

# EVALUATION OF BALANCE PROBLEMS IN PATIENTS WITH KNEE OSTEOARTHRITIS AND ITS IMPACT ON ACTIVITIES OF DAILY LIVING IN TERTIARY CARE HOSPITALS OF PESHAWAR

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#### Abstract

**Background:** Osteoarthritis (OA) is characterized by the breakdown of cartilage and bone in the joints. Knee osteoarthritis is caused when cartilage in knee joint breaks down. Although the etiology of osteoarthritis in the knee limits its complete cure but certain treatments aids in mitigation of symptoms and decelerates the progression of disease.

**Objective:** To evaluate balance problems in patients with knee osteoarthritis and the subsequent impact on their performance of activities of daily living at tertiary care hospitals in Peshawar.

*Material & Methods:* This descriptive cross-sectional study was conducted for a period of six months. To collect the data, 95 osteoarthritis patients who fulfilled the inclusion criteria were recruited from the tertiary healthcare centers in Peshawar via convenience sampling technique. For the assessment of balance, Knee Injury and Osteoarthritis Outcome Score (KOOS) was used. Additionally, Romberg's test and Functional Reach Tests were performed. SPSS version 23 was used to analyze the data.

**Results:** Out of a total 95 participants, 62(65.3%) were males while only 33(34.7%) were females. Regarding the prevalence of risk of fall among the recruited individuals, the study revealed that participants with a higher risk were 49 (51.58%), moderate risk were 36 (37.9%) while those with a low risk were only 10 (10.52%).

**Conclusion:** To conclude, males exhibited a higher risk of balance issues compared to females. Furthermore, patients experiencing balance deficits and



associated risk of fall were linked to advanced age, thus having an adverse impact on one's daily living.

## INTRODUCTION

Osteoarthritis (OA) is a complex, multifactorial disorder that affects the entire joint, along with the bone, the muscles, ligaments, and the cartilage (1). Approximately, one in seven American adults suffer from osteoarthritis (2). As there is a natural inclination of OA for joints of lower extremities like hip & knee joints, OA is the primary cause of lower extremity impairment among adults of older ages with an approximate lifetime risk for knee OA being 40% in men and 47% in women, and with an elevated risk in individuals categorized as obese (3). Since it is a chief cause of disability, thus affecting more than 500 million people globally (1).

Knee OA impacts most adults who age 65 years or above it, with a prevalence of 33.6% (12.4 million) in the United States. An increased prevalence of 42.1% was seen in female population compared to population which was 31.2% male (4).Approximately 3.6% of the population worldwide are affected by knee OA, which is approximately equivalent to 250 million individuals (5). In southern India, the prevalence of knee OA was 27.1%, with more commonly experienced by individuals above the age of 50 years. Moreover, in comparison to males, females were 1.4 times more vulnerability to knee OA. OA of knee was considerably (P  $\leq$  0.01) greater in uneducated individuals compared to educated ones, in comparison to professionals, homemakers had more susceptibility to knee OA. Regarding the socioeconomic standing, the likelihood of knee OA was 2.6 times greater in those with a lower status compared to higher status individuals (6).

Stemming of primary knee OA is due to the process of natural degradation of joint cartilage with no discernable reason, whereas secondary knee OA arises from identified factors which triggers cartilage degeneration (7). Pain with movement is the most common complaint of OA patients typically with the beginning of a movement or when the victims initiate the action of walking, describing the pain as dull ache. Persistent pain and impairment in the joint functionality develops with a progression in the disease. Knee pain being the chief symptom, that mitigates with rest but worsens when the harmed knee is set to motion. As presently,OA is not completely remediable, but signs & symptoms are amenable to treatment, that can aid in suppressing the progression of disease (8). Tissues which are mainly harmed by osteoarthritis are the synovium, bone and the hyaline cartilage. Since it is a joint disease, beginning with the degeneration of cartilage and progressing to afflicting the periarticular soft tissues along with the subchondral bone, resulting chronic in inflammation accompanied with synovitis, decrease in joint space, osteophytosis, remodeling of bone and eventually resulting in severe and irreparable destruction of the joint (9).

Balance is reliant on sensory signals from various of human body like vestibular, systems somatosensory and visual. The risk of falls intensifies in humans with deficits in balance and older age. Knee OA surges the alterations pertinent to aging, leading to balance issues (10). Poor dynamic postural control due to changes in neuromuscular processes developed with the process of ageing are even more exacerbated in older individuals with musculoskeletal lesions like knee OA. Neuromuscular alterations seen in knee OA patients that is detrimental to postural control include weakness in muscles, painful joints, reduction in power, and diminished proprioception (11).

A study aimed to asses static balance in patients with severe knee osteoarthritis. The results revealed that OA patients had imbalances in both symmetrical and asymmetrical loading of the limbs (12). Pazit Levinger et al., conducted a study to figure out biomechanical response of trunk and lower limb joints during a forward induced fall with varying activities in people with and without knee OA. OA victims had difficulty slowing forward momentum after simulating a forward fall. Moreover, tasks became more challenging and their postural control also weakened (13). A study



has concluded that falls are more likely to occur in people with primary osteoarthritis of the knee. Risk factors for falls necessiates to be assessed and preventive measures needs to be developed. Strategies for prevention of falls should include medical approaches, proprioceptive training, balance-gait training protocols, and muscle strengthening exercise regimens (14).

Study conducted by Harshneet Kaur Chhabr et al., depicted that balance exercises were more efficacious than traditional exercises in OA patients above 50 years of age, suggesting that neuromuscular training, neutral knee alignment, and muscle strength can aid in enhancing knee stability (15). A research study by Garima Gupta et al., have suggested that balance issues and severe level of knee OA has a strong impact on an individual's quality of life and perceived fear of fall, and previous falls greatly correlates with one's perceived fear of fall (16). Hee-Sang Kim et al., have observed that patients with moderate to severe OA patients suffered from poor balance control when compared to victims of mild OA, and it was deduced that pain, loss of muscle strength, and proprioception negatively impacts postural stability (17).

Earlier researches conducted worldwide have revealed that knee OA detrimentally effects ability of performing ADLs and balance in humans, but meagre data is found on Pakistani population. Therefore, this study aimed to explore balance deficits and capability of performing ADLs among victims of knee OA at tertiary healthcare centers of Peshawar.

### Material & Methods

It was a descriptive cross sectional study conducted on 95 OA patients in Tertiary healthcare hospitals of Peshawar, who were recruited via convenience sampling technique. The sample size was calculated using OpenEpi online calculator by keeping the confidence interval 95%, with the anticipated frequency taken from previous literature that was 11% (18). The duration of the study was six months. The study was approved by the ethics committee. Both male/female individuals within the age bracket of 40-70 years, diagnosed with knee osteoarthritis were included in the study. Amputees or those who required amputation, having a history of cognitive impairment, peripheral neuropathy and those who did not give consent were excluded from the study.

Following the approval of ethics committee, and seeking of permission from the tertiary healthcare hospitals (Lady Reading Hospital, Khyber Teaching Hospital & Hayatabad Medical Complex), patients were screened for the eligibility criteria and an informed consent was signed by the recruited patients. In this study, the tool for data collection used was Knee Injury and Osteoarthritis Outcome Score (KOOS). It consists of five patientrelevant dimensions, pain (9 items); symptoms (7 items); ADL function (17 items); sport and recreation function (5 items); Quality of Life (4 items), with each dimension scored separately. The recruited participants had to choose their answer from a 5-point likert scale of 0 (no issues) to 4 (very serious difficulties). The scores were then transformed into 0-100 scale with 0 being an indicative of extreme knee problems and 100 signifying no knee problems. Moreover, Romberg's test and functional reach tests too were performed. SPSS version 23 was used for the data analysis, with descriptive statistical approaches made for frequencies while a correlation test was used for Knee Injury and Osteoarthritis Score (KOOS) correlations.

### Results

The total number of participants in this study were 95, among which males and females were 62(65.3%) and 33(34.7%) respectively (Table 1), with a mean age of  $57.21\pm11.02$  years (Table 2).

	Variables	Frequency (Percentage)
Gender of the participants	Male	62(65.3%)
	Female	33(34.7%)
	Total	95(100%)

Table 1 Shows Frequency of Gender

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		Mean±SD
Age of the Participants in Years	Male	61.80±9.55
	Female	48.60±8.37
	Mean Age	57.21±11.02

#### Table 2 Shows Mean Age of Participants

Shapiro-Wilk test showed that the data were normally distributed, the mean value of Functional Reach test performed on the participants was  $6.77 \pm 3.16$ , the number of individuals with positive Romberg test was 4).

70(73.7%) while 25(26.3%) were negative for<br/>Romberg test (Table 3). Participants with a high<br/>risk of fall were 49 (51.58%), moderate risk of fall<br/>were 36 (37.9%) while those with a low risk of fall<br/>was10(10.52%)(Table

		Frequency
Romberg Test	Positive	70(73.7%)
	Negative	25(26.3%)
	Total	95(100%)

Table 3 Shows Romberg Test

		Frequency
Risk of Fall	High	49(51.58%)
	Moderate	36(37.9%)
	Low	10(10.52%)

### Table 4 Shows Frequency of Risk of Fall

The total mean score of KOOS scale was 48.47±23.18. Considering the five domains in KOOS scale, the mean score of Pain domain in KOOS scale was 14.41±8.65, Symptoms domain

was 14.9684±7.23533, ADL domain was 30.0737±16.13984, Sports domain was 13.3263±5.85361 and ADL domain was 8.6526±3.67212 (Table 5).

		KOOS Doman	Mean±SD
Knee Injury and	Osteoarthritis	Pain	14.41±8.65
Score (KOOS)		Symptoms	14.9684±7.23533
		ADL	30.0737±16.13984
		Sports	13.3263±5.85361
		QOL	8.6526±3.67212

Table 5 Shows Knee Injury and Osteoarthritis Score (KOOS) Domain's

As the age increased, the Romberg test value decreased, subsequently increasing the risk of fall (Table 6).

Variables	Age	
	r-value	p-value
Romberg Test	-0.595	0.0000
Functional Reach Test	-0.923	0.000

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KOOS Pain	0.764	0.000
KOOS Symptoms	0.730	0.000
KOOS ADL	0.794	0.000
KOOS Sports	0.680	0.000
KOOS QOL	0.747	0.000
KOOS Percentage	0.807	0.000

Table 6 Knee Injury and Osteoarthritis Score (KOOS) Correlations

### Discussion

The purpose of our study was to investigate balance issues in patients diagnosed with OA and figure-out the effects of OA on their abilities to perform ADLs. The study depicted that the prevalence of fall risk in patients was 73.7%, among which 51.58% had high risk while 37.9% had moderate risk of fall. Furthermore, study revealed that OA have detrimental impact on the patients abilities to perform their ADLs, having a mean value of 48.47±23.18.

A study conducted in 2013 by Hye Jeong Park et al., targeting female population reported that poor balance was significantly associated with older age and radiographic changes. Additionally, the findings of this study depicted that there was a greater risk of fall in OA patients, hence supporting our study's results (19). Contrary to our results, a study conducted in Germany targeting individuals above 60 years of age, portrayed that prevalence of OA was 21% with 42% balance problems. The disparity in the results could be due to differing age groups.(20)

Similar to our study's findings, a study by Noor Azuan Abu Osman et al., revealed that bilateral knee OA have a greater effect on balance and risk of fall, particularly moderate OA substantially escalates the risk of fall in individuals (21). Likewise, a systematic review has reported that there are several researches suggesting that OA is a major risk factor for falls in general population (22). Another study also revealed similar results by stating that OA is significantly associated with risk of fall, consequentially having an adverse impact on an individual's quality of life (23). In the same manner, findings of a longitudinal study by Adam L. Doré et al., in 2014 are in accordance to the current study that OA is an important risk factor for falls in human beings and risk of fall rises with

an exacerbation in severity of OA (24). Despite of focusing on a different population group i.e. those who underwent TKR, a systematic review have concluded that risk of fall is quite high in OA patients specifically those who underwent TKR. Similarity in findings could be due to same outcome measure (25).

## Conclusion

To conclude, balance problems were high among OA patients and with an increase in age the risk of fall escalated. On average male population was at a high risk of balance deficits due to OA when compared to female participants. These balance issues had detrimental effects on their capabilities to perform ADLs.

## Limitations

The total sample size of current study was 151 but due to limited generalizability and limited data sample size taken was 95. Potential selection bias, as participants may differ from the broader population, inability to establish causality due to the nature of study design i.e. it is a cross-sectional study. Reliance on self-reported measures, thus introducing subjective bias, lack of long-term follow-up to assess changes in balance problems and daily activities and inadequate consideration of the impact of medication uses on balance and daily living.

## Recommendations

Conduct larger-scale studies with diverse participant populations to enhance generalizability. Employ randomized controlled trials or longitudinal designs to establish causal relationships between balance problems and daily living activities. Incorporate objective measures, such as physical performance tests or motion



analysis, to complement self-reported measures. Implement long-term follow-up assessments to capture changes in balance problems and functional limitations over time.

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