

SHORT COMMUNICATION**Balance Among Patients after Six Months of Total Knee Arthroplasty***Aimon Aziz, Hufsa Tariq, Hafiz Muhammad Asim, Samreen Sadiq**Lahore College of Physical Therapy, Lahore Medical and Dental College, Lahore, Pakistan.***ABSTRACT**

Total knee arthroplasty (TKA) is an orthopedic surgical technique in which the knee joint surfaces, the femoral condyles and tibial plateau, are substituted with prosthetic components. TKA is found effective for improving perambulating purposes, but some other impairment such as proprioception, muscle strength, and balance may continue postoperatively. Balance is defined as an individual's ability to maintain a desired position within their base of support. The aim of the study was to assess balance among patients who underwent total knee arthroplasty post six months. A cross sectional descriptive study was conducted for a period of 6 months from August 2018 till January 2019 at Ghurki Trust and Teaching hospital and Horizon Hospital Lahore, in which 26 subjects (7 Males and 19 Females) were included according to inclusion criteria. Permission from the Ethical Committee of the Lahore College of Physical Therapy was obtained. The sampling technique used was convenient sampling. Balance of each patient was assessed with Berg Balance Scale. The Berg Balance Scale grades execution on 14 different tasks, utilizing a scale of five points ranging from 0 to 4; the isolated scores are summed, for a total score of 56 where greater scores show enhanced stability of task execution. The results of the study showed that out of the total (n = 26) patients, 19 patients had low risk of fall, 6 patients had moderate risk of fall, while only one patient had high risk of fall. The study concluded that patients, who underwent total knee arthroplasty, had low risk of fall when balance was assessed with Berg Balance Scale after six months of Total knee Arthroplasty procedure.

Keywords: Balance; Berg Balance Scale; Total Knee Arthroplasty.

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INTRODUCTION

Total knee arthroplasty (TKA) is an orthopedic surgical technique in which the knee joint surfaces, the femoral condyles and tibial plateau, are substituted with prosthetic components. It gives significant outcomes concerning physical functioning, patient's consumption and range of movement¹. Improving the activities of daily living is vital for patient satisfaction postoperatively². TKA is found effective for improving perambulating purposes, but some other impairment such as proprioception, muscle strength, and balance may continue postoperatively³. The prevalence of total knee arthroplasty in United States population was 1.52% that is higher with increased age⁴. It is usually used for amendment of deformity, moderation of pain, enhancement of physical ability, also, side effects of osteoarthritis⁵.

Proprioception of knee joint includes the sense of positioning and movement of the joint. These senses somewhat, originate from neural involvements that arise from the mechanoreceptors present in the tendons, joints, muscles and other tissues. Mechanoreceptors detect the actual positioning and motion of the joint⁶. Osteoarthritis is commonly a cause of pain and abnormal locomotion, it may lead to reduced joint sensation, pain, narrowing of joint space, inflammation, and ultimately reduced physical activity. All changes that occur due to osteoarthritis cause further loss of mechanoreceptors, hence leading to poor proprioception and loss of postural balance⁷. Osteoarthritis pathology and total knee arthroplasty seem to amend the proprioceptive sense of the knee joint⁸. If the proprioceptive inaccuracy and muscle weakness persists, there comes the risk of fall. The rate of fall has been accounted to be as higher as 7% to 40% after TKA⁵.

Balance is defined as an individual's ability to maintain a desired position within their base of support. The control of balance is mainly associated with the vestibular system, proprioception, and vision and muscle strength⁹. Balance is important for the maintenance of postural stability while carrying out different daily living activities and for fall avoidance. In older population, lack of balance stability is said to be a common cause of fall¹⁰. Risk of fall is increased mainly due to reduced balance, which results in abnormalities such as, joint fractures, soft tissue injury, loss of physical function and mortality¹¹. This loss is more frequently related to task-oriented movements e.g. walking, and it is less common during static activities or at rest e.g. sitting¹².

A better comprehension of TKA effecting balance and conceivably functional development could encourage more efficacious recovery postoperatively¹³. Improved functional performances and balance skills might be a determining element, since improved balance abilities positively affect the basic task performances¹⁴. In functional terms, the main constraints presented by patients, after TKA are normally associated with balance function¹⁵. Balance assessment after TKA is essential for evaluating the postural stability of the patient. Tools to measure balance functions after TKA should necessarily have adequate receptiveness to sense clinically significant changes and in addition evaluate the viability of interventions postoperatively³. The commonly used tool for balance assessment is Berg Balance Scale and it can be contemplated as a reference standard for balance assessment in patients after total knee arthroplasty clinically⁵.

The Berg Balance Scale was constructed in 1989 with the help of health experts' opinions, patient interviews, and functional tasks performances, which explored different methods for balance assessing¹⁶. The Berg Balance Scale grades execution on 14 different tasks, utilizing a scale of five points ranging from 0 to 4; the isolated scores are summed, for a total score of 56 where greater scores show enhanced stability of task execution¹⁷. In Berg Balance Scale, 41-56 specify low fall risk; 21-40 specify medium fall risk and 0-20 specify high-fall risk. This scale is mainly responsive for detecting change in the balance functioning of patients after TKA³.

The procedures related to the recovery of the systems controlling balance impairments that persist postoperatively may eventually help in improving the plan of rehabilitative interventions by means of scientifically justified evidence-based approaches. Rationale of this study is to assess balance in patients after TKA, for preventing the risk of falls in case of balance impairment. This will also be helpful in improving balance by incorporating balance exercises in rehabilitation program and for

ameliorating ambulation of the patient. The objective of this study is to assess balance among patients after 6 months of total knee arthroplasty.

METHODS

A cross sectional descriptive study was conducted on 26 patients who had gone Total Knee Arthroplasty, post six months. Sample size was calculated by means of World Health Organization (WHO) calculator with 1.52% prevalence (p) (4), 95% confidence interval (1-a) and 0.05 precision (d). The study settings were Ghurki Trust and Teaching Hospital and Horizon Hospital Lahore. The sampling strategy utilized was non-probability convenience sampling. The duration of study was from August 2018 to January 2019.

Patients included in the study were those who have undergone Total Knee Arthroplasty at least six months earlier, due to osteoarthritis having age 20-70 years and those who were able to follow verbal commands and were willing to participate in study. Patients excluded from the study were those who underwent any surgery of knee other than TKA, any other joint replacement surgery or reoperation of the replaced knee, any cause other than osteoarthritis, those who had neurological, cognitive or vestibular problems, those who were using drugs (e.g. antidepressants etc.) and those who denied participating in the study.

Data was collected from the patients who had undergone procedure of total knee arthroplasty, post-operative 6 months. Balance was assessed in patients who fall in the inclusion criteria by using Berg Balance Scale. It is a list of 14 tasks ranging from 0 to 4, where 0 is minimum score and 4 is maximum score. The total score is 56, where 41 to 56 score is labeled as low fall risk, 21 to 40 indicates moderate fall risk and 0-20 indicates high fall risk¹⁸. This scale has high intra-rater reliability with an estimate of 0.98 and inter-rater reliability with an estimate of 0.9719. A prior consent was taken from all participants.

Permission from the Ethical Committee of the LCPT was obtained. An information sheet that explains the nature and purpose of the study, and explains that consent was taken from every patient accompanied questionnaire. The respondents were assured that their responses would remain confidential. Data was entered and analyzed by using Statistical Package for Social Sciences (SPSS) version 23. The study variables were demonstrated in the form of descriptive statistics (tables, graphs and percentage).

RESULTS

In sample size of 26, 73.08% participants were female (n=19) while 26.92% were male (n=7). The

percentage of age group 22-45 was 7.7% (n=2) and percentage of age group 46-69 was 92.3% (n=24). The frequency of age group 46-69 was greatest (92.3%) (Table 1). The frequency of individuals with high risk of fall was 3.8% (n=1), individuals with moderate risk of fall was 23.08% (n=6) and those with low risk of fall was 73.08% (n=19). Therefore, it was concluded that frequency of individuals having low risk of fall is greater than that of moderate and high fall risks (Table 2, 3).

Table 1: Demographic data of participants.

Demographic Characteristics	Frequency	Percentage
Age	22-45 years (2)	22-45 years (7.7%)
	46-69 years (24)	46-69 years (92.3%)
Gender	Males (07)	Males (27%)
	Females (19)	Females (73%)
Total	26	100%

Table 2: Total Score of Balance Assessment.

Fall Risk	Frequency	Percentage
High Fall Risk	01	3.85%
Moderate Fall Risk	06	23.07%
Low Fall Risk	19	73.08%
Total	26	100%

Table 3: Correlation between BMI and Balance.

Fall Risk	Pearson Correlation	p-value
Underweight	0.248	0.215
Normal	0.419	0.091
Overweight	0.836	0.005
Obese	0.945	0.001

DISCUSSION

Total Knee Arthroplasty is an orthopedic surgical technique in which the diseased knee joint is changed with metallic components, providing long-term pain relief and patient satisfaction. Therefore, effect of TKA on fall incidence and other balance impairments postoperatively is of considerable interest. Berg balance scale is measuring tool used to assess balance, in which risk of fall is scored as high, moderate and low risk of fall. The study found that maximum participants have low risk of fall, when assessed after 6 months in individuals with TKA.

When balance was assessed in a study, in individuals with TKA using berg balance scale after 6

months of study, the results showed that slightly more than half of the individuals attained maximum score that means they had mild risk of fall. Whereas my study also showed that maximum, individuals have low-fall risk after 6 months of TKA. The individuals that were involved in their study were elderly but, in current study, young patients were also included⁵.

Another study was conducted to investigate the extent to which balance is improved after TKA. They assessed balance in sample size of 82 participants, whereas sample size of this study was 26. They concluded that functional balance, mobility, quality of life and dynamic balance are significantly improved postoperatively¹³. According to present study, TKA reduced the risk of fall in the participants.

A study was carried out to inspect the consequence of TKA on incidence of functions related to balance. They observed balance impairments in a larger population (n=516) in a period of 16 months, on the other hand, in my study sample size was small (n=26) due to lack of time i.e. 6 months. They concluded that TKA is associated with reduced risk of falls. The results were consistent with the findings of current study regarding reduced balance impairments after TKA¹⁰.

Another study was conducted to assess proprioception postoperatively to compare uni-compartmental (UKA) to total (TKA) knee arthroplasty. Out of total thirty-four participants, seventeen participants underwent UKA and seventeen participants underwent TKA. They concluded that TKA result in a remarkable enhancement in proprioception, whereas my study also concluded that total knee arthroplasty results in reduced fall risks²⁰. One of the striking features of current study is the addition of Body Mass Index (BMI) in terms of balance assessment. Previous researches have focused on the risk of balance while ignoring the concept of height to weight ratio. Thus, present study would allow the practitioners to keep in consideration the aspect of anthropometric characteristics of the patient.

It is recommended to conduct further studies in relatively longer time span and with greater sample size. Studies should be conducted for assessing balance before and after TKA. Future studies should aim at population in which TKA is done due to causes other than OA (e.g. rheumatoid arthritis).

CONCLUSION

It was concluded that in patients with TKA, there is low risk of fall post six months. Therefore, after TKA, balance is improved and patients become independent in their daily life activities.

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CONFLICT OF INTEREST

There was no conflict of interest among the authors.

ETHICS APPROVAL

The study approval was sort from the Lahore College of Physical Therapy Committee.

PATIENTS CONSENT

Verbal and written informed consent was obtained from all patients.

AUTHORS' CONTRIBUTIONS

AA gave the idea, collected data and she wrote the entire article. HT refined the idea, formulated title and paraphrased the whole article, as she was the supervisor so she was the main helper in the whole process. SS analyzed the data, helped in results and table formulation. HMA gave instructional ideas and guidance throughout the research process.

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