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Effectiveness Of Vestibular Rehabilitation For Vestibular Migraine Among Female Athletes

Bhavithra Muthukumarasamy[1], Shanmugananth Elayaperumal[*2], Arun Jennikin[3], Sivasankari Karthikeyan[4], Nabisha Mohammed[5]

[1]Research scholar, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to be a University), Puducherry

[*2]Professor And Principal, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to be a University), Puducherry

[3]Assistant Professor, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to be a University), Puducherry.

[4]Research scholar, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to be a University), Puducherry

[5]Research scholar, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to be a University), Puducherry

***Corresponding Author**:

Shanmugananth Elayaperumal

Professor and Principal, School of Physiotherapy, Sri Balaji Vidyapeeth (Deemed to Be a University), Puducherry

Email ID: shankutty1981@gmail.com

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ABSTRACT

Background: Vestibular migraine is a form of migraine in which individuals suffer from a combination of vertigo, dizziness or loss of balance along with other symptoms of migraine**.** Vestibular migraine (VM) is likely to be the second most prevalent reason for dizziness and affects approximately 3% of population**.** At middle aged females, the prevalence of migrainous vertigo was 5.0%. Unlike traditional migraines, vestibular migraines may not always present with headaches but can significantly impact athletic performance by causing episodes of unsteadiness, nausea, and difficulty concentrating**.**

Objective: The purpose of this study is to find the effectiveness of vestibular rehabilitation for vestibular migraine among female athletes.

Methodology: Through convenient sampling 30 participants with vestibular migraine are included for this study. Group A received Vestibular Rehabilitation Therapy and Group B remained as a Control group and undergoes usual therapy. A received design protocol for six weeks with the sessions supervised for five days in a week.

Results: Independent Sample T-Test shows significant difference in DHI (Dizziness Handicap Inventory) scale.

Conclusion: In this study exercise protocol is effective for treating dizziness in vestibular migraine patients ($p<0.05$).

Keywords: *Vestibular Migraine, Female athletes, Vestibular Rehabilitation.*

1. INTRODUCTION

Vestibular Migraine is a frequent type of migraine that combines experience of dizziness, vertigo and balance issues with other typical migraine signs [1]. This condition is quite common affecting around 6%of men and 15% to 18% of women, mostly between the ages of 25 and 55[2].Vestibular migraine (VM) often causes dizziness, vertigo and imbalance, frequently affecting athletes [3]. Often accompanied by sensitivity to motion, visual disturbances, and nausea [4]. According to estimates, VM affects up to 1% of people in general, with a higher prevalence in women [5]. Female athletes are particularly at risk for developing vestibular migraine due to hormonal fluctuations, physical demands of sports participation, nutritional and hydration factors, stress and anxiety which can exacerbate symptoms [6]. VM can significantly impact athletic performance, quality of life, and overall well-being [7].

Vestibular rehabilitation therapy (VRT), which includes vestibular habituation exercises, is a specialized intervention that reduces dizziness, improves vestibular function and balance, improves overall quality of life, and assists persons in adjusting to sensory changes [8].Vestibular habilitation, a type of rehabilitation that promotes central nervous system compensation for balance abnormalities, has shown promise in treating vestibular migraine symptoms, increasing overall functional

performance, and lowering migraine frequency and intensity [9].VRT is based on neuroplasticity, vestibular compensation, and sensorimotor integration and it consists of exercise-based therapies, education, and behavioral changes [10]. VRT, which combines exercise-based therapies, education, and behavioral adjustments, can help people with vestibular diseases adapt and compensate for their vestibular impairments [11]. The purpose of VRT is to increase functional abilities, relieve symptoms, and improve overall quality of life [12]. VRT is typically provided by a physical therapist with specialized training and expertise in vestibular rehabilitation [13].

METHODOLOGY: Study design: This study was a quasi-experimental study. **Study population: Female** athletes under age category between 25 and 30. **Study duration:** 1 month. **Sample size**: 30 participants. Study **setting:** Study sessions were held in Mahatma Gandhi medical College and research institute where the subjects were assessed, data were collected. **Sampling method:** All participants were selected by convenient sampling method. The Dizziness Handicap Inventory (DHI) Questionnaire is given at both pre and post intervention session, and the outcome will be subjected to the analysis.

SELECTION CRITERIA: Inclusion criteria: The study will include subjects with age category between 25 and 30. Participants having a history of migraine before study participation. Neurologist or ENT diagnosed vestibular migraine patients. Participants who are clinically stable before the study.**Exclusion criteria:** Individuals having any other neurological deficits. Non-co-operative patient Participants with associated neurological conditions like head injury, spinal cord injury etc.

2. DATA COLLECTION PROCEDURE

Adults diagnosed by ENT or Neurologist having vestibular migraine, and age group between 25 and 30 were selected from MGMCRI Hospital. Convenient sampling was done and sample of 30 subjects were included. A written informed consent was taken from the subjects and the procedure and purpose of the study was explained to them. 30 Subjects of Female participants having Vestibular Migraine were selected and included in this study. The Vestibular Migraine Questionnaire (VMQ) was given to them to complete. Following confirmation of Vestibular Migraine, 15 participants are assigned to Group A as the Experimental group and the remaining 15 to Group B as the Control group. Group A receives the exercise protocol for 5 days a week, for a period of 6 weeks, which includes every day one session. Both before and after the intervention session, a questionnaire is administered, and the results will be analyzed.

PROTOCOL: VESTIBULAR HABILITATION THERAPY

Vestibular rehabilitation therapy (VRT) is an exercise-based treatment program designed to promote vestibular adaptation and substitution. The goals of VRT are enhancing gaze stability, enhancing postural stability, improving vertigo, and improving daily living activities.

In sitting

1. Eye movements- at first slow, then quickly

a) Up and down

b) From side to side

c) Focusing on finger movement from 3ft to 1ft away from face

2. Head movement at first slow, then quick; later with eyes closed:

a) Bending forward and backward

b) Turning from side to side

3. Shoulder shrugging and circling

4. Bending forward and picking up objects from the ground (Above mentioned each exercise were performed 20 times daily)

1. EYE MOVEMENTS:



Figure: 1 **Figure: 2** **Figure: 3**

Figure 1: Looking straight ahead, Figure 2: Turn your head around 45degree towards right, Figure 3: Turn your head around 45 degree towards left.

2. HEAD MOVEMENTS:

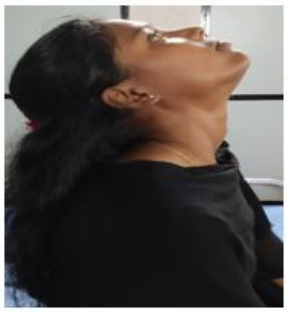


Figure: 4 **Figure: 5**

Figure 4: Bending Upward and Downward, Figure 5 : Turning from side to side

3. SHOULDER SHRUGGING AND CIRCLING:


Figure: 6 **Figure: 7**

Figure 6: Shoulder shrugging, Figure 7: Shoulder Circling

3. BENDING FORWARD AND PICKING UP OBJECTS FROM THE GROUND:

Figure: 8

OUTCOME MEASURE: The Dizziness Handicap Inventory (DHI) is a widely used self-reported questionnaire designed to assess the impact of dizziness on an individual's daily life. It evaluates the physical, emotional, and functional aspects of dizziness and balance disorders. The purpose of DHI scale is to identify difficulties that patient may experience because Of dizziness. The DHI is particularly useful in clinical and research settings to: Assess the severity of dizziness related disability, Evaluate the impact of dizziness on quality of life, Monitor progress and treatment outcomes in vestibular rehabilitation.

Subjects were asked to marked Yes or No or sometimes for each question Questionnaire, which consists of 25 questions in total. DHI is divided into three subscale's DHI-F (Functional), DHI-E (Emotional) and DHI-P (Physical). DHI-F contains 9 items, DHI-E contains 9 items, DHI-P contains 7 items. The patient is asked to answer each question as it pertains to dizziness or unsteadiness problems, specifically considering they had to mark on scale, where Yes= 4, no=0, sometimes=2. The higher the Score indicate more severity. The Score Interpretation are: 16-24 Points (Mild Handicap), 36-52 Points (Moderate Handicap), 54+ Points (Severe Handicap). Group A receives the exercise protocol for 5 days a week, for a period of 6 weeks, which includes every day one session.

DATA ANALYSIS:

Paired t-tests and ANOVA were used to compare pre- and post-intervention scores.

Statistical significance was set at $p < 0.05$.

3. STATISTICAL ANALYSIS

Table 1: DISTRIBUTION OF AGE AMONG GROUPS:

Sl. No	AGE	PERCENTAGE
1	25 to 26	7%
2	26 to 27	10 %
3	27 to 28	16 %
4	28 to 29	30%
5	29 to 30	37%

Table 1: shows the analysis of Distribution of age among groups, it shows higher percentage among age category between 28 and 30.

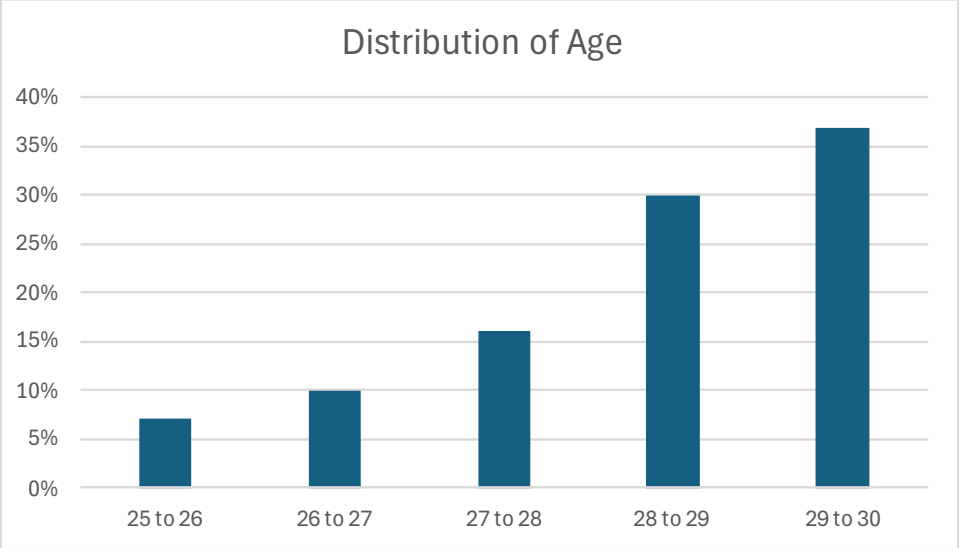

Table 2: Analysis of pretest and post test for Group A:

Sl. No	GROUP A	MEAN	SD	p value	t value
1	Group A Pre test	42.27	3.10	0.0001	8.4836
2	Group A Post test	37.00	3.68	0.0001	8.4836

Table 2: shows the mean and standard deviation of Pre test and Post test for Group B.

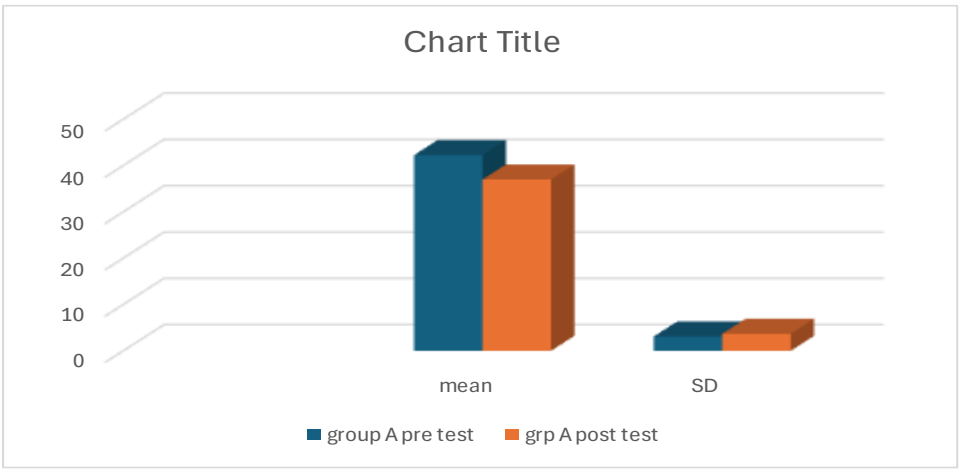

Table 3: Analysis of Pre test of Group B and Post test of Group B.

Sl. No	GROUP	MEAN	SD	p value	t value
1	Group B Pre test	42.13	3.25	0.0001	8.4245
2	Group B Post test	38.07	3.13	0.0001	8.4245

Table 3: shows the mean and standard deviation of Pre test and Post test for Group B.

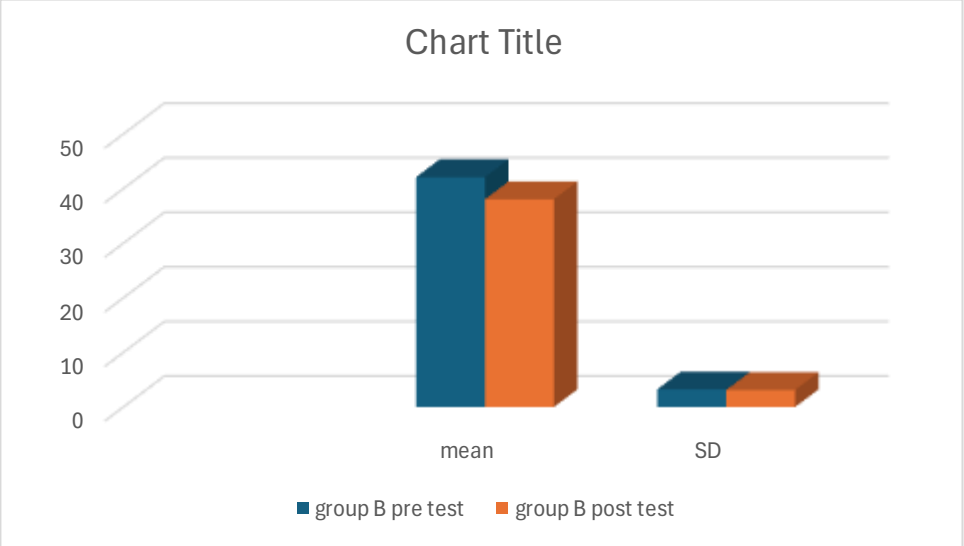

Table 4: shows the mean and standard deviation of Post test of Group A and Post test of Group B.

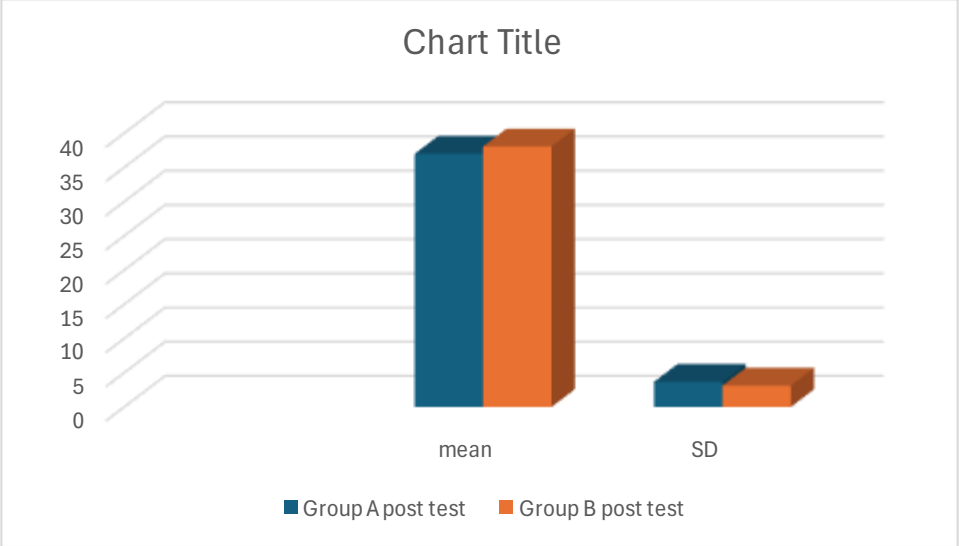

Table 4: shows the mean and standard deviation of Post test of Group A and Group B. The result that there is a significant difference between pretest and posttest for group A comparatively improvement is slightly more in group A than at group B.

RESULT: Both vestibular rehabilitation therapy and Conventional exercises appeared to be effective at treating vestibular migraine among female athletes, but the Vestibular Rehabilitation is much more effective based on the statistical analysis.

4. DISCUSSION

This study investigated the effectiveness of vestibular habilitation in improving vestibular migraine among female athletes, using the Dizziness Handicap Inventory (DHI) questionnaire to assess treatment outcomes. A total of 30 female athletes participated in a structured vestibular rehabilitation program aimed at enhancing balance, reducing dizziness, and improving overall quality of life. The results demonstrated a significant reduction in DHI scores, indicating that vestibular habilitation effectively minimized dizziness-related disability and enhanced functional performance. These findings support the role of vestibular rehabilitation in managing vestibular migraine, particularly in athletes for optimal performance. The results of this study indicate that vestibular habilitation is an effective intervention for managing vestibular migraine among female athletes, as evidenced by the significant improvement in Dizziness Handicap Inventory (DHI) scores. The reduction in dizziness-related disability suggests that targeted vestibular rehabilitation exercises enhance balance control, reduce dizziness severity, and improve functional independence in affected athletes. This improvement can be attributed to the strengthening of vestibulo-ocular and vestibulospinal reflexes, which are crucial for maintaining postural stability and coordination during athletic activities. The study highlights the impact of vestibular migraine on sports performance, psychological well-being,

and daily activities, reinforcing the need for early identification and intervention. Given the physical demands placed on athletes, dizziness and balance disturbances can significantly impair training efficiency, reaction time, and overall performance. By incorporating vestibular habilitation into rehabilitation protocols, athletes can experience faster recovery, reduced dizziness episodes, and enhanced neuromuscular control, ultimately allowing them to return to peak performance levels of athletes. This agrees with the work of Whitney et al. [10] and Wrisley et al. [11] in migraine patients with vestibular disorders.

Vestibular rehabilitation is an exercise strategy to the rehabilitation of disequilibrium and dizziness symptoms of vestibular pathology. The objectives of vestibular rehabilitation are to reduce dizziness, enhance balance function and enhance overall activity levels [14]. Vestibular rehabilitation therapy (VRT) is a type of specialist physiotherapy that is prescribed to help correct and alleviate symptoms resulting from vestibular disorders. It may consist of manual head manoeuvres and/or a graduated program of exercises aimed at alleviating vertigo and dizziness, visual disturbances, and/or imbalance and falls. Vestibular rehabilitation exercises enable central brain compensation to take place, which readjusts the functioning of your vestibular system's impairments [15]

Vestibular rehabilitation is grounded on the principles of Adaptation, Habituation, Substitution and Compensation. Gottshall et al. documented improvement in migraine-associated dizziness (migraine-related vertigo) patients who underwent vestibular physical therapy. Furthermore, Whitney et al. documented marked improvement in functional outcomes in vestibular physical therapy in migraine headache patients. Conversely, Wrisley et. Al.[11] documented fewer patients with a VM have improved on all outcome measures compared to other vestibular patients [16]. Whitney et al.[10] performed a retrospective evaluation of vestibular physical therapy rehabilitation patients who were complaining of migraine headache and were treated. These authors have cited remarkable improvement in the functional outcome in their patient population following vestibular physical therapy rehabilitation. Johansson et al.[17] described reductions in dizziness among elderly patients following vestibular physical therapy rehabilitation and cognitive behavioral therapy. Brown et al.[18] reported marked improvement in outcome measures following a course of physical therapy rehabilitation in a group of patients with bilateral vestibular loss[18].

In general, this research emphasizes the value of vestibular rehabilitation as a non-pharmacological, effective treatment for female athletes with vestibular migraine, supporting both neurological recovery and increased sports activity. The results also agree with existing literature favouring vestibular rehabilitation as an effective treatment for dizziness-related disorders, further confirming its use in sports medicine. Future studies with larger samples and long-term follow-up are advisable to further confirm these results and further modify rehabilitation protocols for female with vestibular migraine.

5. CONCLUSION

The findings of this study, concluded that vestibular habilitation is an effective intervention for treating vestibular migraine in female athletes. The results from Group A, the experimental group, show a significant reduction in dizziness as measured by the Dizziness Handicap Inventory (DHI) scores. Indicating that conventional treatments or non-specific interventions are less effective in managing vestibular migraine-related dizziness. In contrast, Group B, the control group, showed only minimal improvements, suggesting that conventional or interventions are less effective in addressing vestibular migraine-related dizziness.

6. CONFLICT OF INTEREST

The author declares no conflict of interest regarding the publication of this paper.

7. LIMITATION

This study is limited with a small sample size and the short duration which lowers the generalizability of the findings. Further research with larger sample sizes and long-term follow-up could provide additional insights into the sustained benefits and broader applications of vestibular habilitation in athletic and non-athletic populations alike.

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