using student's t-test. A 5% level of probability was used to indicate statistical significance.

RESULTS

Table 1 showed the descriptive statistics of pre- and post-treatment DHI scores in Group-A and B. Statistically significant differences ($p < 0.000$) between pre- and post-treatment DHI scores were found both in Group-A ($t = 8.763$) and B ($t = 15.434$).

The comparison of post-treatment DHI scores between Group- A and B were shown in table 2. Highly significant differences ($t = 8.887$; $p < 0.000$) were found between Group- A and B in post-treatment DHI scores. So far the percent decrement of DHI scores were concerned, patients with Group-B had the higher values (69.21%) than the patients of Group-A (41.13%).

Table 1: Descriptive statistics of pre- and post-treatment DHI scores in Group-A and B.

Combination	Pre-treatment (n =15)		Post-treatment (n =15)		t-value	p-value
	Mean	SD	Mean	SD		
Group-A (n=15)	67.73	11.05	39.87	4.50	8.763	<0.000
Group-B (n=15)	74.93	10.47	23.07	5.39	15.434	<0.000

Table 2: Comparison of post-treatment DHI scores between Group- A and B.

Variables	Post-treatment (n =15)		t-value	p-value	Percent Decrement
	Mean	SD			
Group-A (n=15)	39.87	4.50	8.887	<0.000	41.13%
Group-B (n=15)	23.07	5.39			69.21%

DISCUSSION

Benign paroxysmal positional vertigo is the most common cause of vertigo, where the patients complain of brief episode of vertigo. The purpose of this study was to evaluate the effectiveness of Epley's Maneuver and Semont Mauver versus Brandt-Daroff exercise along with Cawthorne Cooksey exercise in Benign Paroxysmal Positional Vertigo. The findings of the present study revealed that both Group-A (where patients were to perform exercises on Epley's Maneuver and Semont Maneuver) and Group-B (where patients were to perform exercises on Brand Daroff exercise along with Cawthorne Cooksey exercise) were significantly ($p < 0.000$) effective to reduce the DHI scores. Though, the patients treated in Group-B were found to have more percent decrement (69.21%) in the DHI score as compared to the patients treated in Group-A (41.13%).

In fact, Brant-Daroff exercise (BDE) is a kind of home exercise intended to speed up the compensation process and reduce the symptoms of BPPV. The mode of action of BDE is habituating the CNS to provoking position by giving repetitive stimulus to the brain which reduces the brain response to it. It may also act by dislodging debris from the cupula. Cawthorne –Cooksey exercises (CCE) are basically the adaptation exercise. The CNS learns to adapt the imbalance signals coming from the

impaired peripheral vestibular sensory receptors. The effects of CCE are due to several reasons. It loosens the muscles of the neck and shoulders and overcomes protective muscular spasm. It retains the eye movements independent of the head and also balancing everyday situation with special attention to the eye muscle and joint space.

Central nervous system compensation is facilitated by exercises with visual and somatosensory stimulation. This exercise relies on the plasticity of the CNS, which enables reorganization of the mechanisms sub serving balance and symptomatic vestibular compensation. Vestibular compensation further relies on recalibration of the vestibular reflex, sensory and motor substitution in terms of input and predictive activities. Vestibular compensation has been reported to demonstrate that visual input and motor activity are indeed crucial for synaptic recovery. There was also improvement in subjective response of the patients.

Brandt-Daroff Exercises and Cawthorne Cooksey Exercises are new treatment technique developed to promote dizziness and BPPV recovery in vertigo patients. Previous studies in vertigo suggested that Epley's Maneuver and Semont Maneuver may also be beneficial for dizziness and balance function and is

simple, inexpensive and most important patient directed treatment that may improve BPPV in vertigo function (Wolf et al., 1999; Hilton et al. 2014).

In the present study, aspect of Brandt-daroff exercises is taken as a point of reference for treatment in vertigo with functional dependence on the basis of DHI.

Mani et al. (2019) conducted a study, wherein 20 subjects in BPPV patients received treatment for a period of three weeks. Dizziness handicapped inventory scale was used as outcome measure for BPPV patients. Brandt-Daroff exercises for three weeks showed significantly greater improvement in reducing self-perceived handicap among patients with BPPV.

Ramanathan et al. (2019) also conducted a similar study, wherein 20 BPPV patients received Cawthorne Cooksey with Brandt-Daroff exercises. Outcome of this study was that, Cawthorne Cooksey exercises with Brandt-daroff exercise were more effective in treatment of vertigo among BPPV.

Bhadouriya et al. (2021) conducted another study, wherein 30 subjects in BPPV patients received Cawthorne Cooksey with Brandt-Daroff exercises. Conclusion of the study was that Cawthorne Cooksey exercises and Brandt-daroff exercises were safe and able to reduce subjective symptoms and imbalance in BPPV. The limitation of the Study were small sample size with only 30 patients; Training was depended on functional levels of patients. The duration of study was only 6 weeks, so further prognosis and long-term benefits could not be recorded. The study was limited only to BPPV functions.

CONCLUSION

It might be concluded from the present study that, both Epley's Maneuver and Semont Maneuver and Brand Daroff exercise along with Cawthorn Cooksey exercise were significantly effective to reduce the DHI scores. Brand Daroff exercise along with Cawthorn Cooksey exercise had more percentage improvement for DHI scores in BPPV than the Epley's Maneuver and Semont Maneuver.

Ethical Approval

Approved.

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Conflict of interest

The authors declare no conflict of interest.

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