

**Research Article****A Clinical Evaluation of Functional Outcomes After Total Knee Replacement in Elderly Patients****Dr. Solanki Animesh Mahendrakumar<sup>1</sup>, Dr. Rajan Kumar<sup>2</sup>**<sup>1</sup>Assistant Professor, Department of Orthopaedics, Kamineni Institute of Medical Sciences, Nalgonda, Andhra Pradesh, India<sup>2</sup>Assistant Professor, Department of Orthopaedics, Kamineni Institute of Medical Sciences, Nalgonda, Andhra Pradesh, India

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**ABSTRACT**

**Background:** Total knee replacement (TKR) is a proven surgical procedure to address advanced knee osteoarthritis, a degenerative disorder that severely affects mobility and quality of life in elderly patients. As life expectancy increases, the burden of knee osteoarthritis has increased, and the effective treatment strategies are needed to restore the functional capacity and relieve the pain.

**Aim:** To clinically evaluate the functional outcomes following total knee replacement in elderly patients.

**Methodology:** The study was a prospective observational study, which was carried out in the Department of Orthopaedics, Kamineni Institute of Medical Sciences, Nalgonda, Andhra Pradesh, India, in one year. One hundred and sixty patients who had primary total knee replacement aged 60 years and above were included. The demographic data, preoperative and postoperative functional status, range of motion (ROM), and pain scores were gathered. The Knee Society Score (KSS), ROM measurements, and Visual Analog Scale (VAS) were used to evaluate functional outcomes. Descriptive statistics and paired t-tests were used to carry out the statistical analysis.

**Results:** Most of the sample consisted of 60-70 years (52.5) old and had a female majority (62.5). Preoperatively, most patients had poor KSS (68.8%), restricted ROM (<90° in 65.6%), and severe pain (75.0%). After surgery, there were great KSS results in 78.1% of the patients, 75.0% of whom had ROM ≥110 and 81.3% of whom complained of mild pain. There was substantial change in functional parameters with 93.8% of these parameters improving in KSS, 87.5% improving in ROM and 93.8% reporting pain relief.

**Conclusion:** Total knee replacement is a most effective surgery procedure that is applicable to very old patients with severe knee osteoarthritis that brings about great improvement in pain relief, joint functioning and mobility. The procedure is highly successful and helps significantly in improving the quality of life and functional independence.

**Keywords:** Total knee replacement, Elderly patients, Knee osteoarthritis, Functional outcome, Knee Society Score, Range of motion, Pain assessment.

**1. Introduction**

TKR is one of the most effective surgical procedures that can be used to treat severe knee osteoarthritis, a chronic degenerative joint disease that is associated with a gradual loss of cartilage, pain, stiffness, and limitation of

function [1]. Knee osteoarthritis is especially common in the older population and is a significant cause of disability in the world. Not only does the condition compromise physical mobility, but it also has a huge impact on the

psychological and social welfare of the affected people, therefore, decreasing their quality of life. As the life expectancy in the world has been on the rise, the knee osteoarthritis burden has consequently increased significantly, thus becoming a significant issue of public health concern [2].

Conservative treatment (pharmacological therapy, physiotherapy, a change in lifestyle) was historically a key aspect of managing knee osteoarthritis [3]. Nevertheless, these strategies usually reduce the symptoms in progressive disease. In recent decades, total knee replacement has become the gold standard therapy to treat end-stage osteoarthritis to provide significant pain relief and recovery of joint function. The success rate and the life span of the prosthetic joints have remarkably increased due to development of the surgical methods, implantation materials and perioperative care, thus TKR is a viable choice even in aged patients [4].

Functional outcome assessment after TKR has become more and more significant in recent years [5]. Objective measures of postoperative recovery and patient satisfaction are commonly measured using standardized assessment tools, like the Knee Society Score (KSS), range of motion (ROM), and pain scales, including the Visual Analog Scale (VAS) [6]. They can be used to evaluate the progression of the joint functions, mobility and pain relief, allowing clinicians to have a complete picture of surgical effectiveness. Both objective clinical measurements and patient-reported results have improved the validity of functional assessment [7].

Knee osteoarthritis is a non-specific disease influenced by age, gender, genetic tendencies, obesity, and comorbidities like hypertension and diabetes mellitus [8]. According to epidemiological studies, women are more likely to have knee osteoarthritis and prevalence of the same rises dramatically after the age of 60 years. The increasing number of elderly people in India has led to the increased demand in joint replacement surgeries which has become a

burden on the healthcare systems in India. Lifestyle, healthcare access, and disease awareness regional differences also contribute to prevalence and management outcomes of osteoarthritis [9].

Knee osteoarthritis has significant socioeconomic impacts in addition to its clinical implications. Long-term treatment and disability can result in low productivity and increased dependency among patients and raise their healthcare spending [10]. The social isolation, depression, and the reduced engagement in everyday activities may occur due to chronic pain and limited mobility. The economic cost encompasses the direct cost (surgical cost and cost of rehabilitation) and an indirect cost (cost in the form of lost work and care giving requirements) [11].

Not only does total knee replacement help in correcting the structural damage in the joint, but also in enhancing the quality of life of elderly patients [12]. The achievement of successful results hinges on a variety of factors, such as patient selection, the surgical technique, design of the implants, and postoperative rehabilitation. Although it is commonly used, it is mandatory to continuously measure functional outcome, especially among older populations, which can come with several comorbidities and differing degrees of physical frailty [13].

The current research seeks to undertake a clinical assessment of functional outcomes after total knee replacement among the elderly [14]. Through the stepwise examination of preoperative and postoperative clinical parameters, the study is aimed at determining the patterns of recovery, as well as determining the effectiveness of TKR in pain, mobility, and functional independence. It is anticipated that the findings will be put into evidence-based clinical practice and aid in achieving optimal management strategies in elderly patients receiving total knee replacement [15].

## 2. Methodology

### 2.1 Study Design

This was a prospective observational research that sought to assess the functional outcomes of

total knee replacement (TKR) in older individuals. The research was aimed at gathering and examining clinical data pre- and post-surgery to determine the improvement of pain, joint functioning, and mobility. Prospective design was chosen to enable the systematic follow-up of the patients over a specific time frame and to gain a holistic overview of the functional recovery of the elderly during the postoperative period in patients who underwent TKR.

## 2.2 Study Area

The research was done at the Department of orthopaedics, Kamineni Institute of medical sciences, Nalgonda, Andhra Pradesh, India.

## 2.3 Study Duration

This was carried out in a period of one year.

## 2.4 Study Participants

### ➤ Inclusion Criteria

- Inclusion criteria: Patients at the study center aged 60 years and older who had total knee replacement.
- Knee primary osteoarthritis patients.
- Complete clinical, radiological and follow-up data.
- Informed consent to participate in the study was obtained by patients.

### ➤ Exclusion Criteria

- Individuals who are having a revision total knee replacement.
- Patients with inflammatory arthritis including the rheumatoid arthritis.
- Severely systemically ill patients who should not have surgery.
- Patients who had incomplete medical records or lost to follow-up.

## 2.5 Sample Size

The study involved a total of 160 patients who met the inclusion criteria. The sample was chosen to have sufficient representation of the various age groups and clinical conditions of the

elderly population undergoing total knee replacement.

## 2.6 Procedure

Preoperative assessment of patients included a thorough clinical examination, radiographic examination, and functional scores measured by the use of Knee Society Score (KSS). The patients all had a standard total knee replacement with a similar surgical procedure under aseptic conditions. The postoperative care involved standardized rehabilitate guidelines based on early mobilization and physiotherapy. Regular 6-week, 3-month, and 6-month follow-up assessments were done. Validated parameters such as Knee Society Score (KSS), range of motion (ROM), and pain as measured by the Visual Analog Scale (VAS) were used to measure functional outcomes. A structured proforma was used to record data to achieve consistency and accuracy. Patient data were kept confidential, and the ethical clearance was received in the Institutional Ethics Committee of the hospital.

## 2.7 Statistical Analysis

The statistical analysis of the obtained data was done in SPSS version 27.0 (IBM, USA). Continuous and categorical variables were analyzed using descriptive statistics, such as mean, standard deviation, frequency and percentage, respectively. Paired t-tests were used to compare the preoperative and postoperative results. Chi-square tests were used to determine associations between demographic and clinical variables. The p-value of less than 0.05 was found to be statistically significant.

## 3. Result

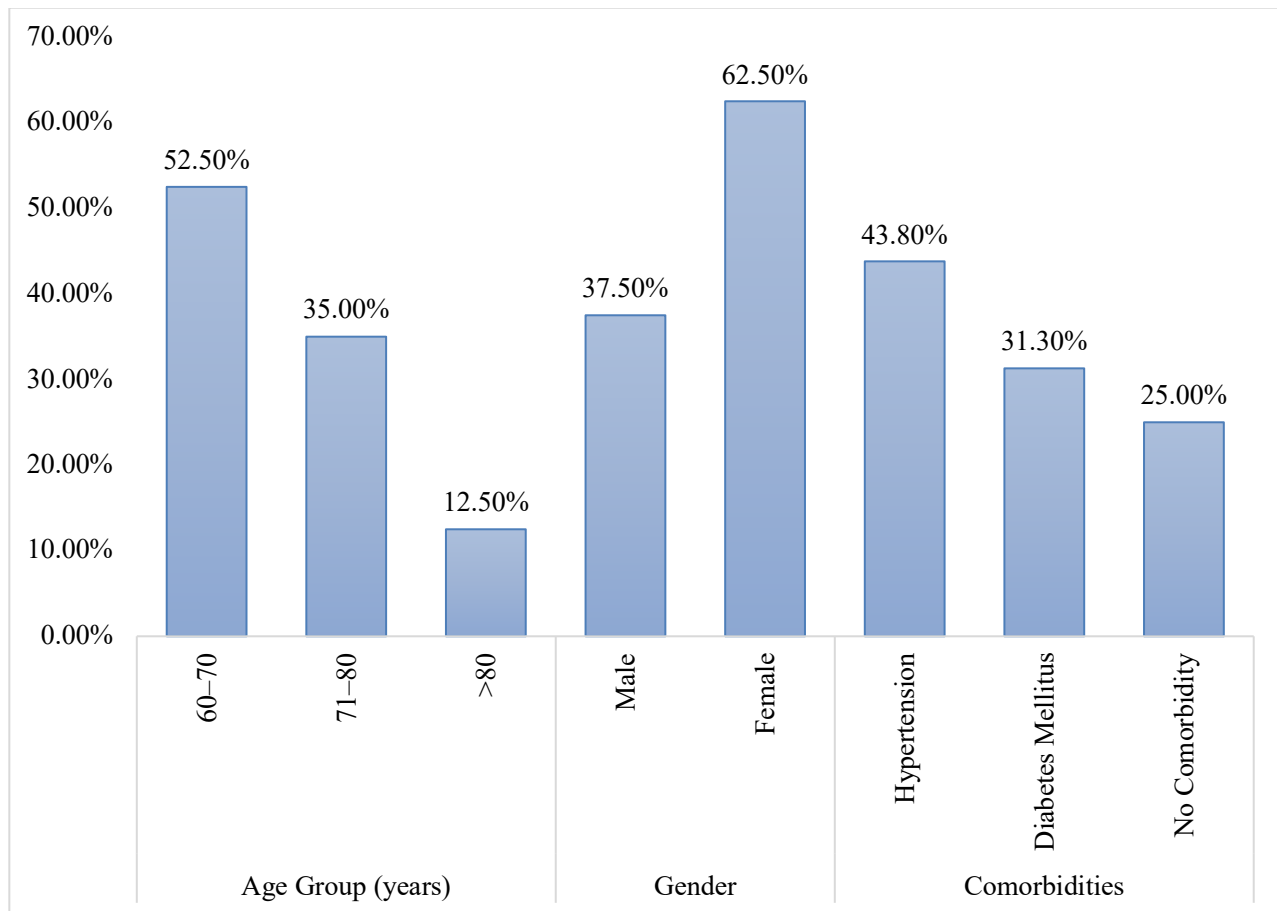
Table 1 summarizes the demographic features of the 160 elderly individuals that were used in the study. The age distribution showed that most participants were between the age of 60 and 70 years (84, 52.5) then 71 to 80 years (56, 35.0) and 80 years (20, 12.5). With gender, the proportion of females in the study population was higher (100, 62.5) than males (60, 37.5). In terms of comorbidities, the most common one was hypertension, with 70 patients (43.8%), and

diabetes mellitus was noted in 50 patients (31.3%), and 40 patients (25.0) had no comorbidity. These distributions can be visualized in Figure 1, demonstrating that

patients that are younger and thus of the older generation, female participants, and the occurrence of common chronic conditions are prevalent.

**Table 1:** Demographic Characteristics of Study Participants

| Parameter         | Category          | Frequency (n) | Percentage (%) |
|-------------------|-------------------|---------------|----------------|
| Age Group (years) | 60–70             | 84            | 52.5%          |
|                   | 71–80             | 56            | 35.0%          |
|                   | >80               | 20            | 12.5%          |
| Gender            | Male              | 60            | 37.5%          |
|                   | Female            | 100           | 62.5%          |
| Comorbidities     | Hypertension      | 70            | 43.8%          |
|                   | Diabetes Mellitus | 50            | 31.3%          |
|                   | No Comorbidity    | 40            | 25.0%          |



**Figure 1:** Visual Representation of Demographic Characteristics of Study Participants

The results indicate that total knee replacement is more frequently practiced in the patients who belong to the early age category (6070 years), which may be explained by the higher disease burden and surgical candidacy of the age group. The increased percentage of female patients is a

suggestion of increased prevalence or severity of knee osteoarthritis in women, which could be explained by hormonal, anatomical, and lifestyle factors. The high comorbidity rates, especially hypertension and diabetes mellitus, indicate the common health conditions of older people who

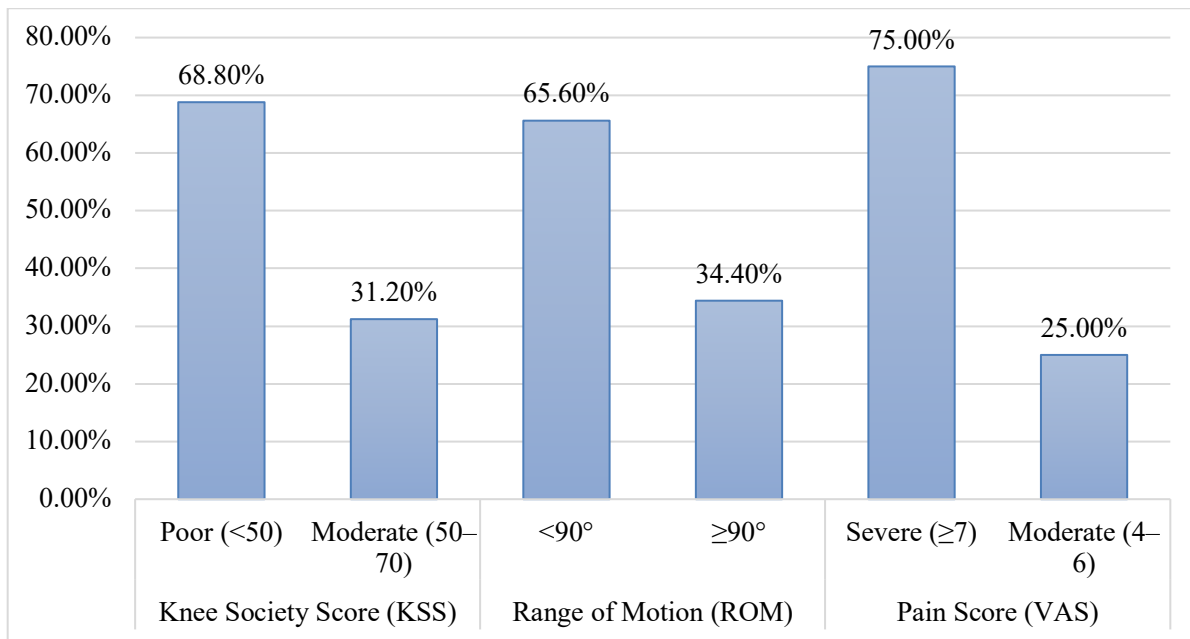
have undergone TKR and the need to perform thorough preoperative assessment and perioperative care. In general, the population trend justifies the applicability of TKR as a significant intervention in enhancing the quality of life among older patients with various factors related to health.

Table 2 provides a preoperative clinical condition of the 160 group of elderly patients undergoing total knee replacement. The means of the Knee Society Score (KSS) indicates that most patients were in poor functional status with 110 patients (68.8) scoring below 50, and 50 patients (31.2) scoring between 50 and 70.

Evaluation of Range of Motion (ROM) shows that 105 patients (65.6%) experienced limited movement of the knees (less than 90 degrees), and 55 patients (34.4%), enjoyed comparatively better movement (greater than 90 degrees). Pain assessment based on the Visual Analog Scale (VAS) indicated that 120 patients (75.0%) had severe pain ( $\geq 7$ ) and 40 patients (25.0) had moderate pain (4-6). These findings are presented in a visual form in figure 2 that clearly shows a high prevalence of poor functional status, limited mobility, and high levels of pain among the study participants before surgery.

**Table 2: Preoperative Clinical Status Distribution**

| Parameter                       | Category            | Frequency (n) | Percentage (%) |
|---------------------------------|---------------------|---------------|----------------|
| <b>Knee Society Score (KSS)</b> | Poor (<50)          | 110           | 68.8%          |
|                                 | Moderate (50–70)    | 50            | 31.2%          |
| <b>Range of Motion (ROM)</b>    | <90°                | 105           | 65.6%          |
|                                 | $\geq 90^\circ$     | 55            | 34.4%          |
| <b>Pain Score (VAS)</b>         | Severe ( $\geq 7$ ) | 120           | 75.0%          |
|                                 | Moderate (4–6)      | 40            | 25.0%          |



**Figure 2: Visual Representation of Preoperative Clinical Status Distribution**

The preoperative data reveal that majority of the patients referred with the advanced functional impairment and high burden of symptoms prior to having undergone total knee replacement. The large percentage of patients with low Knee Society Scores indicates that there is a high level

of disability and low level of joint functionality, which supports the necessity of surgery. Likewise, most patients with limited range of motion (below 90 o ) indicates severe joint rigidity and mobility impairment, which probably impacts the daily activities and

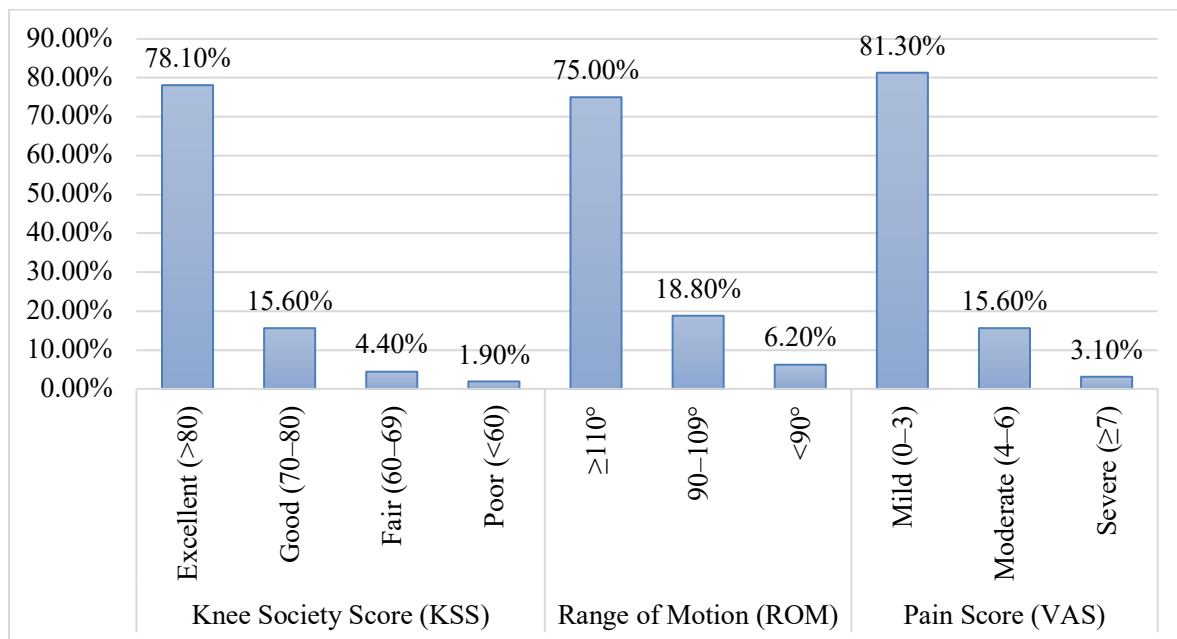
independence. The presence of severe pain is an additional sign of clinical severity of osteoarthritis in this population and is a key indicator of the need to perform surgery. Altogether, these results underline that total knee replacement was done on patients with significant functional deficits and pain, which could serve as a good baseline to assess postoperative improvement.

Table 3 shows the distribution of postoperative clinical outcomes of the 160 elderly patients after total knee replacement. Knee Society Score (KSS) demonstrates that most of the patients had excellent results (>80) in 125 cases (78.1%), and good results (70-80) in 25 patients (15.6%). The

percentage of smaller proportions showed fair (7, 4.4) and poor outcomes (3, 1.9). Assessment of Range of Motion (ROM) indicates that 120 patients (75.0%) achieved a ROM of  $\geq 110^\circ$ , while 30 patients (18.8%) had ROM between  $90-109^\circ$ , and only 10 patients (6.2%) had ROM  $< 90^\circ$ . Pain assessment with the Visual Analog Scale (VAS) indicated that 130 patients (81.3%), 25 patients (15.6%), and 5 patients (3.1) reported mild pain (0-3), moderate pain (4-6), and severe pain (7). Figure 3 depicts visually the distribution of these postoperative outcomes, with significant improvement in the level of function, mobility, and pain.

**Table 3: Postoperative Clinical Outcome Distribution**

| Parameter                       | Category            | Frequency (n) | Percentage (%) |
|---------------------------------|---------------------|---------------|----------------|
| <b>Knee Society Score (KSS)</b> | Excellent (>80)     | 125           | 78.1%          |
|                                 | Good (70-80)        | 25            | 15.6%          |
|                                 | Fair (60-69)        | 7             | 4.4%           |
|                                 | Poor (<60)          | 3             | 1.9%           |
| <b>Range of Motion (ROM)</b>    | $\geq 110^\circ$    | 120           | 75.0%          |
|                                 | $90-109^\circ$      | 30            | 18.8%          |
|                                 | $< 90^\circ$        | 10            | 6.2%           |
| <b>Pain Score (VAS)</b>         | Mild (0-3)          | 130           | 81.3%          |
|                                 | Moderate (4-6)      | 25            | 15.6%          |
|                                 | Severe ( $\geq 7$ ) | 5             | 3.1%           |



**Figure 3: Visual Representation of Postoperative Clinical Outcome Distribution**

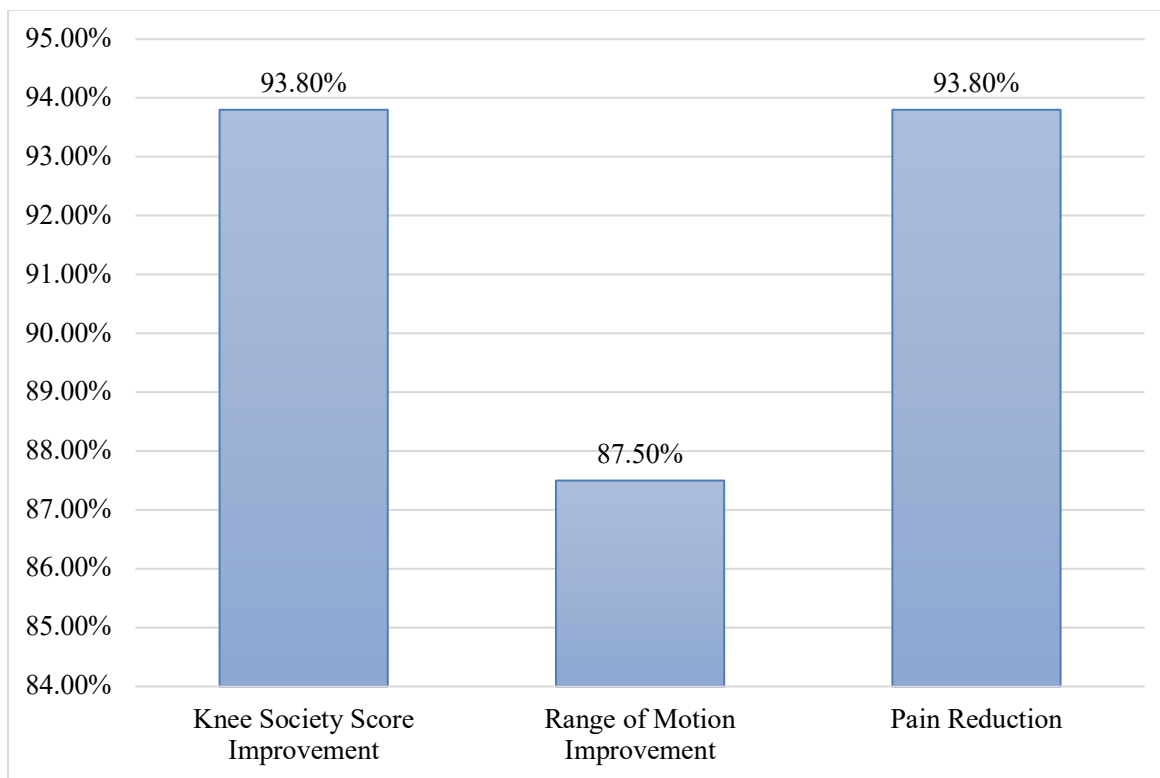
The findings of the post operation reveal that there was a great enhancement in the functional status, joint mobility and pain relief after total knee replacement. A high percentage of patients who attained excellent Knee Society Scores indicates successful restoration of knee functioning and satisfaction of the patient. The significant increase in the range of motion, as most patients reached  $\geq 110^\circ$ , indicates the successful surgical intervention with the help of the proper rehabilitation. Moreover, the significant lowering of the pain scale with most of them reporting mild pain, supports the effectiveness of TKR in mitigating chronic knee pain. The low percentage of patients who had a poor outcome or experienced severe pain means that the procedure was very successful. In general, these findings support the idea that total knee replacement can be considered a highly

effective treatment option in enhancing the quality of life and functional outcomes in geriatric patients.

Table 4 shows the functional parameters improvement of the 160 elderly patients after total knee replacement. Knee Society Score (KSS) showed improvement in 150 patients (93.8%) showing a significant improvement in the overall knee functionality. Likewise, Range of Motion (ROM) was also improved in 140 patients (87.5%), indicating increased joint mobility and flexibility post-surgical. Significant relief of preoperative pain was shown by the fact that pain, measured by a Visual Analog Scale (VAS), decreased in 150 patients (93.8%). These improvements are visualized in Figure 4 where high percentages of patients who benefited are evident in all of the measured functional parameters.

**Table 4:** Improvement in Functional Parameters

| Parameter                      | Improved (n) | Percentage (%) |
|--------------------------------|--------------|----------------|
| Knee Society Score Improvement | 150          | 93.8%          |
| Range of Motion Improvement    | 140          | 87.5%          |
| Pain Reduction                 | 150          | 93.8%          |



**Figure 4:** Visual Representation of Improvement in Functional Parameters

The results suggest that total knee replacement results into significant and consistent functional outcomes in the elderly patients. The fact that a high percentage of patients have improved in terms of Knee society score is an indication of the effectiveness of the procedure in terms of restoring the functions of the joint and improving the performance of daily activities. The significant increase in range of motion indicates that there was successful surgical intervention and effective postoperative rehabilitation that enables the patients to be reinstated to mobility and independence. Moreover, the fact that TKR has been found to reduce pain in most patients significantly proves that TKR is very effective in relieving chronic knee pain, which is related to osteoarthritis. All in all, these findings have a strong rationale in favor of the use of total knee replacement as an effective and useful treatment modality to enhance the quality of life and functional capacity of the elderly.

#### 4. Discussion

The current paper assessed the functional outcomes after total knee replacement (TKR) in older individuals and showed that all parameters measured improved significantly after the surgery (Chung et al., 2007) [16]. The demographic information showed that most of the patients are between 60 -70 years with a preponderance of females as per the current epidemiological data showing that incidence of knee osteoarthritis is higher in women and that the incidence increases with age. The comorbidity with hypertension and diabetes mellitus thus indicates the common clinical presentation of TKR patients in old age (Taylor et al., 2005) [17]. These results underscore the need to select patients carefully and carry out full preoperative evaluation to maximize surgical outcomes in this group.

The preoperative evaluation in this study revealed that the majority of the patients had low functional status, limited range of motion and intense pain which is an indication of an advanced disease at the time of surgery (Weening & Bhandari, 2005) [18]. The level of

pain, range of motion, and Knee Society Score (KSS) improved significantly in the postoperative period; most patients had excellent outcomes. These results are congruent with the past research that has always indicated high levels of functional improvement and relief of pain after TKR. The high range of motion improvement and decrease in pain scores reported in this study highlight the efficiency of current surgical methods and systematic rehabilitation programs in restoring of joint functions and enhancing the mobility of patients (Sugaya et al., 2007) [19].

Moreover, the fact that a high percentage of patients showed improvement in such functional parameters as KSS (93.8%), range of motion (87.5%), pain reduction (93.8%) highlight the overall success of total knee replacement as a treatment modality in elderly patients with advanced osteoarthritis. The low percentage of patients who had adverse outcomes indicate that the procedures are very effective and patients are satisfied. These findings support the importance of TKR in reducing symptoms and improving quality of life and functional independence. Generally, the research confirms the increasing literature that total knee replacement is a safe, reliable, and very effective procedure in the management of end-stage knee osteoarthritis among the elderly population (Jones et al., 2007) [20].

#### 5. Conclusion

The present study concludes that total knee replacement is a highly effective, safe, and reliable surgical intervention for elderly patients suffering from advanced knee osteoarthritis, resulting in substantial improvements in pain relief, joint function, and overall mobility. The majority of patients achieved excellent functional outcomes, as evidenced by significant enhancement in Knee Society Scores, increased range of motion, and marked reduction in pain levels following surgery. The high proportion of patients demonstrating improvement across all functional parameters highlights the effectiveness of standardized surgical techniques combined with structured

postoperative rehabilitation programs. Furthermore, despite the presence of common age-related comorbidities such as hypertension and diabetes mellitus, the procedure showed favorable outcomes with minimal complications, emphasizing its suitability even in medically complex elderly populations. Total knee replacement not only alleviates chronic pain but also restores independence in daily activities, enhances physical performance, and significantly improves overall quality of life.

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