


Agreement Between the Results of the Dix-Hallpike Maneuver Examination and the Romberg Test in Vertigo Patients at RSUD Anutapura Palu

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ARTICLE INFO	ABSTRACT
Article History: Received Accepted Published online	<i>Background: Vertigo is a symptom of vestibular dysfunction and has been described as a sensation of movement, most commonly rotational movement. Research Objective: To determine the suitability of the results of the Dix-Hallpike Maneuver examination with the Romberg Test in patients with Vertigo. Research Method: This study used a deskriptif design with a cross-sectional approach by conducting direct measurements on vertigo patients. The sampling technique was carried out using consecutive sampling method. Research Results: The characteristics of vertigo patients obtained were female patients being the most, (58.9%), and male (41.1%). The most age group was 45-59 years old, (43.8%). In the Dix-Hallpike Maneuver examination, the results were consistent based on gender, namely in females (51.1%). And in the suitability of the results of the Romberg Test and Dix-Hallpike Maneuver examination in vertigo patients, (42.5%). Conclusion: The study found that the characteristics of vertigo 2 patients based on gender showed that the most patients were female, (58.9%). The characteristics of vertigo patients based on age showed that the most patients were in the age group of 45-59 years (43.8%). The percentage of suitability of the results of the Dix-Hallpike Maneuver examination with the Romberg Test based on gender (51.1%) had consistent results. The percentage of suitability of the results of the Dix-Hallpike Maneuver examination with the Romberg Test (42.5%) with consistent results.</i>
Keywords: Vertigo; Romberg Test; Dix-Hallpike Maneuver. This is an open access article under the  CC-BY-SA license.	

INTRODUCTION

Vertigo is a symptom of vestibular dysfunction and has been described as a sensation of movement, most commonly a rotational movement. It is important to distinguish vertigo from other forms of dizziness, such as lightheadedness, which is more often associated with presyncope. The etiology of vertigo may involve lesions or diseases of the central nervous system. These conditions include vestibular migraine, vertebrobasilar ischemic stroke, transient ischemic attack (TIA), multiple sclerosis, and masses in the cerebellopontine angle such as acoustic neuroma and tumors.¹

Peripheral etiologies include more common causes of vertigo, such as benign paroxysmal positional vertigo (BPPV) and Ménière's disease. BPPV is caused by calcium deposits or debris in the posterior semicircular canal and results in temporary episodes of vertigo that often last for several minutes or less.²

According to data from the World Health Organization (2019), approximately billions of people worldwide suffer from vertigo. This means that 1 in 3 people globally are diagnosed with vertigo, although only 36.8% of them receive medication.

In Indonesia, based on a study by Rendra (2019), the prevalence of vertigo was reported to be 50% among elderly individuals

aged 75 years.³ Based on data from the Dinas Kesehatan Provinsi Sulawesi Tengah, the number of patients experiencing vertigo in 2023 was 10,836 people, including 1,476 cases in Palu.

According to medical record data from RSUD Anutapura Palu, there were 273 vertigo patients recorded from January to December 2023.

The Dix-Hallpike maneuver is a test used to determine the presence of benign paroxysmal positional vertigo (BPPV) in the vertical canal. It is performed using specific movements and techniques. A positive test result is indicated by torsional upbeat nystagmus in posterior semicircular canal involvement and torsional downbeating nystagmus in anterior semicircular canal involvement, which appears after a latency of approximately 40 seconds and then disappears.⁴

The Romberg test is a simple examination that should be performed in all patients experiencing imbalance, dizziness, and unexplained falls. A positive Romberg test indicates sensory ataxia as the cause of postural imbalance.⁵

Based on the background described above, the researcher was interested in conducting a study regarding the agreement between the results of the Dix-Hallpike maneuver examination and the Romberg test in vertigo patients at RSUD Anutapura Palu.

MATERIAL AND METHOD

Research Design

This study employed a descriptive design with a cross-sectional approach by conducting direct assessment of vertigo patients

Time and Place of Research

The study was conducted at RSUD Anutapura

Population and Sample

The population and sample of this study consisted of patients diagnosed with vertigo who underwent examination at RSUD Anutapura Palu.

Data Presentation

This study aimed to determine the agreement between the results of the DIX-Hallpike

maneuver examination and the Romberg test in vertigo patients. Data were analyzed using a case report form based on the results of the Dix-Hallpike maneuver and Romberg test examinations.

RESULTS AND DISCUSSIONS

In the univariate analysis, the characteristics of the respondents are presented in the following tables.

Table 1. Characteristics of Vertigo Patients at RSUD Anutapura Palu Based on Gender

Gender	Frequency (n)	Percentage %
Male	30	41.1
Female	43	58.9
Total	73	100%

The result presented in Table 1 show that the majority of vertigo patients were female, totaling 43 patients (58.9%), while male patients accounted for 30 patients (41.1%). To determine the characteristics of vertigo patients at RSUD Anutapura Palu based on gender, a frequency distribution analysis was performed. The results are summarized in Table 2.

Table 2. Characteristics of Vertigo Patients at RSUD Anutapura Palu Based on Age

Age	Frequency (n)	Percentage %
19-44	9	12.3
45-59	32	43.8
60-64	19	26.1
>65	13	17.8
Total	73	100

The results presented in Table 2 show that the highest number of vertigo patients was found in the 45-59 year age group, totaling 32 patients (43.8%), followed by the 60-64 year age group with 19 patients (26.1%), then the >65 year age group with 13 patients (17.8%), and the lowest number in the 19-44 year age group with 9 patients (12.3%).

To determine the percentage agreement between the results of the Dix-Hallpike maneuver and the Romberg test based on gender, a frequency distribution analysis was performed. The results are summarized in Table 3.

Table 3. Agreement of Examination Results Based on Gender

No.	Indicator	Male		Female	
		n	%	n	%
1	Correspond	9	30	22	51.1
2	Not Correspond	21	70	21	48.9
Total		30	100%	43	100%

The results presented in Table 3 show that, based on male gender, the percentage agreement between the Dix-Hallpike maneuver and Romberg test results indicated that 21 patients (70%) had non-corresponding results, while 9 patients (30%) had corresponding results out of a total of 30 male patients.

Among female patients, 22 patients (51.1%) had corresponding results, while 21 patients (48.9%) had non-corresponding results out of a total of 43 female patients.

To determine the percentage agreement between the results of the Dix-Hallpike maneuver and the Romberg test in vertigo patients at RSUD Anutapura Palu, a frequency distribution analysis was performed. The results are summarized in Table 4.

Table 4. Percentage Agreement Between the Results of the Dix-Hallpike Maneuver and the Romberg Test in Vertigo Patients at RSUD Anutapura Palu

Results	Frequency (n)	Percentage (%)
Correspond	31	42.5%
Not Correspond	42	57.5%
Total	73	100

The results presented in Table 4 show that among 73 vertigo patients, based on the agreement between the Dix-Hallpike maneuver and the Romberg test examinations, 42 patients

(57.5%) had non-corresponding results, while 31 patients (42.5%) had corresponding results.

DISCUSSION

Based on Table 1, the characteristics of vertigo patients by gender show that the highest proportion was female patients, totaling 43 patients (58.9%), followed by male patients with 30 patients (41.1%).

These findings are consistent with a study conducted by Andi Vimvi Nisanova, which reported that the majority of vertigo patients were female (67%), compared with males (32.2%). One of the factors contributing to the recurrence of vertigo symptoms is gender. Hormonal changes in women may influence the recurrence of vertigo symptoms. Hormonal fluctuations occurring during the menstrual cycle or pregnancy may increase or decrease hormone levels.⁶

When estrogen levels decline, it may affect sleep quality in women, making them more prone to difficulty sleeping, and many also experience considerable stress. In relation to vertigo symptoms, stress and lack of rest are factors that may contribute to recurrence.

The reason why women experience vertigo more frequently is not yet fully understood; however, it is suspected to be related to benign paroxysmal positional vertigo (BPPV) associated with migraine, which is more commonly found in women. Nevertheless, this has not yet been fully supported by theoretical evidence or clearly explained through analytical studies.

Based on Table 2, the characteristics of vertigo patients by age show that the highest number of vertigo patients was in the 45–59 year age group, totaling 32 patients (43.8%).

These findings are consistent with a study conducted by Andi Vimvi Nisanova (2023), which reported that the majority of vertigo patients were in the 45–64 year age range, with a total of 41 patients (45.6%).⁶

A study conducted by Ardiani et al (2024) stated that one of the causes of declining peripheral vestibular function is aging of the sensory system, central nervous system, and motor system. Age-related changes in the

morphology of the vestibular neuroepithelium include loss of hair cells, as well as a reduction in the number of kinocilia and stereocilia, particularly in the upper central region of the three ampullae. Changes in calcium metabolism of the aging otolithic membrane and microvascular ischemia also have a significant effect on reducing vestibular input in the elderly population.⁷

Based on Table 3, the percentage agreement between the results of the Dix-Hallpike maneuver and the Romberg test among male patients showed that 21 patients (70%) had non-corresponding results, while 9 patients (30%) had corresponding results, out of a total of 30 male patients.

A study by Vibert D et al reported that physiologically and epidemiologically, males have a lower risk of experiencing vestibular disorders such as benign paroxysmal positional vertigo (BPPV) compared with females.⁸

This is closely related to hormonal stability, otolith and bone health, as well as differences in symptom perception and reporting. In addition, the lower prevalence of triggering conditions such as migraine may also contribute. Therefore, examination results such as the Dix-Hallpike maneuver and the Romberg test are less likely to show positive findings in males than in females, not because of differences in the validity of the tests, but due to the underlying physiological and clinical differences.

The percentage agreement between the results of the Dix-Hallpike maneuver and the Romberg test among female patients showed that 22 patients (51.1%) had corresponding results, while 21 patients (48.9%) had non-corresponding results, out of a total of 43 female patients.

A study conducted by Jeong S-H (2020) stated that several factors increase susceptibility to benign paroxysmal positional vertigo (BPPV), including older age, head and neck trauma, physical inactivity, and other ear disorders or previous ear surgery. Many studies have shown a higher incidence among women, and clinical experience in older adults has demonstrated that BPPV may develop due to increased hormonal fluctuations, particularly during menopause.⁹

Based on Table 4.4, the agreement between the results of the Dix-Hallpike maneuver and the Romberg test showed that 42 patients (57.5%) had non-corresponding results, while 31 patients (42.5%) had corresponding results.

This discrepancy may be influenced by external factors, such as patient sensitivity or examination conditions, which can affect test outcomes. Some patients who are more sensitive or better trained in maintaining balance may demonstrate better performance on the Romberg test despite having mild vestibular dysfunction. They may be able to maintain postural stability even when vestibular impairment is present but not severe enough to produce obvious imbalance. In contrast, the Dix-Hallpike maneuver, which more directly identifies vestibular dysfunction (such as by observing nystagmus), may reveal abnormalities more clearly.¹⁰

Another factor contributing to non-corresponding results may be prior treatment received by patients, such as administration of betahistine. Betahistine works as a vasodilator in the middle ear, which can reduce excessive pressure caused by endolymphatic fluid. Betahistine also stimulates H1 receptors located in the blood vessels of the inner ear. This effect causes vasodilation and increases permeability, thereby helping to reduce endolymphatic hydrops.¹¹

CONCLUSION

Based on the study that has been conducted regarding the agreement between the results of the Dix-Hallpike maneuver and the Romberg test in vertigo patients at RSUD Anutapura Palu, the following conclusions can be drawn:

1. The characteristics of vertigo patients at RSUD Anutapura Palu based on gender showed that the majority of patients were female, totaling 43 patients (58.9%).
2. The characteristics of vertigo patients at RSUD Anutapura Palu based on age showed that the highest number of patients was found in the 45–59 year age group, totaling 32 patients (43.8%).
3. The percentage agreement between the Dix-Hallpike maneuver and the Romberg test based on male gender showed that

21 patients (70%) had non-corresponding results. Meanwhile, among female patients, 22 patients (51.1%) had corresponding results.

- Overall, the agreement between the results of the Dix-Hallpike maneuver and the Romberg test showed that 42 patients (57.5%) had non-corresponding results, while 31 patients (42.5%) had corresponding results.

RECOMMENDATION

- Future studies are expected to focus more specifically on certain populations, such as older adults or patients with a history of head trauma, as these factors may influence test results. Evaluating the sensitivity and specificity of both tests in more specific populations would help establish more accurate clinical guidelines.
- Future research may include evaluation of the level of knowledge and skills of medical personnel at RSUD Anutapura Palu in performing these two tests, as well as the effects of more intensive training on the accuracy of test results. This may include additional training on the correct techniques for performing the Dix-Hallpike maneuver and the Romberg test.
- Future studies are also recommended to involve more hospitals in order to accelerate the sample collection process.

AUTHOR CONTRIBUTIONS

Conceptualization, B.R.A.S., N.F., W.H.; Methodology, B.R.A.S.; Validation, N.F., W.H.; Formal Analysis, B.R.A.S.; Investigation, B.R.A.S., Resources, B.R.A.S.; Data Curation, B.R.A.S.; Writing-Original Draft Preparation, B.R.A.S., N.F. and W.H.; Visualization, B.R.A.S. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declares that there is no conflict of interest.

REFERENCES

- Pricilia S, Kurniawan SN. Central vertigo. *J Pain Headache Vertigo*. 2021;2(2):38-39.
- Stanton M, Freeman AM. Vertigo. In: StatPearls. StatPearls Publishing; 2023. Accessed March 2023. <https://www.ncbi.nlm.nih.gov/books/>
- Andreas RK, Rizaldy TP. Evaluation of ceftriaxone injection compounding in one private hospital in Semarang. [*Journal name unavailable*]. 2018.
- Suryanto B, Muyassaroh. Tatalaksana benign paroxysmal positional vertigo. *J Kedokt Syiah Kuala*. 2022;(3):178-186.
- Forbes J, Munakomi S, Cronovich H. Romberg test. In: StatPearls. StatPearls Publishing; 2023. Accessed August 2023. <https://www.ncbi.nlm.nih.gov/books/>
- Nisanova AV. Karakteristik pasien vertigo berdasarkan usia dan jenis kelamin di fasilitas pelayanan kesehatan tahun 2023. *Jurnal Kesehatan Neurologi Indonesia*. 2023;X(X):XX-XX.
- Ardiani T, Yudhiono F, Nikmawati, Sanna AT, Gani SW. Karakteristik penderita vertigo perifer yang berobat di Rumah Sakit Jala Ammari Lantamal VI Makassar tahun 2020–2022. *Jurnal Pendidikan Tambusai*. 2024.
- Vibert D, Kompis M, Hausler R. Benign paroxysmal positional vertigo in older women may be related to osteoporosis and osteopenia. *Ann Otol Rhinol Laryngol*. 2003.

9. Jeong SH. Risk factors of benign paroxysmal positional vertigo in perimenopausal women. *Front Neurol*. 2020.
10. O'Reilly RC. Romberg test: clinical assessment of balance and proprioception. *J Vestib Res*. 2015;25(1):5-10.
11. Ramadhan MG, Abidin MRZ, Wardani E. Efektivitas pemberian betahistin 8 mg pada pasien vertigo usia 53 tahun. *Syntax Admiration*. 2024;5(1).