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## **Effect of vestibular stimulation on depression, anxiety and stress in postmenopausal women with Osteoporosis**

Komala Rao,<sup>1</sup> V Ramesh <sup>2</sup>, Purna Singh <sup>3\*</sup>

<sup>1</sup>Assistant professor, Dept. of Orthopaedics, GEMS, Srikakulam, Andhra Pradesh, India

<sup>2</sup>Assistant professor, Dept. of Orthopaedics. GEMS, Srikakulam, Andhra Pradesh, India

<sup>3</sup>Assistant Professor, King Faisal University, Saudi Arabia.

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### **ABSTRACT**

Osteoporosis is characterized by low bone mass with micro architectural deterioration of bone tissue leading to enhanced bone fragility. This increases the susceptibility to fracture. Osteoporosis is a silent disease, reflected only in a low bone density, till a fracture occurs. The present study was undertaken to observe effect of vestibular stimulation on pain levels in postmenopausal women with Osteoporosis. Postmenopausal women with diagnosed Osteoporosis for past 5 years were recruited for the study after written informed consent by convenient sampling. We have observed positive impact of vestibular stimulation on depression, anxiety and stress in patients with osteoporosis. We recommend further detailed studies in this area to support vestibular stimulation as a supplementary therapy in management of osteoporosis.

**Key words:** Osteoporosis, Depression, anxiety, stress



### **INTRODUCTION**

Osteoporosis is characterized by low bone mass with micro architectural deterioration of bone tissue leading to enhanced bone fragility. This increases the susceptibility to fracture. Osteoporosis is a silent disease, reflected only in a low bone density, till a fracture occurs. As a result of this condition 40% of women and 14% of men over the age of 50 will suffer a fracture. With the increasing number of elderly people, it is anticipated that the disease will become an epidemic in the years to come. Indeed, it has been predicted that by the year 2050 there will be 6.5 million hip fractures worldwide. Osteoporosis increases the number of fragility (low energy) fractures and contributes to the severity of traumatic (high energy) fractures.<sup>1</sup>

The condition is characterized by loss of trabecular bone mass and connectivity as well as thinning of cortical bone. Low bone mineral density in the elderly can result from either low peak bone mass or accelerated bone loss, or a combination of two. A strong genetic component has also been suggested contributing to the pathogenesis of Fragility fractures.<sup>2,3</sup>

During puberty and adolescence, the skeleton takes up calcium avidly and builds up its reserves. This uptake of calcium into the bone is largely dependent on calcium and vitamin D nutrition, as well as exercise. Peak bone mass is usually achieved by the age of 30 yr. From the mid-thirties there is a gradual, progressive bone loss, which continues throughout life and is accelerated at the menopause in women. The fracture prevention strategy therefore consists of increasing peak bone mass in the growing years and reducing subsequent bone loss throughout life.<sup>4,5</sup>

Osteoporosis is by far the commonest metabolic bone disease. It is characterized by a diffuse reduction in the bone density due to a decrease in the bone mass. It occurs when the rate of bone resorption exceeds the rate of bone formation.

Osteoporosis is a metabolic disorder of elderly persons where calcium in the bone matrix fails to produce replacement bone. The result is weakening of the structure.

The World Health Organization has defined it as 'a systemic skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissue leading to enhanced bone fragility and a consequent increase in fracture risk'. The present

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\*Corresponding Author Address: Dr. Purna Singh, Assistant Professor, King Faisal University, Saudi Arabia

study was undertaken to observe effect of vestibular stimulation on pain levels in postmenopausal women with Osteoporosis.

**MATERIALS AND METHODS**

**Study design:** This was a longitudinal follow-up study in which participants were assessed for stress parameters for 2 times. Before the intervention and after 6 months of the intervention.

**Participants:** 30 post menopausal women with diagnosed Osteoporosis for past 5 years were recruited for the study after written informed consent by convenient sampling. Permission obtained from the Institutional Ethics Committee of GEMS Hospital, Srikakulam. After selection they were randomly grouped into two groups.

Group A: (n=15) Control group: Only routine treatment and no vestibular stimulation for 6 months

Group B: (n=15) Routine treatment+ Vestibular stimulation for 6 months

Pain scores was recorded before and after intervention and compared.

**Vestibular stimulation:** Vestibular stimulation was achieved by swinging on a swing, according to their comfort. (Back to front direction) as previously described.<sup>6,7</sup>

**Depression, anxiety, stress scale (DASS):** A previously validated and standardized survey instrument, DASS 42 was used to assess information on depression, anxiety, and stress.<sup>8,9</sup>

**Statistical analysis:** Data analysis was done using SPSS version 20.0.

**RESULTS**

**Table no:1 Depression, anxiety and stress scores before intervention**

Parameter	Control	Intervention group	P value
Depression	23.55±5.0	24.6±4.8	>0.05
Anxiety	15.2±2.0	14.23±3.0	>0.05
Stress	22±3.0	22.5±2.0	>0.05

Data was expressed in Mean±SD.

**Table no:2 Depression, anxiety and stress scores after intervention**

Parameter	Control	Intervention group	P value
Depression	23±4.0	15.5±3.5	<0.05*
Anxiety	16.0±2.5	10.0±1.5	<0.05*
Stress	22.0±3.0	11.25±1.4	<0.05*

Data was expressed in Mean±SD.

**DISCUSSION**

It was reported that Vestibular stimulation activates lateral and ventrolateral subnuclei of the nucleus tractus solitarii (NTS), where the first synapse of the carotid sinus baroreflex is located. Activation of NTS inhibits rostral ventrolateral medulla, where sympathetic activity is thought to be mainly controlled.[25,26] Further, it was reported that blood was lowered followed by caloric and rotational vestibular stimulation, and this effect was abolished on the vestibular lesion.<sup>10,11</sup> in the present

study we have observed significant decrease in the depression, anxiety and stress levels followed by vestibular stimulation.

**CONCLUSION**

We have observed positive impact of vestibular stimulation on depression, anxiety and stress in patients with osteoporosis. We recommend further detailed studies in this area to support vestibular stimulation as a supplementary therapy in management of osteoporosis.

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