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Validation of the subgroup classification system for vestibular dysfunctions in clinical decision making

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Main Article

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Abstract

Objective. To validate a subgroup classification tool designed to support clinical decision-making in vestibular physiotherapy.

Methods. A structured instrument was developed based on the main vestibular disorders commonly treated by physiotherapists. The tool was applied by professionals to simulated clinical cases. Content validation was performed by expert judges using the Delphi technique. The Content Validity Index was calculated for each item.

Results. The tool obtained a Content Validity Index of 0.78 or more across all domains in the first round and reached 100 per cent agreement among experts in the second round, confirming its content validity. The tool demonstrated clarity, coherence and clinical relevance for decision-making in vestibular rehabilitation.

Conclusion. The validated tool presents evidence of content validity and clinical applicability, offering support for physiotherapists in the classification and management of vestibular disorders.

Introduction

Vestibular dysfunctions have diverse aetiologies and are commonly associated with dizziness and vertigo, affecting 1.4 per cent of the global population and up to 30 per cent of individuals in their lifetime.[1–3] These symptoms can stem from vestibular, cardiovascular, neurological or psychological origins,[3,4] making accurate diagnosis essential.

In 24–43 per cent of cases, vertigo originates from benign peripheral causes such as benign paroxysmal positional vertigo (BPPV) or vestibular neuritis, although serious central disorders must be ruled out.[1,2] Anamnesis is critical: in up to 80 per cent of cases, the underlying cause is revealed during history-taking.[3]

Vestibular physiotherapy is a recognised area of physiotherapy practice in Brazil.[5,6] Accurate classification is essential to define effective treatment strategies, which may include exercises, manoeuvres, electrotherapy and assistive devices.

Despite increased publication of diagnostic criteria for conditions like BPPV,[7] vestibular migraine,[8–10] and Ménière's disease,[11] physiotherapists face difficulty integrating this knowledge into structured clinical reasoning. Clinical tools like the HINTS examination[12–14] and video-oculography aid diagnosis, but decision-making in physiotherapy still lacks standardised support.[15–20]

The Subgroup Classification System for Low Back Pain[16] inspired the creation of a similar structure for vestibular dysfunctions. Teixeira (2020, verbal communication) proposed the Subgroup Classification System for Vestibular Dysfunctions to support physiotherapists in clinical decision-making.

This study aimed to validate the Subgroup Classification System for Vestibular Dysfunctions and answer the question: does the Subgroup Classification System for Vestibular Dysfunctions have content validity and support clinical decision-making in vestibular physiotherapy?

Method

An observational study was conducted to validate the Subgroup Classification System for Vestibular Dysfunctions. Eligible participants were physiotherapists specialising in vestibular

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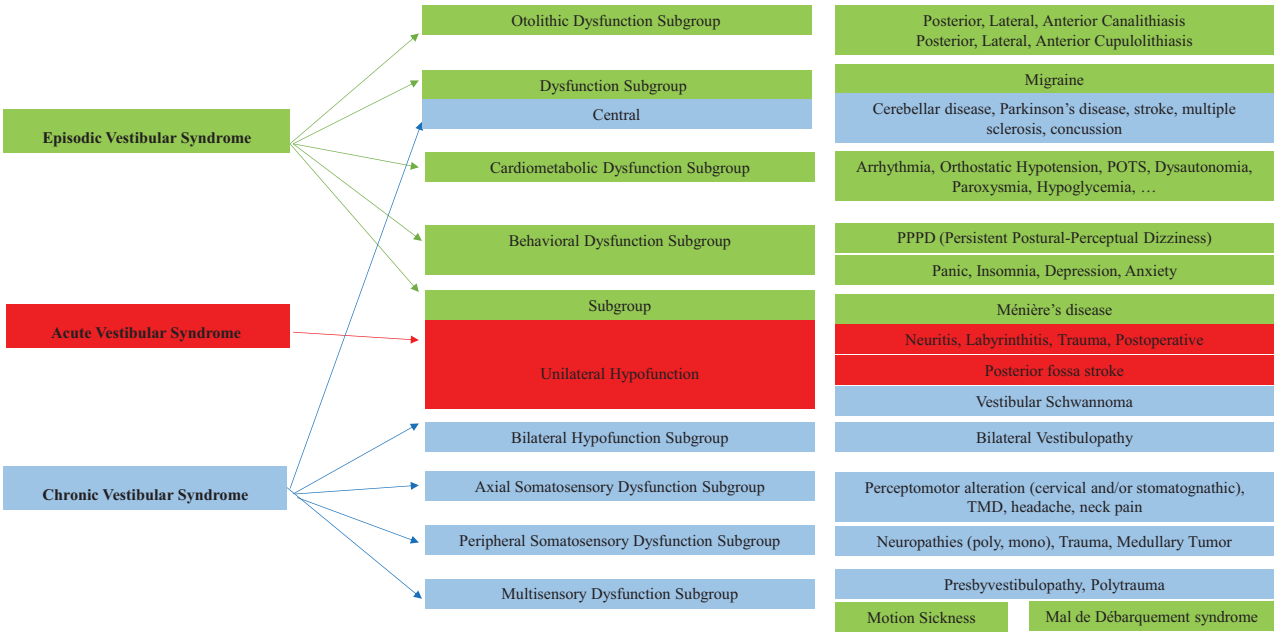


Figure 1. Structure of the Subgroup Classification System for Vestibular Dysfunctions.

rehabilitation. The study was approved by the Ethics Committee of the Faculty of Medicine of Marília (CAAE: 69132823.2.0000.5413).

Following Pasquali's framework,[17] the study involved theoretical, empirical and analytical stages. The validation occurred in four steps: (1) development of the tool and review by five expert physiotherapists; (2) incorporation of suggested modifications; (3) application to 15 physiotherapists using simulated cases; and (4) data analysis and final tool revision.

Content validation used the Delphi technique,[18] involving two rounds. Judges rated each item using a Likert scale and Content Validity Index of 0.78 or more was considered acceptable.[18] Sample groups were based on years of experience: less than 2 years, between 3 and 6 years, and more than 7 years.

Clinical cases were designed to reflect common vestibular dysfunctions. Each participant answered questions using the Subgroup Classification System for Vestibular Dysfunctions. Utility was rated on a Likert scale.

The structure of the Subgroup Classification System for Vestibular Dysfunctions is presented in Figure 1. The six initial content validation questions and their responses by the five expert judges are shown in Table 1. Adjustments based on the first round were incorporated, and the second-round results are shown in Table 2.

Results

Five expert judges participated in the Delphi rounds, with professional experience ranging from 11 to 25 years. In the first round, Content Validity Index scores were 0.78 or more for all items (Table 1). Based on feedback, some diagnostic categories were reassigned, such as mal de débarquement and presbyvestibulopathy.

In the second round, all items achieved 100 per cent agreement (Content Validity Index = 1.0), confirming content validity (Table 2).

Fifteen physiotherapists then applied the Subgroup Classification System for Vestibular Dysfunctions to 10 simulated cases. Accuracy improved with experience: Group 1 scored 76 per cent, Group 2 scored 91 per cent and Group 3 scored 95 per cent (Table 3).

Utility ratings showed that 80 per cent of participants in all groups 'completely agreed' that the tool was helpful (Table 4).

Discussion

The Subgroup Classification System for Vestibular Dysfunctions demonstrated strong content validity and was well-received by physiotherapists. Higher experience correlated with better case accuracy, highlighting the importance of clinical exposure.

Few tools exist to assist vestibular classification in physiotherapy. The Subgroup Classification System for Vestibular Dysfunctions addresses this gap by offering a structured framework aligned with validated clinical syndromes.[1,7–11]

Limitations include lack of a control group, the use of online application and a relatively small sample. Future studies should assess reliability and effectiveness in real-world clinical practice.

An instructional video and flowchart are available at Zenodo (Figure 1; DOI: 10.5281/zenodo.10401256).

- Diagnosing vestibular dysfunctions is challenging because of symptom variability and comorbidities, and physiotherapists lack standardised classification tools to guide decision-making
- This study presents the development and validation of the first validated subgroup classification tool designed to assist physiotherapists in vestibular rehabilitation
- The tool was applied by physiotherapists to simulated clinical cases and assessed by expert consensus
- The tool achieved strong content validity and unanimous expert agreement, supporting clinical use in clinical decision-making for vestibular physiotherapy

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Table 1. First stage of judgment by five physical therapists on the flowchart

Question	Degree of agreement ($n = 5$) (n (%))			IVC_{item} (%)
	IN	NA	AD	
Overall, how do you evaluate the structure and classification of subgroups?	–	1 (20)	4 (80)	80
How do you evaluate the group of provoked episodic vertigo?	1 (20)	–	4 (80)	80
How do you evaluate the group of spontaneous episodic vertigo?	1 (20)	–	4 (80)	80
Overall, how do you evaluate the group of acute spontaneous vertigo?	–	1 (20)	4 (80)	80
Overall, how do you evaluate the group of acute traumatic vertigo?	1 (20)	–	4 (80)	80
How do you evaluate the group of chronic spontaneous vertigo?	–	–	5 (100)	100

IN = inadequate; NA = needs adjustment; AD = adequate; IVC_{item} = Content Validity Index per item
Source: Own elaboration

Table 2. Second stage of the evaluation by the five physical therapists on the flowchart

Question	Degree of agreement ($n = 5$) (n (%))			IVC_{item} (%)
	IN	NA	AD	
Overall, how do you evaluate the structure and classification of subgroups?	–	–	5 (100)	100
How do you evaluate the group of provoked episodic vertigo?	–	–	5 (100)	100
How do you evaluate the group of spontaneous episodic vertigo?	–	–	5 (100)	100
Overall, how do you evaluate the group of acute spontaneous vertigo?	–	–	5 (100)	100
Overall, how do you evaluate the group of acute traumatic vertigo?	–	–	5 (100)	100
How do you evaluate the group of chronic spontaneous vertigo?	–	–	5 (100)	100

IN = inadequate; NA = needs adjustment; AD = adequate; IVC_{item} = Content Validity Index per item

Table 3. Accuracy rate of the 15 physiotherapists in clinical cases by experience time

Case number	Question	Accuracy rate (%)		
		Group 1 (experience <2 years)	Group 2 (experience between 3 and - years)	Group 3 (experience >7 years
1	1.1	80	100	100
	1.2	60	100	100
2	2.1	100	100	100
	2.2	60	100	100
3	3.1	60	100	80
	3.2	60	100	80
4	4.1	80	100	80
	4.2	40	80	80
5	5.1	60	60	100
	5.2	80	60	100
6	6.1	80	80	100
	6.2	80	80	100
7	7.1	100	100	100
	7.2	80	100	100
8	8.1	100	80	100
	8.2	100	100	100
9	9.1	100	100	100
	9.2	60	80	80
10	10.1	80	100	100
	10.2	60	100	100
Total		76	91	95

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Table 4. Agreement rate of the 15 physiotherapists on the utility of the flowchart

Statement: In my opinion, the developed flowchart was useful as an aid in resolving the clinical cases	Concordance rate (%)		
	Group 1 (experience <2 years)	Group 2 (experience between 3 and 6 years)	Group 3 (experience >7 years
Completely agree	80	80	80
Partially agree	20	20	0
Neither agree nor disagree	0	0	20
Partially disagree	0	0	0
Completely disagree	0	0	0
Total	100	100	100

Table 5. Description of vestibular dysfunction subgroups

	Subgroup	Clinical description
1	Positional dysfunction subgroup	In positional dysfunctions, canalithiasis and/or cupulolithiasis variants of the semicircular canals of the labyrinth are included.
2	Central dysfunction subgroup	Broad clinical conditions, ranging from vestibular migraine, characterised as an episodic syndrome with high prevalence, to chronic progressive conditions such as Parkinson's disease, multiple sclerosis, cerebellar diseases, sequelae of stroke or concussion.
3	Cardiometabolic dysfunction subgroup	Clinical conditions related to the cardiovascular and metabolic systems, including cardiac arrhythmia and/or dysrhythmia, postural hypotension and dysautonomia. This subgroup also encompasses vestibular paroxysmia and metabolic imbalances that may cause dizziness, postural instability or falls, such as uncontrolled diabetes and biochemical and/or hormonal alterations, and blood pressure dysregulation, such as hypertension.
4	Behavioural dysfunction subgroup	Psychiatric and behavioural conditions. This group includes conditions such as panic, insomnia, depression, anxiety and persistent postural-perceptual dizziness.
5	Unilateral hypofunction subgroup	Health conditions characterised by reduced unilateral vestibular function evidenced through physiological markers such as the head-impulse test, caloric testing or rotary chair testing. This finding is evident in acute post-traumatic or post-operative cases involving the labyrinth and its related structures, such as the circulation and vestibular nerves. Inflammatory, infectious and ischaemic conditions affecting these structures can also result in unilateral vestibular hypofunction. Episodic conditions like Ménière's disease and chronic conditions such as schwannoma can also cause unilateral vestibular hypofunction.
6	Bilateral hypofunction subgroup	Bilateral hypofunctions consist of bilateral vestibulopathy and conditions that cause bilateral reduction in peripheral labyrinth function. They are chronic conditions, typically due to otosclerosis or ototoxicity.
7	Subgroup of axial (cervical) somatosensory dysfunction	Impairment of somatosensory integration related to the cervical spine, shoulder girdle, face and masticatory system. Proximal somatosensory dysfunction is a chronic condition characterised by complaints of dizziness, tension-type headache, 'head heaviness', pain in the head, temporomandibular joint, face and/or behind the eyes, fatigue, impaired sleep and self-reported anxiety or stress.
8	Subgroup of peripheral somatosensory dysfunction (lower limbs)	This condition involves alterations in the somatosensory system of the spinal cord and lower limbs. It is a chronic condition, presenting complaints of dizziness, difficulty walking, postural instability, pain, distal dysesthesia or paraesthesia in the lower limbs, characteristic of degenerative peripheral neuropathies (such as polyneuropathies, mononeuropathies and/or spinal cord compression), recent or delayed sequelae (injury/trauma, neuro-oncological or orthopaedic joint post-operative) or metabolic conditions not classified under the cardiometabolic subgroup, such as vitamin deficiency.
9	Multisensory dysfunction subgroup	Functional conditions that combine alterations in various well-established bodily structures and functions simultaneously. This condition is clearly defined in the criteria of presbyvestibulopathy, but it can also occur after polytrauma, with multiple comorbidities due to neurological sequelae of the polytraumatised individual, which may also involve other peripheral sensorimotor disorders (labyrinthine, oculomotor, sensorimotor, orthopaedic and cardiocirculatory). We can also include in this subgroup episodic conditions such as motion sickness and mal de débarquement if understood as a clinical expression of a multisystem disorder.

Note: The Subgroup Classification System comprises nine vestibular dysfunction subgroup.

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Conclusion

The Subgroup Classification System for Vestibular Dysfunctions was validated for content and showed promising utility in clinical decision-making. Further studies are recommended to expand its use and validate its impact in broader clinical settings.

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Competing interests. None declared.

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