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A Study to Find out Effects of Vestibular Rehabilitation in Geriatric Population: A Systematic Review

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ABSTRACT

Aging is accompanied by gradual physiological changes in body systems. Vestibular dysfunction is associated with this physiological process of aging. Vestibular disorders have a prevalence ranging from 29 to 45 % in elders. Physiotherapy methods have been employed to improve the quality of life of people who suffer from vestibular disorders; for example, vestibular rehabilitation (VR). So, this study aims to compile a systematic review of the effects of vestibular rehabilitation on the elderly which can aid the physiotherapist in selecting appropriate treatment.
Method: A search for relevant publications was conducted in Pubmed, Medline, Cochrane and other databases.
Results: Twelve studies were selected for inclusion in this systematic review.
Conclusion: Clinical trials indicate that vestibular rehabilitation is an effective means of treating elderly patients with vestibular complaints; however good quality study is lacking in finding effectiveness of vestibular rehabilitation in elder population.

Key Words: Vestibular system, Rehabilitation, Elders.

INTRODUCTION

Elderly is defined as "a group with frequent presence of multiple pathology and atypical way in which illness can present with confusion, falls, loss of mobility and day to day functioning.[1]

Aging is accompanied by gradual physiological changes in body systems.[1]

- Musculoskeletal system
- Skeletal system
- Somatosensory system
- Cardiovascular system
- Pulmonary system
- Nervous system
- Special senses
- Vestibular system
- Other system

Major changes

- Reduction in number of receptors & motor fibers, loss of hair cells (40%);
- Centrally, vestibular nuclei have decreased electrical excitability & deterioration in central processing
- Functional implications
- Decline in vestibular abilities contributes to postural control deficits.
- Incidence of dizziness, vertigo, unsteadiness & balance disorders
- Increased threshold for vestibular activation could contribute to increased body sway.

Falls in elderly are caused by decline in vestibular functioning.

The degeneration and progressive loss of nerve cells in the peripheral and central vestibular system, resulting in dizziness and vertigo. [2,3]

Vestibular dysfunction is associated with this physiological process of aging. [2]

The prevalence of vestibular disorder increases with age and may result in falls,

fear of falling, loss of confidence, anxiety and depression.

Vestibular disorders have a prevalence ranging from 29 to 45 % in individuals over 70 years of age.

Vestibular Rehabilitation Therapy methods have been employed to improve the quality of life of people who suffer from vestibular disorders.

VR is a therapeutic resource that is based on central mechanisms of neuroplasticity, known as adaptation, habituation and substitution, which promote vestibular compensation.

Examination of Vestibular System:

- Dix-Hallpike Test
- Side-Lying Test
- Roll Test
- Head thrust test
- Head shaking nystagmus test
- Vestibular dynamic visual acuity test

TREATMENT:

1. CRT (Canalith Repositioning Treatment) for canalithasis
2. Liberatory maneuver for cupulothasis
3. Brandt- Daroff maneuver for milder complaints

Patient with Vestibular Hypofunction:

- Adaptation Exercises
- Substitution Exercises
- Cawthorne-Cooksey exercises
- Habituation exercise
- Gaze stability exercises

NEED OF STUDY:

- Many studies have been restricted to a systematic review on the effects of vestibular rehabilitation in a middle-aged and elderly population and have not focused specifically and exclusively on the elderly population.
- Therefore this study aims to find out effects of vestibular rehabilitation in the geriatric population with vestibular dysfunction.

AIM OF THE STUDY:

- The aim of this systematic review was to find out effects of vestibular rehabilitation in the geriatric population.

OBJECTIVES:

- This systematic review aims to provide a summary of the evidence on the effects of VR in geriatric population.

MATERIAL AND METHOD

- Source of data: EMBASE, PUBMED, MEDLINE, COCHRANE
- Study design: Systematic review
- Method of collection of data:
  - Study population: Geriatric population
- **Criteria for selection:**
  - **Inclusion Criteria:**
    - A search for relevant publications was conducted in PUBMED, MEDLINE, COCHRANE and other databases.
    - Clinical trials and studies that were written in the English language and published were selected. The methodological quality of the studies was assessed using the PEDro scale.
    - Clinical evidence databases were searched from 2000 to 2017.

METHOD:

- This systematic review is based on the guidelines of the PRISMA protocol.
- Eligibility criteria: Studies eligible for inclusion were RCTs evaluating efficacy of VRT in reducing age related vestibular and balancing problems.
- Identification of studies: Methodological quality assessment: A version of physiotherapy evidence database [PEDro] scale was used to assess the methodological quality of included studies.
- The PEDro scale was used to assess the methodological quality of the included studies. The PEDro scale consists of a list of 11 criteria on validity and interpretation of results of controlled trials.
- A direct search of the following keywords was employed: ‘‘Vestibular System’’ and ‘‘Vestibular rehabilitation’’ and ‘‘older people’’ and

‘‘vestibular Rehabilitation in geriatrics” and ‘‘Aging & VRT’’.

- Potentially relevant studies were identified by the following search strategy: (“aged” OR “elderly” OR “middle aged” OR “older people”) AND (“vestibular diseases” OR “vestibular disorder”) AND (“vestibular rehabilitation” OR “exercises” OR “balance training” OR “balance exercises” OR “virtual reality rehabilitation” OR “rehabilitation”). The search was limited by language (English) and by date of publication (from 2000 to 2017)
- The records retrieved from the search strategy had their titles and abstracts screened for eligibility by two independent reviewers, according to the following inclusion criteria:

(1) Sample aged over 60 years;
(2) Participants with vestibular dysfunction
(3) Random sampling
(4) Experimental group consisting of VR and control group with no treatment/placebo or another type of active intervention
(5) Experimental intervention defined as stimulation exercises for restoration of vestibular and body balance function, through vestibular neuroplasticity.

- After the screening of titles and abstracts, the full texts of potentially eligible studies were screened, and those meeting the inclusion criteria had the relevant data extracted using a standardized form that included the following items: sample characteristics, primary and secondary outcomes, trial design, characteristics of the interventions and effects of the interventions.

RESULTS

- In this study out of 76 articles 12 articles are selected and their results show that VRT is used to reduce age related complications like dizziness, vertigo, falls, and imbalance in elder population.

Methodological quality:

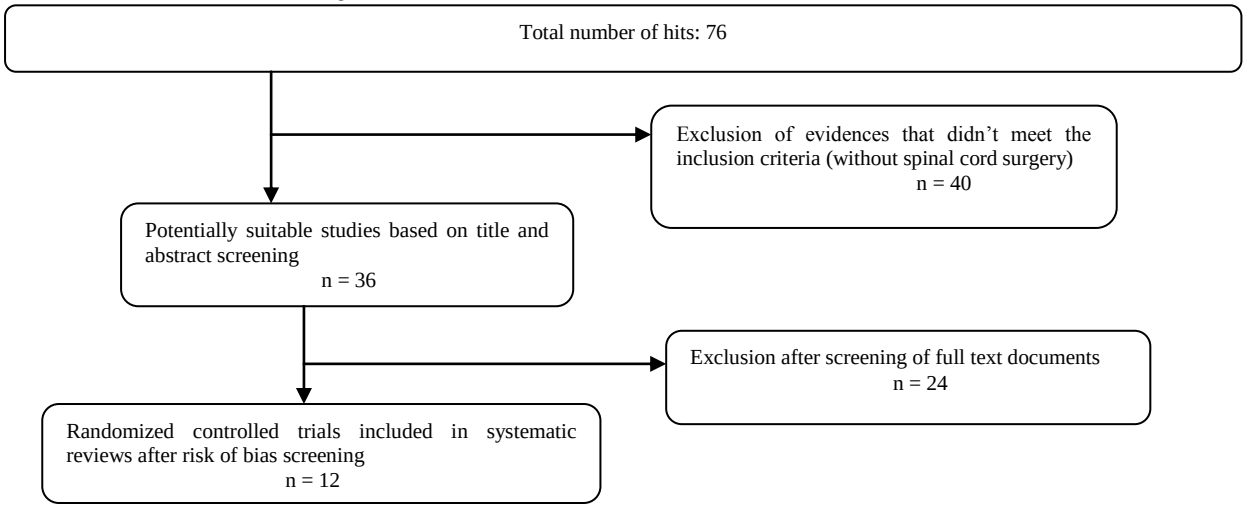
- Quality assessment scores ranged between 5 and 8 out of a maximum of 10.

OUTCOME MEASURE:

Different outcome measures for examination of vestibular function reported in 12 studies were Dizziness Handicap Inventory (DHI), Disability Index (DI), Dynamic Gait Index (DGI), Berg Balance Scale (BBS), Gait variables, Activity specific Balance Confidence scale (ABC scale), Posturography, VAS. DHI, DI, ABC scale, DGI, Posturography were mostly used.

❖ DATA EXTRACTION AND ANALYSIS

METHODOLOGICAL QUALITY



❖ **Quality ratings using the Modified PEDro Scale of reviewed studies (N= 12)**

Author	1	2	3	4	5	6	7	8	9	10	11	TOTAL
Natalia A. Ricci et al(2015)	Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes	8/10
Paulo Roberto Rocha, et al (2014)	Yes	Yes	√	√	√			Yes	Yes	Yes	Yes	5/10
Tannu Khanna, et al (2014)	Yes	Yes		Yes				Yes	Yes	Yes	Yes	6/10
Arash Bayat, et al(2012)	Yes	Yes						Yes	Yes	Yes	Yes	5/10
Dara Melburn, et al (2012)	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	8/10
GinoMarioni et al.(2012)	Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes	7/10
Olivia Helena , et al (2009)	Yes			Yes				Yes	Yes	Yes	Yes	5/10
Lucinda Simoceli et al.(2008)	Yes	Yes		Yes	Yes			Yes	Yes	Yes	Yes	7/10
Halilla , et al, (2007)	Yes	Yes						Yes	Yes	Yes	Yes	5/10
Marina Morettin, et al (2007)	Yes	Yes		Yes				Yes	Yes	Yes	Yes	6/10
Chris A Gibbon, et al (2004)	Yes	Yes		Yes				Yes	Yes	Yes	Yes	6/10
Gerhard Andersson, et al (2004)	Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes	7/10

EVIDENCE FOR VESTIBULAR REHABILITATION THERAPY

AUTHOR	SAMPLE SIZE	OUTCOME MEASURES	INTERVENTIO N	CONCLUSION
Natalia A. Ricci et al(2015)	68	DHI,DGI,ABCscale, ADL scale, Time Up & Go test, Multidirectional Functional Reach test, Romberg test	Conventional VR cowthorne-cooksey in control group & multimodal cowthorne-cooksey exercise in experimental group	Multi-modal cowthorne-cooksey exercise is effective in dizziness
Paulo Roberto Rocha, et al (2014)	9	POMA, Unterberger Fukuda test	Cowthorne-cooksey exercises	VR improves balance and anterior displacement in elderly with vertigo
Tannu Khanna, et al (2014)	30	BBS, DGI, ABC	Adaptation exercise, Substitution exercise, Balance training	Balance training is effective in elderly population.
Arash Bayat, et al(2012)	33	DHI, Vedionystagmography	Cowthorne-cooksey exercises for 2 / week for 2 months	VRT is effective therapeutic method for elderly patients with chronic vestibular disorders
Dara Melburn, et al (2012)	80	DGI, Gait variables, Dynamic Posturography, ABC scale, Dynamic visual Acuity test, Hospital Anxiety & Depression scale	Conventional VS virtual reality based Nintendo Wii Fit plus	NWFP is effective combined with conventional VR to improve dizziness , balance in elderly
GinoMarioni et al., (2012)	14	Computerized posturography, DHI	Group A : VR assisted by posturography and home based exercise program 3 times/day for 6 weeks Group B : only same home based exercise	VR combined with posturography is effective than only home based exercise program
Olivia Helena , et al., (2009)	22	DHI	Cowthorne-cooksey, Gaze stability exercises	Cowthorne-cooksey exercise is effective in elderly
Lucinda Simoceli et al., (2008)	39	Disability Index, VAS, Computerized posturography	Group:A Cowthorne-cooksey exercise twice/day for 2 months Group : B Tusa & Herdman protocol	Both are equally effective in elderly
Halilla , et al., (2007)	8	DHI, Vectonystagmography	Cowthorne-cooksey exercises	Significant improvement in physical, functional, emotional aspects after VR.
Marina Morettin, et al., (2007)	30	DHI	Cowthorne-cooksey exercise and Brandt Darrof exercise, Simont maneuver	VR provides benefits to patients
Chris A Gibbon, et al., (2004)	36	Gait speed, step length, Stance duration, step width	VR vs TC , gaze stability exercise	TC can be complementary treatment to VR
Gerhard Andersson, et al., (2004)	29	DI, VAS, Computerized posturography	Cowthorne-cooksey exercise and Cognitive Behavioral Therapy	Combination of CBT and VR is effective in dizziness

DISCUSSION

- Following an assessment of the studies using the PEDro scale, only two studies demonstrated good scientific evidence.
- This was due to a number of factors including lack of hidden randomization, masking the subject, evaluators and therapists, and limited outcome

measures, which can lead to a decrease in the evidence presented in the study.

- These conditions are the consequences of age-related degeneration of various neural structures, including the central vestibular receptor, proprioceptive, cerebellum, and visual pathways.
- BPPV is one of the oto-neurological conditions that has the highest prevalence in the geriatric population and can cause alterations in body balance that directly affect the quality of life of the individuals involved.
- Among the items evaluated, the Dizziness Handicap Inventory (DHI) was the most frequently used tool to evaluate the impact of dizziness on the quality of life of a patient who suffered from vestibular dysfunction.
- The literature confirmed that the most widely used VR Protocol is that of Cawthorne and Cooksey, which was employed in eight of the selected studies.
- Its use is common because it is suitable for use with the elderly and involves exercises that are easy to perform, which enhances the motivation and interest of the patient, fundamental factors of good-quality treatment.
- Result of these clinical trials showed that VR is beneficial for older adults in terms of gait, body balance control and activities of daily living.
- It is estimated that in 20% of the elderly patients the vestibular dysfunction is due to vascular problems.[7]
- The main circulatory disorders that can cause impairment of the peripheral or central auditory and vestibular systems are hyper- or hypotension, heart failure, myocardial infarction, arrhythmia, hypersensitivity of the carotid sinus reflex, aortic stenosis and atherosclerosis.[7]
- This systematic review summarizes the evidence on the effects of VR for balance disorders and on the assessment tools that can contribute to support the clinical actions of health professionals working in this area.
- The studies presented here support the use of simple and costless protocols for the management of vestibular disorders in geriatric population.
- However, further high-quality studies are still needed to clarify some doubts regarding the effects of VR for certain diseases, the optimal treatment duration necessary to avoid recurrence of symptoms, and the comparison with protocols of multi-components of postural control.

CONCLUSION

- Vestibular rehabilitation has shown efficacy in the treatment of geriatric patients who suffer from vestibular disorders.
- The results of this systematic review indicated that the use of protocols and low-cost methods of treatment can improve the quality of life and functional capacity of the geriatric patients and also reduce frequency of falls.
- However highly Pedro scored RCTs are needed to support effectiveness of VR in geriatric population.

Conflict of Interest: There was no personal or institutional conflict of interest for this study.
Source of funding: No fund was need.
Ethical Clearance: From B.N Patel college of physiotherapy, Anand.

REFFERNCES

1. Narinder Kaur Multani. "Principles of Geriatric Physiotherapy" 2007 1st edition.
2. Susan J. Herdman. "Vestibular rehabilitation"; 3rd edition, 2006.
3. Susan O' Sullivan et al., "Physical Rehabilitation"; 5th edition, 2006.
4. Natalia A. Ricci[I] et al., A systematic review about the effects of the vestibular rehabilitation in middle-age and older adults Brazilian J PT. 2010; 14(5).
5. Paulo Roberto et al., Effects of physiotherapy on balance and unilateral vestibular hypofunction in vertiginous

elderly. International Archives of Medicine 2014, 7:8
6. Tanu Khanna et al., Effect of Gaze Stability Exercises on Balance in Elderly. Journal of Dental and Medical Sciences. 2014, 13 (9); PP 41-48.
7. Ganança MM, Caovilla HH, Munhoz MSL, Silva MLG. Introdução: as vestibulopatias periféricas, centrais e mistas. In: Silva MLG, Munhoz MSL, Ganança MM, Caovilla HH, editores.; 2000. p. 1-8.

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