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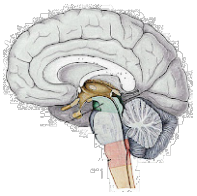

EFFECTIVENESS OF VERTIGO REHABILITATION EXERCISE, DIZZINESS AND BALANCE DISORDERS (VDB) IN ELDERLY : NARRATIVE REVIEW

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ABSTRACT

Vertigo, Dizziness and Balance Disorders (VDB)cause disturbances in the perception of motion or feelings of instability that can affect the ability to see and an unstable gait that causes balance disorders so that immobility can be disturbed, limitations in daily activities, decreased function and can increase the risk of falling. There has been no review of articles that discuss the effectiveness of rehabilitation exercises in patients with Vertigo, Dizziness and Balance Disorders (VDB) in the elderly. To determine the effectiveness of exercise in patients with Vertigo, Dizziness and Balance Disorders (VDB) in the elderly.Narrative review with PICO framework , Identify articles using databases (Google Scholar, Pubmed, and ScienDirect). Selection of articles using PRISMA Flowchart . A total of 434 articles were identified . Articles are limited to 10 years. There were 12 articles that met the inclusion criteria and with the highest prevalence in Brazil 292 population . which states that Vestibular Rehabilitation Therapy (VRT) exercises and Vestibular Rehabilitation with exercise Cawthorne & Cookseycan improve balance .In the practice of Rehabilitation Vestibular Therapy (VRT) and Vestibular Rehabilitation with exercise Cawthorne & Cookseycan reduce symptoms in conditions of balance disorders and produce good results so that it can improve postural stability, self-confidence, can reduce symptoms of dizziness. Functional independence of daily activities can be done at home every day with supervision and doing exercises according to complaints or perceived functional limitations.

INTRODUCTION

Vertigo, Dizziness and Balance Disorders (VDB) is one of the causes of the burden of disability that often occurs in the elderly, especially balance disorders related to immobility, limitations in daily activities and decreased function (Regauer et al. , 2020) . The terms dizziness and vertigo are disturbances of orientation and perception of motion or a feeling of instability that can affect the ability to achieve vision and an unstable gait (Fernández *et al*., 2015).

Vertigo is classified into two, central and peripheral vertigo. Central vertigo involves the brain or cerebellum that occurs in the central nervous system, while peripheral vertigo involves inner ear disorders (Dommaraju & Perera, 2016). One of the most common types of central vertigo is vestibular migraine and peripheral vertigo is BPPV, Meniere's disease, vestibular neuritis and bilateral vestibulopathy.(Kovacset al. , 2019) . The causes of vertigo are idiopathic, head trauma, vestibular nauritis and inner ear infections.(Concha-cisternas and Guzmán-muñoz, 2020) .

The prevalence of vertigo reaches 10% annually, almost 15% to more than 20% who experience dizziness, indicating that vertigo is more common in women than men two to three times increasing with age.(Alenezi et al. , 2020) . In the UK vertigo and dizziness reach 30% by age 60 years,while increasing to 50% over 85 years (Fernándezet al . , 2015) .

Vertigo can interfere with limitationsactivity with a prevalence of 15.5% (Regauer et al. , 2020) . Disruption of balance can result in fractures due to an increased risk of falling about 30% of people over 65 years (Maria et al. , 2020) . The appearance of dizziness in the elderly is a strong predictor of falls, reported50% of deaths are accidental by the age of 65 years (Bansal, 2016) . So if vertigo is not treated quickly, elderly patients will lose their stability and flexibility (Maas et al. , 2019)

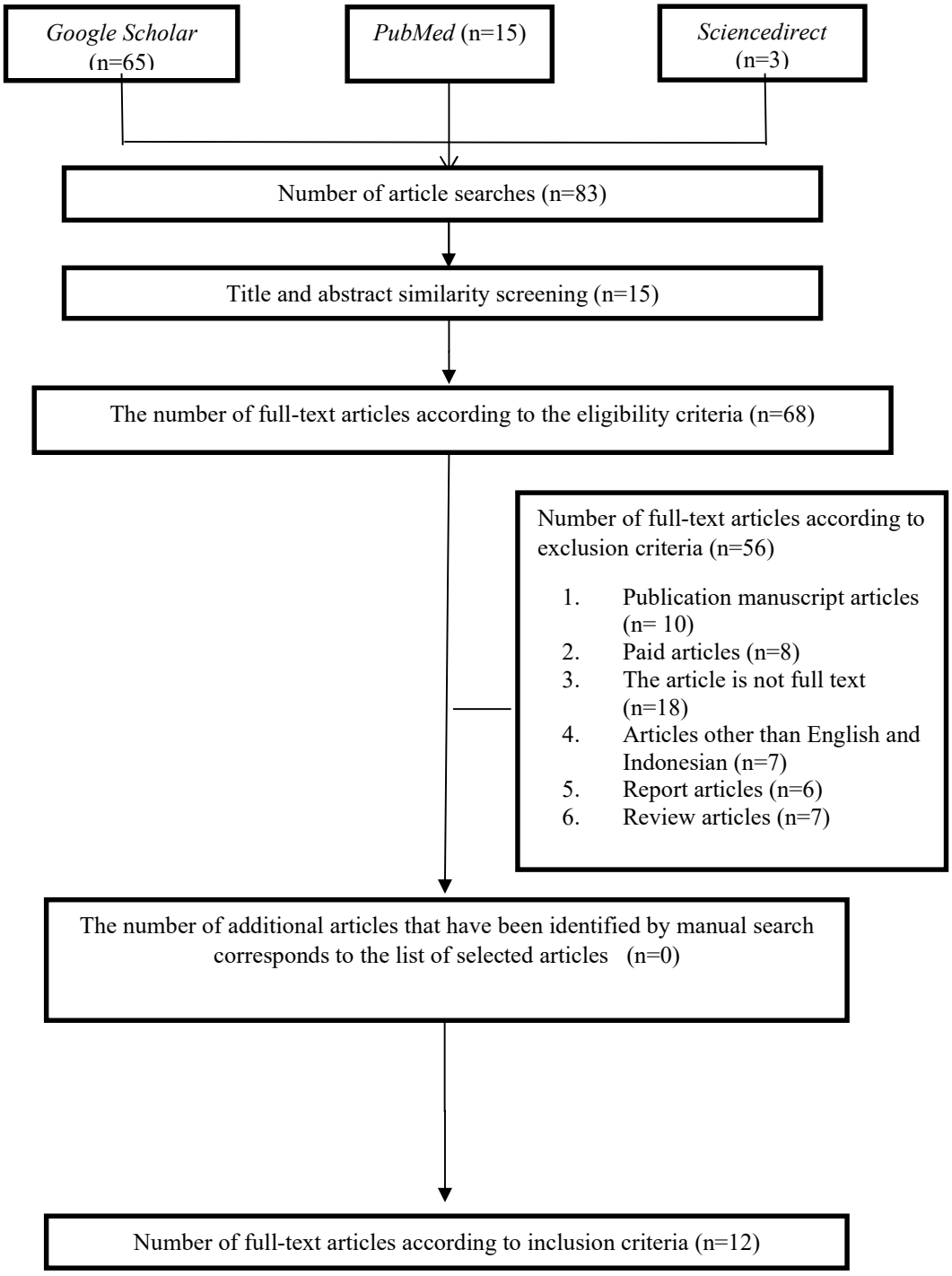
Non-pharmacological therapies are Vestibular Rehabilitation Therapy (VRT), Canalit h Repositioning Maneuver (CR M)/ Epley Maneuver, Cowthorne & Cooksey. However, there has not been found a review regarding the effectiveness of exercise in patients with Vertigo, Dizziness and Balance disorders (VDB) in the elderly, it is necessary to do a further review.

METHODS

The Narrative Review method is a new method for systematic reviews that contains an explanation of a particular topic and analyzes previously published articles and avoids duplication of research and looks for new fields of study that have not been studied (Ferrari, 2015) . Journal search using 3 databases including Google Scholar, Pubmed and Science direct. Using the Keyword “Vertigo OR Dizziness” OR “Balance Disorders” OR “Vestibular Disorders ” AND “ Vestibular Rehabilitation Therapy (VRT)” OR “Canalit Reposition Maneuver (CR M)/ Epley Maneuver” OR “Cawthorne & Cooksey” AND Functional Activity.With the identification of PICO consisting of P: population (VDB in the elderly), I: Intervention (Vestibular Rehabilitation Therapy (VRT), Canalit h Repositioning Maneuver (CRM)/ Epley Maneuver, Cawthorne & Cooksey), C: Comparison (Other Exercise), O: Outcome (Increase balance).

The articles obtained were in accordance with the eligibility criteria, namely the inclusion criteria and exclusion criteria (Marbawi & Salim, 2019) . Articles that include inclusion criteria include articles published in full text, research articles, articles published in English or Indonesian, articles published in the last 10 years from2012-2021, articles on the subject with elderly VDB. Exclusion criteria include articles in the form of published manuscripts, published articlesin prepaid articles, report articles and review articles.

The next step is the articles that have been screened and then stored through the mendeley bibliography . The next stage is filtering duplication of article data, abstract screening, full text and flowchart . In full text screening, it can be seen whether the article complies with the desired criteria and according to the inclusion and exclusion criteria set by the author.from the articles taken in the search for additional references, they were identified by manual article searches, leaving several articles for final review in accordance with the literature review selection flowchart.


Google Scholar (n=65)
PubMed (n=15)
Sciencedirect (n=3)
Number of article searches (n=83)
Title and abstract similarity screening (n=15)
The number of full-text articles according to the eligibility criteria (n=68)
Number of full-text articles according to exclusion criteria (n=56)
1. Publication manuscript articles (n= 10)
2. Paid articles (n=8)
3. The article is not full text (n=18)
4. Articles other than English and Indonesian (n=7)
5. Report articles (n=6)
6. Review articles (n=7)
The number of additional articles that have been identified by manual search corresponds to the list of selected articles (n=0)
Number of full-text articles according to inclusion criteria (n=12)

RESULTS AND DISCUSSION

Table 1 Result of Narrative Review

Code	Country	Research purposes	Types of research	Data collection	Population/ Sample	Results
J1	Brazil	To compare the effects of conventional Cawthorne & Cooksey and multimodal Cawthorne & Cooksey reported in elderly patients with vestibular disorders .	RCT	Dizziness Handicap Inventory (DHI), Visual Analogue Scale (VAS), Vestibular Disorders Activities of Daily Living Scale (VADL), Geriatric Depression Scale (GDS), Activities-specific Balance Confidence Scale (ABC Scale).	Total n= 82 divided into 2conventional (n=40) and multimodal (n=42) groups. - Ederly - Both groups consisted of women (conventional: 67.5% and multimodal: 76.2%)	There was no statistically significant difference between the two groups. In multimodal exercise, it did not produce better results than the more conventional exercise, (p=0.845).
J3	Brazil	The aim of this study was to compare the short-term effects of VRT and CRMon balance.	RCT	Dix-Hallpike test, Visual Analogue Scale (VAS), Dizziness Handicap Inventory (DHI).	Total n = 14 divided into two groups: - Age: average 6 5-70 years old - More women than men from bothgroup. - Experiment (n=7) VRT - Control (n=7) CRM	The experimental group given VRT showed better results dynamically ($p < 0.05$) Compared to a control group that only received CRM
J6	Brazil	The aim of this study was to compare the effects of Cawthorne & Cooksey on balance control in the elderly with dizziness.	RCT	Dynamic Gait Index (DGI), Timed Up-and-Go Test (TUGH) sitting to standing test, Multi-directional Functional Reach Test, static balance test.	Total n= 82. Divided into two groups conventional Cawthorne & Cooksey (n=40) and multimodal Cawthorne & Cooksey (n=42). - Ederly - Woman and man	Both groups produce : Improved balance control in the elderly, the multimodal group performed better on the static balance test.
J7	Brazil	The purpose of this study was to compare the effectiveness of Cowthorne & Cooksey (conventional versus multimodal) on functional capacity and balance control in the	RCT	Dizziness Handicap Inventory (DHI), Dynamic Gait Index (DGI), Visual Analog Scale (VAS).	Total n = 68, divided into two conventional (n=34) or multimodal (n=34) Cowthorne & Cooksey groups. - Age 65 - 73 years - Woman and man	This exercise has been recognized as effective, and it is believed that it is modified by incorporating other components of postural control .

		elderly with dizziness due to vestibular disorders.				
J8	Brazil	The aim of this study was to evaluate the additional effect of VRT with CRM on vertigo, as a source of therapy to improve symptoms and reduce recurrence.	Experimental	Dizziness Handicap Inventory (DHI), Visual Analog Scale (VAS).	Total n= 32, divided into two groups: - Control n=15 do CRM only, - E experiment n=17do CRM and VRT, - Age 65 years and over - Woman and man	VRT and CRM in the experimental group had lower rates of dizziness after treatment ($p<0.05$)
J2	Iran	The purpose of this study was to determine the effectiveness of VRT combined with transcranial Direct Current Stimulation (tDCS) in the elderly	RCT	Dizziness Handicap Inventory (DHI), Activities-specific Balance Confidence Scale (ABC Scale), Beck Anxiety Inventory (BAI)	Total n= 36, divided into two groups. VRT and tDCS (n=18) and VRT Only (n=18). - Age 65 years and over - Women n=15 and men n= 21.	These findings suggest that VRT in combination with tDCS results in a rapid and promising improvement in disability-related dizziness and balance.
J11	Turkey	This study aimed to evaluate the efficacy of the Epley maneuver on quality of life in elderly patients with a positive history of vertigo but without the nystagmus observed during the Dix-Hallpike test .	RCT	Visual Analog Scale (VAS), Dizziness Handicap Inventory (DHI).	Total n=50, divided into two treatment groups (n=25) and control groups (n=25). - 65-70 years old - Male and female	This shows that the *Epley maneuver* has a positive effect on the elderly with vertigo.
J12	Egypt	The aim of this study was to evaluate the efficacy of the Canalith Repositioning Procedure (CRP) in managing certain patients.	Experimental	Dix-Hallpike	Total n=850, given CRP - 65 years old - Male n=450 - Female n=400	In this study, the CRP maneuver is an exercise that can relieve vertigo with or without nystagmus.
J4	English	The aim of this study was to determine the	RCT	Vertigo Sympto Scale-Short Form (VSS-SF)	Total n= 296 patients were then randomized in the trial	VRT reduces dizziness and dizziness-related disability in

		effectiveness of VRT exercisein the elderly who experience dizziness in primary care.			- U age 6 7 years - 66%girl - 34% male	primary care patients Reduced vertigo symptoms .
J9	Poland	The aim of this study was to compare 2 different types of exercise in patients with vestibular dysfunction in vertigo.	Cohort	Dynamic Gait Index (DGI), Berg Balance Scale (BBS), Timed Up and Go Test (TUGH), Dizziness Handicap Inventory (DHI), Visual Analog Scale (VAS).	Total n= 58, divided into two groups. - Group 1 was given VRT (19 women and 8 men) - Group 2 was given Cowthorne & Cooksey and balance exercises (24 women and 7 men) - Age 65 years and over	Group 1 given VRT was superior to the *Cowthorne & Cooksey exercise* Subjectively a decrease in vertigo symptoms was reported in both groups, but was significantly higher in group 1 .
J10	Paris	The aims of this study were to compare the efficiency of the Eplay (Ep) and Semont-Toupet (ST) repositioning maneuvers and to evaluate the effect of post-maneuver restriction on vertigo and short-term dizziness.	Cross Sectional	Visual Analog Scale (VAS).	Total n= 226, divided into two groups: - Group 1 was given EP (n=113) - Group 2 was given ST (n=113) - 171 women (76%) - 55 male (24%) - Age 65 years and over	Ep has a higher efficiency than ST can show signs of liberation.

The results of the 12 articles that the authors *reviewed* , there were 8 articles stating that *Vestibular Rehabilitation Therapy* (VRT) and *Vestibular Rehabilitation* (VR) with *Cawthorne & Cooksey Exercises* were effective and 4 articles with CRM stated that they were less effective.

Giving VRT exercises and *vestibular rehabilitation* with *Cawthorne & Cooksey exercises* has the effect of increasing stability and even increasing *participation* in elderly patients, improving balance and low recurrence rates and can limit the capacity to performdaily activities .

Effectiveness of exercise in patients with *Vertigo,* Dizziness *and Balance Disorders* (VDB) in the elderly.

***Vestibular Rehabilitation* (VR)**

Vestibular Rehabilitation (VR) has been used as a treatment to reduce symptoms, increase independence in ADL, increase self-confidence and even improve imbalance (Aratani *et al.* , 2020) . This exercise is designed for frequent repetition of provocative dizziness stimuli. To achieve a significant improvement in postural control. Exercises with multimodal get better results on balance. This exercise resulted in an increase in balance control in the elderly, which was maintained over the short term (Ricci *et al.* , 2016) . This exercise is considered effective in controlling body imbalances, increasing independence in ADL and also as a consequence can reduce falls (Ricci *et al.* , 2012) .

***Vestibular Rehabilitation Therapy* (VRT)**

VRT is an exercise-based therapy program to improve balance function in patients with symptoms of vestibular disorders. This exercise aims to reduce disabling symptoms through central mechanisms of neuroplasticity, including habitual adjustments, adaptations and substitutions that accelerate the vestibular compensation process (Saki *et al.* ,2020) . VRT is a source of non-pharmacological therapy for patients with balance disorders. Its positive impact on balance is based on mechanisms related to *neural central nervous system plasticity* and its purpose is to promote visual stability, increase visual vestibular interaction during head movement, consequently improve standing postural stability and reduce sensitivity to head movements (Ribeiro *et al.* , 2017) . According to research Geraghty, et al . (2017) VRT is the most effective exercise for dizziness caused by vestibular dysfunction.

VRT promotes central nervous system compensation through a series of simple exercises that involve head movement. And research shows that self-directed VR exercises can be effective. VRT includes vestibular adaptation and postural control exercises, such as training and improving static and dynamic balance. This allows the patient to perform well in functional activities and to continually improve balance, in addition to relieving symptoms and producing good QoL (Rodrigues *et al.* ,2019) . VRT leads to a gradual reduction of subjective and objective symptoms that accompany vestibular disorders. This exercise can improve postural stability and can reduce recurrence (Pilch *et al* ., 2020) .

Chanalit Repositioning Manuever* (CRM) / *Epley Manuever

Practice with therapeutic recommendation CRM with highly proven evidence and VR as a secondary option. There was no significant difference in the exercise Dix-Hallpike test group positive to negative, recurrence. CRM achieved lower negative Dix-Hallpike tests in intragroup comparisons in the experimental group (De Figueiredo Ribeiro *et al.* , 2016) . The *Epley Maneuver* exercise is given no symptoms are felt or not yet clear. So that in this study it is still being re-evaluated for its continuation. Other authors also criticized the lack of evidence of therapeutic success and implied difficulties in daily life (Toupet et al ., 2012) .

This study says the Epley maneuver is more effective and recommended than VR with the second option. Thus , the Epley maneuver had a positive effect on the patient's QoL. Moreover, this study suggested that this treatment modality prevents BPPV-related morbidity (Uz *et al.* ,2019) .*The Epley maneuver* which is also called the particle repositioning procedure or *Canalith Repositioning Procedure* (CRP), although this exercise is effective, the recurrence rate of vertigo after it is given is low (Abdelghaffar, 2012) **.**

Techniques or exercises for patients with *Vertigo, Dizziness and Balance Disorders* (VDB) in the elderly

***Vestibular Rehabilitation* (VR)**

Cawthorne & Cooksey was conducted in 50 minute sessions/2 times a week/16 sessions, conducted in a large, quiet and well-lit area (6 m by 3 m long) (Aratani *et al.* , 2020) . According to research by Ricci, et al . (2016)*Cawthorne & Cooksey*do a 50 minute session/2 times

***Vestibular Rehabilitation Therapy* (VRT)**

VRT was carried out in stages over 3 weeks. The first two weeks of 25-30 minute sessions/6 days/12 sessions. tDCS applied a given current of 2 Ma for 20 min. /6 days over a 3-week period/ 18 sessions (Saki *et al.* , 2020) . VRT was performed 2 times a week/ 50 minutes/12 weeks (Ribeiro *et al.* , 2017) . According to research Geraghty, et al . (2017) VRT was performed 6 sessions/6 weeks. Another study said that VRT was carried out in 5 sessions/2 repetitions of the same exercise (Rodrigues *et al.* , 2019) . VRT is carried out every 6 weeks / once a week for 1 hour 30 minutes (Pilch *et al* ., 2020) .

Chanalit Repositioning Manuever* (CRM) / *Epley Manuever

CRM was performed 3 sessions, after (T1) the patients had the same initial evaluation and those who had a positive *Dix-Hallpike* test underwent CRM again. The same occurred at (T5), (T9) and (T13) weeks after the initial assessment, for a total of 5 assessments. The experimental group performed CRM and VRT twice a week for 12 weeks/ 50 minute sessions (De Figueiredo Ribeiro *et al.* , 2016) . *In the Epley maneuver* , the head is turned to the affected side and the neck is extended, then the therapist turns the head slowly to the opposite position (within 20 seconds). Head rotation for 180°, patient remains in this position for 5 minutes. Next, the patient is asked to lie on the side of the pain and then return to the supine position and slowly move to a sitting position (Toupet *et al* ., 2012) .

The recommended treatment modality is the *Epley maneuver* , according to the guidelines for BPPV, and has been found to be more effective than the vestibular rehabilitation indicated as a second option. This exercise is done with the Dix-Hallpike test and the supine test to check for nystagmus or not (Uz *et al.* , 2019) . CRP is performed using a " *log roll* " exercise, in which the patient is asked to roll over 90°, from a healthy position, then supine, then sit at intervals of 30 seconds/1 time per session (Abdelghaffar, 2012) .

CONCLUSIONS AND RECOMMENDATIONS

The effectiveness *of Vestibular Rehabilitation Therapy* (VRT) and *Vestibular Rehabilitation* exercises with *Cawthorne & Cooksey exercises for Vertigo, Dizziness and Balance Disorders* (VDB) patientsin reducing symptoms in conditions of balance disorders, can produce good results so that both can improve postural stability, self-confidence, can reduce symptoms of dizziness, vertigo and increase functional independence or daily activities.

This exercise is carried out by a physiotherapist so that it is always under supervision and performs exercises according to the patient's complaints and perceived functional limitations, it is also recommended to do it at home every day. For the recommended VRT training dose per 25-30 minute training session and *Cawthorne & Cooksey workouts*It is recommended to do it in a spacious, quiet and well-lit place . of these two exercises can be used for elderly patients until the elderly increase in age.

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