International Journal of Physiotherapy and Research,
Int J Physiother Res 2022, Vol 10(4):4286-90. ISSN 2321-1822
DOI: https://dx.doi.org/10.16965/ijpr.2022.127

Original Research Article

Effect of Proprioceptive Training on Kinesiophobia and Balance in Geriatric Population

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ABSTRACT

Background: The ageing process reduces sensory and motor capabilities such as balance & also increases the fear of movement, resulting in a high number of falls among the elderly. Some therapeutic interventions can directly interrupt this process and improves balance and kinesiophobia. This study examines the effect of proprioceptive training on both.

Objective: To determine the effect of proprioceptive training on kinesiophobia and balance in geriatric population.

Methodology: A random sample consisting of 17 community dwelling elderly participants were recruited from an old age home in Indore. The inclusion criteria were people aged 60 and above, with a history of fall. All the participants were trained under a 6 week proprioception training program using Swiss ball . The proprioceptive exercises were progressed according to the participant's response. Participants were evaluated pre and post intervention for kinesiophobia using Tampa Scale of Kinesiophobia and for Balance using Berg Balance Scale (BBS).

Result: Pre and post intervention comparison of TAMPA shows an average improvement of 18 with t value 33.613, p <0.05, which shows a significant decrease in kinesiophobia after the treatment. Pre and post intervention comparison of BBS shows an average improvement of 14.941 with t value 28.465, p <0.05, which shows a significant improvement in balance after the treatment.

Conclusion: The study provides evidence for the efficacy of proprioception training on Kinesiophobia and Balance in geriatric population.

KEY WORDS: Kinesiophobia, Balance, Proprioception Training, Geriatric Population.

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Access this Article online	Journal Information
Quick Response code	**International Journal of Physiotherapy and Research** ISSN (E) 2321-1822 | ISSN (P) 2321-8975 **https://www.ijmhr.org/ijpr.html** **DOI-Prefix:** https://dx.doi.org/10.16965/ijpr
DOI: 10.16965/ijpr.2022.127	**Article Information** Received: 06 May 2022 Accepted: 16 June 2022 Peer Review: 07 May 2022 Published (O): 11 August 2022 Revised: 07 June 2022 Published (P): 11 August 2022

INTRODUCTION

Ageing is a complex process causes decline in various body function like motor, sensory, cognitive and psychosiocial [1]. The major cause of morbidity and mortality in elderly is fall due to loss of balance [2]. There are various intrinsic and extrinsic factors which increases the risk of fall in older person such as decrease stride length, speed, decrease single support time & fear of fall. Decline in proprioceptive function affects the normal functioning of the body during movement & in maintaining balance [3-5].

Proprioception was defined as the perception of joint & body movement as well as position of body or body segments in space [6].

Several studies have verified the effect of proprioceptive exercise in increasing postural balance by increasing or decreasing body sway [7].

Elderly people with approximately living conditions can have different degrees of disability in the performance of ADL. That disability can partially be explained by avoiding the activities because of the fear of movement. This fear of movement was named kinesiophobia and defined as 'an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury. Some researches emphasize the fear of movement pointing out that it is not only one of the important factors resulting in the avoidance of movement, but also the factor leading to disability even more than the pain itself .few studies suggested that increased level of activity decreases the fear of fall . This study examines the effect of proprioceptive training effect on balance and kinesiophobia.

Need of Study: Fall is one of the common problems faced by elderly population. The prevalence of falls in India, above age of 60 years, reported to range 14 % - 53 % in 2019 as mentioned in the prevalence study of Dr. Pothiraj Pitchai. Falls are due to diminished proprioception sensation with increasing age, which further leads to imbalance and kinesiophobia .Proprioception training in these individuals overcome the deficient proprioception sensation thereby improving kinesiophobia and balance. Hence, fall prevention has become an important consideration in elderly.

Objective:

To test the effect of Proprioception training in assessment of Kinesiophobia and Balance in geriatric population

METHODOLOGY

Study design - Experimental study

Sample size - 17 community dwelling elderly individuals

Sampling technique- Random sampling

Sample population- Dashrath Sevashram in Indore

Inclusion criteria-

a) Age group - 60 years of age or older. (>60 years)

b) Able to follow simple directions like left, right, up or down.

c) Functionally independent and willing to participate

Exclusion criteria-

a) Severe low-back pain

b) Severe lower limb deformities, as diagnosed by a physician, that resulted in the inability to ambulate independently or with the use of an assistive device

c) Major chronic medical or physical conditions, including rheumatoid arthritis or osteoarthritis

d) People with blindness

e) Locomotion problems

f) Physical Activity Contraindications

Outcome measure- Assessment of proprioception training on kinesiophobia and Balance in geriatric population.

Tools of analysis-

a) Tampa Scale of Kinesiophobia

b) Berg Balance Scale

Procedure for proprioception training: Pre and post assessment of participants for kinesiophobia was done using Tampa scale on Kinesiophobia and for Balance by using Berg Balance scale. The subjects included in the study participated in a 6-week proprioceptive training program, performed 3 days per week (Monday, Wednesday and Saturday), with a total of 18 sessions. Each exercise session included 40 minutes (10-minutes warm-up period with gradual walk, mobility and stretching exercises, followed by 20 minutes of proprioceptive exercises program, and terminating with a 10-minute cool down period of stretching and relaxation exercises in combination).

Swiss balls were used for Proprioceptive training program. The proprioceptive exercises were progressed every week to challenge the balance according to patient's response. Patients were trained through three stages: initial, intermediate and advance.

EXERCISE 1: Initial phase: Alternate knee flexion-extension with extended trunk posture using both hands for support.	Intermediate phase: Alternate knee flexion- extension using the homolateral upper limb for support.	Advance phase: Alternate knee flexion-extension with no upper limb support.
EXERCISE 2: Initial phase: Hip and knee flexion-extension with the Swiss ball between the back and wall.	Intermediate phase: Same execution criteria, but increasing the angle of hip and knee flexion	Advance phase: Same execution criteria but reaching 90 degree of hip and knee flexion
EXERCISE 3: Initial phase: Hip raise lying with their back on the floor with both legs on Swiss ball. Upper limbs leaning on the floor to help with the exercise.	Intermediate phase: Same execution criteria with moderate support of upper limb	Advance phase: Same execution criteria but no upper limb support
EXERCISE 4: Initial phase: Knees on the ground and their chest resting on Swiss ball. Trunk extensions and raising with their upper limb extended and 90 degree of shoulder abduction.	Intermediate phase: Same execution criteria but with Swiss ball in their arms.	Advance phase: Same execution criteria that of intermediate phase but with eyes closed.
EXERCISE 5: Initial Phase: Single leg stance with mild support	Intermediate phase: Single leg stance without support	Advance phase: single leg stance with arm variation

Exercises no. 1 to no.4 consisted of 2 sets of 10-15 repetitions with 1 minute of rest between sets.

Exercise no. 5 consisted of 3 repetitions on each leg with 10 second hold.

Initial phase: Weeks 1-2

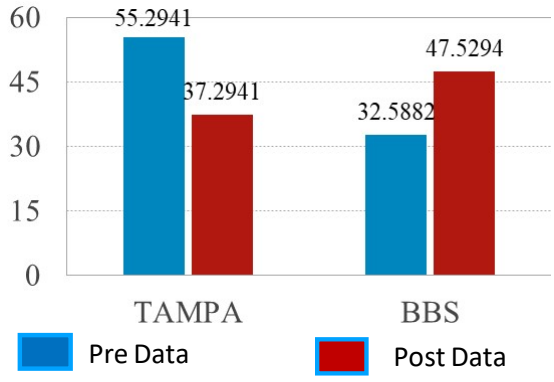
Intermediate phase: Weeks 3-4

Advance phase: Weeks 5-6

RESULTS

Table 1: Showing the Mean and SD for Pre and Post TAMPA and BBS.

		Mean	N	Standard Deviation
TAMPA	PRE	55.2941	17	2.54374
	POST	37.2941	17	2.91043
BBS	PRE	32.5882	17	3.4289
	POST	47.5294	17	3.44815



On completion of the intervention, the statistical analysis of data was done by using SPSS version 20. The study was done on 17 community dwelling male elderly individuals with mean age of 70 ± 4.91.

Table 1 below depicts Pre intervention TAMPA score i.e.,55.29 with SD 2.543, post intervention it reduced to 37.294 with SD 2.910.

Pre intervention BBS score is 32.588 with SD 3.428. post intervention it is increased to 47.529 with SD 3. 448.Graph below depicts the pre and post intervention comparison of TAMPA and BBS scores.

Table 2: Showing the Average improvement for TAMPA and BBS.

		Average improvement	T value	p-value	result
TAMPA	Pre post	18	33.613	0.001	p<0.05 sig
BBS	Pre post	14.94118	28.465	0.001	p<0.05 sig

DISCUSSION

This study was designed to evaluate the effects of proprioception training program in kinesiophobia and balance in older adults (aged >60 years). Our training protocol involved the use of Swiss ball, and our protocol seems to be effective in static and

dynamic stability, leading to an improvement in balance and decrease in kinesiophobia.

The result of the study shows that there is significant improvement in pre and post intervention score of balance with the mean value of 32.5 to 47.5 respectively. The most probable reason for improvement in balance is change in the sense of the relative position of one's parts of body and strength of effort being employed in movement. At central level the repetitive afferent inputs from the mechanoreceptors could modify the cortical maps of the body over time. Plastic changes in the cortex can be induced by repeated positions of body & limb joints in specific spatial positions as demonstrated by exercise. Regular physical activity over time can increase cortical representation of joint leading to enhanced joint proprioception. Duray M, et al. (2018) and Seung hun chae (2017) also supported the findings of our study.

At peripheral level improvement in proprioception were linked to alteration in muscle spindle. The training induces morphological adaptation in the major mechanoreceptor, the muscle spindle, training can induce muscle spindle adaption at microlevel, the intramural muscle fibers may show some metabolic changes & at a more macro level, the latency of the stretch reflex response decreases, and the amplitude increases. As supported by the study done by Takashi Milwa (1995) on rats dynamic and static sensitivities.

In case of kinesiophobia this study supported the theory that barrier to activity is caused by kinesiophobia, which is understood as a barrier against discomfort as a consequence of physical activity. The results of all fitness trails significantly impact the level of kinesiophobia. Similarly, to low physical activity, a low level of fitness also negatively impacts on the level of barrier against activity.

The proprioceptive training resulted in improved functional balance and in turn improvement in functional skills decrease dependence on others and improves self-confidence. This improvement in self-confidence leads to decrease in score of kinesiophobia. These findings in our study are supported with study done by Mariola Saulic which shows low level of physical activity & fitness in women of perimenopausal age favor a kinesiophobic attitude. Another study done by Edward Saulicz (2016) concluded that the level of physical activity during childhood and youth has a significant impact on the level of kinesiophobia at the older stages of human life.

Limitations: The limitations of my study include follow and small Sample size

Future studies: To analyze the effect of long-term proprioceptive training on different variables.

CONCLUSION

The scores obtained with the Tampa Scale of Kinesiophobia & Berg balance scale seem to be appropriate. Our results showed a significant decrease in Tampa Scale score increase in the Berg test score after proprioceptive training. In conclusion, the results of this study suggest that a proprioceptive training program is associated with significant improvements in Kinesiop-hobia in and functional balance, and it can reduce the risk of falling in people aged 60 years and older.

Conflicts of interest: **None**

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How to cite this article: Pavneet Singh Saluja, Mayuri Sharma. Effect of Proprioceptive Training on Kinesiophobia and Balance in Geriatric Population. Int J Physiother Res 2022;10(4):4286-4290. **DOI:** 10.16965/ijpr.2022.127