Development and Validation of Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire

VARDHA PATTUNDAN

PO1II24S023038

A Dissertation Submitted in Part of Fulfilment of Degree of Master of Science

(Audiology)

University of Mysore

ALL INDIA INSTITUTE OF SPEECH AND HEARING,MANASAGANGOTHRI,

MYSURU-570006

June,2026

CERTIFICATE

This is to certify that this dissertation entitled " **Development and Validation of Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire"** is a bonafide work submitted in part fulfillment for the degree of masters of science(Audiology) of the student with Registration number **P011124S023038**. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any Diploma or Degree.

Mysuru

8th June ,2026

Dr. M. Pushpavathi

Director

All India Institute of Speech and hearing

Manasagangothri, Mysuru Mysuru

57006

CERTIFICATE

This is to certify that this dissertation entitled "**Development and Validation of Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire"** has been prepared under my supervision and guidance. It is also being certified that this dissertation has not been submitted earlier to any other university for the award of any other Diploma or Degree.

11/6/26

Mysuru

June, 2026

Mr. Prajeesh Thomas

Guide

Assistant Professor of Audiology

Department of Audiology

All India Institute of Speech and Hearing,

Manasagangothri, Mysuru-570006

01/6/26

Dr. Vasantha Lakshmi M. S

Co-Guide

Associate Professor in Biostatistics

Center of Excellence (COE-C-PEC)

All India Institute of Speech and Hearing,

Manasagangothri, Mysuru - 570006

DECLARATION

This is to certify that this dissertation entitled "**Development and validation of benign paroxysmal positional vertigo impact and outcome questionnaire**" is the result of my own study under the guidance of Mr. Prajeesh Thomas, Assistant Professor in Audiology, All India Institute of Speech and hearing, Mysuru and co-guide Dr. Vasantha Lakshmi M.S, Associate professor in biostatistics, center of excellence, All India Institute of Speech and hearing, Mysuru and has not been submitted earlier to any other University for award of any other Diploma or Degree.

Mysuru

June ,2026

Registration Number:

PO1II24S023038

Acknowledgements

I would like to express my sincere gratitude to my guide, ***Mr. Prajeesh Thomas****, for his constant guidance, encouragement, valuable suggestions, and unwavering support throughout the course of this dissertation. Your patience, supportive guidance, and mentorship made the entire dissertation process smooth and manageable. I am truly grateful for your willingness to clarify doubts, provide constructive feedback, and guide me at every stage of this study. Your motivation and encouragement have greatly contributed to the successful completion of this work. Thank you for considering and helping me at the last minute also.*

I extend my heartfelt thanks to my co-guide, ***Dr. Vasantha Lakshmi M.S****, for her immense support and valuable guidance in the development of the questionnaire as well as the statistical analysis of this study. Your expertise, insightful suggestions, and continuous encouragement were truly invaluable throughout the research process.*

I would like to express my sincere gratitude to our respected Director, ***Dr. M. Pushpavathi****, for granting me the opportunity and permission to conduct this study at the institute.*

I would also like to express my sincere thanks to ***Apoorva Ma'am*** *for her valuable corrections, constructive suggestions, which greatly contributed to the improvement of this work. Also to the* ***staff members and faculties of the Vestibular Unit*** *for their support during data collection and validation procedures. Your cooperation and assistance played an important role in the successful completion of this work.*

My sincere thanks to all the participants who willingly took part in this study. Their cooperation and valuable participation made this research possible.

*I would like to express my deepest gratitude to my **husband** for his unconditional support, endless encouragement, patience, and understanding throughout this journey. Thank you for constantly pushing and motivating me throughout this Master's journey. Thank you for always reminding me to take a pause and re-energize whenever I was overwhelmed with my studies. Your belief in me and patience with me gave me the strength to complete this work successfully.*

*I am forever grateful to my **father and mother** for their constant prayers, sacrifices, love, and unwavering support in every step of my life. This achievement would not have been possible without you.*

*I also wish to thank my friends the '**adab group'-**"Neba, Zaithu, Masu, and Lulu who have been with me for the past six years. Knowing that you all were there was one of the reasons I decided to pursue my Master's. Your constant support, encouragement, and presence kept me motivated throughout this journey and helped me reach the finish line. And to my **'group' group members**—thank you for always cheering each us on and standing together through every challenge. Thank you for being there in the terrace when ever we needed each other.I also wish to thank people who where there with me that their presence, influence made a lot of impact in my life even if you are not there with me now.*

***To the reader**,Thank you for taking the time to engage with my dissertation. I hope you find it informtaive and useful. With deep gratitude, I now conclude this journey, thankful for every hand that guded me and every heart that supoorted me.*

*Last but not least, I would like to thank **myself** for being strong, hopefull, for surving the silent struggles, for surving the drained days but yet did the best. Through the hurdles, I choose to believe in myself. In the end, I choose me and thankful to me- end of story*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background: Benign Paroxysmal Positional Vertigo (BPPV) is a peripheral vestibular disorder that is highly prevelant and can significantly impact balance, mobility, activities of daily living, emotional well-being, sleep quality and overall quality of life. Existing questionnaire are either general vestibular assesment or primarily diagnostic tools and don't comprehensively evaluate the multidimensional impact of BPPV

Aim: This study aimed to develop and validate a **self-administered questionnaire**, **Benign Paroxysmal Positional Vertigo – Symptom and Clinical Profile Evaluation (BPPV-SCOPE),** to comprehensively asses the multidimensional impact of the BPPV.

Method: A methodological cross-sectional stud with a psychometric validation design wasd conducted in this study. Questionnaire is developed through literature review, patient interviews. Expert consultation, content validation and pilot testing. The final instrument comprised 35 items organized in to seven domains. It was administered to sixty participants (30 individuals diagnosed with BPPV and 30 healthy controls) aged between 20-70 years. Content validity was established usin the Content Validity Ratio (CVR) and Content Validity Index (CVI).convergent validity was assesed via Spearman's correlation with Dizziness Handicap Inventory(DHI).Discriminative validity was evaluated using the Mann-Whitney U test and Receiver operating Characteristics(ROC) analysis. Reliability was measured using Cronbach's alpha and the Intraclass Correlation Coefficient(ICC)

Results: The questionnaire demonstarted good content validity across all the domains and total (CVI=0.80-0.85), excellent convergent validity with DHI, with Spearman's correlation coefficient value of $\rho = 0.981$, $p < .001$, and strong discriminative validity (AUC = 1.00, $p <$

.001). it exhibited a excellent internal consistency (α = 0.945) and test-retest reliability (ICC = 1.000, p < .001).

Conclusion: The BPPV-SCOPE questionnaire is a valid, reliable, self-administered and clinically useful tool for assesing the multudimensional impact of BPPV. Its comprehensive domain-specific evaluation facilitates patient-centered assesment, individualized treatment planning, monitoring of treatment outcomes and in research applications also. Furthur it's a simple self-administered format and cultural relevance enhance its applicability in different clinical settings.

Keywords: Benign Paroxysmal Positional Vertigo (BPPV), BPPV-SCOPE, Questionnaire Development, Psychometric Validation, Quality of Life

CHAPTER I

INTRODUCTION

Maintenance of balance and spatial orientation is a complex process that depends on the coordinated functioning of the vestibular, visual and somatosensory systems. Among these systems, the vestibular system has an important role in detecting head movements, maintaining clear vision during bodily movements and supporting our postural stability (Baloh et al., 2010). When the vestibular system is affected, individuals experience dizziness, vertigo, imbalance, and reduced confidence during movement. These symptoms can significantly interfere with the independence and overall quality of life (Cullen, 2012).

Vertigo is described as a sensation that either the individual or their surrounding environment is moving. It is a common complaint encountered in otologic and neurological practice areas. Among peripheral vestibular disorders, Benign Paroxysmal Positional Vertigo (BPPV) is considered the most common cause of positional vertigo(Bhattacharyya et al., 2017). Epidemiological studies have also identified that BPPV as one of the most prevalent vestibular disorder world widely (von Brevern et al., 2006). BPPV is usually characterised by brief episodes of spinning sensation triggered by changes in head position relative to gravity, such as getting up from a sitting position, turning in bed, bending forward, looking upward, or getting up from a lying position. Although these episodes are brief, they can be distressing and may recur frequently.

The most widely accepted explanation of BPPV physiology is the canalithiasis theory, in which otoconia become detached from the utricle and move into the semicircular canals (Schuknecht, 1969). During positional changes, these particles shift within the endolymph and produce abnormal stimulation of the vestibular receptors, resulting in vertigo and characteristic nystagmus (Epley, 1992). The posterior canal is the most commonly affected canal because of

its anatomical position in the vestibular system, although horizontal and anterior canal variants are also seen (Bhattacharyya et al., 2017).

BPPV may occur without any clear cause, but several associated risk factors have also been identified. Increase in age is considered one of the strongest contributors because of degenerative changes that affect otoconia and the vestibular system(Agrawal et al., 2009a). Other noted factors include head injury, vestibular neuritis, migraine, osteoporosis, diabetes mellitus, hypertension, prolonged bed rest and vitamin D and vitamin B3 deficiency (Jeong et al., 2013). These factors may influence the onset of the condition and the likelihood of recurrence (von Brevern et al., 2006).

Studies indicate that BPPV is highly prevalent worldwide. Lifetime prevalence has also been estimated to be around 2% to 3%, with higher occurrence among older adults and females(Von Brevern et al., 2007). In clinical practice, a considerable proportion of patients with complaints of dizziness are eventually diagnosed with BPPV (Bhattacharyya et al., 2017). Despite being common and treatable, many of the cases remain unrecognised, particularly in rural and community settings where access to specialised vestibular testing services may be limited.

Although BPPV is not a life-threatening disorder, it can create a substantial burden for the affected individuals. Recurrent episodes of vertigo, fear of falling and imbalance may interfere with walking, driving, climbing stairs, work schedules and household tasks. Many individuals begins to avoid movements or any particular environments that trigger the symptoms, which can lead to activity restriction and reduced participation in everyday life (Whitney et al., 2005). In older adults, these situations are especially significant because dizziness-related falls may result in injury, functional decline, and reduced confidence.

The effects of BPPV are not limited to physical symptoms. Research has shown that individuals with vestibular disorder commonly experience anxiety, frustration, fear of

recurrence and reduced emotional well-being (Balaban & Jacob, 2001a). Sleep disturbances are also reported frequently, especially when turning in bed provokes vertigo. Poor sleep may further contribute to daytime fatigue, reduced concentration and irritability. Some individuals also report cognitive difficulties, such as mental fatigue, forgetting things, and difficulty focusing during the attack period (Smith, 2017). Therefore, BPPV is increasingly being recognised as a multidimensional condition affecting physical, emotional and social well-being.

Diagnosis of BPPV depends on the patient's history and positional tests such as the Dix-Hallpike maneuver and the Supine Roll Test. These will help in identifying the affected canal and guide the treatment decisions (Bhattacharyya et al., 2017). The canalith repositioning maneuver, such as Epley's maneuver are considered the first line of treatment and often provides fast relief from symptoms (Epley, 1992). Additional maneuvers, including the Gufoni's maneuver, are useful in specific canal variants (Hall et al., 2022). However, successful repositioning does not always show a complete recovery. Some patients will continue to report dizziness, fear of movement, imbalance or recurrence of symptoms even after treatment (Brandt et al., 2006).

Traditional vestibular assessment will mainly focus on identifying the physiological cause of symptoms and treatment success. While these methods are clinically valuable, they may not fully show how the disorder affects a patient's daily life, emotional well-being or perceived recovery. For this reason, patient-reported outcome measures (PROMs) have been increasingly important in research and clinical practice. PROMs will provide direct insight into symptom severity, functional limitations and treatment outcomes from the patient's perspective (Kyte et al., 2015). They also support more-centred approach to care and clinical decision-making (Churruca et al., 2021).

Several standardized questionnaires are commonly used in the vestibular practice, including Dizziness Handicap Inventory (DHI), Vertigo Symptom Scale (VSS), Activities-Specific Balance Confidence Scale (ABC), and Vestibular Disorders Activities of Daily Living Scale (VADL). The DHI is the only widely used to asses dizziness-related disability (Jacobson & Newman, 1990). The VSS is commonly used to evaluate the vertigo symptom severity(Yardley et al., 1992). The ABC scale measures a person's confidence in maintaining the balance during everyday activities (Powell & Myers, 1995). Meanwhile, the VADL focuses on how the vestibular problem limits daily activities (Gold & Kimball, 2000). However, most of these tools were created for vestibular disorders in general, not specifically for BPPV. Because of this they might miss the important details like specific positional triggers, patterns of recurrence, brief episodes of vertigo, symptom linked to particular inner ear canals and changes after treatment.

To fill these gaps, a few questionnaires specifically for the BPPV have benn developed mainly aimed at screening or identifying subtypes. For example, Kim's six-item questionnaire has proven to be helpful in spotting probable BPPV cases (Gold & Newman-Toker, 2020). Another brie five-question tool recently created to make predicting BPPV easier in clinical settings (Muraleedharan et al., 2024). Some additional questionnaires helps to classify subtypes or distinguish BPPV from other vestibular disorders (Qiao et al., 2022). However, these tools mainly focuses on diagnosis and classificiation. They often don't asses how BPPV affects daily functioning, quality of life, emotional well-being or treatment results (Wan et al., 2023).

1.1 Need for the Study

The need for a culturally appropriate questionnaire is especially important in india. Factors like language difference, literacy levels, Cultural understandings of symptoms and access to healthcare can affect how the patients interpret and answer questionnaires. Using tools designed for other populations without adaptation may reduce the clarity, accuracy and

usefulness (Beaton et al., 2000). Developing a questionnaire in English but tailored to local clinical settings could improve patient understanding and response accuracy, making it relevant for both rural and urban populations.

A single BPPV-specific questionnaire that covers the symptoms, functional limitations, psychosocial effects and treatment outcomes would be very valuable. It would support a patient-centered care, help tailor the treatment plans, track recovery over time and bring consistency to research efforts. Such a tool would be particularly useful in places where advanced vestibular testing is not readily available.

Considering the complex impact of BPPV and the shortcoming of existing tools, this study proposes the development and validation of Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire. This new tool aims to comprehensively evaluate the symptoms, emotional well-being and functional effects in people with BPPV, while being culturally relevant and practical for use in the indian context.

1.2 Aim of the Study

The aim of the study is to develop and validate a self- administered outcome measure, the Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire, that throughly evaluates how BPPV affects patients daily lives across multiple dimensions.

1.3 Objectives of the Study

1. To develop the Benign Paroxysmal Positional Vertigo Impact and Outcome Questionnaire
2. To determine the psychometric properties of the developed questionnaire by establishing its validity convergent, concurrent, discriminative) and reliability.

CHAPTER II

REVIEW OF LITERATURE

2.1 Vestibular System and Balance Physiology

Maintaining balance and spatial orientation is a complex process that relies on coordinated functioning of three major sensory system. They are the vestibular, visual and somatosensory systems. Among these, the vestibular system plays a crucial role in detecting head movements in relation to gravity, helps maintain posture and stabilises the vision during motion (Baloh et al., 2010). The vestibular system is located in the inner ear and consists of two main parts: the semicircular canals and the otolith organs, including the utricle and saccule. Together, these structures detect both angular and linear head movements. The semicircular canals are specialised in sensing rotational or turning movements, while the otolith organs respond to gravity and linear acceleration (Goldberg, 1991)

There are three semicircular canals positioned at right angles to each other-anterior, posterior and horizontal-allowing detection of the movements in all three planes. Each canal contains endolymph fluids and a sensory organ called the crista ampullaris, where hair cells are embedded in the gelatinous structure, cupula. When the head rotates, endolymph movement bends the cupula, stimulating the hair cells. This generates impulses that travel through the vestibular nerve to the brainstem and cerebellum (Purves et al., 2001). The utricle and saccule contain a sensory area called the maculae, which is responsible for linear acceleration detection and head position. These organs contain tiny calcium crystals known as otoconia, embedded in a gelatinous layer. Changes in the head position or movement cause these crystals to shift, bending the underlying hair cells and providing the brain with information about gravity and orientation (Kandel et al., 2021).

Vestibular impulses are mainly processed in the vestibular nuclei of the brainstem and cerebellum. Here, it integrates with proprioceptive and visual input to produce coordinated responses that help maintain balance, stabilise eye movements, and control posture. One of the most significant reflexes resulting from this integration is the vestibulo-ocular reflex(VOR), which allows the eyes to remain fixed on an object even while the head is moving (Leigh & Zee, 2015)When vestibular functioning is disrupted, individuals may experience vertigo, difficulty with spatial orientation and imbalance. Among peripheral vestibular disorders, BPPV is considered the most common condition affecting the vestibular system.

2.2 Mechanisms of Balance and Postural Control

Balance control depends on the continuous interaction of three components: sensory input, central nervous system processing, and motor responses. Information from the vestibular, visual and proprioceptive receptors is constantly combined to help maintain the body's stability. This process of multisensory integration enables individuals to respond effectively to changes in the environment and maintain an upright posture (Horak, 2006).The vestibular system plays an important role in maintaining posture and stabilising gaze. Vestibular signals assist in regulating the muscle tone, coordinating the eye movements and preserving orientation with respect to gravity which is one of the main mechanisms involved in the vestibulospinal reflex, which helps to activate postrual muscles and maintain balance during movements (Cullen, 2012).

With advancing age, vestibular funtion eventually declines and can negatively affect the balance performance. Degeneration of sensory hair cells, loss of nerve fibres and reduced efficiency of central processing may results in poor balance control and a greater risk of falls among older adults (Allen et al., 2016). These age-related physiological changes may also explain higher prevalence of vestibular disorders such as BPPV in the elderly population.

2.3 Benign Paroxysmal Positional Vertigo: Definition and Clinical Characteristics

BPPV is a common peripheral vestibular disorder that causes a brief episodes of vertigo when the head changes position relative to the gravity. The term "benign" indicates that this condition is not life-threatening, "paroxysmal" refers to the sudden and brief attacks, "positional" means the symptom is triggered by certain head movement and 'vertigo' describes the spinning sensation experienced by the individual (von Brevern et al., 2017). BPPV is considered as the most frequent cause of positional vertigo and is responsible for nearly 20-30% of patients who seek medical attention for dizziness (Bhattacharyya et al., 2017). Although it can occur at any age and it is seen more commonly in older adults. The main clinical feature of BPPV is brief episodes of vertigo, usually lasting less than a minute, that are triggered by changes in head position such as lying down, looking up, bending forward, getting up from bed. These episodes may also be associated with nystagmus, vomiting, nausea and a feeling of imbalance (Kim & Zee, 2014).

2.4 Pathophysiology of BPPV

The underlying pathophysiology of BPPV was first explained by Schuknecht (1969) and later further developed by Epley (1992). The most widely accepted explanation is the canalithiasis theory, which proposes that BPPV occurs when the otoconia become dislodged from utricle and enter one of the semicircular canals. Normally otoconia are embedded within otolith membranes of the utricle and saccule, where they help detect the gravity and linear motion. However, factors such as ageing, head injury, infections or degenrative changes may cause these crystals to detach. Once dislodged, they migrate into the semicircular canals. During changes in head position, these free-floating particles move within the canal fluid, leading to the abnormal stimulation of hair cells and producing episodes of vertigo (Epley, 1992).

Among the semicircular canals, the posterior semicircular canal is most frequently affected accounting for 80-90% of BPPV cases. This is mainly due to its anatomical position, which makes it easier for the displaced otoconia to enter and remain trapped under the influece of gravity (Bhattacharyya et al., 2017).

The two primary mechanisms of BPPV described in the literature are canalithiasis and cupulolithiasis.

2.4.1 Canalithiasis

Canalithiasis is the most common mechanisms underlying BPPV and occur when loose otoconia are freely floating within the semicircular canals. When the head changes its position, these particles will move within canal fluid, creating abnormal endolymph flow. This movement stimulates the vestibular receptors and results in short episodes of vertigo accompanied by nystagmus (Von Brevern et al., 2017).

2.4.2 Cupulolithiasis

Cupolithiasis occurs when otoconia adhere to the cupula of semicircular canal. This results in the perisistant defection of the cupula, leading to the prolonged vertigo symptoms compared to the canalithiasis(Correa, 2025).

2.5 Classification of BPPV

BPPV is classified based on the semicircular canal involved:

1. **Posterior Canal BPPV** – most common type, characterised by torsional up-beating nystagmus.
2. **Horizontal Canal BPPV** – presents with horizontal nystagmus and positional vertigo.

3. **Anterior Canal BPPV** – rare, associated with down-beating nystagmus

Each of these subtypes presents with a distinct clinical features and requires a specific diagnostic maneuvers and treatment strategies.

2.6 Epidemiology and Prevalence of BPPV

BPPV is recognised as one of the most common peripheral vestibular disorders worldwide. Epidemiological research suggests that its lifetime prevalence is around 2-3% with higher occurrence among older adults (Von Brevern et al., 2015).Community-based studies have estimated that the annual incidence is approximately 64 cases per 100,000 people. However, the actual number of affected individuals may be higher, as many cases go undiagnosed and unreported especially in rural areas where awareness and access to healthcare may be limited(Neuhauser, 2007). In clinical practice, BPPV represents a large proportion of patients who seeks medical attention for dizziness. Nearly one-third of the individuals presenting with vertigo-related complaints are eventually diagnosed with BPPV (Bhattacharyya et al., 2017).

Age plays an important role in the occurrence of BPPV. The disorder is uncommon in children but becomes increasingly common after age 50. This rise in prevelance is believed to be related to the degeneration of otoconia and age-related changes within the vestibular system(Agrawal et al., 2009). Differences between females and males have also been reported. BPPV is more common in women than in men, with studies suggesting a female to male ration of nearly 2:1. Hormonal influences and conditions such as osteoporosis have also been suggested as possible contributing factors (Jeong et al., 2013).

Data on prevalence of BPPV in india remain limited. However, hospital-based studies indicate that BPPV is a frequently diagnosed condition among the patients visiting the

otolaryngology and audiology departments. In indian clinical settings, reported prevalence rates range from 8-12% among individuals presenting with vertigo-related complaints (Yetiser & Ince, 2015). Several factors may contribute to the under-diagnosis of BPPV in india, especially in rural communities. Limited access to healthcare services, lack of awarness about the vestibular disorder and cultural beliefs may prevent many individuals from seeking appropriate treatment. In some cases, symptoms are often mistaken for the general weakness, stress or normal ageing rather than being recognised as a treatable vestibular disorder (Muraleedharan et al., 2024).

2.7 Clinical Features and Symptom Profile of BPPV

BPPV usually presents with a distinct group of symptoms, the most prominent of which is the vertigo triggered by changes in the head position. These symptoms occur because of the displaced otoconia abnormally stimulate the semicircular canal, leading to a sudden sensation of movements. Although BPPV is considered benign, it can greatly interfere with the daily functioning and overall quality of life. The most common symptom of BPPV is short, repeated episodes of spinning sensation that usually last for a few seconds to less than a minute. These attacks are often triggered by actions such as lying down, bending forward, turning over in bed or looking upwards. The sudden onset and brief duraiton of vertigo are important clinical features that will help differentiate BPPV from other vestibular disorders(Bhattacharyya et al., 2017).

Patients may describe the experience as either feeling that they themselves are spinning or sensing that the surrounding environment is rotating. Along with vertigo, many individuals report imbalance, fear of falling and unsteadiness especially immediately after an episode. In some cases, mild disequilibrium may continue for minutes to even hours due to temporary vestibular disturbance (Kim & Zee, 2014). Nystagmus is an important clinical sign seen during

positional tests such as Dix-Hallpike Maneuver. The type, direction and duration of nystagmus will help in identifying which semicircular canal is affected. Posterior canal BPPV commonly produces torsional up-beating nystagmus, while the horizontal canal is associated with horizontal nystagmus (von Brevern et al., 2017).

Autonomic symptoms are frequently reported during the episodes. Patients may experience vomiting, nausea, sweating and palpitations. These reactions are thought to occur because of abnormal interactions between the vestibular system and autonomic centres in brainstem (Baloh et al., 2010). BPPV can also affect emotional and cognitive well-being. Some patients report difficulty in concentrating, mental fatigue, reduced confidence and anxiety in carrying out everyday tasks. The fear of sudden vertigo atatcks may lead to avoidance of certain movements or social situations (Zein-Elabedein et al., 2025).

Sleep problems are another common concern for these individuals. Many individuals avoid certain sleeping positions or wake during the night when changing the posture triggers the vertigo. Over time, disturbed sleep may results in daytime tiredness and reduced productivity (Whitney et al., 2005).

2.8 Functional Impact of BPPV Symptoms

Although BPPV is generally considered as a benign disorders, its symptoms can have a considerable impact on everyday life. The main difficulties usually arise from dizziness, fear of falling, imbalance and a tendancy to avoid movements that may trigger vertigo episodes. Many individuals with BPPV report challenges with routine activities such as walking on uneven grounds, driving, climbing stairs and managing household tasks. Work performance may also be affected, escpecially in occupation that requires quick head movements, frequent position changes or good balance control (Whitney et al., 2005).

BPPV can also lead to limitations in social and physical participations. Some patients avoid going out, travelling or exercising because they worry that vertigo may occur unexpectedly. Over time, these changes in bahaviour may reduce the independence and negatively affect the overall quality of life (Franco et al., 2023). The condition may also influence who experience repeated episodes. The unpredictable nature of BPPV often causes emotional distress, fear of recurrence and reduced confidence (Zein-Elabedein et al., 2025).

2.9 Risk Factors Associated with BPPV

Several factors can increase the likelihood of developing BPPV. Among these, ageing is considered the most important risk factor, as the otoconia gradually degenerate and become more prone to displacement with increasing age. This risk is higher in people aged 60 or older. Researchers have also identified other factors contributing to the development of BPPV, which increase the risk with age (but not limited to those aged 60 or older). This includes those with head injury, vestibular neuritis, osteoporosis, migraine, vitamin D and B3 deficiency and long periods of bed rest or reduced movement. Certain metabolic disorders, including hypertension and diabetes, are also linked to a greater risk of developing BPPV (von Brevern et al., 2006). Certain metabolic disorders, including diabetes and hypertension, have also been linked to a greater risk of developing BPPV (Jeong et al., 2013).

Head trauma is another significant cause of BPPV. Injury to the head can mechanically dislodge otoconia from the utricle, allowing them to enter the semicircular canal and trigger the vertigo episodes. Studies have shown that post-traumatic BPPV may account for approximately 15-20% of all cases (Hoffer et al., 2004). Metabolic and systemic factors have been an important influence. Vitamin D deficiency has been strongly linked to a higher risk of recurrent BPPV. Low serum vitamin D levels may affect the calcium metabolism within otoconia, making them more fragile and prone to detachment (Jeong et al., 2013). Other

conditions as mentioned before, may also increase the susceptibility by affecting the normal structure and function of otolith organs (Von Brevern et al., 2006).

2.10 Recurrence of BPPV

Though repositioning maneuvers are effective in treating the BPPV, recurrence of symptoms is not uncommon. Research has shown that recurrence rates may range from 15-50% within the first 5 years after successful treatment. The likelihood of the recurrence is higher in individuals with advanced age, gender, vitamin deficiencies and associated with medical conditions (Brandt et al., 2006).

Repeated episodes of BPPV can affect the daily functioning and emotional well-being. Frequent recurrences may lead to a reduced confidence, activity limitations and increased anxiety about future attacks. For this reason. Regular follow-up and long-term monitoring are important parts of effective BPPV management.

2.11 Multidimensional Impact of BPPV

Although BPPV is considered as a non-life threatening disorder, it can have a major impact on everyday functioning. Recurrent episodes of vertigo along with imbalance and fear of falling, often make it difficult for the individual to carry out the daily routine activities comfortably and safely. Functional difficulties in BPPV are mainly related to the postrual instability and sensitivity to movement. Many patients report problems like walking in uneven places or in crowded places. Tasks such as climbing stairs, bending down or making a quick head movements will trigger the vertigo, causing indivduals to avoid these kinds of activities whenever possible (Whitney et al., 2005).

Research has also shown that the people with BPPV may reduce their overall physical activity because of fear of the symptoms. Lower activity levels can lead to muscle deconditioning, which may further worsen the balance problems and increase the risk of falls. As a result, some of the patients enter a cycle of inactivity, declining functional ability and fear (Agrawal et al., 2009). BPPV can also affect occupational performance. Individuals whose job involve frequent head movements, visual tracking or physical effort may find it difficult to meet the work demands. Recurrent vertigo episodes can lead to a reduced productivity, missed working hours or the need for temporary job modifications (Franco et al., 2023).

Beyond its physical symptoms, BPPV can also cause a significant restriction in social participation. Many individuals begin to avoid social gatherings, travelling or recreational activities because they fear experiencing vertigo in public or any unfamiliar settings. According to the international Classification of Functioning, Disability and Health (ICF) framework, BPPV can affect several areas of life, including the body functions, the ability to perform activities, and participation in the social roles. As a result, some individuals will reduce their involvement in community and social activities, which may negatively influence social connection and overall quality of life (World Health Organization, 2001). Studies have shown that many people with BPPV limit their routine activities such as shopping, attending family or social events, and participating in exercise. Over time, these restrictions may reduce independence, lower self- confidence and affect the general well-being (Whitney et al., 2005).

Psychological distress is an important consequence of BPPV. Many individuals experience low mood, anxiety and fear of falling as a result of recurrent vertigo episodes. Because attacks often occur suddenly and unpredictably, patients may develop an ongoing worry and emotional stress. This relationship may be explained by close connections between

the vestibular pathways and the limbic system, which plays a major role in emotional regulation (Balaban & Jacob, 2001).

Fear of falling is especially common among the older adults with BPPV. Even when no actual fall has occurred, many individuals continue to feel the unstable and unsafe while moving. This may lead to overly cautious movements patterns, reduced confidence and avoidance of routine activities. Such persistent concerns are often referred to as a postrual anxiety, can greatly limit the mobility and independence (Agrawal et al., 2009). Depressive symptoms have also been reported, particularly in people with chronic or recurrent BPPV. Emotional difficulties may develop because of the activity restrictions, social withdrawal and reduced quality of life. In turn, these psychological factors can increase the perceived severity of dizziness and may slow the recovery (Zein-Elabedein et al., 2025).

Recent research suggest that vestibular dysfunction may also influence the cognitive functioning. Many individuals with BPPV report the problems such as difficulty concentrating, mental fatigue and a reduced attention span, especially during or after vertigo episodes. The vestibular system has important connections with several brain regions involved in spatial orientation and higer cognitive processes. When the vestibular input is disrupted, functions such as spatial memory, attention and navigation may be affected (Smith, 2017). Another common featuren seen in BPPV is increased visual dependence. In these cases, patients rely heavily on visual information to maintain the balance. As a result, environments with excessive visual motion or complexity-such as crowded places, supermarkets or traffic may provoke discomfort and worsen the dizziness. This mismatch between visual and vestibular input can intensify the symptoms.(Cousins et al., 2014).

Sleep disturbances are commonly reported by the individuals with BPPV. Vertigo triggered by turning in bed or changing position during the night will interrupt sleep and make

restful sleep difficult to achieve. Many patients start to avoid certain sleeping position out of fear of triggering symptoms, which may further reduce the sleep quality and lead to daytime fatigue. Ongoing sleep problems can also contribute to emotional stress, poor concentration, reduced cognitive performance and a decline in overall well-being. Research have shown that people with vestibular disorder often experience significantly poorer sleep quality compared with healthy individuals (Mutlu & Topcu, 2022).

Quality of life (QoL) is a broad concept that includes physical health, emotional well-being, social participation and the ability to function independently in their daily life. BPPV can negatively affect all of these areas. Many individuals with BPPV experience difficulties with mobility, reduced confidence in moving independently, and less participation in social or recreational activities. Emotional factors such as anxiety and stress can furthur reduce the overall life satisfaction and well-being (Franco et al., 2023). Studies using a patient-reported outcome measure have shown that people with BPPV often report lower quality of life scores compared with the healthy individuals. Even after a sucessful treatment, some patients may continue to experience mild residual symptoms that interfere with everyday functioning (Whitney et al., 2005).

2.12 Treatment Approaches in BPPV

The primary treatment for BPPV involves the canalith repositioning maneuvers designed to relocate displaced otoconia back to the utricle. These maneuvers are quick, highly effective and non- invasive.

2.13 Repositioning Maneuvers

The Epley's Maneuver is the most commonly used treatment for posterior canal BPPV. It consist of sequence of carefully guided head and bodily movements designed to move the

displaced otoconia out of semicircular canal and back into utricle, where they no longer trigger the vertigo. Studies have also shown a success rate of more than 80-90% after one or two treatment sessions (Epley, 1992). For horizontal canal BPPV, repositioning techniques such as Gufoni's and the Barbeque roll Maneuvers are frequently recommended. These maneuvers are highly effective and widely used in clinical practice to relieve symptoms by repositioning the displaced particles (Alfarghal et al., 2023).

2.14 Pharmacological and Rehabilitation Approaches

Medications are generally not considered as a primary treatment for BPPV. While vestibular suppressants may offer a short-term relief from the symptoms such as nausea or dizziness, they do not correct underlying cause, which is the displacement of otoconia within the semicircular canal. Vestibular Rehabilitation Therapy (VRT) can be helpful for the individuals who continue to experience the imbalance or have a recurrent episodes of BPPV. This form of therapy uses specific exercises to improve gaze stability, postrual control, balance and brain's ability to integrate the senosry information more effectively (Hall et al., 2022).

2.15 Treatment Outcomes and Recovery

Most individuals experience a rapid relief of symptoms after a canal repositioning maneuvers. Howerver, some patients may continue to report mild dizziness, imbalance or sense of unsteadiness even after sucessful treatment. Research suggest that nearly 30% of patients experience residual symptoms following repositioning procedures. These lingering complaints may be related to the incomplete central compensation or ongoing vestibular dusfunction despite correction of positional vertigo (Lee & Kim, 2010). Long-term outcomes can differ from a person to person and are influenced by factors such as recurrence risk, associated medical conditions and how consistently the rehabilitation recommendations are followed. For

this reason, a through and ongoing assesment of outcomes is an important part of effective BPPV management.

2.16 Role of Patient-Reported Outcome Measures in Vestibular Disorders

The assesment of vestibular disorder has traditionally depended on clinical examination and objective diagnostic methods such as positional testing, vestibular function tests and imaging procedures. Although these approaches are important for identifying the underlying physiological causes of vestibular dysfunction, they may not fully reflect how the condition affects a patients everyday life activities, emotional well-being and overall quality of life. Patient outcome measures (PROMs) have become increasingly valuable in both clinical and resarch setting, as they provide direct information about the patients own experience, perceived difficulties and response to treatment.

These tools help the clinicians to understand symptom severity, track progress over time and evaluate the effectiveness of rehabilitation or medical interventions (Kyte et al., 2015). In vestibular disorders, PROMs are especially useful because symptoms such as dizziness, imbalance and motion sensitivity are highly subjective and cannot always be measured accurately through an objective test alone. Standardized questionnaires allow for a more comprehensive and consistent assessment, improve communication between clinicians and patients and contribute to the evidence- based treatment planning (Churruca et al., 2021).

2.17 General Questionnaires Used in Vestibular Disorders

Over the past few decades, several standardized questionnaires have been introduced to evaluate dizziness and vestibular dysfunction. While these tools are widely used in both the clinical practice and research, most were developed to asses vestibular disorders in general rather than being specifically tailored for BPPV.

2.17.1 Dizziness Handicap Inventory (DHI)

The Dizziness Handicap Inventory (DHI), developed by Gary P. Jacobson and Craig W. Newman (1990), is one of the most commonly used questionnaires for evaluating how the dizziness affects a person's daily life. It includes 25 items that are grouped into three areas: functional, emotional, and physical impact. The DHI has shown strong reliability and validity in a wide range of vestibular disorders and frequently used to asses the treatment outcomes. Studies involving patients with BPPV have also used DHI to evaluate perceived disability and quality of life. Significantly reduced quality of life and increased dizziness-related handicap were observed among patients with positional vertigo when assesed using DHI (Handa et al., 2005). Scores were reported in patients with lateral canal BPPV, indicating a greater perceived disability compared to other canal variants (Martens et al., 2019).

However, the DHI mainly measures overall disability associated with dizziness and does not specifically capture positional triggers or the belief, episodic symptoms typically seen in BPPV (Whitney et al., 2005).

2.17.2 Vertigo Symptom Scale (VSS)

The Vertigo Symptom Scale(VSS) developed by Lucy Yardley et al. (1992), used to asses the frequency and severity of vertigo-related symptoms, along with the anxiety that may accompany them. It contains subscales that measure vestibular symptoms as well as autonomic symptoms. The VSS has been applied in studies involving patients with vestibular disorders, including BPPV, to assess symptom severity and associated psychological distress. Studies examining the psychometric properties of the VSS have demonstrated that it is a reliable and valid measure for dizziness-related symptoms in vestibular populations (Wilhelmsen et al., 2008). In addition, Turkish adaptation studies involving patients with BPPV supported the

reliability and validity of the VSS in assessing vertigo severity and symptom burden (Yanik et al., 2008).

While the VSS is useful for measuring the intensity and frequency of vertigo symptoms, studies have also noted that it has limitations in evaluating the broader impact of the condition. It does not adequately asses day to day functional difficulties, changes following treatment or the tendency for symptoms to recur, all of which are particularly important in patients with BPPV(Wilhelmsen et al., 2008).

2.17.3 Activities-specific Balance Confidence Scale (ABC)

The Activities-specific Balance Confidence Scale (ABC), developed by Powell and Myers (1995), assesses an individual's confidence in maintaining balance during various activities. It is commonly used in vestibular rehabilitation and fall risk assessment.

Several studies involving patients with vestibular disorders, including BPPV, have used the ABC scale to evaluate balance confidence and fear of falling. A significant relationship was observed between dizziness-related handicap and balance confidence in individuals with vestibular dysfunction, indicating that increased perceived handicap was associated with reduced confidence during balance-related activities (Whitney et al., 1999). More recent studies have also shown that lower ABC scores are associated with poorer balance performance and increased fall risk in vestibular patients (Herssens et al., 2021).

While the ABC scale provides insight into functional confidence, it does not evaluate vertigo characteristics, emotional impact, or treatment outcomes (Powell & Myers, 1995).

2.17.4 Vestibular Disorders Activities of Daily Living Scale (VADL)

The Vestibular Disorder Activities of Daily Living Scale(VADL), developed by Helen S. Cohen and Kay T. Kimball (2000), measures the functional limitations in daily living activities caused by vestibular disorders. It assesess mobility, self-care and instrumental activities.

The VADL has been used in patients with vestibular dysfunction to identify activity limitation and participation restrictions associated with the dizziness and imbalance. Studies have shown that this scale is useful in evaluating functional disability in vestibular populations and demonstrate a good psychometric properties (Ricci et al., 2014).

Although the VADL is helpful in assesing functional limitations caused by the vestibular disorders, it does not specifically address the positional triggers, recurring episodic vertigo or treatment-related improvements that are commonly seen in BPPV (Cohen & Kimball, 2000).

2.18 Questionnaires Specifically Developed for BPPV

Recognizing the limitations of general vestibular tools, researchers have developed several questionnaires specifically designed for BPPV.

2.18.1 Kim's Six-Item BPPV Questionnaire

Kim et al. (2020) developed a brief six-item diagnostic questionnaire that designed to help identify BPPV and determine affected semicircular canal. The questionnaire was developed to support the rapid clinical screening based on symptom characteristics and positional triggers.

In clinical validation studies, the tool demonstrated a high sensitivity and specificty for identifying BPPV and differentating the canal involvement, suggesting a good diagnostic accuracy and clinical usefilness. The questionnaire was found to be particularly effective in identifying posterior canal BPPV, which is the most common subtype seen (Kim et al., 2020). Studies also reported that the questionnaire was easy to administer and useful in out-patient settings where positional testing may not always be immediately available.

However, the questionnaire is mainly intended for a diagnostic purpose and does not evaluate the functional impact of condion, its effect on quality of life, psychological consequences ot outcome following treatment.

2.18.2 Five-Question Predictive Questionnaire

Muraleedharan et al. (2024) introduced a brief five-question screening tool aimed at predicting BPPV in the rural and resource-limited clinical settings. The questionnaire was developed to improve early identification of patients who may require the vestibular assessment and positional testing.

The study demonstrated a strong diagnostic accuracy, with high sensitivity and high specificity for identifying probable BPPV cases. The questionnaire was also reported as simple, cost-effective and practical for routine use in primary healthcare settings, particularly in areas where access to vestibular specialists is limited. In addition, the authors highlighted its usefulness in community-based screening programs and referral planning (Muraleedharan et al., 2024).

However, while the questionnaire is useful as a screening measure, it does not assess the symptom severity, functional limitations, recurrence patterns, emotional impact, or changes following treatment.

2.18.3 Subtype-Determining Questionnaire

Wan et al. (2023) developed a questionnaire designed to identify different BPPV subtypes based on symptoms characteristics and positional triggers reported by the patients. The questionnaire aimed to assist clinicians in distinguishing canal involvement before positional testing.

Clinical evaluation of the tool demonstrated moderate reliability and acceptable diagnostic performance in identifying common BPPV subtypes. The study suggested that the questionnaire may help support clinical decision- making and improve diagnostic efficiency in vestibular clinics. However, the authors have also reported that diagnostic accuracy was lower in older adults, possibly because elderly patients often present with atypical, less specific or more variable vestibular symptoms (Wan et al., 2023).

Although the questionnaire may be clinically useful for subtype identification, it does not provide information regarding the disability, activity limitation, quality of life, or treatment-related improvement.

2.18.4 Screening Questionnaires for Positional Vertigo

Several additional screening questionnaires have been developed to help differentiate BPPV from other vestibular disorder based on the symptom patterns and positional characteristics. These tools are primarily intended to support early diagnosis and improve referral accuracy in both primary care and specialized vestibular settings.

Symptom based questionnaires used in the screening of positional vertigo have been reported to improve the identification of BPPV when combined with clinical examination

findings. Structured screening tolls have also been found to reduce diagnostic delays and enhance the awareness of vestibular disorders among healthcare professionals (Qiao et al., 2022).

However, most of these questionnaires mainly focus on diagnostic identification and screening. They generally do not provide a comprehensive assessment of symptom severity, long-term functional impact, psychosocial consequences, quality of life or treatment outcomes in patients with BPPV (Qiao et al., 2022).

2.19 Limitations of Existing Questionnaires

Although several assessment tools are currently available, a number of important limitations still exist. Most questionnaires are designed mainly to support the diagnosis rather than to evaluate how BPPV affects a patient's daily life. Many of them also fail to asses treatment outcomes or monitor recurrence of symptoms over time. In addition, functional difficulties, psychological effects and social participation are often not adequately addressed. The usefulness of some tools may also be reduced in diverse populations because of challenges related to the cultural adaptation and language differences. Furthermore, clinicians often need to use multiple questionnaires to asses the different aspects of condition, which can increase the patient burden and reduce practicality in clinical settings. These gaps ampasize the need for a comprehensive, disease-specific assesment tool for BPPV.

2.20 Need for a Comprehensive BPPV Questionnaire

BPPV is a multidimensional condition that will influence the physical functioning, emotional well-being, cognitive performance and social participation. Because of this broad impact, an effective management requires the assesment tools that captures all of these important areas rather than focusing on symptoms. A comprehensive questionnaire would help

the clinicians understand symptoms characteristics, identify functional limitations, monitor the treatment progress, track the recurrence patterns and evaluate the patients overall quality of life. This would allow for a more complete understanding of condition and a better individualized care.

In addition, there is a stronger need for a culturally appropriate questionnaire tailored to Indian population. Factors such as language diversity, literacy and differences in access to healthcare may affect how patients describe symptoms and respond to questionnaire (Beaton et al., 2000). Developing a single unified tool that combines symptom assesment with outcome evaluation could reduce the response burden, improve the quality of collected data and make clinical assesment more efficiently. Such a tool would promote patient-centred care, support informed clinical decision-making and strengthen the research in vestibular disorders.

The literature shows that BPPV is a common vestibular disorder that can have a considerable impact on individuals functional abilities, psychological well-being and overall quality of life. Although a number of diagnostic and assesment tools are available, none fully captures the multidimensional effects of condition of the outcomes following the treatment. The lack of a culturally relevant, disease-specific questionnaire highlights the need to develop a comprehensive tool specifically tailored for the Indian population.

CHAPTER III

METHODS

The present study was a methodological cross-sectional study with a psychometric validation design**,** aimed at the development and validation of the benign paroxysmal positional vertigo impact and outcome questionnaire**.** The psychometric evaluation included assessment of content validity, discriminative validity, convergent validity, internal consistency, and test–retest reliability. Participants were recruited using a purposive sampling technique.

3.1 Participants

sixty individuals within the age range 20-70 years (as per the literature report of most common occurrence of BPPV in this age group, Zhao et al., 2025; (Palmeri & Kumar, 2022)) were included in the study. Thirty individuals diagnosed with confirmed benign paroxysmal positional vertigo (BPPV) within the last 6 months were included in the benign paroxysmal positional vertigo group, and thirty individuals with normal auditory and vestibular function were included in the healthy group. Table 1 contains demographic characteristics of the participants

Table 3.1

Demographic details of the participants

Variable	BPPV Group (n=30)	Healthy Group (n=30)	Total (n=60)
Mean Age ± SD	45.67 ± 16.17	38.43 ± 11.34	42.05 ± 14.27
Age Range	20–70	20–70	20–70
Male	12	13	25
Female	18	17	35
Male (%)	40.0%	43.3%	41.7%

Variable	BPPV Group (n=30)	Healthy Group (n=30)	Total (n=60)
Female (%)	60.0%	56.7%	58.3%

Participants for the present study were selected based on predetermined inclusion and exclusion criteria. For the Benign Paroxysmal Positional Vertigo (BPPV) group, individuals within the age range of 20 to 70 years who had been diagnosed with BPPV within the last six months were included. All participants in this group had undergone detailed Audiological, otolaryngological and neurological evaluations to rule out other possible causes of dizziness. In addition, individuals with adequate English literacy to independently comprehend and complete the questionnaire were included. English proficiency was informally assessed through a brief conversation during case-history taking and participant self-confirmation.

For the healthy control group, individuals within the age range of 20 to 70 years with no history of vestibular dysfunction were included. The participants in healthy group also underwent detailed audiological evaluation, otolaryngology consultation and detailed balance related case history by an expert audiologist to rule out potential conditions affecting balance. Similar to the clinical group, participants in the healthy group were also required to have basic literacy in English to ensure adequate understanding of questionnaire items.

Participants from either group were excluded if they had reduced intellectual functioning (assesed using detailed case history) or limited proficiency in reading and writing English, as these factors could interfere with accurate comprehension and completion of the questionnaire. Further, relevant demographic details such as age, gender, educational status, occupation and patient related variables such as age at which diagnosis was made, type of BPPV, lifestyle & daily habits, and medical background were collected from the participants for descriptive purposes.

When choosing study participants, ethical considerations were taken into account. Participants and their family members or caregivers were explained the objectives of the study and methods. The participants or caregivers involved in the study signed a informed consent form. Oral consent was taken from participants joined in video call. The Ethical committee guidelines for Bio-behavioral research involving human subjects(version 2.0, 2033) at the All India Institute of Speech and Hearing, mysuru, were followed in the present study for collecting data. Ethical approval for the study was obtained from the Institutional Review Board, and the approval reference number assigned was SH/IRB/M.4/AUD.37/2025-26.

3.2 procedure

The study was conducted in three phases, they are:

Phase I: Development of questionnaire

Phase II: Validation of the developed questionnaire

Phase III: Testing Reliability of the outcome measures

3.2.1 Phase 1: Development of questionnaire

The questionnaire was developed in the English language through a systematic and evidence-based process. Initially, existing general questionnaires commonly used in vestibular evaluation were reviewed to identify the usefulness and limitations of items relevant to benign paroxysmal positional vertigo (BPPV). These included the Dizziness Handicap Inventory(Jacobson & Newman, 1990), Vestibular Disorders Activities of Daily Living Scale(Cohen & Kimball, 2000), Situational Characteristics Questionnaire(Jacob et al., 1993), Vertigo Symptom Scale(Yardley et al., 1992), and Vestibular Activities and Participation Scale(Alghwiri et al., 2013). In addition, questionnaires specifically developed

for BPPV were examined to understand their strengths and limitations for framing relevant items. These included Kim's 6-Item BPPV Diagnostic Questionnaire(H. J. Kim et al., 2020), Simple 5-Question Questionnaire for Predicting BPPV(Muraleedharan et al., 2024), BPPV Subtype-Determining Questionnaire,(Wan et al., 2023) and Screening Questionnaire for BPPV(Qiao et al., 2022).

Further, cognitive interviews were conducted with 10 participants diagnosed with Benign Paroxysmal Positional Vertigo (BPPV) and their caregivers to ensure that the questionnaire adequately reflected real-world symptoms, daily difficulties, patient experiences, and treatment outcomes. In addition, a comprehensive review of the current literature on the psychometric properties of BPPV questionnaire was conducted to identify relevant domains and formulate appropriate items for inclusion in the tool. Suggestions were also obtained from professionals with atleast 5 years of clinical experience in vestibular assesment and rehabilitation. Expert opinions were further sought from Otorhinolaryngologists and Neurologists involved in the management of patients with balance disorders, including BPPV.

During the initial stage of questionnaire development, an item pool of 58 items was generated based on a literature review, clinical observations, expert suggestions, and patient interviews. The preliminary items were subsequently reviewed by an expert panel to evaluate their relevance, clarity and appropriateness. Following the review processes, one question was deleted and two questions were modified due to redundancy, overlap with similar constructs, ambuguity in wording, lack of clarity and failure to exclusively represent the intended construct. This refinement process improved the content validity and overall quality of the questionnaire.

3.2.2 Phase II: Validation of the developed questionnaire

Step 1: face validity

The face validity of the questionnaire was assesed by a panel of experts comprising 3 audiologist with more than three years of professional experience was constituted to review and refine the questionnaire at different stages of development. The experts reviewed the each item in the preliminary version of the questionnaire by rating it as appropriate," "inappropriate," or "revision required," along with suggestions for modification wherever it is necessary. Furthur discussions were conducted with the expert panel to incorporate additional revelant aspects and improve the item representation. All feedback and recommendations obtained during the review process were systematically incorporated to develop the final revised version of the questionnaire.

Step 2: Content validation

Validation of the revised questionnaire was carried out by distributing the completed questionnaire to eleven audiologists across India who were actively involved in vestibular assessment and rehabilitation to obtain both qualitative and quantitative feedback. The experts were provided with a content validation rating scale to evaluate the relevance, clarity, practicality, and ambiguity of each questionnaire item using a 4-point Likert scale. For relevance, a score of 1 indicated "not relevant," 2 indicated "less relevant," 3 indicated "relevant but requires minor modifications," and 4 indicated "highly relevant." For clarity, a score of 1 represented "not clear," 2 represented "less clear," 3 represented "clear but requires minor modifications," and 4 represented "very clear."For practicality, a score of 1 indicated "not practical," 2 indicated "less practical," 3 indicated "practical but requires minor modifications," and 4 indicated "very practical."For ambiguity, a score of 1 indicated "ambiguous," 2 indicated "less ambiguous," 3 indicated "not-ambiguous but requires minor

modifications," and 4 indicated "not at all ambiguous". In addition to rating the items, the experts were also requested to provide suggestions for modifying questions deemed irrelevant or unclear. Items that were rated as 3 and 4 by at least nine audiologists in relevance, clarity, ambiguity and practicality were retained in the questionnaire.

During the expert panel review, the preliminary version of the questionnaire was critically assessed for relevance, clarity, and adequacy in representing the intended construct. Based on the expert ratings and recommendations, one question (eg: *Any home exercises recommended to you?*) due to lower ratings, redundancy, ambiguity, and inadequate construct representation is removed from the questionnaire. Furthermore, two questions were rephrased and modified in line with expert suggestions to improve clarity, appropriateness, and comprehensibility. The revised items were subsequently incorporated into the final version of the questionnaire. Content validity of the BPPV-SCOPE questionnaire was established using the Content Validity Ratio (CVR) and the Content Validity Index (CVI) from the article *Making Sense of Methods and Measurement: Lawshe's Content Validity Index* (Gilbert & Prion, 2016)

Step 3: Pilot study

Five participants with confirmed benign paroxysmal positional vertigo and another five without any audio-vestibular problems were included in the pilot study (using the same inclusion and exclusion criteria detailed in section 3.1). The tool, developed after content validation, is administered to the participants. Once these participants had completed the questionnaire, they were interviewed by the researcher to provide information on the questionnaire items' transparency, relevance, and understandability. The ease of answering, the comprehensibility of each and every question in the questionnaire, and its relevance were also

discussed with participants. Later, the expert panel reviewed the participants' feedback and appropriate modifications were made.

During the pilot study, one question was removed as participants found it confusing and difficult to interpret consistently (For example, the question *"Have you undergone any vestibular exercise session?"* was removed because several participants were unsure about the meaning of "vestibular exercise session" and interpreted it differently). In addition, one question was rephrased based on participant feedback to improve clarity and ease of understanding. For instance, a question originally framed in technical terminology was revised to simpler, more comprehensible language to improve participant understanding and response accuracy. Following the pilot study and subsequent revisions, the final version of the questionnaire consisted of 35 questions acorss seven domains and 18 questions in the demographic details section.

Step 4: Administration of the questionnaire

The final questionnaire was administered to 60 participants (30 benign paroxysmal positional vertigo group and 30 healthy group) aged 20-70 years, using purposive sampling. The data were collected via face-to-face and video calls after explaining the need for the study and obtaining their consent. The participants were asked to sit in a comfortable position while self- administering the test. First, the participants' demographic data were collected. The participants were instructed to read each question carefully and were encouraged to ask for doubts whenever necessary before giving the answers. However, except for two participants who asked for some clarification, the others understood the instructions and completed the questionnaire independently.

Step 5: Descriptive Statistics

Prior to statistical analysis, the normality of data distribution was assesed using the shapiro-wilk test. As the data did not follow a normal distribution ($p < .05$), non- parametric statistical methods were employed for the furthur analysis. Descriptive statistics were computed to summarise the participants characteristics and distribution of the final questionnaire scores. Measures including mean, standard deviation, median and interquartile range were calculated for both total questionnaire score and individual domain scores. This analysis provided an overview of symptom severity and functional impact within the study sample and facilitated comparison of scores disrtibutions between the BPPV and healthy groups.

Step 6: Discriminative Validity

Discriminative validity of BPPV-SCOPE questionnaire was evaluated by examining its ability to differentiate individuals with BPPV from healthy groups. Since the data did not meet the assumption of normal distribution, the Mann-Whitney U test was employed to compare total and domain-specific scores between the two groups. Higher questionnaire scores in the BPPV group relative to the healthy group were considered indicative of adequate discriminative validity. In addition, the magnitude of group differences was quantified using effect size (r)(According to Cohen (1988), effect size values of 0.50 or greater represents large effect) (Fiel Peres, 2026)**.**

To further evaluate the diagnostic accuracy of the questionnaire, Receiver Operating Characteristic (ROC) curve analysis was performed. The Area Under the Curve (AUC), sensitivity, specificity, and optimal cutoff score were calculated to determine the ability of the developed questionnaire to distinguish individuals with BPPV from healthy participants. An AUC value closer to 1.0 was interpreted as indicating excellent discriminative

performance.This analysis was conducted using appropriate statistical software, and the level of statistical significance was set at $p < .05$.

Step 7: Convergent validity

Convergent validity of the developed questionnaire was assessed to determine the extent to which the developed questionnaire was associated with an established measure assessing similar constructs. For this purpose, the scores from the developed questionnaire were correlated with those of the Dizziness Handicap Inventory (DHI), a widely used measure of dizziness-related disability. The questionnaire was administered to participants with BPPV, and the resulting scores were analysed using Spearman's rank-order correlation coefficient. Higher positive correlations between the two measures were considered indicative of good convergent validity.

3.2.3 Phase III: Reliability measurements

3.2.3.1 Internal consistency

Internal consistency of the BPPV-SCOPE questionnaire was assessed to determine the extent to which its items consistently measured the same construct. Internal consistency was evaluated using Cronbach's alpha. The analysis was carried out for the overall questionnaire and its individual domains. Responses obtained from all participants included in the study were subjected to statistical analysis using SPSS software. Cronbach's alpha values were used to assess the questionnaire's homogeneity and consistency.

3.2.3.2 Test-Retest Reliability

The test-retest reliability of BPPV-SCOPE questionnaire was assessed to determine the stability of instrument over time. A subgroup of 10 participants was selected and asked to

complete the questionnaire on two sepearate occassions, with an interval of one week between the administrations. The one-week interval was choosed to minimize recall while ensuring that no substantial change in symptom status was expected.

The degree of agreement between first and second administartions was evaluated using the Intraclass Correlation Coefficient (ICC) with a 95% confidence interval(Koo & Li, 2016). ICC values were interpreted according to the established guidelines, with higher values indicating greater temporal stability and reliability of the questionnaire. Statistical significance was determined at a level of $p < .05$**.**

In addition to temporal stability, the internal consistency of the questionnaire and its individual subscales was examined using Cronbach's alpha (α)**.** Cronbach's alpha values greater than 0.70 were considered indicative of acceptable internal consistency, whereas values above 0.90 were interpreted as excellent. Together the ICC and Cronbach's alpha analysis were used to evaluate reliability and consistency of BPPV-SCOPE questionnaire across repeated administrations.

3.3 Statistical analysis

All statistical analyses were performed using IBM SPSS for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). The normality of the data distribution was assesed using Shapiro–Wilk test. Since the data were not normally distributed ($p < .05$), non-parametric statistical methods were employed for subsequent analysis.

Content validity of BPPV-SCOPE questionnaire was evaluated using the Content Validity Ratio (CVR) proposed by Lawshe and the Content Validity Index (CVI)(Gilbert & Prion, 2016). CVR values were calculated for each of the questionnaire item based on expert

ratings of clarity, relevance, ambiguity and practicality. The overall CVI was subsequently computed to determine the content validity of the questionnaire.

Descriptive statistics for demographic variable and including mean, standard deviation, median, interquartile range, frequency, and percentage**,** were used to summarize participant characteristics and questionnaire scores.

Discriminative validity was assessed using the Mann–Whitney U test to compare the total and domain-specific scores between the BPPV and Healthy groups. The magnitude of group differences was determined using effect size (r)(Fiel Peres, 2026). In addition, Receiver Operating Characteristic (ROC) curve analysis was performed to evaluate the ability of the BPPV-SCOPE questionnaire to distinguish individuals with BPPV from Healthy controls. The Area Under the Curve (AUC), sensitivity, specificity, and optimal cut-off score were calculated.

Convergent validity was examined using Spearman's rank-order correlation coefficient **t**o determine the relationship between the BPPV-SCOPE questionnaire scores and the Dizziness Handicap Inventory (DHI) scores.

Reliability of the questionnaire was evaluated through Cronbach's alpha coefficient(Tavakol & Dennick, 2011) (according toTavakol and Dennick (2011), Cronbach's alpha (α) values of .90 or above indicate excellent internal consistency)for internal consistency and the Intraclass Correlation Coefficient (ICC)(Koo & Li, 2016) with 95% confidence intervals for test–retest reliability (According to Koo and Li (2016), Intraclass Correlation Coefficient (ICC) values of greater than 0.90 indicate excellent reliability). A p-value of less than 0.05 was considered statistically significant for all analyses.

CHAPTER IV

RESULTS

The objective of the present study was to develop and validate the benign paroxysmal positional vertigo impact and outcome questionnaire, a multidimensional clinical tool to assess the severity and impact of BPPV symptoms. The questionnaire was developed after a thorough review of the literature, examination of other questionnaires, and interviews with patients and experts in the field.

The results of the present study are organised into different sections to study the psychometric properties of the questionnaire.

- Section 4.1 presents the findings of content validation of the questionnaire.
- Section 4.2 describes the descriptive statistics of the demographic variable and the total and domain-wise questionnaire scores obtained from the participants.
- Section 4.3 presents the discriminative validity of the questionnaire, including comparison between the BPPV and healthy groups and Receiver Operating Characteristic (ROC) analysis.
- Section 4.4 describes the construct validity of the questionnaire through correlation with the Dizziness Handicap Inventory (DHI).
- Section 4.5 presents the reliability measures of the questionnaire, including internal consistency and test–retest reliability.

Although post-treatment and recurrence-related sections after the treatment/maneuver were initially developed to comprehensively assess symptom evolution following intervention, a preliminary statistical evaluation suggested that including longitudinal treatment-related constructs increased dimensional complexity and reduced psychometric coherence. Based on

these findings, the content validators and expert committee members recommended excluding these sections from the primary questionnaire and instead exploring treatment-related outcomes through repeated administration of the questionnaire during the pre- and post-treatment phases, or through the development of a separate follow-up module at a later stage. Therefore, the final validated version focused primarily on symptom profiling and multidimensional clinical impact assessment.

The title of the final validated questionnaire was revised to better represent its comprehensive focus, rather than being limited to recurrence. The revised title, "Benign Paroxysmal Positional Vertigo – Symptom and Clinical Profile Evaluation (BPPV-SCOPE)", focused on clinical symptoms and profiling. The BPPV-SCOPE comprised a demographic details section and a questionnaire section. The questionnaire comprised 35 questions across seven domains and 18 questions in the demographic information section. Each question was scored on a 4-point scale, with a minimum score of 0 and a maximum score of 3. The scoring details are provided in Table 4.1. The final version of the BPPV-SCOPE questionnaire, including all questions and the scoring format, is included in Appendix I.

Table 4.1

Domains and Scoring Details of the BPPV-SCOPE Questionnaire

Domains	Range of questions	No of questions covered	Maximum scores
General information section	Q1-Q18	18 questions	---
Positional & vestibular symptoms	Q19-Q24	6 questions	18
Balance, mobility & fall concern	Q25-Q30	6 questions	18
Activity limitation & participation	Q31-Q37	7 questions	21
Visual & cognitive difficulties	Q38-Q41	4 questions	12
Emotional & psychological impact	Q42-Q47	6 questions	18
Sleep & fatigue	Q48-Q50	3 questions	9
Autonomic & associated problems	Q51-Q53	3 questions	9

BPPV-SCOPE was administered to 60 individuals (30 BPPV individuals (47.8 ± 16.3) and 30 normal individuals (33.10 ± 9.6)) aged 20-70 years. The scores obtained from the BPPV-SCOPE in Healthy Group and BPPV Group were tabulated and analysed using IBM SPSS for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA).

4.1 Content validation

The content validation procedure used in the present study was based on Lawshe's Content Validity Index (Gilbert & Prion, 2016). Content validity of the BPPV-SCOPE questionnaire was established using the Content Validity Ratio (CVR) (proposed by Lawshe, 2016) and the Content Validity Index (CVI). The questionnaire was evaluated by 11 audiologists across India who had experience in vestibular assessment and rehabilitation. The experts independently reviewed each item for its relevance, clarity, practicality, and ambiguity in the questionnaire. A 4-point rating scale was used for each parameter.The experts were also encouraged to suggest modifications/reworing or deletions of items as needed to improve the questionnaire's comprehensibility and appropriateness. The content validation was conducted only for the BPPV-SCOPE questionnaire section as the demographic information section comprised mandatory participant details.

The Content Validity Ratio (CVR) for each item was calculated using the following equation:

$$CVR = \frac{(n_e - N/2)}{N/2}$$

Where:

- n_e = number of experts rating the item as very clear/very practical/very relevant/not ambiguous

- N = total number of experts

For the present study, $N = 11$. According to lawshe (1975) and the revised recommendations by Ayre and Scally(2014), items with CVR value of 0.63 or higher were considered acceptable for retention in the questionnaire. So, item with acceptable CVR values were retained in final questionnaire. The CVR values obtained for the 35 questions are shown in table 4.2, indicating satisfactory agreement among experts regarding the essentiality of the items.

Table 4.2

Content Validity Ratio (CVR) Values for Individual Items of the BPPV-SCOPE Questionnaire

Item No.	Clarity	Relevance	Ambiguity	Practicality
Q1	1.00	1.00	1.00	1.00
Q2	1.00	1.00	1.00	1.00
Q3	1.00	1.00	1.00	0.81
Q4	1.00	1.00	1.00	1.00
Q5	1.00	1.00	1.00	1.00
Q6	0.63	1.00	0.81	0.63
Q7	1.00	0.81	0.81	0.81
Q8	0.63	0.81	0.81	1.00
Q9	0.81	0.63	0.63	1.00
Q10	1.00	0.63	1.00	1.00
Q11	1.00	1.00	1.00	1.00
Q12	0.81	1.00	0.81	0.63
Q13	1.00	0.63	1.00	0.81
Q14	0.81	0.81	0.63	0.81
Q15	0.63	0.63	0.63	0.81
Q16	1.00	1.00	1.00	1.00
Q17	1.00	0.63	0.63	1.00
Q18	0.63	0.81	0.81	1.00
Q19	1.00	0.63	0.81	0.81
Q20	0.81	0.45	0.63	0.81
Q21	0.63	0.81	0.63	0.63
Q22	0.63	0.81	0.81	0.63
Q23	0.81	0.63	0.63	0.81

Item No.	Clarity	Relevance	Ambiguity	Practicality
Q24	1.00	1.00	1.00	1.00
Q25	0.81	0.63	0.63	1.00
Q26	1.00	0.63	0.63	0.63
Q27	0.63	0.63	1.00	0.63
Q28	1.00	1.00	1.00	1.00
Q29	0.63	1.00	1.00	0.63
Q30	0.63	0.81	0.63	0.63
Q31	0.63	0.63	0.81	0.81
Q32	1.00	0.81	0.81	0.63
Q33	1.00	0.63	1.00	1.00
Q34	1.00	0.81	1.00	1.00
Q35	0.81	0.81	0.63	0.63

The Content Validity Index (CVI) was calculated as the mean of CVR values for the retained items, reflecting the questionnaires overall content validity.

$$CVI = \frac{\sum CVR}{\text{Number of retained item}}$$

The obtained CVI value for the BPPV-SCOPE questionnaire is given in table 4.3, indicating a good overall content validity. Based on the expert suggestions minor modifications (eg: The ‘vertigo’ term in “*do you experience vertigo during rolling over in bed*” changed to spinning sensation for the easy understanding of the participants) were made to improve the wording clarity and appropriateness of the selected items before finalising the questionnaire. Overall, the findings suggested that the BBPV-SCOPE questionnaire demonstrated acceptable content validity and was appropriate for furthur psychometric evaluations.

Table 4.3

Content Validity Index (CVI) Values for the Validation Parameters of the BPPV-SCOPE Questionnaire

Validation parameters	CVI Value
Clarity	0.85
Relevance	0.80
Ambiguity	0.83
Practicality	0.84

Note: CVI- content validity index

4.2 Descriptive statistics

4.2.1 *Descriptive statistics for demographic variable*

A total of 60 participants were included, comprising 30 individuals with BPPV and 30 healthy controls. The mean age was higher in the BPPV group (45.67 ± 16.17 years) than in the healthy group (38.43 ± 11.34 years), with females constituting a slightly greater proportion in both groups. Most participants had an undergraduate education, reported less than two hours of daily screen time, and demonstrated low to moderate stress levels. Poor physical activity levels, long-term medication use, and vitamin deficiency were more commonly reported among participants with BPPV. Within the BPPV group, right posterior canal BPPV was the most common diagnosis, and most participants reported a sensation of surrounding rotation with episodes lasting less than one minute. No clear trigger for symptom onset was identified in the majority of cases, symptoms were more frequently provoked on the right side, and most participants rated their overall physical health as good or fair. Table 4.4 shows the detailed descriptive statistics for the demographic variable.

Table 4.4 *Descriptive statistics for demographic variable*

Variable	Category	BPPV Group (n=30)	Healthy Group (n=30)
Age (years)	Mean ± SD	45.67 ± 16.17	38.43 ± 11.34
Gender (%)	Male	40.0	43.3
	Female	60.0	56.7
Education (%)	SSLC/Below	20.0	3.3
	Higher Secondary	20.0	16.7
	Undergraduate	50.0	66.7
	Postgraduate	10.0	13.3
Occupation	Skilled	20.0	46.6
	Not skilled	16.6	16.6
	House wife	63.4	36.8
Work Type(%)	Mostly Sitting	40.0	36.7
	Mostly Standing	16.7	23.3
	Mostly Moving	43.3	40.0
Screen Time (%)	< 2 hours/day	73.3	58.3
	2–4 hours/day	16.7	21.7
	4–6 hours/day	10.0	16.7
	> 6 hours/day	0.0	3.3
Stress Level (%)	Low	46.7	43.3
	Moderate	30.0	36.7
	High	23.3	20.0
Physical Activity (%)	Poor	60.0	53.3
	Fair	26.7	23.3
	Good	13.3	23.3
Long-term Medication (%)	Yes	43.3	0.0
	No	56.7	100.0
Vitamin Deficiency (%)	Yes	56.7	20.0
	No	43.3	*36.0
Provisional Diagnosis (%)	Right Posterior Canal BPPV	60.0	—
	Left Posterior Canal BPPV	40.0	—
Duration of Symptoms (%)	< 1 week	13.3	—
	1–4 weeks	33.3	—
	1–6 months	28.8	—
	6–12 months	3.3	—
	> 1 year	23.3	—
Nature of Spinning Sensation (%)	Surrounding Rotation	76.7	—
	Self-rotation	3.3	—
	Mixed	20.0	—
Duration of Episodes (%)	< 30 seconds	36.6	—
	30 sec to <1 min	46.7	—
	1–5 min	16.7	—
Probable Trigger at Onset (%)	No clear reason	90.0	—
	Head injury	3.3	—
	Lack of sleep	3.3	—

	Previous illness (Dengue)	3.3	—
Provoking Side (%)	Right side	49.7	—
	Left side	30.3	—
	Both sides (right predominant)	13.3	—
	Both sides (left predominant)	6.7	—
Overall Physical Health (%)	Good	46.7	—
	Fair	43.3	—
	Poor	10.0	—

**For 44% information is not available*
*Note: Age is presented as Mean ± Standard Deviation (SD)**.*** *All other variables are presented in percentage (%) of participants in each group*

4.2.2 *Descriptive statistics for the domain variable*

Descriptive statistics were computed to summarize the distribution of scores across different domains of BPPV-SCOPE questionnaire. The mean and standard deviation were calculated for each domain and total scores as shown in table 4.4. Based on the standard deviation values some of the domains revealed variablity in scores among participants, indicating the heterogenity in symptom severity. The observed mean scores across domains in BPPV Group suggest that BPPV has a multidimensional impact, affecting the vestibular function, balance, activity participation, cognitive and emotional aspects, sleep and associated symptoms.

The BPPV group demonstrated consistently higher mean scores across all the domains compared with the Healthy group, indicating greater symptom burden and functional impairment. The total scores was higher in the BPPV Group (31.33 ± 19.6), reflecting the cumilative effect of symptoms. Overall, the findings demonstrate a clear trend of increased severity of the symptoms and multidimensional impact in BPPV Group. Figure 4.1 shows the distribution of scores across domains in BPPV group and figure 4.1 shows the distribution of scores across domains in healthy group.

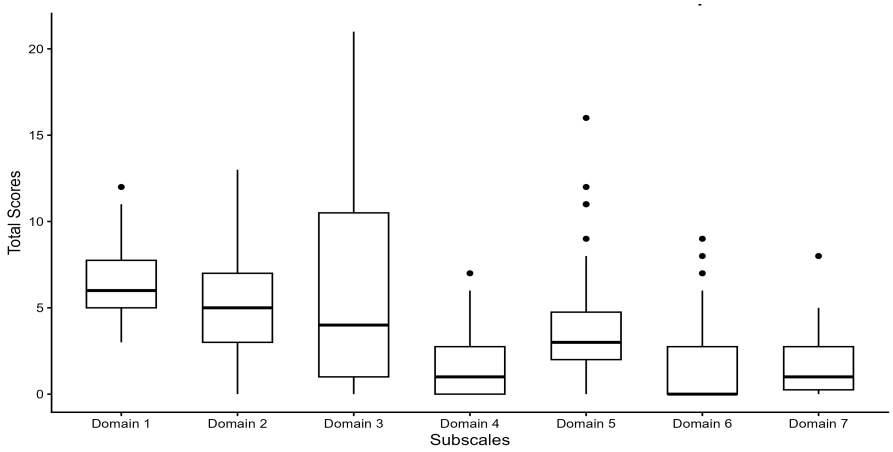
Table 4.5

Mean and standard deviation for each domain

Sub-Scales	BPPV Group		Healthy Group	
	Mean (SD)	Median (IQR)	Mean ± SD	Median (IQR)
Positional & vestibular symptoms	4.30(2.1)	4.0(3)	0.13 ± 0.3	.00(0)
Balance, mobility & fall concern	6.07(4.4)	5.0(7)	0.07 ± 0.2	.00(0)
Activity limitation & participation	6.13(6.5)	4.0(11)	0.03 ± 0.1	.00(0)
Visual & cognitive difficulties	1.87(2.1)	1.0(3)	0.07 ± 0.2	.00(0)
Emotional & psychological impact	2.10(1.9)	1.5(2)	0.00 ± 0.0	.00(0)
Sleep & fatigue	4.00(4.3)	2.5(5)	0.07 ± 0.3	.00(0)
Autonomic & associated problems	1.57(2.3)	1.0(2)	0.00 ± 0.0	.00(0)
Total score	31.33(19.6)	22.0(27)	0.13 ± 0.5	.00(0)

Figure 4.1

Distribution of domain scores in the BPPV group

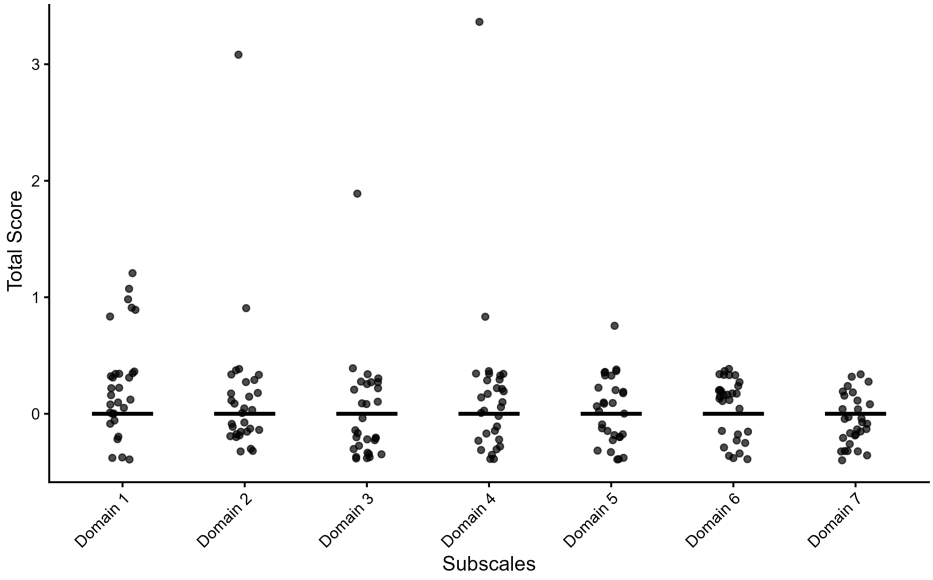


Note: Domain-1: Positional & vestibular symptoms, Domain-2: Balance, mobility & fall concern, Domain-3: Activity limitation & participation, Domain-4: Visual & cognitive

difficulties, Domain-5: Emotional & psychological impact, Domain-6: Sleep & fatigue, Domain-7: Autonomic & associated problems

Figure 4.2

Distribution of domain scores in the healthy group



Note: Domain-1: Positional & vestibular symptoms, Domain-2: Balance, mobility & fall concern, Domain-3: Activity limitation & participation, Domain-4: Visual & cognitive difficulties, Domain-5: Emotional & psychological impact, Domain-6: Sleep & fatigue, Domain-7: Autonomic & associated problems

4.3 Discriminative Validity

4.3.1 Comparison Between the BPPV and Healthy Groups

The Mann–Whitney U test was conducted to compare the scores between the BPPV and healthy groups. The results are shown in Table 4.5. Since Shapiro-Wilk's test for normality revealed that the data did not follow a normal distribution ($p<0.05$), non-parametric measures were used. The median and interquartile range of total score obtained from the BPPV and healthy groups are shown in figure 4.3. The analysis revealed statistically significant

differences in total scores between the two groups, with individuals in the BPPV group scoring higher than those in the healthy group. These findings indicate that participants with BPPV experienced greater severity of the symptoms and functional impairment than healthy individuals across all subscales. Since Man-Whitney U test showed significant results the effect sixe were subsequently calculated. The observed effect sizes were large(≥ 0.50 indicate large), indicating the questionnaire's ability to show substantial differences between the two groups in symptom burden and functional impact.

The effect size (r) for the Mann–Whitney U test was calculated using the following formula(Fiel Peres, 2026):

$$r = \frac{|Z|}{\sqrt{N}}$$

Where:

- Z = standardised test statistic obtained from the Mann–Whitney U test
- N = total number of participants across both groups

Table 4.6

Comparison of Total and Domain-Specific Scores Between the BPPV and Healthy Groups

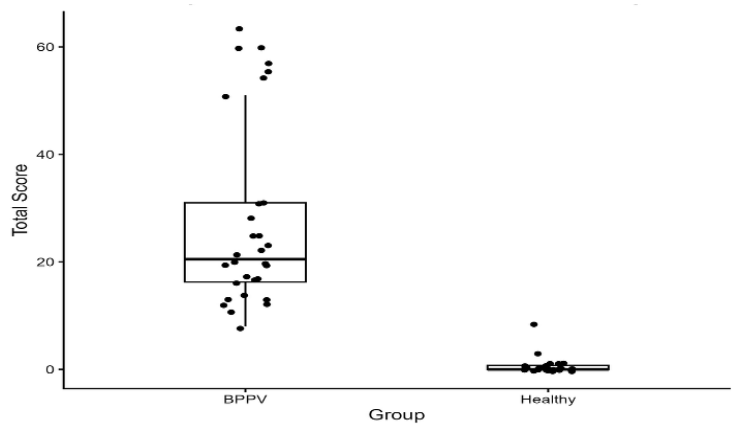
Sub scales	Mann–Whitney U	Z value	p value	Effect Size (r)
Total Score	900.0	6.942	< .001	0.89
Positional and Vestibular Symptom	900.0	6.989	< .001	0.90
Balance, Mobility & Fall Concern	882.0	6.788	< .001	0.87
Activity Limitation & Participation	789.5	5.673	< .001	0.73
Visual and Cognitive Difficulty	747.0	5.040	< .001	0.65
Emotional & psychological Impact	810.0	6.027	< .001	0.77
Sleep & fatigue	786.5	5.626	< .001	0.72

Sub scales	Mann–Whitney U	Z value	p value	Effect Size (r)
Autonomic and associated problems	705.0	4.752	< .001	0.61

Figure 4.3 illustate the median and interquartile range(IQR) of the total BPPV-SCOPE scores obtained from the BPPV group and Healthy groups. THE BPPV group demonstated a higher median total score compared to the Healthy group, indicating a greater impact of symptom and functional limitations. The wider interquartile range observed in the BPPV group reflects greater variability in questionnaire scores among participants, whereas, the Healthy group showed consistently lower scores with less variability.

Figure 4.3

The median and interquartile range of total score obtained from the BPPV and healthy groups



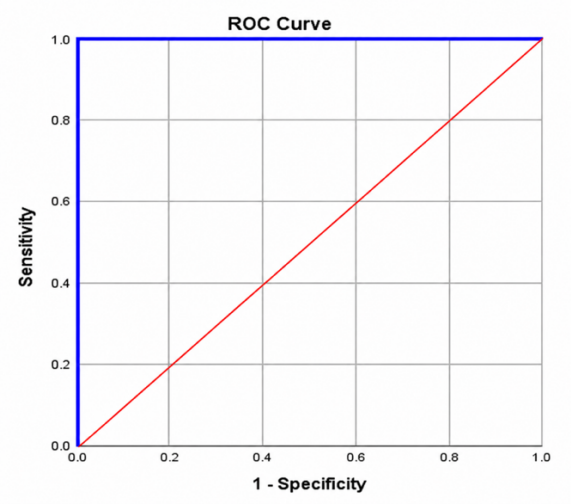
Note: BPPV- Benign Paxoxysmal positional vertigo

4.3.2 Receiver Operating Characteristics (ROC analysis) for the BPPV-SCOPE questionnaire in differntating inividuals with BPPV from healthy individuals.

Receiver Operating Characteristic (ROC) analysis was performed to establish the discriminative validity of the BPPV-SCOPE questionnaire by distinguishing individuals with BPPV from healthy individuals. The area under the curve (AUC) was 1.0 ($p < .001$), indicating excellent discriminative ability between the two groups. A cutoff score of 5.00 yielded 100% sensitivity and 100% specificity within the present sample. The minimum and maximum score obtained by BPPV group is 6 and 68. These findings suggest that the BPPV group obtained higher scores and the BPPV-SCOPE questionnaire effectively distinguished individuals with confirmed BPPV from healthy participants in the selected study population. However, the ROC analysis was limited to comparisons between participants with clinically diagnosed BPPV and healthy controls, as the questionnaire was not evaluated in individuals with other vestibular or balance disorders. The figure of the ROC curve is given in Figure 4.4

Figure 4.4

Receiver Operating Characteristic (ROC) curve demonstrating the discriminative validity of the BPPV-SCOPE questionnaire.



4.4 Convergent validity

Convergent validity of the BPPV-SCOPE questionnaire was assessed by examining the relationship between the total and subscale scores of the BPPV-SCOPE questionnaire and the total score of the Dizziness Handicap Inventory (DHI) using Spearman's rank-order correlation analysis. The findings revealed significant positive correlations between the BPPV-SCOPE total score, all seven subscale scores, and the DHI total score, indicating that greater dizziness-related handicap as measured by DHI was associated with higher symptom severity scores on BPPV-SCOPE questionnaire.. These findings support the questionnaire's concurrent validity. The results of the correlation analysis are presented in Table 4.6.

Table 4.7

Concurrent Validity of the BPPV-SCOPE Questionnaire with the Dizziness Handicap Inventory (DHI)

Subscales	Spearman's Correlation Coefficient (ρ)	**p value**
Positional & Vestibular Symptoms	0.878	< .001
Balance, Mobility & Fall Concern	0.931	< .001
Activity Limitation & Participation	0.876	< .001
Visual & Cognitive Difficulties	0.771	< .001
Emotional & Psychological Impact	0.807	< .001
Sleep & Fatigue	0.864	< .001
Autonomic & Associated Symptoms	0.603	< .001
Total BPPV-SCOPE Score	0.981	< .001

4.5 Reliability Analysis

4.5.1 Internal consistency

Internal consistency of the BPPV-SCOPE questionnaire was assessed using Cronbach's alpha coefficient. The total score demonstrated excellent internal consistency(according toTavakol and Dennick (2011), Cronbach's alpha (α) values of .90 or above indicate excellent internal consistency) with a Cronbach's alpha value of 0.945, indicating a high degree of homogeneity among the questionnaire items. In addition, the domains also demonstrated excellent internal consistency (details provided in Table 4.7), suggesting that the items within each domain consistently measured their respective constructs.

4.5.2 Test-Retest Reliability

The BPPV-SCOPE questionnaire was re-administered to 10 participants after a one-week interval to evaluate its test–retest reliability. Reliability analysis using the Intraclass Correlation Coefficient (ICC) demonstrated excellent temporal stability of the questionnaire across repeated administrations (According to Koo and Li (2016), Intraclass Correlation Coefficient (ICC) values of greater than 0.90 indicate excellent reliability). The questionnaire also demonstrated excellent internal consistency, indicating high item homogeneity.

The subscale-wise test–retest reliability findings are presented in Table 4.7. All subscales demonstrated excellent reliability and consistency, suggesting that the BPPV-SCOPE questionnaire provides stable and dependable measurements over time.

Table 4.8

The domain–specific test–retest reliability measures of the BPPV-SCOPE questionnaire

Subscale	ICC (Single Measures)	95% Confidence Interval	p value	Cronbach's Alpha (α)
Total Score	1.00	.999 – 1.00	< .001	0.945
Positional & Vestibular Symptoms	.945	.787 – .990	< .001	.990
Balance, Mobility & Fall Concern	.995	.981 – .999	< .001	.997
Activity Limitation & Participation	.997	.990 – .999	< .001	.998
Visual & Cognitive Difficulties	.987	.951 – .997	< .001	.993
Emotional & Psychological Impact	.993	.973 – .998	< .001	.996
Sleep & Fatigue	.993	.966 – .998	< .001	.997
Autonomic & Associated Symptoms	.982	.928 – .995	< .001	.990

Based on the findings of content validation, discriminative validity, concurrent validity, internal consistency and test-retest reliability analysis, the BPPV-SCOPE questionnaire was found to be a psychometrically sound instrument. The questionnaire demonstrated adequate validity and excellent reliability, supporting its use as a comprehensive measure for avaluating the multidimensional symptom profile and clinical impact of BPPV

CHAPTER V

DISCUSSION

The present study aimed to develop and validate Benign Paroxysmal Positional Vertigo – Symptom and Clinical Profile Evaluation (BPPV-SCOPE) questionnaire for individuals with BPPV. The questionnaire was developed as a multidimensional, self- administered clinical tool to comprehensively asses the symptom severity, balance and mobility difficultues, activity limitations, cognitive and emotional impact, sleep -related difficulties and associated symptoms in individuals with BPPV. The present study found that developed questionnaire posses satisfactory psychometric properties and can effectively asses the multidimensional impact of BPPV in affected individuals.

The development of BPPV-SCOPE questionnaire was considered necessary because currently available vestibular assesment tools primarly focus on the general dizziness-related disability and vestibular symptoms rather than the multidimensional clinical manifestations associated with the BPPV. Although the widely used questionnaires such as DHI, VSS, ABC, VADL provide useful information regarding the vestibular dysfunction, they may not comprehensively evaluate triggers, balance-related fear, emotional burden, activity restriction, sleep disturbances and cognitive difficulties specifically associated with the BPPV. The existing BPPV- specific questionnaire primarily focuses on screening and subtype identification rather than multidimensional clinical impact assesment. Therefore, the BPPV-SCOPE questionnaire was designed to provide a more comprehensive evaluation of the symptom burden and functional impact associated with the BPPV.

5.1 Content Validity

The present study evaluated the content validity of BPPV-SCOPE questionnaire using the Content Validity Ratio (CVR) and Content Validity Index (CVI), based on the methodology

proposed by Lawshe and further refined by Ayre and Scally. Content validation was performed by 11 audiologist experienced in vestibular assesment and rehabilitation, ensuring the questionnaire items were reviewed by professionals with relevant clinical expertise.

The findings demonstrated a satisfactory content validity across all the four validation parameters namely clarity, revelance, ambiguity and practicality. The majority of them met the recommended threshold and were therefore retained. These findings suggest that items adequately represented the construct intended to be measured and were considered suitable for assesing the impact and outcomes associated with BPPV.

The overall CVI values furthur supported the adequacy of the questionnaire content, with values ranging from 0.80 to 0.85 across the four validation parameters. According to the previous literature, a CVI value of 0.80 or higher is generally considered indicative of good content validity. The highest CVI value was observed for the clarity (0.85), suggesting that questionnaire items were generally well understood and appropriately worded. Similarly, the CVI values for practicality (0.84) and ambiguity (0.83) indicated that the questionnaire items were feasible to administer and sufficiently unambiguous. The relevance parameter yielded a CVI value of 0.80, demonstrating that retained items were considered clinically meaningful and representative of the symptomatology and functional consequences of BPPV.

The favorable content validity findings may be attributed to the systematic questionnaire development process adopted in the study. Item generation was based on an extensive review of existing vestibular and BPPV- specific questionnaires, cognitive interviews with the individual diagnosed with BPPV, consultation with caregivers and expert opinions from the audiologist and other healthcare professionals involved in the vestibular rehabilitation. This multi-source approach likely enhanced the comprehensiveness and clinical relevance of the questionnaire content.

Furthermore, qualitative feedback obtained from the expert panel facilitated refinement of several items through modification and rewording, thereby improving their clarity and appropriateness. Such iterative revisions are considered essential in questionnaire development because they help to ensure that the final instrument accurately captures the intended construct while remaining understandable to respondents.

Overall the content validation results are indicating that BPPV-SCOPE questionnaire posses adequate content validity and provides a comprehensive coverage of symptoms, functional, emotional and participation-related consequences of BPPV. These findings support the suitability of the questionnaire for furthur psychometric evaluation and the clinical application in individuals with BPPV.

5.2 Discriminative Validity

The BPPV-SCOPE questionnaire demonstrated excellent discriminative validity that effectively differentiating individuals with BPPV from healthy individuals across all domains. Individuals with BPPV demonstrated a significantly higher scores in all the domains.

The BPPV group demonstarted a higher scores (31.33± 19.6) compared with the healthy group (0.13 ± 0.5), indicating a significantly greater symptom burden and functional impairment in individuals with BPPV.Similar findings have been reported in studies using DHI and the other vestibular disability questionnaire, where the individuals with vestibular dysfunction demonstrated substantially greater disability and reduced quality of life compared with healthy individuals.

The positional and vestibular symptom domain demonstrated the largest group difference, with a highly significant effect size ($r = 0.90$, $p < .001$). Similarly, the balance and mobility domain demonstrated very large effect size ($r = 0.87$, $p < .001$). These findings suggest

that positional vertigo, imbalance, and fear of movement are the most distinguishing clinical features that differentiate individuals with BPPV from healthy participants.

The activity limitation domain also demonstrated large effect size ($r = 0.73$, $p < .001$), indicating a clinically meaningful difference in functional participation between groups. Similar findings have been reported in studies evaluating vestibular disability and fear- related movement avoidance among individuals with chronic dizziness.

The emotional and psychological impact domain demonstrated significant differences with large effect size ($r = 0.77$, $p < .001$), suggesting that emotional burden substantially contributes to the multidimensional impact of BPPV. Similar findings have been reported in the vestibular literature, where anxiety, fear of recurrence, emotional distress, and reduced psychological well-being were commonly associated with vestibular dysfunction.

The visual and cognitive difficulty domain ($r = 0.65$, $p < .001$), sleep and fatigue domain ($r = 0.72$, $p < .001$), and autonomic symptoms domain ($r = 0.61$, $p < .001$) also demonstrated moderate to large effect sizes. Further supporting the multidimensional nature of BPPV. These findings suggest that vestibular dysfunction extends beyond physical dizziness-related disability and additionally influences cognition, fatigue, sleep quality and autonomic functioning.

Receiver Operating Characteristic (ROC) analysis demonstrated excellent discriminative ability of the BPPV-SCOPE questionnaire in differentiating individuals with BPPV from healthy participants. The obtained Area Under the Curve (AUC) value indicated excellent classification accuracy, supporting the questionnaire's ability to identify individuals with vestibular dysfunction accurately.

Comparable discriminative performance has been reported for vestibular assessment tools such as the DHI; however, the present questionnaire may provide a superior multidimensional assessment by evaluating positional symptoms, balance difficulties, activity limitations, emotional burden, cognitive difficulties, sleep disturbances, and associated symptoms simultaneously, rather than focusing solely on dizziness-related handicap.

The excellent classification accuracy observed in the present study may therefore be attributed to the questionnaire's multidimensional structure and its BPPV-specific item representation. These findings further support the clinical usefulness of the BPPV-SCOPE questionnaire as a screening and assessment tool in vestibular practice.

5.3 Convergent Validity

The convergent validity of the BPPV-SCOPE questionnaire was assessed by examining the relationship between BPPV-SCOPE scores and DHI scores using Spearman's rank-order correlation analysis. The findings revealed significant positive correlations between the total BPPV-SCOPE score and the DHI total score ($\rho = 0.981$, $p < .001$), indicating excellent concurrent validity. Similar strong correlations with DHI scores have been reported in vestibular disability questionnaires evaluating dizziness-related handicap and functional impairment.

The positional and vestibular symptom domain demonstrated a strong correlation with DHI scores ($\rho = 0.878$, $p < .001$), suggesting that positional vertigo substantially contributes to perceived dizziness-related disability. Similar findings have been reported in previous BPPV-related questionnaires and vestibular disability studies, where positional dizziness and head-movement provocation were strongly associated with reduced functional independence. The

strong association observed in the present study suggests that the BPPV-SCOPE questionnaire adequately measures the construct it was designed to assess.

The balance, mobility, and fall concern domain demonstrated the strongest correlation with DHI scores ($\rho = 0.931$, $p < .001$). Comparable findings have been reported in the Activities-specific Balance Confidence Scale and the Vestibular Disorders Activities of Daily Living Scale, in which imbalance and fear of falling significantly affected daily functioning. This suggests that the BPPV-SCOPE questionnaire also assesses constructs related to instability, fear of symptom provocation, and movement avoidance, which individuals with BPPV commonly experience.

The activity limitation and participation domain additionally demonstrated strong correlation with DHI scores ($\rho = 0.876$, $p < .001$). Similar findings have been reported in vestibular rehabilitation studies demonstrating reduced participation in mobility-related activities, driving, social participation, and household responsibilities among individuals with vestibular dysfunction. These findings suggest that recurrent vertigo episodes and fear of symptom provocation substantially interfere with routine activities and social participation.

The emotional and psychological impact domain demonstrated a strong correlation with DHI scores ($\rho = 0.807$, $p < .001$), indicating that emotional distress contributes substantially to the overall burden experienced by individuals with BPPV. Similar findings have been reported in vestibular literature, where anxiety, fear of falling, emotional stress, and reduced psychosocial well-being were strongly associated with vestibular dysfunction.

The visual and cognitive difficulties domain demonstrated moderate-to-strong correlation with DHI scores ($\rho = 0.771$, $p < .001$). Similar findings have been reported in studies evaluating vestibular-related cognitive dysfunction and visual dependence. Vestibular

dysfunction has been shown to affect concentration, spatial orientation, attention, and higher cortical processing. However, the slightly lower correlation observed, compared with physical domains, may indicate that cognitive symptoms occur secondary to persistent dizziness, fatigue, anxiety, and reduced participation rather than directly due to vestibular dysfunction itself.

The sleep and fatigue domain demonstrated a strong correlation with DHI scores ($\rho = 0.864$, $p < .001$), supporting the previous reports that vestibular dysfunction negatively affects the sleep quality and daytime functioning. Positional vertigo during turning in bed and nocturnal movement-related dizziness may contribute to disturbed sleep, fatigue, reduced concentration and irritability.

The autonomic and associated symptoms domain demonstrated comparatively lower but still significant correlation with the DHI scores ($\rho = 0.603$, $p < .001$). The relatively lower correlation observed in this domain may indicate that autonomic symptoms such as nausea and sweating occur less consistently across individuals with BPPV and may represent secondary physiological responses during vertigo rather than core disability-related constructs.

5.4 Reliability Analysis

Internal consistency reliability analysis demonstrated excellent homogeneity among the questionnaire items. The overall questionnaire demonstrated Cronbach's alpha value of 0.945, indicating excellent internal consistency. Comparable high Cronbach's alpha values have been reported in vestibular disability questionnaires, including the DHI, supporting adequate coherence among questionnaire items assessing vestibular symptom burden and functional impact.

The high internal consistency observed in the present study suggests that the questionnaire items effectively measure related multidimensional constructs associated with BPPV. However, although the obtained alpha values indicate strong reliability, excessively high values may additionally suggest overlap among certain questionnaire items. Since the questionnaire was intentionally designed to comprehensively asses the multidimensional symptoms associated with BPPV, some degree of inter relatedness among domains such as emotional distress, balance difficulties, activity limitations and participation restriction may be expected.

The test–retest reliability analysis also demonstrated excellent temporal stability of the questionnaire. The questionnaire demonstrated a single-measures Intraclass Correlation Coefficient (ICC) value of 0.995 with $p < .001$, indicating excellent reproducibility across repeated administrations. Similar high ICC values have been reported in vestibular outcome measures, including the DHI. The strong temporal stability observed in the present study may be attributed to the questionnaire's structured, multidimensional nature, consistent symptom reporting, and clarity of item interpretation among participants.

5.5 Strengths and clinical relevance of the BPPV-SCOPE questionnaire

One of the major strength of the questionnaire is its multidimensional struture. Unlike many existing vestibular assesment questionnaire, this questionnaire evaluates positional and vestibular symptoms, activity limitations, balance and mobility difficulties, emotional impact, cognitive difficulties, sleep disturbances and associated symptoms within a single self-administered instrument. This comprehensive assesment will enables a more holistic understanding of the impact of BPPV on the individuals quality of life and daily functioning. Previoys literatures highlighted the importance of patient-reported outcome measures in

providing a valuable insights into the symptom burden and functional difficulties experienced by the patients, thereby facilitating a patient-centred care.

Another impprtant strength of the questionnaire is its condition-specifc focus. To the best of current knowledge, very few questionnaires have been developed specifically to comprehensively evaluate the multidimensional impact of BPPV. Most available instruments primarily focuses on diagnosis, sub-type identification or general dizziness-related disabilty. Although the DHI is widely used to asses the dizziness-related handicap, it does not specifically adresses several characteristic manifestation of the BPPV, such as positional triggers, brief episodes of vertigo associated with the head movements, activity avoidance due to positional symptoms and associated functional concerns. Therefore, the BPPV-scope questionnaire provides a more targeted and comprehensive evaluation of symptom profile and functional consequences of BPPV.

A furthur strength of the study is the development of a culturally relevant questionnaire for indian population. This may improve the patient comprehension, response accuracy and clinical applicability across a diverse healthcare environments. Furthermore, its self-administered format and practical nature may increase its utility in the resource-limited settings where access to specialised vestibular assesment facilities may be restricted.

The BPPV-SCOPE questionnaire has several important clinical implications. By providing a domain-specific information, the questionnaire may assist the clinicians in identifying specific areas of difficulty, including the balance impairment, activity restrictions, emotional distress, cognitive difficulties, associated symptoms and sleep-related concerns. Such information mat facilitate a individualized rehabilitation planning and support patient-centred management approaches tailored to the unique needs of the each patients.

In addition, the questionnaire may serve as useful measure for monitoring treatment-related changes over time. Administration of the questionnaire before and after the therapeutic intervention may help clinicians evaluate treatment effectiveness, monitor the patient progress and identify residual symptoms requiring furthur management. Consequently, the BPPV-SCOPE questionnaire has the potential to be a valuable clinical tool fot both the assesment and outcome evaluation in individuals with BPPV

5.6 Limitations

Despite promising findings, certain limitations were observed in the study. The validation smaple was relatively small and purposive sampling was used during participant recruitment. Inclusion of a larger and more diverse populations from different regions may improve generalizability of findings. Additionally, the questionnaire was developed only in english, which may limit its applicability for individuals with limited english proficiency. Participants were recruited primarily from a single clinical settings, which may limit the external validity of the findings. Multicentric studies involving a diverse geographic and clinical populations may furthur improve the generalizability of the questionnaire.

Although a excellent test-retest reliability was observed, temporal stability wasassesed in only a small subset of participants(n=10). Including a larger sample for repeated administrations may yield a more reliability estimates.

In addition, the responsiveness of the questionnaire to treatment-related changes was not evaluated in the study. Therefore, the ability of BPPV-SCOPE questionnaire to detect sumptom improvement following vestibular rehabilitation or canalith repositioning maneuvers remains to be establised.

Since the questionnaire was self-administered, participants responses may have been influenced by the subjective perceptions, recall bias, emotional status and symptom fluctuations during the assesment.

5.7 Future Recommendations

Future studies may focus on translating this questionnaire into different regional indian languages and on establishing a normative data across larger and more diverse populations. Inclusion of participants from the diverse geographic regions and multicentric clinical settings may further strengthen questionnaires generalizability and clinical applicability.

Furthur research may additionally focuses on adminstering the BPPV-SCOPE questionnaire across a larger samples to establish a stronger reliability estimates and improve the external validity. Longitudinal studies involving repeated assesments over a extended follow-up periods may help better understand the symptom progression and recurrence patterns in individuals with BPPV.

Future studies may also evaluate the responsiveness of the questionnaire to treatment-related changes following canalith repositioning maneuvers and vestibular rehabilitation. Assesing questionnaire scores at pre- treatment, post- treatment and follow-uo phases may helps determine the ability of BPPV-SCOPE questionnaire to identify symptom reduction, functional improvement and changes in psychosocial impact over time.

In addition, future studies may compare BPPV-SCOPE findings across different BPPV subtypes, severity levels, age group and recurrent versus non-recurrent cases ij order to furthur strengthen its clinical utility and research applicability.

5.8 Conclusion

Overall, the findings of the present study indicate that BPPV-SCOPE questionnaire is a valid, reliable and clinically useful multidimensional tool for assesing the impact of BPPV. The questionnaire demonstrated a satisfactory psychometric ability, excellent internal consistency and high test-retest reliability.

The BPPV-SCOPE questionnaire effectively evaluated positional and vestibular symptoms, activity limitations, balance and mobility difficulties, emotional and psychosocial impact, cognitive difficulties, sleep disturbances and associated symptoms in individuals with BPPV. In addition, the questionnaire sucessfully differentiated individuals with BPPV from the healthy participants and demonstrated a strong correlation with the DHI, thereby supporting its clinical applicability.

Unlike many currently available vestibular associated questionnaire, which primarily asses the general dizziness-related disability or serve as a diagnostic screening tools, the BPPV-SCOPE questionnaire provides a more comprehensive, condition-specific evaluation of the multidimensional impact of BPPV. Therefore, the questionnaire may serve as a valuable clinical and research tool for the patient-centred assesment, symptom monitoring and rehabilitation planning in individuals with BPPV, particularly within the indian clinical populations.

CHAPTER VI

SUMMARY AND CONCLUSION

Benign Paroxysmal Positional Vertigo (BPPV) is one of the most common peripheral vestibular disorders and is characterised by brief episodes of vertigo triggered by changes in head position. Although the condition is considered benign, it can significantly affect balance, mobility, daily activities, emotional well-being, sleep quality, and overall quality of life. Existing assessment tools commonly used in vestibular practice, such as the Dizziness Handicap Inventory (DHI), Vertigo Symptom Scale (VSS), Activities-specific Balance Confidence Scale (ABC), and Vestibular Disorders Activities of Daily Living Scale (VADL), provide useful information regarding dizziness-related disability and vestibular dysfunction. However, these tools are not specifically designed to comprehensively assess the multidimensional impact of BPPV. Furthermore, currently available BPPV-specific questionnaires mainly focus on diagnosis and subtype identification rather than evaluating symptom severity and functional consequences.

Therefore, the present study aimed to develop and validate a self-administered questionnaire, namely the Benign Paroxysmal Positional Vertigo – Symptom and Clinical Profile Evaluation (BPPV-SCOPE), to comprehensively assess the multidimensional impact of BPPV. The specific objectives were to develop a questionnaire and establish its psychometric propeerties through a validity and reliability analysis.

The study used a cross-sectional validation design. The questionnaire was developed through a extensive review of literature, evaluation of existing vestibular and BPPV- specific questionnaires, cognitive interviews with individuals with BPPV and consultations with experts involved in vestibular assesment and rehabilitation. An initial pool of items was generated and subsequently refined through a expert reviwe, content validation and pilot

testing. Following this systematic development process, the final version of BPPV-SCOPE questionnaire consisted of 35 items distributed across seen domains: positional and vestibular symptoms; Balance; Mobility and Fall Concern; Activity Limitation and Participation; Visual and Cognitive Difficulties; Emotional and Psychological Impact; Sleep and Fatigue; and Autonomic and Associated Symptoms.

The questionnaire was administered to sixty participants aged 20-70 years, comprising 30 individuals with BPPV and 30 healthy controls. Content validity was estalished through evaluation by 11 audiologist experienced in the vestibular assesment and rehabilitation. The findings demonstrated a excellent content validity with high Content Validity Ratio **(**CVR) and content validity index (CVI) across relevance, clairity, practicality and ambiguity. CVI values of 0.85 for clarity, 0.80 for relevance, 0.83 for ambiguity and 0.84 for practicality indicating a good agreement regarding the appropriateness, comorehensibility and clinical usefulness of the questionnaire items. Furthermore, most items achieved CVR values above the recommended cutt off 0.63, supporting their retention in the final version of the questionnaire. These findings suggest that the questionnaire adequately represents the multidimensional clinical manifestations of BPPV also it is understandable, appropriate,clinically relevant and suitable for assesing individuals with BPPV.

Descriptive analysis revealed that the participants with BPPV consistently scored higher across all the domains than healthy individuals, indicating a greater symptom severity and functional limitations.

The discriminative validity findings indicated that BPPV-SCOPE questionnaire effectively differentiated individuals with BPPV from healthy controls. A statistically significant difference was observed between the groups for the total scores (Mann–Whitney U = 900.0, Z = 6.942, $p < .001$), with a large effect size (r = 0.89). Furtermore, ROC analysis

demonstrated excellent disciminative ability, with an Area Under the Curve(AUC) of 1.00, with 100% sensitivity and 100% specificity at a cutoff score of 5.00. These findings indicate that the questionnaire has a excellent capability to distinguish individuals with BPPV from healthy individuals within the study.

The convergent validity analysis demonstrated a very strong positive relationship between BPPV-SCOPE questionnaire and Dizziness Handicap Inventory (DHI). The total BPPV-SCOPE score showed a spearman's correlation coefficient of $\rho = 0.981$ ($p < .001$) with the DHI total score, indicating that both instruments measure closely related constructs.this strong association supports the ability of the BPPV-SCOPE questionnaire to asses dizziness-related disability and symptom burden in individuals with BPPV while providing additional condition-specific information.

The BPPV-SCOPE questionnaire demonstrated excellent internal consistency. The overall questionnaire yielded a Cronbach's alpha coefficient of 0.945, indicating a high degree of homogenity among the items and suggesting that the questionnaire consistently measures the intended construct. The high internal consistency supports the reliability of questionnaire for clinical and research applications.

The test-retest reliability findings demonstrated a excellent temporal stability of the questionnaire. The total BPPV-SCOPE score yielded an Intraclass Correlation Coefficient (ICC) of 1.000 ($p < .001$), indicating a near-perfect agreement between the two administations conducted one week apart. These findings that the questionnaire provides a stable and reproducible measurements over time and is suitable for monitoring symptom changes and treatment outcomes in individuals with BPPV.

The findings of the present study demonstrate that BPPV is a multidimensional disorder affecting not only the vestibular symptoms but also mobility, daily activities, emotional well-being, cognitive functioning, sleep quality and participation in everyday life. The BPPV-SCOPE questionnaire was specifically designed to capture these multiple dimensions within a single assesment tool. The questionnaire adresses important limitations of currently available measures and provide a comprehensive evaluation of clinical impact of BPPV.

In conclusion, the BPPV-scope questionnaire is a valid, reliable and clinically practical instrument for assesing the multidimensional impact of BPPV. The questionnaire demonstrated a excellent content validity, strong construct validity, satisfactory discriminative validity and high reliability. The tool has potential applications in clinical assesment, treatment planning, outcome evaluation and research involving individuals with BPPV. The development of BPPV-SCOPE contributes to the availability of a disease-specific and culturally relevant assesment measure that can facilitate a patient-centred management and improve the evaluation of symptom burden and functional impact associated with BPPV.

REFERENCES

Agrawal, Y., Carey, J. P., Della Santina, C. C., Schubert, M. C., & Minor, L. B. (2009). Disorders of balance and vestibular function in US adults: Data from the National Health and Nutrition Examination Survey, 2001-2004. *Archives of Internal Medicine*, *169*(10), 938–944https://doi.org/10.1001/ARCHINTERNMED.2009.6

Alfarghal, M., Singh, N. K., Algarni, M. A., Jagadish, N., & Raveendran, R. K. (2023). Treatment efficacy of repositioning maneuvers in multiple canal benign paroxysmal positional vertigo: a systematic review and meta-analysis. *Frontiers in Neurology*, *14*, 1288150. https://doi.org/10.3389/FNEUR.2023.1288150

Allen, D., Ribeiro, L., Arshad, Q., & Seemungal, B. M. (2016). Age-Related Vestibular Loss: Current Understanding and Future Research Directions. *Frontiers in Neurology*, *7*(DEC), 23 https://doi.org/10.3389/FNEUR.2016.00231

Balaban, C. D., & Jacob, R. G. (2001). Background and history of the interface between anxiety and vertigo. *Journal of Anxiety Disorders*, *15*(1–2), 27–51. https://doi.org/10.1016/S0887-6185(00)00041-4

Baloh, M. F. R. W. ., Honrubia, M. Dms. Vicente., & Kerber, M. K. A. . (2010). *Baloh and Honrubia's Clinical Neurophysiology of the Vestibular System, Fourth Edition Robert W. Baloh, MD, FAAN; Vicente Honrubia, MD, DMSc; Kevin A. Kerber,MD*https://books.google.com/books/about/Baloh_and_Honrubia_s_Clinical_Neurophysi.html?id=ZVHiBwAAQBAJ

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014

Bhattacharyya, N., Gubbels, S. P., Schwartz, S. R., Edlow, J. A., El-Kashlan, H., Fife, T., Holmberg, J. M., Mahoney, K., Hollingsworth, D. B., Roberts, R., Seidman, M. D.,

Steiner, R. W. P., Do, B. T., Voelker, C. C. J., Waguespack, R. W., & Corrigan, M. D. (2017). Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngology--Head and Neck Surgery : Official Journal of American Academy of Otolaryngology-Head and Neck Surgery*, *156*(3_suppl), S1–S47. https://doi.org/10.1177/0194599816689667

Brandt, T., Huppert, D., Hecht, J., Karch, C., & Strupp, M. (2006). Benign paroxysmal positioning vertigo: a long-term follow-up (6-17 years) of 125 patients. *Acta Oto-Laryngologica*, *126*(2), 160–163 https://doi.org/10.1080/00016480500280140

Churruca, K., Pomare, C., Ellis, L. A., Long, J. C., Henderson, S. B., Murphy, L. E. D., Leahy, C. J., & Braithwaite, J. (2021). Patient-reported outcome measures (PROMs): A review of generic and condition-specific measures and a discussion of trends and issues. *Health Expectations : An International Journal of Public Participation in Health Care and Health Policy*, *24*(4), 1015. https://doi.org/10.1111/HEX.13254

Cohen, H. S., & Kimball, K. T. (2000). Development of the Vestibular Disorders Activities of Daily Living Scale. *Archives of Otolaryngology–Head & Neck Surgery*, *126*(7), 881–887. https://doi.org/10.1001/ARCHOTOL.126.7.881

Cousins, S., Cutfield, N. J., Kaski, D., Palla, A., Seemungal, B. M., Golding, J. F., Staab, J. P., & Bronstein, A. M. (2014). Visual Dependency and Dizziness after Vestibular Neuritis. *PLoS ONE*, *9*(9), e105426. https://doi.org/10.1371/JOURNAL.PONE.0105426

Cullen, K. E. (2012). The vestibular system: multimodal integration and encoding of self-motion for motor control. *Trends in Neurosciences*, *35*(3), 185–196. https://doi.org/10.1016/J.TINS.2011.12.001

Epley, J. M. (1992). The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngology--Head and Neck Surgery : Official Journal of*

American Academy of Otolaryngology-Head and Neck Surgery, *107*(3), 399–404. https://doi.org/10.1177/019459989210700310

Fiel Peres, F. (2026). Effect sizes for nonparametric tests. Biochemia Medica, 36(1), 010101. https://doi.org/10.11613/BM.2026.010101

Franco, I., Uricel, Y., Valencia, S., Castillo-Bustamante, M., & Madrigal, J. (2023). Quality of life in patients with vestibular disorders: a narrative review. *International Journal of Otorhinolaryngology and Head and Neck Surgery*, *9*(5), 426–434. https://doi.org/10.18203/ISSN.2454-5929.IJOHNS20231093

Gold, D. R., & Newman-Toker, D. E. (2020). Reader response: Questionnaire-based diagnosis of benign paroxysmal positional vertigo. *Neurology*, *95*(19), 887–888. https://doi.org/10.1212/WNL.0000000000010935

Goldberg, J. M. (1991). The vestibular end organs: morphological and physiological diversity of afferents. *Current Opinion in Neurobiology*, *1*(2), 229–235. https://doi.org/10.1016/0959-4388(91)90083-J

Gilbert, G. E., & Prion, S. (2016). Making Sense of Methods and Measurement: Lawshe's Content Validity Index. Clinical Simulation in Nursing, 12(12), 530–531. https://doi.org/10.1016/J.ECNS.2016.08.002

Hall, C. D., Herdman, S. J., Whitney, S. L., Anson, E. R., Carender, W. J., Hoppes, C. W., Cass, S. P., Christy, J. B., Cohen, H. S., Fife, T. D., Furman, J. M., Shepard, N. T., Clendaniel, R. A., Dishman, J. D., Goebel, J. A., Meldrum, D., Ryan, C., Wallace, R. L., & Woodward, N. J. (2022). Vestibular Rehabilitation for Peripheral Vestibular Hypofunction: An Updated Clinical Practice Guideline From the Academy of Neurologic Physical Therapy of the American Physical Therapy Association. *Journal of Neurologic Physical Therapy : JNPT*, *46*(2), 118–177. https://doi.org/10.1097/NPT.0000000000000382

Hoffer, M. E., Gottshall, K. R., Moore, R., Balough, B. J., & Wester, D. (2004). Characterizing and treating dizziness after mild head trauma. *Otology & Neurotology : Official Publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology*, *25*(2), 135–138. https://doi.org/10.1097/00129492-200403000-00009

Horak, F. B. (2006). Postural orientation and equilibrium: what do we need to know about neural control of balance to prevent falls? *Age and Ageing*, *35 Suppl 2*(SUPPL.2). https://doi.org/10.1093/AGEING/AFL077

Jacobson, G. P., & Newman, C. W. (1990). The Development of the Dizziness Handicap Inventory. *Archives of Otolaryngology--Head and Neck Surgery*, *116*(4), 424–427. https://doi.org/10.1001/ARCHOTOL.1990.01870040046011,

Jeong, S. H., Kim, J. S., Shin, J. W., Kim, S., Lee, H., Lee, A. Y., Kim, J. M., Jo, H., Song, J., & Ghim, Y. (2013). Decreased serum vitamin D in idiopathic benign paroxysmal positional vertigo. *Journal of Neurology*, *260*(3), 832–838. https://doi.org/10.1007/S00415-012-6712-2

Kandel, E. R. ., Koester, John., Mack, Sarah., & Siegelbaum, Steven. (2021). *Principles of neural science*. 1646. https://books.google.com/books/about/Principles_of_Neural_Science_Sixth_Editi.html?id=IYoEEAAAQBAJ

Kim, J.-S., & Zee, D. S. (2014). Clinical practice. Benign paroxysmal positional vertigo. *The New England Journal of Medicine*, *370*(12), 1138–1147. https://doi.org/10.1056/NEJMCP1309481

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. Journal of Chiropractic Medicine, 15(2), 155–163. https://doi.org/10.1016/J.JCM.2016.02.012

Kyte, D. G., Calvert, M., van der Wees, P. J., ten Hove, R., Tolan, S., & Hill, J. C. (2015). An introduction to patient-reported outcome measures (PROMs) in physiotherapy. *Physiotherapy (United Kingdom)*, *101*(2), 119–125. https://doi.org/10.1016/j.physio.2014.11.003

Lee, S. H., & Kim, J. S. (2010). Benign paroxysmal positional vertigo. *Journal of Clinical Neurology (Seoul, Korea)*, *6*(2), 51–63. https://doi.org/10.3988/JCN.2010.6.2.51

Leigh, R. J., & Zee, D. S. (2015). The Neurology of Eye Movements. *The Neurology of Eye Movements*. https://doi.org/10.1093/MED/9780199969289.001.0001

Muraleedharan, A., Somnath, P., Chandrashekar, Y., & Jayanna, N. (2024). Diagnosis of Benign Paroxysmal Positional Vertigo Using a Questionnaire in a Hospital Based Rural Setting in India. *Indian Journal of Otolaryngology and Head and Neck Surgery*, *76*(4), 3208–3211. https://doi.org/10.1007/S12070-024-04646-3

Mutlu, B., & Topcu, M. T. (2022). Investigation of the Relationship between Vestibular Disorders and Sleep Disturbance. *International Archives of Otorhinolaryngology*, *26*(4), e688. https://doi.org/10.1055/S-0042-1742763

Neuhauser, H. K. (2007). Epidemiology of vertigo. *Current Opinion in Neurology*, *20*(1), 40–46. https://doi.org/10.1097/WCO.0B013E328013F432

Palmeri, R., & Kumar, A. (2022). Benign Paroxysmal Positional Vertigo. StatPearls. https://www.ncbi.nlm.nih.gov/books/NBK470308/

Powell, L. E., & Myers, A. M. (1995). The Activities-specific Balance Confidence (ABC) Scale. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *50A*(1), M28–M34. https://doi.org/10.1093/GERONA/50A.1.M28

Purves, D., Augustine, G. J., Fitzpatrick, D., Katz, L. C., LaMantia, A.-S., McNamara, J. O., & Williams, S. M. (2001). *The Semicircular Canals*. https://www.ncbi.nlm.nih.gov/books/NBK10863/

Qiao, Q., Chen, G., Zhang, C., Zhou, L., Li, Y., & Huangfu, H. (2022). [Design and verification of the screening questionnaire for benign paroxysmal positional vertigo]. *Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi = Chinese Journal of Otorhinolaryngology Head and Neck Surgery*, *57*(6), 677–682. https://doi.org/10.3760/CMA.J.CN15330-20210716-00462

Schuknecht, H. F. (1969). Cupulolithiasis. *Archives of Otolaryngology (Chicago, Ill. : 1960)*, *90*(6), 765–778. https://doi.org/10.1001/ARCHOTOL.1969.00770030767020

Smith, P. F. (2017). The vestibular system and cognition. *Current Opinion in Neurology*, *30*(1), 84–89. https://doi.org/10.1097/WCO.0000000000000403

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Von Brevern, M., Bertholon, P., Brandt, T., Fife, T., Imai, T., Nuti, D., & Newman-Toker, D. (2015). Benign paroxysmal positional vertigo: Diagnostic criteria. *Journal of Vestibular Research: Equilibrium and Orientation*, *25*(3–4), 105–117. https://doi.org/10.3233/VES-150553

von Brevern, M., Bertholon, P., Brandt, T., Fife, T., Imai, T., Nuti, D., & Newman-Toker, D. (2017). Benign paroxysmal positional vertigo: Diagnostic criteria Consensus document of the Committee for the Classification of Vestibular Disorders of the Bárány Society. *Acta Otorrinolaringologica Espanola*, *68*(6), 349–360. https://doi.org/10.1016/J.OTORRI.2017.02.007

Von Brevern, M., Radtke, A., Lezius, F., Feldmann, M., Ziese, T., Lempert, T., & Neuhauser, H. (2006). Epidemiology of benign paroxysmal positional vertigo: a population based study. *Journal of Neurology, Neurosurgery, and Psychiatry*, *78*(7), 710. https://doi.org/10.1136/JNNP.2006.100420

Von Brevern, M., Radtke, A., Lezius, F., Feldmann, M., Ziese, T., Lempert, T., & Neuhauser, H. (2007). Epidemiology of benign paroxysmal positional vertigo: a population based study. *Journal of Neurology, Neurosurgery, and Psychiatry*, *78*(7), 710–715. https://doi.org/10.1136/JNNP.2006.100420

Wan, Y., Li, Y., & Sun, J. (2023). The reliability of a subtype-determining questionnaire in efficient benign paroxysmal positional vertigo diagnosis in geriatrics. *Frontiers in Aging Neuroscience*, *15*, 1209342. https://doi.org/10.3389/FNAGI.2023.1209342/BIBTEX

Whitney, S. L., Marchetti, G. F., & Morris, L. O. (2005). Usefulness of the dizziness handicap inventory in the screening for benign paroxysmal positional vertigo. *Otology and Neurotology*, *26*(5), 1027–1033. https://doi.org/10.1097/01.MAO.0000185066.04834.4E

Wilhelmsen, K., Strand, L. I., Nordahl, S. H. G., Eide, G. E., & Ljunggren, A. E. (2008). Psychometric properties of the Vertigo symptom scale - Short form. *BMC Ear, Nose, and Throat Disorders*, *8*(1). https://doi.org/10.1186/1472-6815-8-2

Yardley, L., Masson, E., Verschuur, C., Haacke, N., & Luxon, L. (1992). Symptoms, anxiety and handicap in dizzy patients: Development of the Vertigo symptom scale. *Journal of Psychosomatic Research*, *36*(8), 731–741. https://doi.org/10.1016/0022-3999(92)90131-K

Yetiser, S., & Ince, D. (2015). Demographic Analysis of Benign Paroxysmal Positional Vertigo as a Common Public Health Problem. *Annals of Medical and Health Sciences Research*, *5*(1), 50. https://doi.org/10.4103/2141-9248.149788

Zein-Elabedein, A., Abd-Elhamid, H., Ragab, A., & Salah Mokhtar, A. (2025). Does benign paroxysmal positional vertigo impact the psychological state of patients? A case–control study. *Egyptian Journal of Otolaryngology*, *41*(1), 81-. https://doi.org/10.1186/S43163-025-00828-0/TABLES/5

APPENDIX

BPPV-SCOPE QUESTIONNIARE

Benign Paroxysmal Positional Vertigo – Symptom and Clinical Profile Evaluation

SEC	SI NO	ITEMS	RATING SCALE
I	**Demographic information details**		
I 1			
I 1.1		*Basic Information*	
	1	Name:	
	2	DOB: ___/___/_____	
	3	Diagnosis:	
	4	Sex: ☐ Male ☐ Female ☐ Prefer not to say	
	5	Education:_____ occupation:_____	
	6	Work type: ☐ Mostly sitting ☐ Mostly standing ☐ Physical labour ☐ Mixed	
I 1.2		*Lifestyle & Daily Habits:*	
	7	On average, how many hours per day do you spend using screens (phone/computer/TV etc..)? ☐ <2 hrs ☐ 2–4 hrs ☐ 4–6 hrs ☐ 6–8 hrs ☐ >8 hrs	
	8	How would you describe your usual stress level? ☐ Very low ☐ Low ☐ Moderate ☐ High ☐ Very high	
	9	How often do you engage in leisure-time physical activity (walking, exercise, sports, gym)? ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Regularly	
I 1.3		*Medical Background:*	
	10	Do you have any of the following medical conditions? *(Tick all that apply)* ☐ High blood pressure (Hypertension) ☐ Diabetes ☐ Thyroid disorder ☐ Migraine ☐ Cervical spine/neck problems ☐ History of head injury ☐others (specify:_____)	

	11	Are you currently taking long-term medications? ☐ No ☐ Yes (please specify): _____				
	12	Have you ever been told you have a vitamin deficiency? ☐ No ☐ Yes, Vitamin D ☐ Yes, Vitamin B12 ☐ Yes, Other(specify_____				
I 1.4		*Symptom History:*				
	13	How long have you been experiencing this spinning/unsteadiness problem? ☐ <1 week ☐ 1–4 weeks ☐ 1–6 months ☐ 6–12 months ☐ >1 year				
	14	During your spinning episodes, does it feel like ☐ you are spinning or ☐ that your surroundings are spinning? ☐ Both				
	15	For how long the spinning sensation lasts? ☐<30 sec ☐ 30 sec- <1 minute ☐ 1–5 minutes ☐ 5–20 minutes ☐ > 20 minutes				
	16	Did your symptoms start after any of the following? ☐ Head injury ☐ Infection/fever ☐after any inner ear pathology(if yes specify:_____) ☐after any surgical procedure (if yes specify:_____) ☐others, specify_____ ☐ No clear reason				
	17	When turning in bed, which side more often triggers symptoms? ☐ Right side ☐ Left side ☐ Both sides(if yes specify ☐R>L ☐ L>R)☐ Not sure				
I 1.5		*General Health Perception:*				
	18	How would you rate your overall physical health? ☐ Poor ☐ Fair ☐ Good ☐ Very good ☐ Excellent				
I 2		**BPPV-SCOPE Questionnaire**				
I 2.1		*Positional & Vestibular Symptoms*	0 Never	1 sometimes	2 Most of the time	3 always
		Do you experience a spinning sensation:				
	19	After a sudden side-to-side head movement?				

	20	When rolling over in bed?				
	21	When bending down?				
	22	When looking up?				
	23	When getting up from the bed?				
	24	How often do you experience a spinning sensation (vertigo) in a week?				
I 2.2		*Balance, Mobility & Fall Concern*	0 Never	1 sometimes	2 most of the time	3 always
		After the brief spinning sensation, do you experience any of the following:				
	25	Difficulty walking confidently outdoors and uneven surfaces?				
	26	Difficulty climbing the stairs ?				
	27	Feeling unsafe while walking in the dark?				
	28	Feeling that you might lose your balance?				
	29	Fear of falling during daily activities?				
	30	Feel unsteady while standing?				
I 2.3		*Activity Limitation & Participation*	0 Never	1 sometim es	2 most of the time	3 always
		Because of your balance problem (spinning sensation / unsteadiness), do you:				
	31	Avoid travelling?				
	32	Cancel or reschedule plans?				
	33	Take more time than before to complete daily activities?				
	34	Have difficulty doing household work?				
	35	Avoid intense physical activities?				
	36	Feel that your job or studies are restricted?				
	37	Need to change your work or work schedule?				

I 2.4		*Visual & Cognitive Difficulties*	0 Never	1 sometimes	2 most of the time	3 always
	38	Do you feel spinning/unsteadiness in places where there is a lot to look at or where many things are moving around you (such as crowds or traffic)?				
		After the onset of your balance problems, do you experience any of the following:				
	39	Difficulty concentrating on your work or daily tasks?				
	40	Difficulty focusing because of mental tiredness				
	41	Difficulty remembering things?				
I 2.5		*Emotional & Psychological Impact*	0 Never	1 sometimes	2 most of the time	3 always
		After the onset of your spinning sensation / unsteadiness, do you experience any of the following:				
	42	Feelings of frustration due to dizziness?				
	43	Feelings of helplessness at times?				
	44	Feelings of low mood or depression due to dizziness?				
	45	Feeling embarrassed when you experience a spinning sensation/unsteadiness in public?				
	46	Feeling anxious about unexpected episode of dizziness?				
	47	Feeling worry about next episode?				
I 2.6		*Sleep & Fatigue*	0 Never	1 sometimes	2 most of the time	3 Most of the time
		After the onset of your spinning sensation / unsteadiness, do you experience any of the following:				
	48	disturbed sleep because of spinning sensation?				
	49	Waking up feeling tired?				

	50	Feeling irritable due to lack of sleep?				
I 2.7		*Autonomic & Associated Symptoms*	0 Never	1 sometimes	2 most of the time	3 always
		Do you experience:				
	51	Nausea during the episode?				
	52	Vomiting during severe episode?				
	53	Feel exhausted after an episode?				

SCORES OBTAINED

Positional and Vestibular Symptoms:

Balance, Mobility and Fall Concern :

Activity Limitation and Participation:

Activity Limitation and Participation:

Visual and Cognitive Difficulties:

Sleep and Fatigue:

Autonomic and Associated Symptoms:

Total score: