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Comparative Effects of Semont Liberatory Maneuver and Cawthorne Cooksey Exercises in Benign Paroxysmal Positional Vertigo (Bppv)

Dr. Anbreena Rasool [1], Amina Mehak Hasnat [2], Umaima Naeem [3], Rimsha Zaheer [4], Ruhma Tariq [5]

[1] Assistant Professor Department of Rehabilitation Sciences, The University Of Faisalabad ORCID: 0009-0007-7919-5611 assistant.professor.rehab.419@tuf.edu.pk
[2] Chartered Physiotherapist the University of Faisalabad aminahmehak1@gmail.com
[3] Faisalabad Physiotherapy Center umaimanaeem18@gmail.com
[4] The University of Faisalabad ORCID:0009-0004-7799-6310 rimsha.Zaheer.24@gmail.com
[5] Physiotherapist The University of Faisalabad ruhma19@yahoo.com
Dr. Anbreena Rasool; PT (Corresponding Author)

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Abstract
Dizziness is an impression of turning or spinning. The patient feels or thinks motion as a result of the vestibular system's dysfunction. It is associated with vertigo, nausea, and difficulty standing and walking. The most common cause of vertigo is BPPV, impacts between 20% and 40% of patients with peripheral vestibular disease affecting the PC. This study's objective was to determine the comparative effects of SLM and CCE in PC BPPV. This is quasi experimental study in which we collected data from Allied Hospital and National hospital Faisalabad. Twenty-eight patients with BPPV participate among two groups. Group A got SLM and group B got CCE in this study. The intervention was performed three times per week for 3 weeks. Liberatory maneuver depends on the theory of cupulolisthiasis. It includes quickly guiding the sufferer through resistance intended to remove the debris from cupula. CCE was utilized to energize and rush the rebuilding of equilibrium to diminish episodes of lightheadedness. Patients were made to lie in prostrate if patient can't sit up. In any case, the patients were made to sit in any situation without arm rest. The patients were included on the basis of criteria for inclusion and exclusion. SPSS version 20 was utilized for the analysis of the data.

Keywords: Vertigo; lightheadedness; Cupulolisthiasis; Semont Maneuver; CCE; BPPV

Introduction

The short spinning sensations that characterize BPPV are typically resulting from a change in the head's orientation with respect to gravity (1).Lightheadedness is a non-specific symptom that can arise from practically any organ system disease. As a result, a wide range of medical, neurological, and otologic factors ought to be included when making a differential diagnosis for these patients. Lightheadedness in patients may include vertigo, which is the false perception of movement in one's environment or oneself. Among the most common kinds of vertigo is BPPV. This syndrome manifests as quick onset lightheadedness or vertigo brought on by specific head position alterations (2). As per World health organization (WHO) the quantity of people matured 60 years or more will be 37% by 2050 in many of the agricultural nations. In the last ten years, it has been estimated that 50% of people have BPPV (BPPV), and that 85% of people with inner ear defects have vertigo and balance problems. The prevalence of Harmless Paroxysmal Positional Lightheadedness is 2.4% everywhere (3).
With 14% to 27% among patients with BPPV having a past head injury, head trauma is thought to be the most often directly diagnosed triggering cause of BPPV. BPPV was originally linked

to head trauma by Adler, and further research on patients with moderate or extreme traumatic brain damage (TBI) revealed a higher incidence of BPPV. A 1999 report on TBI (TBI) from the Disease Control and Prevention Centers to Congress shows the typical population experiences bidirectional head injury, peaking in the 15–34 age groups primarily from auto accidents, and peaking in the 75+ age group primarily from falls. Using the DHT to evaluate patients experiencing lightheadedness, Katsarkas conducted huge retrospective research in 1999 and discovered that 16.6% of the patients (ages 30-79) had BPPV.

Testing in room light was challenging for the examiner because the subject's capacity for object fixation, suppress Nystagmus both vertically and horizontally, and difficulty keeping their eyes open made it harder to accurately pinpoint the precise canal or canals at issue than it would have been in other studies if infrared video goggles had been used during spot assessment. Researchers Katsarkas and Kirkham discovered that patients may also use the lights of Frenzel goggles as focal points. The bulk of studies often referenced in the BPPV literature do not specifically mention using goggles or Frenzel glasses with an infrared camera for positioning assessment and therapy, which is now thought to be optimal practice. Moreover, the DHT was used in each of these investigations to determine that BPPV solely affected the PC. It has been established that the anterior or horizontal canal might be affected by BPPV in as many as 37% of cases. Herdman discovered that using an infrared camera, the spread of canal participation among BPPV was 76% posterior, 13% anterior, 5% horizontal, and 6% either posterior or front-equipped goggles in a group of 200 people with the diagnosis at two medical facilities. These factors may make young individuals more susceptible to BPPV that is neither reported and nor treated, with prolong signs of imbalance, headaches, and lightheadedness as well as their risk of falling. It is yet unknown how often BPPV is in this younger demographic. The incidence of BPPV in young adults is not yet well-documented, and it is probably underreported across the board. TBI is probably underreported as well, based on the current surge in awareness of the condition, which includes bang on the head injuries related to sports and car crashes involving people of various age categories. The PC BPPV (BPPV) is a disorder where certain head motions cause short bouts of vertigo. Typical symptoms consist of the following:

Vertigo: This is the main symptom, which is characterized by a spinning or whirling feeling that is frequently brought on by particular head motions. Moving the head in specific ways, such as tilting it backward or turning over in bed, can typically cause vertigo in PC BPPV.

Nystagmus: During episodes of vertigo, rapid, uncontrollably moving eye movements, usually involving rotation, are frequently noticed. Rotational component of nystagmus in PC BPPV is usually torsional and up beating.

Although they are generally not advised, medical therapy with vertigo treating drugs could be explored in situations of sudden, increased worsening of BPPV. These mostly consist of medications belonging to the anticholinergic and antihistamine classes, such as scopolamine (hyoscine butylbromide) and meclizine, respectively. Over the last ten years, the medical care of vestibular syndromes has gained popularity. Several new pharmacological medications, as well as those that are already approved but have been given additional indications, have been developed to treat vertigo/lightheadedness disorders. The modes of action of these medications differ greatly, with many of them being ion channel- or receptor-specific. These include Ménière's disorders treated with betahistine or dexamethasone/gentamicin, and vestibular migraine gets treated with the use of metoprolol/topiramate or valproic acid/tricyclic antidepressants.

Thirty percent of PSCC patients and fifty eight percent of HSCC patients reported that their symptoms had subsided after seven days of hospital visits, following the beginning of vertigo. In 36% and 11% of cases, respectively, vertigo persisted for more than a month without therapy. Advice giving and canalith repositioning maneuvers like the Epley procedure are advised for the treatment of PSCC-BPPV. The Barbeque Roll (Lempert) movement or the Gufoni/Appiani maneuvers are advised when the horizontal canal is impacted. Practitioners of vestibular

rehabilitation (VR), such as doctors and vestibular therapists, frequently carry out these repositioning maneuvers. These are thought to have greater efficacy than Brandt-Daroff exercises. There are seldom descriptions available of VR success rates for BPPV or of potential influencing factors on treatment results in physiotherapy practice. Nevertheless, this information appears to be crucial and might direct clinical judgment and therapy. It might be challenging to identify the primary cause of lightheadedness if it develops into a persistent condition. VR programs that involve repetitively performing head, neck, and trunk motions that cause lightheadedness are recommended to chronic patients in order to promote central compensation and habituation. These virtual reality apps are simple to use, safe, and efficient. It is possible to prevent postponing the ultimate diagnosis by offering the proper care in a venue that is easily accessible, like primary care. It is possible to identify patients who may benefit or not from therapy with the use of prognostic indicators, which are clinical traits that predict the outcome of treatment.

The most prevalent vertiginous condition in the regular sample of population is BPPV. Any abrupt change in the state of head, such as reversing in bed, reclined at couch (or at the physician or hairstylist's shop), gazing high, bending, or any other abrupt movement in the state of head, is the primary symptom regarding sudden vertigo. A large range of severity exists. PV that fluctuates is one of the milder symptoms. Prolonged positional episodes interspersed with disequilibrium are indicative of moderate symptoms. The majority of head motions can cause severe vertigo, which appears to be ongoing. Day, week, month, or year-long symptoms are possible, as can repeated symptoms over an extended period of time. The inner ear's skeletal and certain membranous structures were well-described physically by the early 19th century, but their purposes remained unclear.

Prolonged BPPV is diagnosed depends on episodic rotational vertigo bouts and accompanying nystagmus caused by abrupt head movements in relation to the gravity. It is thought that trauma is the primary cause of BPPV in people under the age of fifty. High morbidity is correlated with chronic BPPV. These individuals frequently experience pain, and since they do not exhibit rotatory vertigo, other illnesses are frequently blamed for their symptoms (4). Significant functional impairment is linked to BPPV (BPPV), which is characterized with a change in head position relative to gravity. Although some people may have prolonged symptoms and be severely incapacitated, therapeutic maneuvers can relieve their symptoms (5). Dix Hallpike motions directed at the affected canal are usually what cause the positional nystagmus in PC-BPPVThis causes the eyes to twist in the direction of the topmost ear and tonic downward deviation. The higher angle of eye would beat to the direction of the lowest ear, resulting in an upbeat and torsional nystagmus. The direction of the nystagmus reverses when seated, and it often begins with a short delay of many seconds and gets treated within 60 seconds, normally in between thirty seconds. An important mean to measure intensity of vertigo is by using visual analogue scale (6).The visual analog scale, or VVAS, measures the degree of visual vertigo in nine difficult scenarios including visual movements that usually cause lightheadedness. There are nine different visual analog scales to assess the strength of a visual vertigo-inducing condition on a line of 0 to 10. To show how much lightheadedness each of the nine scenarios causes, an individual draws a vertice on a 10-centimeter line.In addition to the maneuvers, to treat vertigo health practitioners perform a simple daily program (Cawthorne –Cooksey exercise) designed to guarantee otoconia clearance and enable complete remission of signs of vertigo. Most of the studies up to date have compared only the maneuvers. Very few studies have included the home treatment and office treatment (7).

The Semont technique is a set of easy motions that BPPV victims can use to assist halt their dizzy spells. Why the motions are effective is unclear. According to some research, the motions may aid in moving the loose crystals that initially create the feeling disoriented. Other data, however, points to a reduced degree of vertigo with repeated exposure.

Most patients see quick and durable alleviation from BPPV symptoms after using canalith repositioning techniques. Patients who need more than one therapy session, however, may

experience disappointment and disillusionment if their expectations of quick relief are not met. It is more likely that patients having BPPV that is never contained in a single PSC canal would need several therapy sessions and should get the proper counseling. Before beginning treatment, vestibular therapy frequently needs prior permission in this age of managed healthcare. The study's findings suggest that insurance be authorized for three therapy appointments, since this would have accounted for 98.3% of the participants' symptom relief. Evaluation for brainstem disease, bilateral brainstem disease, and BPPV should be taken into consideration for patients who need more than three treatment sessions (8).

Following a maximum of four sessions, the SLM showed a 90.3% recovery rate. The rate of recovery was lower for individuals with traumatic BPPV or for those who sought treatment after the onset of symptoms (>6 months) (9).

This study compares the effects of CCE to the SLM which are both used for the management of vertigo due to PC BPPV. Both the protocols are used because they are safe, cheap and effective. The time taken by both the treatment does not vary much but the effectivity does. This study will compare the effectiveness of both.

Methodology

A randomized clinical trial was conducted at the physiotherapy departments of Allied Hospital Faisalabad and National Hospital Faisalabad. Participants were randomly assigned to intervention groups using block randomization to ensure equal distribution. The study was single-blinded, with participants unaware of their assigned intervention.

Female participants aged 25-45 years diagnosed with posterior canal benign paroxysmal positional vertigo (PC BPPV) were recruited using convenience sampling. Screening was conducted based on inclusion and exclusion criteria, including the presence of a positive Dix-Hallpike Test (DHT) and the ability to perform the Semont Maneuver. Participants with other vestibular disorders, cognitive impairments, or unstable mental states were excluded.

A total of 28 participants were allocated into two groups. Group A received the Semont Liberatory Maneuver (SLM), which was administered three times a week for three weeks. The maneuver was performed with the patient seated on the treatment table, turning their head 45 degrees toward the unaffected side. They were then rapidly guided to a side-lying position on the affected side, maintaining this posture for five minutes. Without altering head positioning, they were quickly repositioned to the opposite side and held for five to ten minutes before returning to a seated position. This repositioning technique aimed to facilitate otolith repositioning within the posterior semicircular canal, reducing vertigo symptoms. Each session included three repetitions of the maneuver, with care taken to minimize discomfort.

Group B received Cawthorne-Cooksey Exercises (CCE), a structured vestibular rehabilitation program performed three times a week for three weeks. The exercises were conducted in sitting, standing, and dynamic positions, progressing in difficulty. The intervention included eye movement exercises such as slow and rapid gaze shifts in vertical and horizontal directions, tracking a moving target, and focusing on near and distant objects. Head movement exercises involved slow and rapid rotations, flexion, and extension with eyes open and closed. Postural control exercises included shoulder shrugs, trunk rotations, bending forward to pick up objects, tandem stance balancing, and transitional movements such as sitting to standing and walking with various visual and postural challenges. Functional activities like ball-passing, walking over uneven surfaces, and simulated sports movements were incorporated to enhance adaptability and reduce dizziness symptoms.

Both interventions were administered in individual sessions by trained physiotherapists. Participants in both groups received baseline assessments before the intervention and follow-up assessments after three weeks. Primary outcome measures included lightheadedness assessed using the Visual Analogue Scale (VAS) for vertigo and functional, emotional, and physical stability evaluated through the Dizziness Handicap Inventory (DHI). Secondary outcomes focused on improvements in quality of life.

Participants provided informed consent before enrollment. Ethical approval was obtained from the University of Faisalabad's ethics committee, ensuring confidentiality and anonymity throughout the study.

Results

The study included a total of 33 participants, with a mean age of **36.31 ± 7.46 years** in Group A and **34.29 ± 5.86 years** in Group B, yielding an overall mean age of **35.27 ± 6.65 years**. The effectiveness of the **Semont Liberatory Maneuver (SLM)** and **Canalith Repositioning Maneuver (CCE)** in managing **Posterior Canal Benign Paroxysmal Positional Vertigo (PC-BPPV)** was evaluated using independent and paired sample t-tests. The results of this study illustrate the comparative effects of the Semont Liberatory Maneuver (SLM) and Canalith Repositioning Exercises (CCE) in treating Posterior Canal Benign Paroxysmal Positional Vertigo (PC BPPV). The study evaluated the changes in Visual Analog Scale (VAS) scores for vertigo and the Dizziness Handicap Inventory (DHI) before and after intervention within and between groups.

The intervention effects for both groups (SLM and CCE) are shown below. Data were analyzed using the independent sample t-test for between-group comparisons and paired sample t-test for within-group comparisons. For the Visual Analogue Scale (VAS) and the Dizziness Handicap Inventory (DHI), significant differences were found within groups post-treatment.

Table 4.1: Between and Within Group Comparison of VAS and DHI at Pre and Post Treatment

Outcome	Group A (SLM) Pre	Group A (SLM) Post	Group B (CCE) Pre	Group B (CCE) Post	P-value (Between Groups)	P-value (Within Groups)
VAS for Vertigo	73.504 ± 10.511	52.964 ± 15.594	82.036 ± 10.420	35.152 ± 8.795	0.211	0.000025
DHI for Lightheadedness	70.423 ± 12.668	42.512 ± 9.294	73.065 ± 10.146	24.361 ± 7.970	0.819	0.0000

Discussion

The present study investigated the comparative effects of the Semont Liberatory Maneuver (SLM) and Canalith Repositioning Maneuver (CCE) in the management of Posterior Canal Benign Paroxysmal Positional Vertigo (PC-BPPV). The findings indicated that both interventions were effective in reducing symptoms of vertigo and dizziness, as measured by the Visual Analogue Scale (VAS) and the Dizziness Handicap Inventory (DHI). However, the CCE group demonstrated a greater reduction in symptoms, suggesting superior efficacy of this intervention.

The reduction in VAS scores post-treatment aligns with previous research demonstrating the efficacy of repositioning maneuvers in alleviating vertigo symptoms. A study by Bhattacharyya et al. (10) found that CCE was more effective than other repositioning techniques in reducing vertigo intensity and frequency. Similarly, Lopez-Escamez et al. (11) reported a significant improvement in vertigo symptoms following CCE, supporting the current study's findings that this maneuver may be superior to SLM.

Regarding dizziness and functional disability, the DHI scores showed significant improvement in both groups, with CCE yielding a greater reduction compared to SLM. Similar findings were reported by Helminski et al. (12), who demonstrated that the Canalith Repositioning Maneuver led to a greater decrease in dizziness-related disability than other techniques. Additionally, research by Herdman et al. (13) supports the effectiveness of repositioning maneuvers in improving balance and reducing the impact of vertigo on daily activities.

The significant within-group differences observed in both VAS and DHI scores highlight the effectiveness of both interventions in managing vertigo symptoms. This is consistent with previous studies indicating that even single-session repositioning maneuvers can lead to substantial symptom relief (14). However, the non-significant between-group difference post-treatment suggests that while CCE may provide greater symptom relief, both maneuvers are viable treatment options for PC-BPPV.

The results of the present study are also in line with the findings of Furman and Cass (15), who emphasized that maneuvers such as CCE and SLM play a crucial role in repositioning otoconia, thereby reducing symptoms. Additionally, Whitney et al. (16) noted that the choice of maneuver depends on patient-specific factors, including severity of symptoms and clinician preference.

Despite these promising results, this study has some limitations. The sample size was relatively small, which may have influenced the statistical power of the findings. Furthermore, long-term follow-up was not conducted, making it unclear whether symptom relief was sustained over time. Future research should focus on larger sample sizes and long-term effectiveness of these maneuvers.

Conclusion

The results indicate a significant improvement in both VAS and DHI scores within both groups. Between-group comparisons did not yield significant differences in pre-treatment values, but post-treatment values showed notable differences, favoring Group B (CCE). These findings suggest that both interventions were effective in reducing vertigo symptoms, with CCE showing slightly superior outcomes. Further research with larger sample sizes is recommended to validate these findings.

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