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Navigating unsteady ground: vestibular rehabilitation in postural perceptual positional dizziness: A narrative review

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Abstract

Persistent Postural-Perceptual Dizziness (PPPD) is a multifaceted and incapacitating disorder characterized by persistent dizziness and instability. Vestibular rehabilitation has arisen as a promising therapeutic strategy, aiming to mitigate symptoms and enhance patients' overall well-being. However, this therapy is not without its set of challenges and controversies. This narrative review delves into Vestibular Rehabilitation in Patients with Persistent Postural-Perceptual Dizziness (PPPD), revealing several pivotal themes. The challenges associated with diagnosing PPPD, its inherent heterogeneity, and the often-intertwined psychological aspects add complexity to treatment decisions. Despite these obstacles and ongoing debates, vestibular rehabilitation stands as a promising therapeutic path, underscoring the significance of continuous research and individualized care in the management of this intricate and debilitating condition.

Keywords: Vestibulocochlear nerve diseases; Vestibular disorders; Vestibular rehabilitation; Dizziness

1. Introduction

In the intricate realm of vestibular disorders, one condition stands as both enigmatic and pervasive, known as Postural Perceptual Positional Dizziness (PPPD) [1]. As a diagnostic entity that often defies straightforward classification, PPPD challenges healthcare professionals and researchers alike in their quest to restore equilibrium to those who suffer from it [1].

PPPD, previously known as chronic subjective dizziness (CSD), somatic dizziness, or phobic postural vertigo, presents a constellation of symptoms encompassing dizziness, unsteadiness, and heightened perceptual awareness of bodily position and movement [2]. Its pathophysiology, while elusive, appears rooted in the intricate interplay of sensory, vestibular, and psychological factors [2]. A disruption within or between visual and postural control mechanisms is commonly described as the direct cause of this disorder [3]. Initial triggers may include neuro-otologic conditions, metabolic factors, and psychological distress [3]. Symptoms often manifest after a vestibular insult, such as vestibular neuritis, Meniere's disease, benign paroxysmal positional vertigo, or other predisposing medical conditions [3]. Anxiety, neuroticism, depression, and heightened body vigilance are known to contribute to the development of PPPD as well [3].

While diagnostic clarity has evolved, the pursuit of effective management continues to be a dynamic and evolving landscape [2,3]. Among the emerging approaches, vestibular rehabilitation shines as a beacon of promise, providing hope to those seeking stability in their daily lives [2,3]. This narrative review embarks on an exploration of the role and potential of vestibular rehabilitation in the multifaceted realm of PPPD. As we navigate this journey, we delve into not

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only the benefits but also the inherent complexities and challenges of applying vestibular rehabilitation to meet the nuanced needs of PPPD patients.

2. Review

This review was conducted between June and August 2022. We conducted a search using MeSH headings, including "Persistent postural perceptual dizziness" OR "phobic postural vertigo" OR "chronic subjective dizziness" OR "PPPD," AND NOT ("vestibular rehabilitation" OR "selective serotonin uptake inhibitor*" OR SSRI OR "serotonin-norepinephrine reuptake inhibitor*" OR SNRI OR "antidepressant" OR "cognitive-behavioral" OR "CBT"). We searched the PubMed, Bvsalud, and Google Scholar databases for relevant articles. The search was limited to articles published between 2017, when the Barany Society published the diagnostic criteria for postural perceptual persistent dizziness, and 2023. We included complete manuscripts published in English, specifically focusing on vestibular rehabilitation in patients with postural perceptual persistent dizziness, while excluding studies outside the fields of neurotology, neurology, and otolaryngology. Additionally, articles centered on pediatric populations, middle and inner ear malformations, and those exclusively focused on anxiety and depression were excluded.

The results were cross-checked among the four authors, and initially, 44 indexed papers were identified. However, only 8 indexed articles were selected for inclusion as they reported on patients with PPPD undergoing vestibular rehabilitation. The quality of evidence in the published articles was assessed following the 2009 Levels of Evidence criteria outlined by the Oxford Centre for Evidence-Based Medicine. Figure 1 provides a summary of the evidence search and selection process.

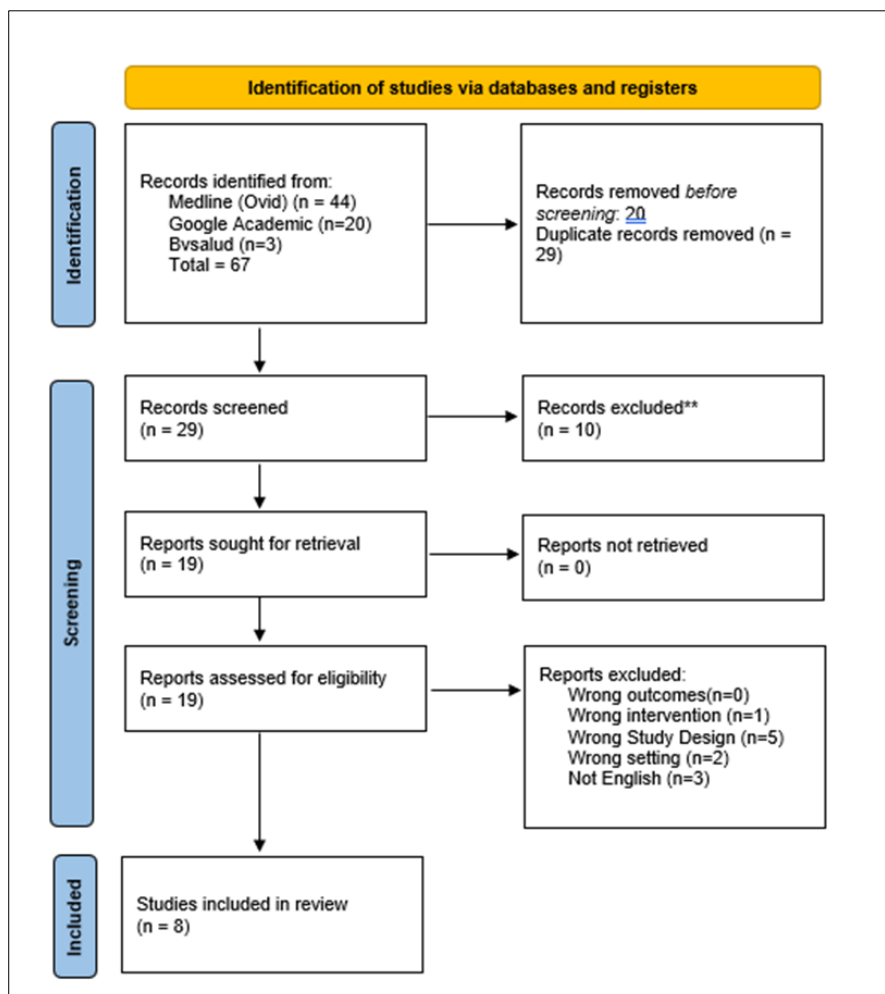


Figure 1 Summary of evidence search and selection

From these, there were three case-control studies, two retrospective studies, one randomized controlled trial, one pilot study, and one cross-sectional study. These studies were primarily conducted in Asia, Europe, East Africa, and the United States, as indicated in Table 1.

Table 1 Demographic variables and study design characteristics

Authors	Country	Patients	Type
Nada, 2019	Egypt	60	Case-control
Choi, 2021	Korea	30	Case- control
Mempouo, 2021	United Kingdom	100	Retrospective study
Herdman, 2022	United Kingdom	40	Randomized Controlled Trial
Eldøen, 2021	Norway	9	Cross-sectional
Fujimoto, 2023	Japan	30	Retrospective study
Teh, 2023	Malaysia	30	Pilot study
Kobel, 2023	United States	12	Case-control

3. Facts, controversies and upcoming challenges

3.1. Facts

Vestibular rehabilitation, a cornerstone in the management of various vestibular disorders, offers a promising avenue for individuals dealing with Postural Perceptual Positional Dizziness (PPPD) [4]. Nevertheless, the application of this therapeutic approach within the context of PPPD is not without its intricacies, giving rise to debates and challenges that merit careful consideration. In this discussion, we delve into the controversies and complexities [5].

Numerous studies have reported that vestibular rehabilitation can result in a notable reduction in the severity and frequency of symptoms associated with PPPD [6]. Dizziness, unsteadiness, and heightened perceptual awareness often show improvement after completing a course of vestibular rehabilitation [6]. The principles and exercises provided by vestibular rehabilitation have the potential to target the underlying sensory and perceptual disturbances contributing to PPPD symptoms [6,7]. Through systematic challenges to the vestibular system and the promotion of central compensation, rehabilitation aims to restore equilibrium and mitigate the disabling effects of dizziness and unsteadiness [6].

However, the journey to integrate vestibular rehabilitation into the management of PPPD is not without complexities [8]. The diagnosis of PPPD often requires meticulous exclusion of other vestibular and medical conditions. Additionally, the personalized and multidimensional nature of PPPD symptoms calls for a nuanced approach to rehabilitation [6-8]. Effective management of PPPD through vestibular rehabilitation necessitates a patient-centered care approach [5-7].

Moreover, multidisciplinary collaboration with psychologists and psychiatrists can be pivotal in addressing the psychological components of PPPD [9]. PPPD often involves psychological factors such as anxiety and heightened symptom perception. Vestibular rehabilitation not only addresses the physical aspects of PPPD but also provides a structured framework for addressing psychological distress [10].

3.2. Controversies

Studies have observed that the benefits of vestibular rehabilitation in PPPD may not manifest immediately. Many patients experience gradual improvements over the course of treatment and even after its completion; however, healthcare providers may encounter some challenges along the way [6]. Controversies persist regarding PPPD diagnosis and its precise criteria, the complex spectrum of symptoms, the coexistence of psychological conditions such as anxiety and depression, the availability of objective measurement tools for assessing PPPD symptoms and tracking rehabilitation progress, as well as the lack of objective tools to quantify patients' physical, psychological, and cognitive improvements. These challenges represent common hurdles faced by healthcare providers in the assessment of vestibular rehabilitation. However, as PPPD is still under active research, more discoveries are expected to emerge (Table 2).

Table 2 Controversies, facts and proposals on vestibular rehabilitation in PPPD

Controversy	Facts and proposals
PPPD diagnosis is often based on the exclusion of other vestibular and medical conditions, leading to concerns about diagnostic accuracy and the potential for overdiagnosis [2].	The challenge lies in establishing precise diagnostic criteria for PPPD and distinguishing it from other vestibular disorders with overlapping symptoms. This lack of clarity affects the selection of appropriate candidates for vestibular rehabilitation [2].
PPPD manifests as a spectrum of symptoms, from dizziness to heightened perceptual awareness. Tailoring a standardized rehabilitation protocol to such diverse presentations is contentious [4].	A one-size-fits-all approach to vestibular rehabilitation may not address the unique sensory and psychological components of each PPPD case. Personalization is key, but this complexity may hinder protocol development and standardization [4].
PPPD often co-occurs with psychological conditions, such as anxiety and depression. Debates center around whether vestibular rehabilitation alone can adequately address the psychological aspects of PPPD [5].	A holistic approach may necessitate collaboration between vestibular therapists and mental health professionals, raising questions about the optimal timing and structure of such collaborations within rehabilitation programs [6].
Managing PPPD comprehensively often requires collaboration between vestibular therapists, psychologists, and psychiatrists. Coordination among professionals can be logistically challenging [3,4].	Interdisciplinary communication and care pathways need to be established to ensure that patients receive comprehensive support. This requires overcoming logistical barriers and fostering effective teamwork [3,11].
Objective measurement tools for assessing PPPD symptoms and tracking rehabilitation progress remain limited, making it difficult to establish clear benchmarks and quantify improvements [3,12].	Researchers and clinicians are exploring novel approaches to measure the multifaceted aspects of PPPD, including the development of patient-reported outcome measures and the integration of wearable technology [3,12].

3.3. Upcoming challenges

Vestibular rehabilitation in patients with PPPD may encounter new challenges in this globalized era post-COVID-19. Currently, specific tools have been adopted, particularly by PPPD patients. One such tool is a self-instructive web application that comprises six-weekly online sessions featuring written information and video presentations [13]. This web course spans six weeks [13], offering daily exercises and delivering information, both in written and oral formats. It covers topics such as chronic dizziness, vestibular rehabilitation, compensatory mechanisms of the balance system, methods for improvement, and various coping strategies [13]. The exercises were demonstrated through video examples [13]. These lessons encompassed a range of activities, including head exercises (such as bending backward and forward, moving from shoulder to shoulder, and turning to the sides, with both open and closed eyes, both at rest and during body movement), eye movements (involving keeping the eyes fixed in different directions while moving the body), body rolling from side to side in a lying position, head bending toward the floor in a sitting position, standing up from a lying to a standing position, standing with legs together, standing on one leg, standing with heel to toe, and walking in a circle. These exercises were combined with head and eye fixation exercises, with gradual progression [13]. Participants in this study reported that the web application was easily accessible, understandable, effective, and contained an appropriate number of exercises. They also noted significant benefits and improvements in their motor skills [13]. However, some challenges were encountered, such as difficulties in determining the right exercise intensity and dosage, finding the time to complete them, and performing the rolling exercises on the floor [13]. Nevertheless, this self-help web application for vestibular rehabilitation appeared to be a feasible and potentially effective treatment, especially for individuals experiencing long-lasting and high symptom burdens [13].

Other experiences with self-care management over a period of 2 months have been documented in a retrospective case review [14]. In this study, 67% of patients diagnosed with PPPD, who were instructed to engage in a 2-month self-management vestibular rehabilitation program, successfully completed the program, while 22% chose to discontinue the vestibular rehabilitation program at their own discretion [14]. The authors reported that self-management vestibular rehabilitation led to a reduction in Dizziness Handicap Inventory scores and improvements in the Niigata PPPD questionnaire, which assesses subjective symptoms of dizziness [14]. However, this retrospective study indicated that patients who completed the self-care management program showed subjective improvements in dizziness symptoms but did not exhibit enhanced postural stability when objectively measured through posturography [14].

Recently, a pilot study was conducted in Malaysia to compare the effects of home-based vestibular rehabilitation therapy in patients with PPPD. The participants were monitored at 4 and 12 weeks after the start of therapy using dizziness handicap scores, DASS-21 scores, and quality of life assessments with EQ-5D VAS scores [15]. Within three months, significant improvements were observed in anxiety levels, quality of life, depression, and dizziness handicap inventory [15]. Preliminary results suggest that this type of therapy may be even more effective than hospital-based vestibular rehabilitation and could potentially be considered as a treatment option for PPPD [15].

3.4. Limitations

In the realm of vestibular rehabilitation for postural perceptual persistent dizziness, several limitations become apparent when examining the existing literature. Firstly, a notable constraint lies in the heterogeneity of patient populations and the variability in diagnostic criteria across studies. This lack of uniformity makes it challenging to draw generalized conclusions about the efficacy of specific rehabilitation interventions. Secondly, the absence of long-term follow-up data in many studies hampers our understanding of the durability of treatment effects. Additionally, the limited number of randomized controlled trials (RCTs) and the prevalence of small sample sizes in this field limit the strength of evidence available. Furthermore, it's important to acknowledge the potential for publication bias, as studies with positive results are more likely to be published, leading to an incomplete representation of the literature. Lastly, the complexity of postural perceptual persistent dizziness itself poses a challenge, as it encompasses a spectrum of disorders with varying underlying mechanisms, necessitating tailored treatment approaches. These limitations underscore the need for further well-designed RCTs, standardized diagnostic criteria, and long-term outcome assessments to advance our understanding and management of this condition through vestibular rehabilitation.

4. Conclusion

Vestibular rehabilitation offers hope for individuals with PPPD, but it is not without its controversies and challenges. The lack of diagnostic clarity, symptom heterogeneity, overlapping psychological factors, and ethical considerations are complex issues that demand ongoing research, collaboration, and innovation. Navigating these challenges is crucial to harnessing the full potential of vestibular rehabilitation in managing the multifaceted nature of Postural Perceptual Positional Dizziness. The dynamic landscape of vestibular rehabilitation in PPPD calls for continuous dialogue, adaptability, and an unwavering commitment to improving the lives of those affected by this enigmatic condition.

Compliance with ethical standards

Disclosure of conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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Authors's contributions

All author contribution- Substantial contributions to conception and design, data acquisition, or data analysis and interpretation, Drafting the article or critically revising it for important intellectual content, Final approval of the version to be published, Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of the work are appropriately investigated and resolved

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