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Prevalence of Post-Surgical Pain and Quality of Life After Total Knee Replacement

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ABSTRACT

Total knee arthroplasty appears to be particularly advantageous for patients with significant knee joint disorders such as osteoarthritis, rheumatoid arthritis, and post-traumatic arthritis. **Objective:** To investigate the prevalence of post-surgical pain after total knee replacement and its impact on quality of life. **Methods:** This cross-sectional study was conducted at The University of Lahore Teaching Hospital during the period of 5th April, 2023 to 5th January, 2024 on 185 participants using a non-probability convenience sampling technique. It included both male and female patients between age of 50 to 80 years, undergoing TKR following diagnosis of osteoarthritis only, and patients who had undergone a TKR operation at least six months previously. A numeric pain rating scale was used for data collection. Data were analyzed using IBM SPSS version 25.0. **Results:** The participants' average age was 62.94 ± 6.33 years. 79 (42.7%) participants reported light pain, 82 (44.3%) reported moderate pain, and 24 (14.0%) reported severe pain. The mean and standard deviation of pain is 4.62 ± 2.08 and quality of life is 61.05 ± 15.16. The results showed a moderately negative correlation (r = -0.482, p=0.000) between pain and quality of life, demonstrating that there is a substantial decrease in quality of life with increasing pain levels. **Conclusions:** This study demonstrates that a significant percentage of individuals following total knee replacement have moderate to severe post-surgical pain. The findings indicate a clear relationship between higher pain levels and a decrease in quality of life.

INTRODUCTION

Total knee arthroplasty appears to be particularly advantageous for patients with significant knee joint disorders such as osteoarthritis, rheumatoid arthritis, and post-traumatic arthritis [1]. The main objectives of TKR are pain alleviation, enhanced range of motion, and enhancement of the patient's quality of life [2]. Nonetheless, as there is always the possibility of incisional and post-operative soreness, which hinders swift recovery and the development of optimal progress, there is a slight chance that effective recovery will be unearthed [3]. Several past studies have provided the prevalence of people who on average have the residual pain of around ten to forty percent after the total knee replacement (TKR) surgery [4]. This sophisticated procedure which involves placing an artificial prosthesis in place of the damaged or arthritic knee joint has given relief to millions of patients who previously suffered from chronic joint pain. Owen states that osteoarthritis (OA) is the leading cause of chronic knee pain in the United Kingdom with its epidemiology ranging from 7% to 33% in the general

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population [5]. There are several non-invasive modes of treatment but not limited to self-management programs, drugs and physical modalities that can be useful to patients with knee pain [6]. At the same time, it has become evident that the effect of these therapies on knee soreness is negligible. Patients may be advised surgical techniques, for example, arthroscopy and osteotomy, if conservative therapy fails; however, the effectiveness of these procedures in ameliorating pain is also limited. The only procedure that most efficiently reduce chronic knee pain is total knee arthroplasty [7]. TKR, a procedure that ranks among the most frequently done in the world, is considered cost-effective and hopeful for its outcome though such outcome scores vary from country to country [8]. The surgeon's scheme of total knee replacement involved taking a knife, cutting into the bone or the bone marrow of the knee, cutting the muscles and ligaments holding it in place, taking the bone and replacing it with plastic, titanium, and sewing everything back again. This patient's insight proves the complexity of the procedure and the probable drastic effects on the body. Making a complete recovery is not always easy, as a great number of patients suffer from chronic pain after the operation, which lasts for a long period after the surgery [9]. A survey conducted recently by experts shows that persistent post-operative pain following total knee arthroplasty (TKA), in whichever form, could be present between 10% and 34%. Such vast discrepancies in the reporting of rates underlie the intricacy of the condition as variables such as patient population, surgical procedures and individual pain tolerance all play up to the outcome [10]. Although many people do recover quite rapidly, expert opinion points out that a large number of people still experiences pain, which necessitates the demand for deeper understanding of the causes and aggressive measures [11]. For instance, after the surgery, the patient claimed that the hill had full range of motion restoration and walked without support in a few weeks. But not all patients are as lucky; many presents with terrible chronic pain, which interferes greatly with their activities of daily living [11]. After surgery, patients may experience chronic post-surgical pain, which must have persisted for at least two months to be considered. The prevalence of CPSP varies from 3% to 85%. The causes of post-surgery pain are complex and may result from a number of reasons, including irritation or injury to the nerves during the surgical process, long-term prior pain disorders, including osteoarthritis, individual variations in sensitivity to and perceptions of pain psychological elements, such as anxiety and sadness. Knowing the particular causes of each patient's pain is essential to creating customized treatment plans and delivering high-quality care. Medical researchers and healthcare professionals are always looking for novel surgical methods and technological advancements to help address the problem of post-operate issues [12]. In order to enhance early pain control, additional assets need to be directed towards the poorly managed pain after total knee arthroplasty (TKA). This is particularly true considering that patients are usually discharged from the hospital in 4-5 days after surgery [13]. Older people who have had total knee replacement surgery can be treated for persistent pain using both pharmaceutical and non-pharmacological approaches. Topical medications have less systemic negative effects than oral therapy and may even be advantageous. Support or other types of therapy may be beneficial for patients with depression due to chronic pain or patients who have not responded to usual treatment [14]. With increased awareness of the causes of persistent pain after surgery, the medical community is starting to embrace a more complete, team-oriented approach to TKA rehabilitation. This method seeks to address every patient input in a holistic manner by incorporating surgery, physiotherapy, pain management and psychology. Total knee replacement (TKR) is an effective procedure which increases mobility and reduces chronic pain in the knee region. But one of the complaints, which arises after total knee replacement, is pain, and which remains one of the most relevant issues for patients. Appreciating the reasons for the common occurrence of chronic pain or infrequent surgery is important. It, in the first instance, aids in the management of the patients' attitudes. That is the proportion of patients who are going to experience pain after the procedure is performed is important for planting proper expectation on the surgical team as well as enabling proper mental preparations of the patients prior to the recovery process. Further on, knowing the prevalence makes things better with the treatment even to anger. Healthcare professionals can create better pain management regimens, which may involve pharmacological changes, nerve blocks, or rehabilitation procedures, if they have a firm grasp of how common this pain is. Finally, determining the frequency of pain following surgery opens the door to further research. Researchers can concentrate their efforts on studying the causes and creating more specialized pain management therapies to boost patient results and general satisfaction following TKR surgery by determining the percentage of individuals affected.

This study aimed to investigate the prevalence of post-surgical pain after total knee replacement and its impact on quality of life.

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METHODS

This cross-sectional research was carried out at The University of Lahore Teaching Hospital during the period 5th April, 2023 to 5th January, 2024 by using a non-probability convenience sampling approach. Permission from the ethics committee of The University of Lahore Teaching Hospital was obtained before starting of this study under reference number REC-UOL-/387/08/24. Before beginning the data collection process, informed consent was obtained from the participants. Religious and cultural factors were appropriately considered while gathering data. Total sample size calculated through open epi tool was 185 using formula n = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)]. The % frequency of outcome factor in the population was 14% taken from pain variable. Inclusion criteria were both male and female patients between age of 50 to 80 years, not presenting any diagnosed psychiatric or neurologic pathology like (psychosis, dementia), undergoing TKR following diagnosis of osteoarthritis only [15], individuals who had undergone TKR surgery at least six months earlier. The patients who had been identified were called and invited to visit the hospital and take informed consent of the research. Patients were excluded if arthroplasties performed due to fractures, as well as hemiarthroplasties and revision or emergency arthroplasties. Patients who had received TKR surgery more than six months prior were also excluded [16]. Numeric pain rating scale (NPRS) and Sf-36 questionnaire was used for data collection to assess pain and quality of life of participants. Due to its direct questioning of patients regarding measuring their level of pain on a range of 0 (no pain) to 10 (worst possible agony), the NPRS has proven to have strong content validity. This makes it a useful and simple tool for assessing pain. Pain was categorized as 0 indicates no pain, 1-3 indicates mild pain, 4–7 indicates moderate pain, and 8–10 indicates severe pain [17]. The Short Form 36 Health Survey is a patient oriented 36-item questionnaire measuring the health of the patients. The SF-36 captures a state of health as well as a quality-of-life measure. Within the SF-36 consists of eight scaled scores which are the Additive scores of the questions in the respective section. Each scale is converted to a 0-100 range presuming that the questions contained in that scale are equally important. With respect to score, more the disability lesser is the score. The lesser the particular scale score the greater the level of disability with zero score being equal to maximum level of disability and one hundred being the minimum level of disability [18]. Data were analyzed using IBM SPSS version 25.0. All qualitative variables were shown as frequency and percentages, all quantitative data were provided as Mean ± S.D. Correlation was measured by Pearson Correlation coefficient. The p-value was kept at 0.05 for significance.

RESULTS

Participants' demographic information revealed that the participants' average age was 62.94 ± 6.33 years. 110 (59.5%) of the 185 participants were men, and 75 (40.5%) were women (Table 1).

Table 1: Demographic Profile of study Participants

Variables	Mean ± S.D	
Age (Years)	62.94 ± 6.33	
Gender n (%)	Male	110 (59.5%)
	Female	75 (40.5%)

The mean and standard deviation of pain is 4.62 ± 2.08 and total quality of life is 61.05 ± 15.16. The mean and standard deviation of individual domains of quality of life are as follows: General health (8.3 ± 2.6), Limitation of activities (10.87 ± 3.3), Physical health problem (2.0 ± 1.2), Emotional health problem (18.75 ± 3.5), Social activities (2.3 ± 1.10), Pain (4.5 ± 1.92) (Table 3).

Table 2: Pain Categories of study Participants

Pain Categories	n (%)
Mild Pain	79 (42.7%)
Moderate Pain	82 (44.3%)
Severe Pain	24 (13.0%)
Total	185 (100.0%)

The mean and standard deviation of pain is 4.62 ± 2.08 and total quality of life is 61.05 ± 15.16. The mean and standard deviation of individual domains of quality of life are as follows: General health (8.3 ± 2.6), Limitation of activities (10.87 ± 3.3), Physical health problem (2.0 ± 1.2), Emotional health problem (18.75 ± 3.5), Social activities (2.3 ± 1.10), Pain (4.5 ± 1.92) (Table 3).

Table 3: Descriptive Statistics of Pain and Quality of Life

Variable	Mean ± S.D
Pain (Numeric Rating Scale)	4.62 ± 2.08
Quality of life (total)	61.05 ± 15.16
Domains of Quality of Life	**Mean ± S.D**
General Health	8.3 ± 2.6
Limitation of Activities	10.87 ± 3.3
Physical Health Problem	2.0 ± 1.2
Emotional Health Problem	18.75 ± 3.5
Social Activities	2.3 ± 1.10
Pain	4.5 ± 1.92

The results of the analysis showed a moderately negative correlation (r = -0.482, p = 0.000) between pain and quality of life, demonstrating that there is a substantial decrease in quality of life with increasing pain levels (Table 4).

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Table 4: Correlation of Pain and Quality of Life

Correlation		Quality of life
Pain (Numeric Rating Scale)	Pearson Correlation	-0.482**
	Sig. (2-tailed)	0.000
	n	185

DISCUSSION

In orthopaedic surgery, the frequency of post-surgical pain after total knee replacement (TKR) is still a major concern since it affects patient outcomes and quality of life. According to the numeric pain rating scale (NPRS), of the 185 patients in current study, 42.7% reported having mild pain, 44.3% reported having moderate pain, and 13.0% reported having severe pain. Our findings allowed to synchronize our findings with those reported in prior studies in this area and offer some insight into the status of burden associated with managing postsurgical pain in TKR patients. From our findings, it is evident that a good number of patients suffer from moderate to severe pain after complete knee replacement. Some authors found different prevalence measures of pain after surgery. For instance, a considerable number 20% of patients a year after total knee replacement suffer moderate to severe pain. This was way lower than our investigation which established a 57.3% overall cut-off of what can be termed as moderate to severe pains. On the contrary, Andrew *et al.*, found that, yet again, a smaller percentage of patients 15 - 20%- suffered from good level pain following TKR [19]. In our study, the most likely cause of these discrepancies may be a combination of patients' demographics, differences in surgical techniques or differences in pain management strategies. The findings of the study that there is a negative relationship between pain and quality of life after total knee arthroplasty is consistent with previous studies. Similar to our study, Edwards *et al.*, established a correlational link between post-operative pain and quality of life in knee replacement patients, wherein the more postoperative pain experienced, the worse one's quality of life [20]. It was also reported by Lee N-K *et al.*, who postoperatively assessed subjects who had knee arthroplasty that the quality of life and physical activities improved owing to a reduction of pain after an effective pain control [21]. In other studies, such as that of Fugaru *et al.*, a more pronounced relationship between pain relief and quality of life enhancement was shown, particularly in patients who adhered to early-postsurgical rehabilitation, while our data did not exceed mild association between the factors as described [22]. These comparisons show a general consensus among the studies, yet the raise a caveat that factors such as patient compliance or even the level of rehabilitation could play a role in how pain and quality of life are inter-related after total knee arthroplasty. In our investigation, male respondents accounted for 59.5 percent while female respondents accounted for 40.5 percent. Similarly, regional variations or public health system accessibility may also lead to disparities in the gender gap. Having said that, even though TKR is more common in women than in men, there were no marked differences in pain responses in our study because there was male and female compared with Taylor CE *et al.*, who reported gender outcomes as well [23]. This means that the average age of the study participants was 62.94 years and the standard deviation was 6.33. This corresponds with the typical age found in other studies like the one by Jason *et al.*, where average age of TKR was found to be sixty-five years [24]. In general, age structure and the age of the patient, especially in the TKR population, were indeed comparable to the wider TKR population and age had significant impact on outcome of the procedure. Pain intensity was assessed with the help of the NPRS which is commonly and widely accepted in clinical research. It has been reported in the literature that the NPRS is a valid and reliable tool for the measurement of pain. Furthermore, prior studies have used the NPRS or similar tools, thereby aiding in the direct comparison of pain outcomes. Our usage of NPRS assures the accuracy of our conclusions and provides compatibility with previous research findings. Even if the incidences of pain prevalence in our study are higher than in some other studies, it is important to take possible causes into account. Pain results can be impacted by differences in surgical methods, postoperative care guidelines, and patient traits. Furthermore, reporting and perception of pain may be influenced by cultural and regional variables. In addition, our study's brief follow-up period would have caught a higher rate of acute postsurgical pain than studies with longer follow-up periods, which frequently record a reduced prevalence of pain as patients continue to heal. Our study has some limitations. Our sample size was adequate for preliminary research, but it might not be sufficient to extrapolate the results to all TKR patients. More extensive and varied samples are required to validate these findings. Data were collected from Lahore. The results of our study might be indicative of particular procedures and patient demographics that aren't typical of other cities. Future researchers are advised to carry out studies using larger sample sizes and include other cities in research too for generalizability of findings.

CONCLUSIONS

It was concluded that post-surgical pain continues to be an area of concern for patients who undergo total knee arthroplasty surgery with many patients reporting moderate to severe pain. Results indicated a definitive correlation between the increasing levels of pain and the diminishing levels of quality of life.

Authors Contribution

Conceptualization: AH
Methodology: AH, HMW, MA, MKN
Formal analysis: AH, MKN, YM

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Writing-review and editing: MA, WA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

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