



INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation

Journal Home Page: <https://ijrps.com>

The effectiveness of vestibular stimulation by rocking and vestibular exercises on postural stability, depression, anxiety and stress in elderly

Sahaya Rani¹, Archana R^{*2}, Shyla Kamala Kumari³¹St. Mary's School of Nursing, Coimbatore, Tamil Nadu, India²Department of Physiology, Saveetha Medical College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamil Nadu, India³Sree Abhirami College of Nursing, Coimbatore, Tamil Nadu, India

Article History:

Received on: 14.07.2018
 Revised on: 21.02.2019
 Accepted on: 24.02.2019

Keywords:

Postural stability, Vestibular stimulation, Stress, Elderly

ABSTRACT

Using swings and rocking chair is a universal practice. Rocking was soothing as it offers relaxation through vestibular stimulation. Stimulation of vestibular receptors will begin during fetal life, and it was recommended to continue throughout life. The present study was undertaken to observe the effectiveness of vestibular stimulation by rocking on postural stability in the elderly. A total of 150 elderly male and females were part of the study after obtaining the written informed consent. After recruiting the participants, they were randomly grouped into three groups with 50 participants in each group. Neither exercise nor rocking was administered to the control group. Rocking was administered using a rocking chair once a day for 5 days in a week for 6 months for a rocking group. Rocking was administered using a rocking chair once a day for 5 days in a week + vestibular exercises were practiced two sessions per week for 6 months for rocking and vestibular exercise group. Demographic data were not significant between the groups. There was a significant decrease ($P < 0.001$) in the stress score in both rocking the only group and rocking along with vestibular exercise group. The present study highlights the beneficial role of vestibular stimulation by rocking and by vestibular exercises in improving the postural stability and reducing the negative emotions like depression, anxiety and stress. Hence, the study recommends practicing vestibular stimulation either by rocking or by exercises in day to day life for better quality of life in general.



* Corresponding Author

Name: Archana R
 Email: dr.rarchana@gmail.com

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v10i2.423>

Production and Hosted by

IJRPS | <https://ijrps.com>

© 2019 | All rights reserved.

INTRODUCTION

Using swings and rocking chair is a universal practice. Rocking was soothing as it offers relaxation through vestibular stimulation. Stimulation of vestibular receptors will begin during fetal life, and it

was recommended to continue throughout life (SaiSailesh Kumar et al., 2016). The vestibular system is called a sixth sense by the modern scientific community as it influences almost all the functions of the body. It has wide connections throughout the brain structures. In fact, 18500 neuronal connections exist to and fro from the vestibular system to the cortical and subcortical areas (Kumar Sai Sailesh et al., 2018). Ageing is associated with a decline in the postural security as it causes a modulation in the sensory, motor and vestibular systems. This will decrease muscle stability and contributes to a decrease in postural stability. Vestibular stimulation was reported to be beneficial in the regulation of postural stability (Bisson et al., 2010; Giagazoglou et al., 2009; Sforza et al., 2000; W.-L. Hsu et al., 2007). Vestibular stimulation was reported to

reduce stress through its connections with cortical and subcortical structures (Kumar Sai Sailesh *et al.*, 2016). A significant decrease in the cortisol levels was reported followed by vestibular stimulation (Archana R *et al.*, 2016). As it is well reported that elderly population has higher levels of depression, anxiety and stress, stimulating the vestibular system by simple means like rocking chair will be very beneficial not only to maintain postural stability but also to relieve stress (Badger Terry A, 2001; Baltes Paul and Smith Jacqui, 2003). Hence, the present study was undertaken to observe the effectiveness of vestibular stimulation by rocking on postural stability and depression, anxiety and stress in elderly

MATERIALS AND METHODS

Study design: Experimental study with pre and post control.

Study setting: The present study was conducted at St. Mary's school of nursing, Podanur, Tamil Nadu, India.

Participants: A total of 178 elderly male and female participants were screened to recruit in the study. Twenty-eight individuals were not met with the inclusion-exclusion criteria. The participants were recruited from different old age homes of Coimbatore. The study protocol was duly approved by the institutional ethics committee. Written informed consent was obtained from all the participants. The following inclusion and exclusion criteria were followed while recruiting the participants:

Inclusion criteria

1. Age group 60 years to 75 years.
2. Willing participants.

Exclusion criteria

1. Patients with Inner ear disease, Migraine, cerebrovascular disease and any serious systemic illness.
2. Patients undergoing therapy or treatment for postural stability
3. Unwilling participants.

After recruiting the participants, they were randomly grouped into three groups with 50 participants in each group.

The control group (n=50): Neither exercise nor rocking was administered.

Rocking group (n=50): Rocking was administered using a rocking chair once a day for 5 days in a week for 6 months.

Rocking and vestibular exercise group (n=50): Rocking was administered using a rocking chair

once a day for 5 days in a week + vestibular exercises were practiced two sessions per week for 6 months.

Rocking chair: Rocking chair was specially designed for the study. Regular wooden rocking chair fitted on the MS rectangle tubular frame. The chair is connected and locked to the tubular frame with 4nos "Tension Spring", 2nos on front and 2nos on the rear side, parallel to each other for perfect movement. The chair is connected to the DC Motor with distance adjustable threaded stud and metal flange for its eccentric and zic - zac movement. An electronic device is used for speed regulation of rocking (Low- high). Foldable Aluminium footrest for the best and convenient for the person to keep relaxes his/her legs. Best quality U-form and polyfab rexine are used for comfortable seating. A/C adapter: Input voltage AC.220/50 hdz, Output Voltage 12v. DC, 29amps, 12 v. DC Geared motor: input current 29 amp. 36 rpm, Speed regulator: Generic - Input 12v.DC 0-50 amps. Output 12v.DC 29 amps were used. The detachable power cord should be plugged into the main power socket. Switch on the ON/OFF switch to ON position. Then the speed can be increased by rotating the regulator clockwise. Speed can be fixed at which the participant was comfortable. Vestibular simulation by rocking chair was administered for 30 minutes per day with a frequency of 30 cycles/ min. This frequency was selected as per the comfort of the participants by trial and error method.

Vestibular exercises: Each session of exercises comprises of 45 minutes (Ida Wiszomirska *et al.*, 2015). Two sessions per week were administered to the participants.

Step one: The participants were asked to lie down on their back; the participants shifted to lying on their right side, then to their left side. This cycle was repeated for ten times. Following this 3 minutes' rest is given while lying on the right side. Again the process is repeated, and this time during rest the participant lies to his left side for 3 minutes. Then same procedure he will perform with closed eyes.

Step two: The participant is asked to sit with legs extended straight and bend alternatively to the right and left sides while the arms are resting on the mat behind the body. After ten times, three minutes' rest is given. During these three minutes, the participants will be in a side-bend position to the right side. After the rest, the participant will repeat the side bends for ten times and again three minutes' rest was given. During this three minutes' rest, the participant will be in a side-bend position to the left side.

Step three: The participant will be in a sitting position and is asked to move the head up and down directions slowly and gently while eyes are closed. This was performed for ten times and followed by three minutes' rest. Then the participant's moves head to sideways for ten times slowly and gently while eyes are closed.

Outcome measures

Assessment of Postural stability: Postural stability was assessed using the Berg balance scale (Berg et al., 1992; Berg et al., 1992).It assesses the ability of the individual to balance during a series of pre-determined tasks safely.

Assessment of depression, anxiety and stress: Depression, anxiety and stress were assessed by using DASS 21 which is a standard questionnaire (Lovibond, S.H. and Lovibond, P.F, 1995).

Ethical considerations: The present study was approved by the institutional human ethical committee of Saveetha Institute of Medical and Technical Sciences.

Data analysis: Data was analysed using SPSS 20.0 version. One-way ANOVA followed by Bartlett's test for equal variances was used to compare the demographic variables. Two-way ANOVA followed by Bonferroni posttests was used to observe the difference between the outcome variables. A probability value of less than 0.05 was considered significant.

RESULTS

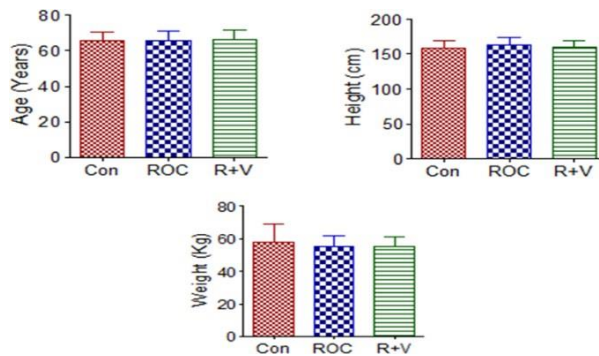


Figure 1: Demographic variables of the participants

Figure 1 presents the demographic data. Demographic data were not significant between the groups. Figure 2 presents the Berg Balance Scale score of the participants. There was a significant increase (P<0.001) in the Berg Balance Scale score in both rocking only group and rocking along with vestibular exercise group. Figure 3 presents the depression score of the participants. There was a significant decrease (P<0.001) in the depression score in both rocking the only group and rocking along with vestibular exercise group. Figure 4 presents the anxiety score of the participants. There

was a significant decrease (P<0.001) in the anxiety score in both rocking the only group and rocking along with vestibular exercise group. Figure 5 presents the stress score of the participants. There was a significant decrease (P<0.001) in the stress score in both rocking the only group and rocking along with vestibular exercise group.

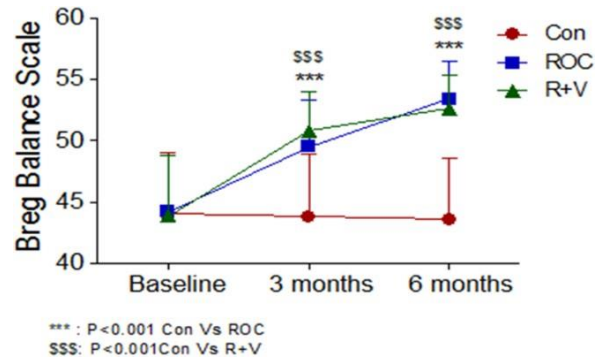


Figure 2: Berg Balance Scale score of the participants. (P<0.001 is significant, \$\$\$P<0.001 is significant)**

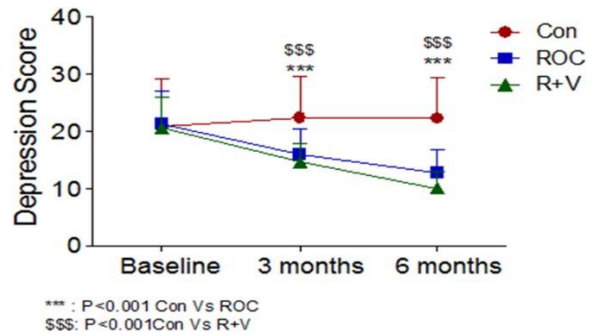


Figure 3: Depression score of the participants. (P<0.001 is significant, \$\$\$P<0.001 is significant)**

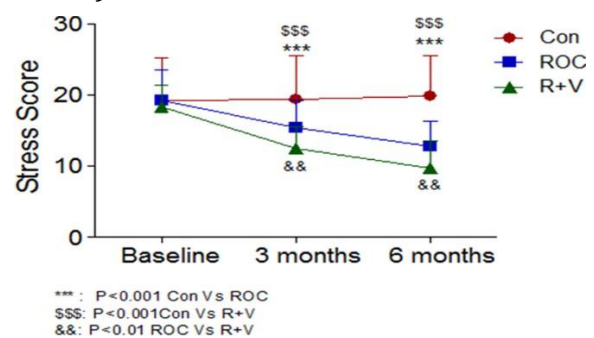


Figure 4: Anxiety score of the participants. (P<0.001 is significant, \$\$\$P<0.001 is significant)**

DISCUSSION

The present study was undertaken to observe the effectiveness of vestibular stimulation by rocking on postural stability and depression, anxiety and stress in the elderly. There was a significant improvement in the postural stability and significant decrease in the depression, anxiety and stress levels. Impairment in postural stability and balance

problems are very common in the elderly population (Patel M *et al.*, 2009; Blaszczyk J, Michalski A, 2006). It was reported that vestibular stimulation improves the postural stability in both the males and females (Badke *et al.*, 2004). It was reported that stimulation of the vestibular system causes cortical integration and improves postural stability (Kumar SSG, 2014). This was studied in pilots and, and it was proved that the trained sportsmen and pilots have better postural stability when compared with the control group (Balter *et al.*, 2004). Further, vestibular stimulation also causes integration of the structures of the medulla and maintains the postural stability (Sarnat HB, 1989). Vestibular system also acts at the level of the spinal cord through the medial and lateral vestibular pathways and maintains the postural stability (Rea P, 2015). Stimulation of vestibular receptors was reported to reduce the stress levels by inhibiting the stress axes that is the hypothalamic pituitary adrenal axis. Further, vestibular stimulation also inhibits the sympathetic system and simultaneously it activates the parasympathetic system. This function helps to reduce the blood pressure and heart rate within the normal limits (Clench M and Williams B, 2005). Interestingly, the close association was reported between the anxiety and postural stability and vestibular therapy was reported to reduce the anxiety and improvement of balance (Deroualle D, Lopez C, 2014; Kalueff AV *et al.*, 2008). The present study supports earlier studies as there was a significant improvement in the postural stability and significant decrease in the negative emotions like depression, anxiety and stress. Hence, long-term practice of vestibular stimulation may be more beneficial.

CONCLUSION

The present study highlights the beneficial role of vestibular stimulation by rocking and by vestibular exercises in improving the postural stability and reducing the negative emotions like depression, anxiety and stress. Hence, the study recommends practicing vestibular stimulation either by rocking or by exercises in day to day life for better quality of life in general.

Conflicts of interest: Nil

Source of funding: Self-funding

REFERENCES

Archana R, Kumar SaiSailesh, Mukkadan JK (2016). Effect of vestibular stimulation on stress and cardiovascular parameters in healthy college students. *Biomedical Research* 27 (3): 985-990.

Badger Terry A (2001). Depression, Psychological Resources, and Health-Related Quality of Life. *Journal of Clinical Geropsychology* 7:189-200.

Badke M, Shea T, Miedaner J (2004). Outcomes after rehabilitation for adults with balance dysfunction. *ArchPhys Med Rehabil* 85:227-233.

Balter SGT, Stokroos RJ, Akkermans E, Kingma H (2004). Habituation to galvanic vestibular stimulation for analysis of postural control abilities in gymnasts. *NeurosciLett* 366: 71-75.

Baltes Paul, Smith Jacqui (2003). *New Frontiers in the Future of Aging: From Successful Aging of the Young-Old to the Dilemmas of the Fourth Age.* *Gerontology.* 49:123-35.

Berg K, Wood-Dauphinee S, Williams JI, Maki, B (1992). Measuring balance in the elderly: validation of an instrument. *Can. J. Pub. Health July/August supplement.* 1992; 2: S7-11.

Berg K, Wood-DauphineeS, Williams JI, Maki, B (1992). Measuring balance in the elderly: validation of an instrument. *Can. J. Pub. Health July/August supplement* 2: S7-11

Bisson E. J., Chopra S., Azzi E., Morgan A., Bilodeau M (2010). Acute effects of fatigue of the plantar flexor muscles on different postural tasks. *Gait Posture* 32:482-486.

Blaszczyk J, Michalski A (2006). Ageing and postural stability. *StudPhys Cult Tourism* 13: 11-14.

C. Sforza, L. Eid, and V. F. Ferrario (2000). Sensorial afferents and centre of foot pressure in blind and sighted adults," *Journal of Visual Impairment and Blindness.* 2000; 94(2):97-107.

Clench M, Williams B (2005). Psycho/physiological effects of vestibular and audio stimulation: The Trinity Table. *Subtle Energies & Energy Medicine* 16(2):29-32.

Deroualle D, Lopez C (2014). Toward a vestibular contribution to social cognition. *Front IntegrNeurosci* 8:16.

Ida WiszomirskaKatarzyna, Kaczmarczyk, MichalinaBłażkiewicz, Andrzej Wit (2015). The impact of a vestibular-stimulating exercise regimen on postural stability in women over 60. *Journal of Exercise Science & Fitness* 13(2); 72-78.

Kalueff AV, Ishikawa K, Griffith AJ (2008). Anxiety and otovestibular disorders: Linking behavioural phenotypes in men and mice. *Behavioural Brain Research.* 186:1-11.

Kumar SaiSailesh, Archana R, Mukkadan J K (2016). Impact of traditional vestibular stimulation on depression, anxiety and stress in college students. *27(2): 295-297.*

- Kumar SaiSailesh, M Ravikanth, Arun H S Kumar (2018). Effect of Vestibular Stimulation on Different Body Systems: A Overview. *Journal of medical sciences and health* 4(2):1-10.
- Kumar SSG (2014). Need for vestibular stimulation. *J Clin Biomed Sci* 4: 263-264.
- Lovibond, S.H. & Lovibond, P.F (1995). *Manual for the Depression Anxiety & Stress Scales.* (2nd Ed.) Sydney: Psychology Foundation.
- P. Giagazoglou, I. G. Amiridis, A. Zafeiridis, M. Thimara, V. Kouvelioti, and E. Kellis (2009). "Static balance control and lower limb strength in blind and sighted women," *European Journal of Applied Physiology.* 2009; 107(5);571-579.
- Patel M, Fransson P, Magnusson M (2009). Effects of ageing on adaptation during vibratory stimulation of the calf and neck muscles. *Gerontology* 55: 82-91.
- Rea P (2015). *Essential Clinical Anatomy of the Nervous System.* Springer, Berlin.
- Sai Sailesh Kumar, Archana Rajagopalan, Joseph Kurien Mukkadan (2016). Vestibular Stimulation for Stress Management in Students. *Journal of Clinical and Diagnostic Research Vol-10(2):* CC27-CC31.
- Sailesh KS, Archana R, Antony NJ, Mukkadan JK (2014). You are never too old to swing. *Research Journal of Pharmaceutical, Biological and Chemical Sciences.* 5(5):612-15.
- Sarnat HB (1989). Do the corticospinal and corticobulbar tracts mediate functions in the human newborn? *Can J Neurol Sci* 16: 157-160.
- W.-L. Hsu, J. P. Scholz, G. Schöner, J. J. Jeka, and T. Kiemel (2007). Control and estimation of posture during quiet stance depends on multi joint coordination," *Journal of Neurophysiology.* 2007;97(4):3024-3035.