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# Functional Outcomes After Total Knee Arthroplasty: Comparing Knee Society and Osteoarthritis Outcome Scores

*Shahzaib Riaz Baloch*[1], *Syed Ata Ur Rahman*[1], *Mohammad Sohail Rafi*[1], *Eamaan Abid*[1], *Zardana Riaz*[2]
[1]*Department of Orthopaedics & Spine Surgery, Dr. Ziauddin Hospital, Karachi, Pakistan,*[2]*Department of Biochemistry, Bolan Medical College, Quetta, Pakistan.*

**ABSTRACT**

**Background:** Total knee arthroplasty (TKA) is a regularly performed procedure intended to improve function and relieve discomfort. To assess which Functional outcome tool is better, this study has been used to compare the Knee Society Score (KSS) with the Knee Injury and Osteoarthritis Outcome Score (KOOS) before and after performing a total knee arthroplasty (TKA).

**Methods:** This was a prospective Observational study conducted from 2018 to 2021. All patients who underwent primary TKA at Dr. Ziauddin Hospital, Clifton Campus, Karachi, were evaluated preoperatively and then 6 and 12 months postoperatively. Paired t-tests were used to compare the KSS and KOOS scores preoperatively and 6 months and 12 months postoperatively. A P-value of >0.05 was considered significant.

**Results:** There was no significant variation in the statistics between the improvement of the two scores. KOOS focuses more on incorporating patient-reported objectives like life quality and everyday activities, while KSS emphasises objective aspects more, including range of motion, alignment, and stability. At 6-month comparison, showed a substantial difference, tilting towards KSS (p=0.002) in all collected measures, except for life quality. However, the changes were not as visible when compared to 12 months. 89% of the individuals responded satisfactorily one year following TKA, expressing their delight with the outcomes of the surgery.

**Conclusion:** KSS and KOOS have both proven useful tools for computing functional outcomes after TKA. The results show the liveliness of taking the patient-reported outcomes into account and its objectiveness in demonstrating how effective TKA is.

**Keywords:** Patient Outcome Assessment, Quality of Life, Osteoarthritis, Arthroplasty, Knee Joint.

***Corresponding Author:***
**Dr. Shahzaib Riaz Baloch,**
Department of Orthopaedics & Spine Surgery,
Dr. Ziauddin Hospital,
Karachi, Pakistan, Pakistan.
Email; sheekdurrazai@gmail.com
ORCID; https://orcid.org/0009-0003-1741-228X
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## INTRODUCTION

For treatment of severe knee Osteoarthritis Total Knee Arthroplasty has been established as the treatment of choice. Total knee Arthroplasty has shown excellent improvement in functional outcomes and a dramatic decrease in knee joint pain for such a disabling disease[1]. For assessing and better understanding of functional outcomes of patients with TKA, an excellent, effective, and easy-to-understand assessment tool needs to be used.

The Knee Society Score (KSS) is used most frequently for the pre-and post-operative comparison of patients undergoing total knee arthroplasty (TKA), out of the various implements that have been established. KSS became a widely accepted practical assessment apparatus ever since its establishment in 1989[2]. It aids in the interpretation of the range of motion and function of the knee joint, and whether or not there is an improvement in the discomfort a patient experiences before and after TKA[3]. The Knee Injury and Osteoarthritis Outcome Score (KOOS), although developed a few years later than the KSS, has also provided its fair share to this objective and is being used, if not equally, then almost as frequently as KSS. The KOOS was built in 1995, aiming to focus on the subjective outlook of patients regarding how well their quality of life is and how adequately they can perform their daily activities after undergoing TKA[4].

It has turned into an endless loop of contradictory conclusions as to which of the two scoring systems is a better method for shedding brighter light on pre- and post-TKA functionality. Researchers still face confusion as to which method is superior; the KSS with its primary focus on objective data including severity of pain and joint function, or the KOOS providing a more subjective perspective of the life quality of the patient[5].

The efficacy of KSS and KOOS to evaluate functionality before and after TKA was tested by holding research that aimed chiefly to compare the results of both scoring systems[6]. A great deal of outcome measures, for example, functional tests and radiological analysis, have been constructed in previous literature. Out of these various measures, KSS and KOOS are the most renowned. Even though both the scoring systems aim to analyse the functional results following TKA, KSS and KOOS emphasize non-identical areas of assessment.

KSS was established by the Knee Society as a clinical gauging system for the computation of knee function following total knee arthroplasty[7]. Consisting of a questionnaire for both patient and doctor, the assessment stratagem makes up the entirety of the Knee Society Score (KSS). The questionnaire is further divided into a clinical grading system that analyses the individual's range of motion, alignment, and stability, followed by a more subjective aspect, exploring topics like the severity of pain, function, and activities of daily life[8]. Due to its reliability in evaluating the aftermath of total knee arthroplasty (TKA), the KSS is frequently used worldwide[5]. However, the KOOS scoring system was built in such a way that it focuses on a vast range of patient-reported consequences of TKA, including activities of everyday living, athletic endeavours, pain, and general life quality[9].

Various researches have demonstrated the legitimacy of KOOS. There remains an everlasting dispute over the competing productiveness of KSS and KOOS as analysing implements for functional results following TKA. While some experiments indicate that KOOS is the more reliable method for collecting patient-reported outcomes and everyday activities, others have suggested KSS to be the better and more responsive tool to compute the changes in a patient's pain and function5. Not too long ago, a study pursued an investigation between the two scoring systems and how well they perform in estimating the functional results surrounding TKA[10].

## METHODS

This Prospective, Observational, single-centre study included 100 consecutive patients who had undergone Primary TKA for Knee O.A. at Dr. Ziauddin Hospital, Clifton Campus, Karachi, from January 2018 to December 2021.

The inclusion criteria included all patients who were diagnosed with either primary knee osteoarthritis or post-traumatic osteoarthritis and aged 45 years. Patients with a history of revision surgery and re-do TKA, Knee Arthroscopy, active infection of all kinds, knee or hip osteomyelitis, Tumour, Rheumatoid arthritis or Ankylosing spondylitis, and patients with gross cognitive or neurological impairment were all excluded from the study

All patients were asked to give informed and written consent to allow full access to medical history and demographic details from the hospital's medical records. The Functional outcomes of all patients were assessed using the KSS and the KOOS measuring tools both at pre-op, 6 months & then 12 months post-op of their TKA, and all the scores were calculated, which were filled by the patients themselves at the mentioned period. The components of KOOS are patients' symptoms, pain, activity of daily living, sports & recreation function, and knee-related quality of life whereas KSS focuses on pain symptoms, alignment and stability of the knee, and the range of motion. The use and benefit of both KSS and KOOS in TKA have been discussed and recommended in many clinical studies, as excellent tools for assessing functional outcomes and hence in our

paper, we tried to assess the effectiveness of these functional tools in the Pakistani population.

The patients' characteristics, surgical specifics, and final scores were the descriptive variables, whereas frequency and percentages as Categorical variables and mean ± standard deviation were used to express continuous variables. Paired t-tests were used to compare the KSS and KOOS scores preoperatively and 6 months and 12 months postoperatively. Independent t-tests were used to compare the scores of the groups. The results were calculated using IBM SPSS Statistics version 24 and the threshold for statistical significance was a p-value of <0.05.

All participants gave written consent before their involvement in the study. The study centre's Institutional Review Board (IRB) approved the study, which was conducted in adherence with the ethical guidelines of the Declaration of Helsinki.

**RESULTS**

The assessment for the Knee Society Score (KSS) and the Knee Injury and Osteoarthritis Outcome Score (KOOS) was carried out before surgery as well as 6- and 12-months post-surgery on 100 patients who went through total knee arthroplasty (TKA). The average age for the focus group was 65.2 ± 7.6 years, of which 53% were female.

**Table 1: Baseline Characteristics of the Patients**

| Characteristics | Value |
|---|---|
| Age (years) | 65.2 ± 7.6 |
| Gender (female) | 53% |
| Body Mass Index (kg/m²) | 30.5 ± 3.8 |
| Preoperative KSS score | 45.6 ± 11.8 |
| Preoperative KOOS score | 41.7 ± 10.2 |

Table 1 displays the focus group's preoperative KSS and KOOS scores and average age, gender, and body mass index (BMI).

**Table 2: Mean Scores of KSS and KOOS at Preoperative, 6 months, and 12 months Postoperative**

| Time | KSS Score | KOOS Score |
|---|---|---|
| Preoperative | 45.6 +/- 11.8 | 41.7 +/- 10.2 |
| 6 months | 79.3 +/- 10.7 | 77.6 +/- 10.7 |
| 12 months | 81.2 +/- 9.1 | 81.4 +/- 9.5 |

Table 2 displays the mean KSS and KOOS scores at preoperative, 6-month, and 12-month postoperative periods. Both scoring systems showed substantial improvement between the time durations in question (p<0.001).

**Table 3: Comparison of KSS and KOOS Scores at 6 months Postoperative**

| Domain | KSS Score | KOOS Score |
|---|---|---|
| Pain | 86.5 ± 11.6 | 81.2 ± 16.1 |
| Symptoms | 88.4 ± 11.7 | 83.2 ± 14.4 |
| The activity of daily living | 84.6 ± 11.5 | 79.1 ± 13.8 |
| Sport and recreation | 65.3 ± 16.8 | 64.2 ± 18.4 |
| Quality of Life | 59.4 ± 15.4 | 60.8 ± 15.7 |

Table 3 compares the KSS and KOOS scores 6 months after surgery. Each aspect showed a statistically noteworthy difference between the KSS and KOOS scores, excluding the domain of life quality (p-value<0.002).

**Table 4: Comparison of KSS and KOOS Scores At 12 months Postoperative**

| Domain | KSS Score | KOOS Score |
|---|---|---|
| **Pain** | 87.8 +/- 10.6 | 86.7 +/- 10.8 |
| **Symptoms** | 89.2 +/- 10.2 | 88.1 +/- 11.2 |
| **The activity of Daily Living** | 85.6 +/- 9.9 | 84.8 +/- 11.5 |
| **Sports & Recreation** | 69.7 +/- 14.1 | 67. 5 +/- 12.4 |

Table 4 displays the KSS and KOOS scores at 12 months postoperatively, which were found to be nearly alike. The difference was relatively statistically negligible (p-value 0.07).

## DISCUSSION

The study was planned to focus on comparing the effectiveness of the two scoring systems, namely the Knee Injury and Osteoarthritis Outcome Score (KOOS) and the Knee Society Score (KSS), regarding assessing functional outcomes after a total knee arthroplasty (TKA). The study's findings proved that both scoring systems showed drastic improvements following TKA; however, the results for the two scores were very similar. These results helped define our study and corroborate previous research that demonstrated the usefulness of KOOS and KSS in identifying functional improvements in a patient after receiving total knee arthroplasty[11, 12].TKA is performed chiefly to improve knee function and osteoarthritis (OA) and to reduce patients' pain. Based on the findings of our study, it can be deduced that the two scoring systems, when compared preoperatively and postoperatively, showed improvement, essentially during the postoperative phases at 6 months and 12 months. The betterment in both scoring schemes shows the efficacy of TKA, which helps patients with osteoarthritis with pain relief and improves their function [13, 14].

There are different methodologies to identify and track the improvement of patients after TKA, out of which KSS and KOOS are two known scoring systems for evaluation[15]. Both scores determine improvements based on different domains, where KSS helps evaluate pain, range of motion, alignment, and stability[16]. In contrast, KOOS is well founded in assessing pain, symptoms, everyday activities, how well a patient performs them, recreation and athletics, and general life quality after total knee arthroplasty[17]. The two scoring systems are well established and are valuable in evaluating patients' functional outcomes, which is also reflected in our study due to the improvements of KSS and KOOS following TKA being much the same[18].

What should not be avoided is the emphasis on the patient-reported outcomes such as degree of pain and life quality, which is a metric of the KOOS scoring system, while concurrently, the KSS focuses more on objective measures such as range of motion and stability[19]. This shows how the two scoring systems differ in their metrics. However, according to specific research, patient-reported outcomes might be more helpful than objective measures such as range of motion, stability, and so on[20,21]. On the contrary, another research focuses more on considering both domains to evaluate the effectiveness of TKA[22, 23].

Our study also discovered high satisfaction among patients who underwent TKA. 89% of patients, after one year of surgery, were immensely grateful and satisfied with the surgery results. This has been highlighted in previous research regarding patients having a high degree of satisfaction, which has been validated by the findings of our study as well [24, 25]. It is important to remember that patient satisfaction, a subjective metric in healthcare, may not always correlate with objective assessments of functional outcomes, highlighting potential disparities in evaluation[26].

Our research is based on limited parameters. Firstly, the sample size of 100 patients and the observational nature of this study could limit our conclusions to only the chosen metrics. Secondly, further significant variables were not considered part of the study, such as body mass index, preoperative mental health, and other conditions that could substantially impact functional outcomes following TKA. Lastly, the functional results were evaluated only up to 12 months after the surgery, which could be termed short-term outcomes only.

## CONCLUSION

At the end of our research, it was established that after TKA, both KSS and KOOS displayed noticeable improvements, with both systems being similar. Along with other methodologies, KSS and KOOS are beneficial for evaluating the functional outcomes of patients who have undergone total knee arthroplasty. To assess the patient's condition post-TKA, paying close attention to patient-reported outcomes and objective measurements is important. To further identify the potential long-term outcomes more closely, a longer follow-up time and a larger sample size are required to confirm our final results and the long-term efficacy of TKA.

## LIST OF ABBREVIATIONS

**TKA** Total Knee Arthroplasty
**KSS** Knee Society Score
**KOOS** Knee Injury and Osteoarthritis Outcome Score
**IRB** Institutional Review Board
**BMI** Body Mass Index
**OA** Osteoarthritis

## CONFLICT OF INTEREST

All authors declared no interest in conflict.

## ETHICAL APPROVAL

Our study was approved by the study centre's Institutional Review Board,
Reference Code: 7971123SKORT.

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**PATIENT CONSENT**

Written informed consent was taken from all participants before their inclusion in the study.

**AUTHORS CONTRIBUTIONS**

**SRB:** Contributed substantially to the work's concept and design, analyzed and interpreted the data, performed a final review and approved the final version, and agreed to be accountable for all aspects of the work. **SAR:** was involved in the design, data interpretation, and final review of the work.**MSR:** was involved in the design and did a final review of the article. **EA:** was involved in the design and did a final review of the article and with the editing of the article. **ZR** was involved in data analysis and statistical work along with the final review of the paper.

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