Individuals with osteoarthritic knee have better dynamic standing balance when compared to age-matched asymptomatic Indians.

PA Deshkar*

Department of Computer Technology, Yeshwantrao Chavan College of Engineering, Nagpur, India

Abstract

Balance deficits have been linked to an increased risk of falls and reduced mobility in the senior population, which can lead to ADL restriction and social isolation, according to several studies. Osteoarthritis (OA) of the hips and knees becomes a major debilitating disorder as people get older because it limits movement. OA has become a severe health threat and a financial burden for many countries as the global population ages. OA is expected to affect around 18% of women and 10% of men aged 60 and up. There have been several studies on balance deficits in the elderly, but there has been far less research on the presence of balance impairments in the osteoarthritic population. Objectives: 1. to measure dynamic standing balance in persons with arthritic knees and age-matched asymptomatic individuals by using step test. 2. To examine dynamic standing balance in persons with arthritic knees and age-matched asymptomatic individuals by using forward reach test. 3. To analyses the results of the step test and the forward reach test in both groups. Material and Methods: Keeping in view of inclusion & exclusion criteria the subjects were explained about the study in their language they understood and if they agreed to participate they were asked to sign a written consent. Results: The results of the present study shows that the Dynamic standing balance is impaired in the patients with osteoarthritis of the knee

Keywords: Step test, Forward reach test, Stopwatch, Measuring tape, Foot table, Weighing machine.

Introduction

Osteoarthritis (OA) of the knee is one of the most common musculoskeletal illnesses; affecting 30–40% of the population by the age of 65. It is a main cause of older impairment and disability, as well as a huge financial burden on society. Over time, people with knee OA lose function and rely more on walking, stair climbing, and other lower-extremity activities. These, and a variety of other daily activities, necessitate a certain level of equilibrium. Understanding the impact of knee OA on balance could lead to a greater understanding of the different processes that cause disability in this patient population, as well as better care for those who suffer from the disease. Balance control requires sensory input from the vestibular, ocular, and somatosensory systems. When balance is disrupted, cerebral processing of this data leads to synchronised neuromuscular responses that ensure the centre of mass remains within the base of support [1].

Physical therapists are concerned about a loss of balance response and a rise in the number of falls. Improved balance may be a desired functional outcome for many individuals. Increased postural motion and poorer stability have been associated to age-related declines in balance function. Balance is influenced by sensory input, brain processing, and muscle responses. Sensory components include the vestibular, ocular, and proprioceptive systems. When your balance is disrupted, you'll need a healthy neuromuscular system and enough muscle strength to return your centre of mass to the base of support. Older persons had poorer muscle strength, muscular atrophy, a decrease in the size and quantity of mitochondria, and a loss of both the number and size of muscle fibres when compared to younger people.

The most frequent chronic ailment among persons over the age of 65 is osteoarthritis. Knee osteoarthritis affects the body in a variety of ways, including a loss of knee strength and proprioception. Strength and proprioception are both important aspects of balance. All determinants of balance have been reported to decline with age, although the deterioration in the domains of proprioception and strength may be accelerated in people with osteoarthritis [2].

Osteoarthritis (OA) is one of the most frequent musculoskeletal illnesses among the elderly, and it is one of the leading causes of death and disability in this age range around the world. Osteoarthritis is a degenerative musculoskeletal disease characterised by inflammation, deterioration, and eventual loss of articular cartilage in the joints. Women are more likely than men to get OA, and the disease's frequency increases with

***Correspondence to:** PA Deshkar, Department of, Computer Technology, Yeshwantrao Chavan College of Engineering, Nagpur, India, E-mail: padeshk989@gmail.com

***Received:** 31-Mar-2022, Manuscript No. AABPS-22-59161; **Editor assigned:** 02-April-2022, Pre QC No. AABPS-22-59161(PQ); **Reviewed:** 16-April-2022, QC No. AABPS-22-59161; **Revised:** 19-April-2022, Manuscript No. AABPS-22-59161(R); **Published:** 26-April-2022, DOI:10.35841/2249-622X.88.120*

***Citation:** Deshkar PA. Individuals with osteoarthritic knee have better dynamic standing balance when compared to age-matched asymptomatic Indians. Asian J Biomed Pharmaceut Sci. 2022;12(88):120*

age. Knee osteoarthritis has been linked to factors such as age, weight, and joint damage from repetitive actions like squatting and kneeling. Patients with knee osteoarthritis have pain and difficulty performing functional activities like prolonged sitting, stair climbing and descending, walking, squatting, kneeling, rising from a chair, and getting in and out of a car, which leads to a loss of functional independence and a lower quality of life. The ligaments, tendons, and per articular tissues, including the muscles, as well as the tissues within the articular cavity, are all affected by osteoarthritis (OA).The number of mechanical sensory receptors around the ligaments of knee joints with OA has been found to be diminished when evaluated histologically. Because falls and loss of balance are most common during dynamic tasks like walking, balance evaluations must incorporate testing procedures that represent the dynamic nature of locomotors tasks [3].

Methodology

1) Study Design- Comparative Study Methodology.
2) Study set up: Nagpur's Datta Meghe College of Physiotherapy has a study set up.
3) Criteria for Selection.

Criteria for inclusion

- Age range of 45 to 55 years.
- Females who are asymptomatic.
- Subjects with quadriceps MMT=or>3 • Females with OA knee (primary, unilateral)
- Subjects reporting discomfort on a VAS scale of 0 to 7.

Criteria for exclusion

- Any knee surgery (H/O) (eg TKR,ACL reconstruction)
- A subject with bilateral OA knees • A subject with a systemic arthritic condition (eg RA)
- Congenital and acquired lower limb deformity • H/O any neurological involvement.
- Sample size: 60 female (30- OA, 30-Asymtomatic.

Materials used-step test, forward reach test, stopwatch, measuring tape, 15cm foot table, weighing machine.

Procedure

The ethical committee of the Datta Meghe college of Physiotherapy in Nagpur granted permission to conduct the study. Subjects who were willing to engage in the study on a voluntary basis were chosen from Datta Meghe College in Nagpur. Subjects who fulfilled the inclusion criteria were explained about the study in their own language and invited to sign a written consent form if they consented to participate.

The following are the tests explained to the subjects:

Step test

- Subjects were asked to maintain balance on one leg while stepping the contralateral limb as quickly as possible on and off a 15 cm step using a foot stool.
- By using a stop watch, the number of times the subjects placed their foot on the step and returned it to the floor throughout a 15 second interval was recorded.
- For OA knee patients, the test was completed while standing on the arthritic limb without support.

Forward reach test

- In a standing position, a functional reach test is defined as the maximum distance forward distance beyond arm's length with a fixed base of support.
- The shoulders should be stretched to 90 degree and elbow extended, the individual stands relaxed next to the wall without touching it.
- The patient should asked to lean as forward as possible without losing balance or taking a step by making starting markings on the wall at shoulder level and fist level.
- Markings were created at the first level in the forward reach position once more.
- For both groups, the differences in markings in the positions were recorded and documented.

Results

This is the graph of comparisons of characteristics of aged matched asymptomatic individuals and osteoarthritis subjects and statistically result shows not significant **Table 1**.

This is the graph of comparisons of mean value of no of steps made in 15 sec for Asymptomatic and OA group and result shows significant difference **Table 2**.

This is the graph of comparisons of mean value of no of steps made in 15 sec for Asymptomatic and OA group and result shows significant difference **Table 3**.

This is the graph of comparisons of mean value of functional reach test for both group and statistically results shows significant difference **Table 4**.

Table 1. *Comparisons of characteristics of aged matched symptomatic individuals and osteoarthritis subjects.*

Characteristics	Asymptomatic group		OA group		Significance
	Mean	SD	Mean	SD	
AGE YRS	49.4	-3.349	50.767	3.36	NS
HEIGHT	2.328	-0.3309	2.313	0.2961	NS
WEIGHT	60.5	-8.585	61.833	8.599	NS
BMI	26.807	-5.623	26.923	3.743	NS

Citation: *Deshkar PA. Individuals with osteoarthritic knee have better dynamic standing balance when compared to age-matched asymptomatic Indians. Asian J Biomed Pharmaceut Sci. 2022;12(88):120*

Table 2. *Comparisons of mean value of no of steps made in 15 sec (step test) for asymptomatic and OA group.*

Groups	No of steps in 15 sec	Standard deviation	Standard error mean	P-value
ASYMPTOMATIC	12.5	-2.03	0.3706	0.0371 SIGNIFICANT
OA	9.8	-2.231	0.4073	

Table 3. *Comparisons of mean value of functional reach test for both groups.*

Groups	Mean CMS	Standard deviation	Standard error mean	P-value
ASYMPTOMATIC	12.367	-2.846	0.519	0.041 SIGNIFICANT
OA	10.033	-7.285	1.33	

Table 4. *Comparison of mean difference values of step test and forward reach test.*

Tests	Mean difference	Standard deviation	P-value
STEP TEST	2.567	-1.547	0.1912 (NS)
FORWARD REACH TEST	3.367	-2.93	

Discussion

In this study, patients with OA knees' postural control deteriorate in dynamic resting settings. This demonstrates a decreased capacity to keep upright balance while engaging in potentially dangerous activities. As people get older, the amount of skeletal muscle replaced by fibrous tissue increases. Gross muscular atrophy is characterised by a reduction in the number of muscles as well as a reduction in their size. Excess weight puts axial forces on joint structures, pushing them over their physiological limits and hastening joint degradation.

Proprioception and muscle strength impairments in the lower limb have been associated to OA knee, and may be a cause of reduced balance. In a study on sensorimotor changes and functional performance in patients with knee osteoarthritis, Hurley, D. Scott concluded that articular damage may reduce quadriceps motor neurone excitability, which decreases voluntary quadriceps activation, contributing to quadriceps weakness and diminishing proprioceptive acuity in patients with OA knee [4].

Pain may result in reduced loading of the affected joint and an individual's ability to maintain their centre of mass within the base of support because OA knee pain affects balance and the presence of pain may reflexively inhibit the muscles around the knee, compromising an effective and timely motor response in postural control. Older people with the lowest lower extremity function, according to Guralnik et al., have a larger risk of ADL handicap than older people with higher lower extremity functions.

In addition, Hassan et al. and Wegner discovered that when people with OA knees stand on a firm surface, their dynamic standing balance is compromised. He came to the conclusion that those with symptomatic knee OA have quadriceps weakness, decreased knee proprioception, and higher postural sway pain, and that muscle strength may affect postural sway. Balance deficits are induced by the existence of OA knee as well as differences in age, gender, and BMI between groups, according to this study's comparisons between OA knee subjects and age-matched normal healthy persons [5].

Conclusion

It is concluded that the patients with osteoarthritis of the knee has impaired dynamic standing balance when compared with asymptomatic individuals.

References

1. Hinman RS, Bennell KL, Metcalf BR, et al. Balance impairments in individuals with symptomatic knee osteoarthritis: a comparison with matched controls using clinical tests. Rheumatol. 2002;41(12):1388-94.
2. Wegener L, Kisner C, Nichols D. Static and dynamic balance responses in persons with bilateral knee osteoarthritis. J Orthopaedic Sports Physical Therapy. 1997;25(1):13-8.
3. Abichandani D, Jetpurwala H. Comparison of knee joint position sense, balance and physical function in patients with knee osteoarthritis and age-sex matched normals. Int J Sci Res. 2017;6(3):2259-64.
4. Hurley MV, Scott DL, Rees J, et al. Sensorimotor changes and functional performance in patients with knee osteoarthritis. Annals Rheumatic Dis. 1997;56(11):641-8.
5. Hassan BS, Mockett S, Doherty M. Static postural sway, proprioception, and maximal voluntary quadriceps contraction in patients with knee osteoarthritis and normal control subjects. Annals Rheumatic Dis. 2001;60(6):612-8.

Citation: *Deshkar PA. Individuals with osteoarthritic knee have better dynamic standing balance when compared to age-matched asymptomatic Indians. Asian J Biomed Pharmaceut Sci. 2022;12(88):120*