

Effectiveness of 6 weeks vestibular exercises practice on depression, anxiety, stress, and memory in hypertensive working women



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ABSTRACT

Background: There is a raise in the psychological problems globally. Depression, anxiety, and stress are the negative psychological emotions that have to be diagnosed and managed at earlier stages. Vestibular stimulation was known to manage the negative psychological emotions. **Aims and Objectives:** The aim of the study was to observe the effectiveness of selective vestibular exercises on depression, anxiety, stress, and memory in hypertensive working women. **Materials and Methods:** A total of 20 working women with untreated pre-hypertension to Stage I hypertension and 20 healthy age-matched controls (working women), after obtaining written and informed consent. **Results:** There was a significant improvement in the depression, anxiety, and stress scores followed by the practice of vestibular exercise. Spatial memory was significantly improved followed by practice of vestibular exercise for 6 weeks. Although there was an improvement in the verbal memory, but it was not statistically significant. **Conclusion:** The study results present significant improvement in the depression, anxiety, and stress scores and significant improvement in spatial memory followed by the vestibular exercises for 6 weeks. The study recommends further detailed study with higher sample size to recommend vestibular exercise in the management of negative emotions and to improve memory.

Key words: STOPS; Neonatal intensive care unit; Newborn; Prognosis

INTRODUCTION

There is a raise in the psychological problems globally.¹ Depression, anxiety, and stress are the negative psychological emotions that have to be diagnosed and managed at earlier stages. Conditions like COVID-19 have worsened the scenario. Vestibular system was known to maintain the posture and equilibrium. However, it was also reported that there is a need to stimulate vestibular system throughout the life for proper homeostasis. Considering this important role, vestibular system was called as the sixth sense.² The negative emotions are regulated by two important axes that is hypothalamo pituitary adrenal axis

and sympathetic adreno medullary axis. It was reported that vestibular stimulation inhibits both the axis by direct and indirect pathways provided the stimulation was optimal stimulation.³ Excessive stimulation of vestibular system results in adverse effects whereas under stimulation has no effect. Optimal vestibular stimulation is associated with more beneficial effects. Vestibular system is well connected with different brain areas associated with memory. It has been used as a therapy for management of anxiety in earlier days.⁴ The negative emotions are associated with decrease in the memory if not managed effectively.^{5,6} Vestibular stimulation was known to improve memory effectively. Considering these earlier reports, three set of standard

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vestibular exercises were adopted from the standard protocol to manage the negative psychological emotions. The studies in this area are sparse. Hence, the present study was undertaken to observe the effectiveness of selective vestibular exercises on depression, anxiety, stress, and memory in hypertensive working women.

Aims and objectives

The aim of the study was to observe the effectiveness of selective vestibular exercises on depression, anxiety, stress, and memory in hypertensive working women.

MATERIALS AND METHODS

Study design

This was an experimental study. After recording the baseline parameters, vestibular exercises were administered as exercise for 6 weeks to intervention group and no intervention to the control group for 6 weeks. Post-intervention values were recorded after 6 weeks from both the groups and compared.

Study setting

This study was conducted at Department of Physiology, LFMRC, Angamaly, Kerala, India.

Study participants

A total of 20 working women presented with untreated pre-hypertension to Stage I hypertension and 20 healthy age-matched controls (working women), after obtaining written and informed consent. The study was approved by the Institutional Human Ethical Committee (IEC/LFHRC/27-01-2016) (mention the EIC number with dates). The participants were recruited using the following criteria.

Inclusion criteria

Willing working women within the age group of 25–50 years and minimum 8 working hours, untreated SBP ≥ 130 mmHg but < 160 mmHg, DBP < 100 mmHg, and not suffering from any other diseases were included in the study.

Exclusion criteria

Pregnancy or postpartum < 3 months, body mass index > 40 kg/m², using any medications including use of oral contraceptives or under any therapy, having ear, or vestibular disorders were excluded from the study.

Control group: (n=20): Vestibular exercises were not administered

Intervention group: (n=20): Vestibular exercises were practiced for 6 weeks.

Vestibular exercises

The exercise comprises of 6 min with three different types of exercises. These exercises were adopted from the standard protocol of e Cawthorne and Cooksey. Each exercise comprises of 2 min. First 2 min, the subject has to walk in a straight line moving the head corresponding to the leg that is forwarded. Next 2 min, he should throw a ball from one hand to other and fixing the gaze of the eye on the ball. Last 2 min, he should walk in the straight line and throwing the ball and fixing the gaze on ball.^{7,8} The total duration of intervention is 6 weeks with five sessions per week. Each session duration is 6 min. All the participants were trained about the exercises by expert physiotherapist for 2 days before, they start practicing.

Assessment of depression, anxiety, and stress

DASS 42 was used to assess the depression, anxiety, and stress. This is a standard questionnaire and self-administered questionnaire.⁹

Assessment of spatial and verbal memory

Standard spatial and verbal memory test was used to assess the spatial and verbal memory. The minimum score was zero and maximum score was 10.¹⁰⁻¹²

Ethical considerations

The present study protocol was approved by the Institutional Human Ethical Committee of LFMRC, Angamaly.

Statistical analysis

Data were analyzed using SPSS 21.0 version. Student t test was applied to observe the significance of difference between the groups. Probability value < 0.05 was considered as significant.

RESULTS

The mean age of the participants in the control group is 32 ± 1.34 (mean and standard error of the mean), 34 ± 1.79 in the intervention group. Table 1 presents the comparison of depression, anxiety, and stress scores among control and intervention groups before intervention. Table 2 presents the comparison of depression, anxiety, and stress scores among control and intervention groups after the intervention. Depression scores were not significantly different before the intervention (Table 1). There was a significant decrease in the depression scores followed by the intervention (Table 2). Anxiety scores were not significantly different before the intervention (Table 1). There was a significant decrease in the anxiety scores followed by the intervention (Table 2). Stress scores were not significantly different before the intervention (Table 1). There was a significant decrease in the stress scores followed by the

Table 1: Comparison of depression, anxiety, and stress scores among control and intervention groups before intervention

Parameter	Control (n=20)	Intervention (n=20)	P value
Depression	22±1.34	23±1.57	0.6304
Anxiety	14±0.89	13±1.34	0.5388
Stress	23±1.79	21±1.34	0.3767
Spatial memory	5±0.22	4±0.45	0.0527
Verbal memory	4±0.22	4±0.45	1.000

Data were presented as mean and SEM

Table 2: Comparison of depression, anxiety, and stress scores among control and intervention groups after the intervention

Parameter	Control (n=20)	Intervention (n=20)	P value
Depression	22±1.34	15±0.89	0.0001***
Anxiety	13±0.89	9±0.89	0.0031**
Stress	22±1.12	14±1.12	0.0001***
Spatial memory	5±0.45	7±0.67	0.0177*
Verbal memory	5±0.22	6±0.67	0.1654

Data were presented as mean and SEM. ***P<0.001 is significant. **P<0.01 is significant. *P<0.05 is significant

intervention (Table 2). Spatial memory scores were not significantly different before the intervention (Table 1). There was a significant decrease in the spatial memory scores followed by the intervention (Table 2). Verbal memory scores were not significantly different before the intervention (Table 1). Although there is an improvement in verbal memory after intervention, it was not statistically significant (Table 2).

DISCUSSION

The studies in this area were sparse. Hence, the present study was undertaken to observe the effectiveness of selective vestibular exercises on depression, anxiety, stress, and memory in hypertensive working women. There was a significant improvement in the depression, anxiety, and stress scores followed by the practice of vestibular exercise. Spatial memory was significantly improved followed by practice of vestibular exercise for 6 weeks. Although there is an improvement in the verbal memory, it was not statistically significant. There exist several methods to stimulate vestibular system. Optimal stimulation was reported to offer multiple benefits. Earlier studies reported significant decrease in the cortisol levels followed by vestibular stimulation.³ Significant decline in the anxiety scores was reported followed by vestibular stimulation by swing.¹³ Close association was reported between the anxiety and vestibular system. Impaired vestibular system was reported to increase the anxiety in an individual.¹⁴

Vestibular training methods were reported to reduce the anxiety levels significantly by inhibiting the stress axis directly and indirectly.^{15,16} The present study results support earlier studies as we have observed significant decrease in the depression, anxiety, and stress scores in the participants after the 6 week practice of vestibular exercise. Vestibular system was reported to improve both spatial and verbal memory.¹⁷ Vestibular system is closely associated with the hippocampus that has a pivot role in memory. Stimulation of place cells was observed followed by the vestibular stimulation.^{18,19} Both animal and human studies reported improvement in the memory followed by the vestibular stimulation.^{19,20} Connections from vestibular system were reported to limbic system and neocortex of the brain that has a role in memory.²¹⁻²³ The present study results support earlier studies as we have observed significant improvement in spatial memory but not verbal memory in the participants after the 6 week practice of vestibular exercise.

Limitations of the study

As the study was conducted at one center, the results may not be generalized.

CONCLUSION

The study results present significant improvement in the depression, anxiety, and stress scores and significant improvement in spatial memory followed by the vestibular exercises for 6 weeks. The study recommends further detailed study with higher sample size to recommend vestibular exercise in the management of negative emotions and to improve memory.

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