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EFFECT OF VESTIBULAR REHABILITATION EXERCISES ON RELIEVING DIZZINESS IN PATIENTS WITH VISUAL VERTIGO

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Abstract
This research aimed to investigate the efficacy of vestibular rehabilitation exercises in alleviating dizziness among patients with visual vertigo. A total of 59 participants diagnosed with visual vertigo were randomly assigned to either the experimental group (n = 28) or the control group (n = 26). The experimental group underwent a three-month regimen of vestibular rehabilitation exercises, while the control group did not receive this intervention. Dizziness and unsteadiness questionnaires were administered to all participants before and after the intervention period.
The results demonstrated a significant improvement in dizziness within the experimental group compared to the control group, particularly notable during the second month of the intervention. The findings suggest that the implementation of vestibular rehabilitation exercises, guided by physical therapists on a weekly basis over a medium-term duration (3 months), holds promise in substantially reducing subjective dizziness in individuals suffering from visual vertigo.
The study's hypothesis regarding the effectiveness of frequent and medium-term physical therapist-guided vestibular rehabilitation exercises in relieving dizziness appears to be supported by the observed improvements in the experimental group. This highlights the potential value of incorporating structured vestibular rehabilitation programs into the management of visual vertigo, providing healthcare practitioners with a viable therapeutic approach to address the debilitating symptoms experienced by patients.
Keyword: Vestibular rehabilitation exercises, dizziness, visual vertigo, dizziness and unsteadiness questionnaires.

INTRODUCTION

Visual vertigo manifests through symptoms like dizziness, lightheadedness, imbalance, and visual blurring. While these symptoms often ameliorate with improved vestibular compensation, some individuals experience prolonged dizziness due to sluggish compensation.[1,2] This chronic dizziness is thought to result from a detrimental cycle initiated by vertigo symptoms. Initially, vertigo triggers anxiety and panic, prompting individuals to avoid activities that might induce vertigo. This avoidance not only delays vestibular compensation but also contributes to depression and restricted social behavior, ultimately diminishing overall quality of life.

Addressing vestibular decompensation involves employing vestibular rehabilitation exercises. These exercises focus on enhancing postural stability and gaze functions related to head movements, aiming to accelerate vestibular compensation and alleviate restrictions on daily activities. By promoting social participation, these exercises contribute to an improved quality of life. The field of vestibular rehabilitation has evolved significantly, offering diverse methods such as group workouts, individualized exercise programs, and even online programs[3-4].

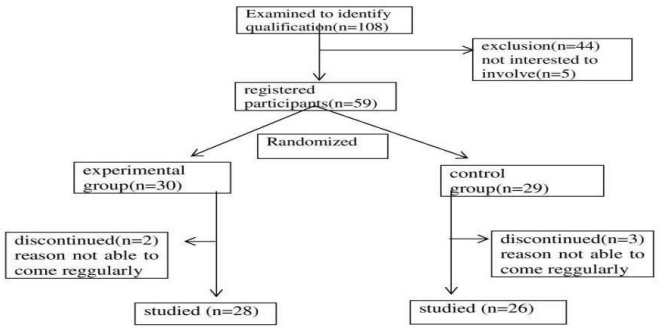
Numerous randomized trials[5-7] have investigated the impact of vestibular rehabilitation activities, consistently reporting improvements in subjective dizziness, postural stability, gait speed, and dynamic visual acuity. These positive outcomes underscore the efficacy of vestibular rehabilitation in addressing the symptoms of visual vertigo and enhancing various aspects of physical functionality. As these rehabilitation methods continue to diversify and advance, they hold promise as valuable interventions for individuals grappling with the challenges of vestibular decompensation and its associated symptoms.

METHODOLOGY

Patients with visual vertigo were recruited from the Department of ENT at Vinayaka Mission Medical College Hospital in Karikal, India, for this study.Patients were accepted into the trial if they matched the following requirements: (1) unilateral or bilateral peripheral vestibular hypofunction with abnormal results on at least one of the three tests, (2) age between 30 and 70 years, and (3) presence of dizziness and imbalance symptoms for at least six months are required. Exclusion criteria included: (1) involvement of the central nervous system, (2) spontaneously fluctuating and intermittent vertigo, and (3) serious orthopaedic or cardiac problems.

Patients in the experimental group participated in weekly vestibular rehabilitation exercise sessions for three months. Patients in the control group learned about the illness and did general exercises. The dizziness and unsteadiness questionnaire

was used to evaluate every patient both prior to and following the intervention.The author of these evaluations conducted them without knowing which patient groups they were evaluating.



DIZZINESS AND UNSTEADINESS QUESTIONNAIRE

The easiest way to examine subjective data on dizziness handicap is to utilise this questionnaire since it makes it easy to employ clinical measures that have been validated, including Jacobson and Newman's "Dizziness Handicap Inventory" [22].

Since 1995, the Japanese populace has had access to "The Dizziness and Unsteadiness Questionnaire," which was adapted from the "Dizziness Handicap Inventory," for the evaluation of daily handicap brought on by dizziness. It features 14 main questions, and Table 1 provides an English translation of them [23]. The responses to each of the main questions were graded on a scale of 1 to 5, with severe handicap equaling 5, substantial handicap equaling 4, moderate handicap equaling 3, small handicap equaling 2, and no disability due to the symptom equaling 1. The ultimate score for each element was calculated by adding the individual scores for each of the three main questions. The key questions 1, 5, and 9 are connected to factor 1: interruption of social activity caused by dizziness; 2, 6, and 10 are related to factor 2: dizziness caused by head and sight motion; and 3, 7, and 11 are related to factor 3: restriction of social engagement.4, 8, and 12 are related to factor 4: emotional disruption brought on by dizziness; and 1, 12, and 13 are related to factor 5: disruption of interpersonal communications brought on by dizziness.

1) Do you refrain from going out or travel for works or amusement due to dizziness or unsteadiness?
   (a) always
   (b) frequently
   (c) sometimes
   (d) rarely
   (e) no
   (f) no idea
2) Do you hate walking in the dark places even though around your home due to dizziness or unsteadiness?
   (a) absolutely
   (b) significantly
   (c) moderately
   (d) slightly
   (e) no
   (f) no idea
3) Do you hate going downstairs due to dizziness or unsteadiness?
4) Do you feel annoying due to dizziness or unsteadiness?
5) Do you feel that you are not able to do your work either at home or at office due to dizziness or unsteadiness?
6) Is the degree of dizziness or unsteadiness strengthened when you suddenly move your head (e.g., at turning back)?
7) Do you hate walking through the narrow spaces (e.g., narrow sidewalk) due to dizziness or unsteadiness?
8) Do you feel that you have a handicap in your body and are inferior to other persons due to dizziness or unsteadiness?
9) Don't you concentrate on something due to dizziness or unsteadiness?
10) Do you think it too much trouble to read books or newspaper due to dizziness or unsteadiness? Or do you have some trouble in reading them?
11) Is the degree of dizziness or unsteadiness strengthened when you stand up from a chair?
12) Do you feel anxiety about yourself when you are in the presence of others due to dizziness or unsteadiness?
13) Do you refrain from meeting or going out with your family or friends due to dizziness or unsteadiness?
14) Do you have difficulties in your daily due to dizziness or unsteadiness?

VESTIBULAR EXERCISE REHABILITATION PROGRAM

In our physiotherapy department, participants in the control group received a modified version of the Cawthorne–Cooksey vestibular rehabilitation exercise (24, 25) named MAHOROBA (i.e., an ancient Japanese word meaning "calm and comfortable area"). The MAHOROBA-style vestibular rehabilitation exercises comprise of adaptation, habituation, balance, and gait training, with a steady increase in difficulty over three levels. Participants got weekly 1-hour sessions and conducted daily exercises independently at home with the use of a handbook. The patients' home workouts were observed using a chart that was updated daily by the patients. Patients in both groups were examined on a monthly basis to explain their current status and offer life advice. The status of medications differs from patient to patient; no drug modifications were performed during the study period to avoid influencing the outcomes.

STATISTICAL ANALYSIS

For statistical analysis, SPSS 25 for Windows was utilized, employing the Shapiro-Wilk test to check for normal data distributions. Baseline characteristics were compared using Fisher's exact test, non-paired t-tests, or Mann-Whitney U-tests for numerical and nominal data. Two-way repeated measures ANOVA, with group and time factors, assessed pre- and post-intervention questionnaire scores. Bonferroni correction was applied post-hoc. Likert scale results were treated as ordinal data, analyzed with two-way repeated measures ANOVA if normally distributed. Spearman's rank correlation coefficient examined relationships between dizziness factors and activity changes. Percentage increases in activity levels were compared between groups using unpaired t-tests. Significance was set at $p < 0.05$.

RESULTS

Participants Attributes

Table 2 contains details on the participant's characteristics, such as age, gender, length of disease, diagnosis, and results of diagnostic tests. None of these factors (sex: $p = 1.00$, age: $p = 0.72$, length of illness: $p = 0.114$, diagnosis: $p = 0.434$) varied significantly between the two groups.

Comparisons of the Scores for Unsteadiness and Dizziness Within and Between Groups

Following the 6-month intervention, the ANOVA (Figure 2) revealed notable differences between the experimental and control groups in several factors. Specifically, there were significantly greater improvements in the experimental group for factor 1 (disturbance of social activity due to dizziness), component 2 (body motion inducing dizziness: head and sight), and factor 3 (limitation of physical activity: body movement) compared to the control group. However, the interaction between factor 4 (emotional disturbance brought on by dizziness) and factor 5 (disturbance of interpersonal communications due to dizziness) did not show significant differences. While there was a substantial overall decline in scores for all factors post-intervention, the group factor did not exhibit a significant main effect on any questionnaire element. Post-hoc analysis indicated that both the Vestibular Rehabilitation Therapy (VRT) and control groups demonstrated significant improvements across all criteria after the 6-month intervention.

patient No/sex/age, year	Diagnosis	sickness duration, month	C- test Right	C-test left	vHIT Right	vHIT left	cVEMP
Experimental group	Visual vertigo						
1/m/43s	Visual vertigo	7	-	Pathologic	-	Pathologic	-
2/f/45s	Visual vertigo	15	Pathologic	Pathologic	-	-	Pathologic
3/f/52s	Visual vertigo	31	-	Pathologic	-	Pathologic	-
4/m/36s	Visual vertigo	9	-	-	-	-	Pathologic
5/f/40s	Visual vertigo	23	Pathologic	-	-	-	-
6/m/50s	Visual vertigo	37	-	Pathologic	-	Pathologic	-
7/f/52s	Visual vertigo	32	Pathologic	-	Pathologic	-	Pathologic
8/f/51s	Visual vertigo	18	-	-	-	Pathologic	Pathologic
9/f/51s	Visual vertigo	32	-	-	-	-	Pathologic
10/m/52s	Visual vertigo	360	Pathologic	Pathologic	Pathologic	-	Pathologic
11/f/46s	Visual vertigo	19	-	-	-	-	Pathologic
12/f/40s	Visual vertigo	45	-	Pathologic	-	Pathologic	-
13/m/52s	Visual vertigo	39	Pathologic	-	-	-	-
14/f/41s	Visual vertigo	39	Pathologic	-	Pathologic	Pathologic	-
15/f/38s	Visual vertigo	36	-	Pathologic	-	-	Pathologic
16/f/41s	Visual vertigo	9	Pathologic	-	-	-	-
17/f/60s	Visual vertigo	40	Pathologic	Pathologic	Pathologic	Pathologic	-
18/f/51s	Visual vertigo	31	-	-	-	Pathologic	-
19/f/56s	Visual vertigo	46	-	-	-	Pathologic	Pathologic
20/f/54s	Visual vertigo	25	-	-	-	-	Pathologic
21/f/58s	Visual vertigo	70	-	-	-	-	Pathologic
22/f/60s	Visual vertigo	60	-	-	-	Pathologic	Pathologic
23/f/55s	Visual vertigo	25	-	-	-	-	Pathologic
24/f/52s	Visual vertigo	45	Pathologic	-	Pathologic	-	Pathologic
Control group							
1/m/51s	Visual vertigo	64	-	Pathologic	-	Pathologic	-
2/f/52s	Visual vertigo	20	Pathologic	-	-	-	-
3/f/42s	Visual vertigo	50	-	-	-	-	Pathologic
4/f/60s	Visual vertigo	46	Pathologic	-	Pathologic	-	-
5/m/59s	Visual vertigo	5	-	Pathologic	-	-	-
6/f/51s	Visual vertigo	94	-	Pathologic	-	Pathologic	-
7/f/57s	Visual vertigo	73	-	-	-	-	-
8/m/51s	Visual vertigo	60	-	-	-	Pathologic	Pathologic
9/f/56s	Visual vertigo	40	-	Pathologic	-	Pathologic	-
10/f/40s	Visual vertigo	32	Pathologic	-	Pathologic	-	-
11/f/50s	Visual vertigo	38	Pathologic	-	Pathologic	-	-
12/f/30s	Visual vertigo	30	-	-	Pathologic	-	-
13/f/57s	Visual vertigo	45	-	Pathologic	-	Pathologic	-
14/f/59s	Visual vertigo	21	-	-	Pathologic	-	Pathologic
15/m/40s	Visual vertigo	230	Pathologic	-	Pathologic	-	-
16/m/40s	Visual vertigo	47	-	-	-	Pathologic	-
17/f/56s	Visual vertigo	49	-	-	-	-	Pathologic
18/f/54s	Visual vertigo	49	Pathologic	Pathologic	Pathologic	Pathologic	-

DISCUSSION

The findings from this study suggest that vestibular rehabilitation exercises are notably effective in reducing subjective vertigo. The experimental group exhibited greater improvement in subjective dizziness, particularly in the factors of social activity disturbance induced by dizziness, body motion causing dizziness (head and eyes), and physical activity restriction (body movement). This implies that vestibular rehabilitation exercises can successfully stimulate compensatory mechanisms. While both groups engaged in regular exercise, only the experimental group participated in daily voluntary exercises specifically designed to alleviate vertigo, potentially explaining the observed differences.

The involvement of vestibular rehabilitation exercises seems to be more related to improving motor abilities than addressing emotional effects on dizziness, as evidenced by the lack of significant interaction between factors of emotional disturbance and disturbance in interpersonal communication due to dizziness. Past studies have reported reductions in subjective dizziness and improvements in objective measures like postural control following vestibular rehabilitation exercises administered by physical therapists.

Despite variations in outcomes, the control group, receiving lifestyle advice alone, showed improvement in all aspects of subjective vertigo. Both interventions shared the commonality of providing explanations and lifestyle advice to alleviate the fear of vertigo. A clear diagnosis and lifestyle advice, emphasizing the inevitability of movement-induced symptoms as part of the recovery process, likely influenced the improvement in dizzy symptoms in both groups. Notably, this study extended its investigation over a longer period, 6 months, as opposed to the usual 4 weeks in prior research, revealing the potential long-term effectiveness of supervised vestibular rehabilitation.

However, the study has limitations. The uneven frequency of therapist contact between the control and experimental groups may have influenced the findings, introducing bias. The study focused solely on subjective dizziness reduction, and objective measures of balance and fixation were not considered. Future

research should explore the efficacy of vestibular rehabilitation based on specific conditions, tailoring interventions to individual patient characteristics for optimal outcomes.

CONCLUSION

Regular (weekly) and ongoing (for three months) supervised vestibular rehabilitation exercises were beneficial in reducing subjective dizziness in patients with visual vertigo.

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Patient consent – Yes
All authors have contributed significantly towards the article
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