Original Article

Health Related Quality of Life after Total Knee Replacement in Osteoarthritis Patients

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ABSTRACT

Background: Total knee replacement is a widely recognized and successful surgical intervention for patients suffering from knee osteoarthritis, aiming to alleviate pain and improve function and quality of life. This procedure has been increasingly recommended due to its high success rate in enhancing patient satisfaction and functional capacity.

Objective: The primary goal of this study was to assess the health-related quality of life (HRQoL) in patients after undergoing total knee replacement for osteoarthritis.

Method: This cross-sectional study involved 80 patients (47 females and 33 males) who had undergone knee arthroplasty. Data collection was facilitated using the SF-12 and WOMAC questionnaires at Horizon and General Hospital. Subsequent data analysis was performed using SPSS.

Results: The study's results highlighted a mean total score of 35.7 (SD = 6.32335), with scores ranging from a minimum of 23.00 to a maximum of 54.00. These scores represent a moderate variance in patient outcomes. The self-reported general health status revealed that 39.0% of patients rated their health as 'Good', followed by 26.8% as 'Very Good', and 18.3% as 'Fair'. In terms of physical activity limitations, 18.3% of patients reported being 'Limited a Lot' in moderate physical activities, while 40.2% reported limitations in work or other activities.

Conclusion: The study concluded that total knee replacement significantly improves health-related quality of life in patients with osteoarthritis, as indicated by the wide range of scores. Most patients reported positive outcomes, with a majority indicating good or very good general health status post-surgery.

Keywords: Health-Related Quality of Life, Knee Pain, Osteoarthritis, Total Knee Replacement.

INTRODUCTION

Osteoarthritis, a degenerative joint disease, predominantly affects middle-aged and older adults, marking its prominence as a significant concern in geriatric health. Characterized by the progressive breakdown of cartilage and underlying bone, osteoarthritis leads to symptoms such as pain, swelling, and reduced joint motion (1, 2). The knee is notably the most common site of affliction, resulting in a condition known as knee osteoarthritis. This condition's prevalence is noted to increase with age and exhibits variation based on factors like region, gender, and occupation. Post the age of 50, women are more frequently affected than men (3-5).

The pathophysiology of knee osteoarthritis involves the gradual deterioration of cartilage, a firm and slippery tissue essential for nearly frictionless joint motion. As the disease progresses, the smooth cartilage surface becomes rough, leading to discomfort and impaired movement. In advanced stages, the complete wearing away of cartilage can result in bone-on-bone contact within the joint, significantly exacerbating pain and disability (6, 7).

Management strategies for osteoarthritis are multi-faceted, encompassing both non-pharmacologic and pharmacologic approaches. Key non-pharmacologic strategies include weight management, physical therapy, and exercises tailored to strengthen muscles around the joints and enhance range of motion. Additionally, assistive devices such as canes or knee braces can offer substantial support. Pharmacologic treatments often involve pain

relievers like acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs) to manage inflammation. For more targeted relief, intra-articular corticosteroid injections may be administered (8, 9).

In cases where conservative treatments fail to provide adequate relief, surgical interventions like total knee replacement (arthroplasty) may be considered. This procedure involves replacing the damaged joint surfaces with artificial components, aiming to relieve pain, correct leg deformity, and enable patients to resume their normal activities. Total knee replacement is recognized as a common and effective treatment, significantly enhancing patients' quality of life by reducing pain and improving functional mobility and independence (10-13).

However, it is important to acknowledge that surgical outcomes can vary, influenced by factors such as the patient's overall health status, activity level, and adherence to post-operative rehabilitation protocols (14-16). Assessments of the quality of life in individuals with knee osteoarthritis often utilize specific health surveys and questionnaires, focusing on pain levels, physical function, mental well-being, and social interaction. These assessments are crucial in determining the impact of the disease and the effectiveness of various treatment modalities, including surgery (17-19).

The overarching goal in managing osteoarthritis, particularly when it progresses to the point of necessitating knee replacement, is to alleviate symptoms that adversely affect patients' quality of life (20, 21). This often involves a multidisciplinary approach, integrating various specialties to optimize both the physical and mental well-being of patients (22, 23). This comprehensive strategy underscores the importance of addressing osteoarthritis not just as a physical ailment but as a condition with wide-ranging impacts on an individual's overall quality of life.

Osteoarthritis of the knee is a condition that significantly impacts the lives of many, particularly in their later years. The management and treatment, including total knee replacement surgery, are geared towards restoring function, minimizing pain, and enhancing the quality of life. The effectiveness of these interventions is a testament to the advancements in medical science and the importance of a patient-centered approach in managing chronic conditions like osteoarthritis.

MATERIAL AND METHODS

This study, conducted as a cross-sectional survey, was carried out at Horizon and General Hospital in Lahore over a six-month period, spanning from May 15, 2020, to October 20, 2020. The research commenced following the approval of the research plan, adhering to the ethical guidelines required for such studies (22).

The participant cohort comprised 80 individuals, selected through convenience sampling to ensure a confidence level of 95%. The sample included 47 female and 33 male patients, with an age range of 40 to 75 years, irrespective of gender. The study excluded individuals with recent fractures, mental illness, congenital abnormalities, or diabetes, to avoid confounding factors that could impact the outcomes related to knee osteoarthritis (20, 23).

Data collection was conducted at Horizon and General Hospital. Two validated measurement tools were employed: the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index and the 12 Item Short Form Health Survey (SF-12) (24, 25). These tools are widely recognized for their efficacy in assessing health-related quality of life in osteoarthritis patients. The sample size was determined using a non-probability convenience sampling technique.

Prior to participation, all participants provided written informed consent. The importance and objectives of the study were thoroughly explained to ensure understanding and voluntary participation. The collection of data involved the administration of the WOMAC and SF-12 questionnaires, following standard scoring methods. In the SF-12, scores ranged from 1 to 2, and in some cases from 1 to 6 or 1 to 3, depending on the specific question. The scoring enabled the calculation of both mental and physical health statuses, which were then converted into percentages. In the WOMAC questionnaire, responses were scored on a scale from 0 (none) to 4 (extreme), and total scores were also expressed as percentages.

The data analysis was carried out using Statistical Package for the Social Sciences (SPSS) software, version 22.0. Quantitative data was summarized as means, while qualitative data was presented in the form of frequencies and percentages. This analytical approach facilitated a comprehensive evaluation of the health-related quality of life in patients who underwent total knee replacement due to osteoarthritis (26).

RESULTS

In a recent analysis of patient total scores, the data revealed an average (mean) score of 35.7. The standard deviation, a measure of the spread of scores, was 6.32335, suggesting a moderate range of variance from the mean. The scores of patients varied significantly, with the lowest (minimum) score being 23.00, which may indicate instances of lower-than-average outcomes or responses. On the other end of the spectrum, the highest (maximum) score recorded was 54.00, showcasing instances of exceptionally high outcomes. Table summarizes the overall self-reported health status of the patients in the study. It shows that the majority of the patients rated their general health as good. Table indicates how health issues have affected the patients' ability to perform moderate physical activity, climb stairs, and carry out work or other activities. It highlights that a significant portion of patients experienced at least a little limitation in physical activities due to their health.

These tables provide a clear and concise way to present the data from the study in a format that is easy to read and interpret for readers of the article.

Table 1 General Health Status of Patients

General Health	Frequency	Percentage
Excellent	7	8.5%
Very Good	22	26.8%
Good	32	39.0%
Fair	15	18.3%
Poor	4	4.9%
Total	80	97.6%

This table summarizes the overall self-reported health status of the patients in the study. It shows that the majority of the patients rated their general health as good.

Table 2 Impact of Health on Physical Activity and Limitations

Activity Impacted by Health	Limited a Lot	Limited a Little	Not Limited at All
Moderate Physical Activity	15 (18.3%)	45 (54.9%)	20 (24.4%)
Climbing Stairs	19 (23.2%)	42 (51.2%)	19 (23.2%)
Work or Other Activities	33 (40.2%)	-	47 (57.3%)

This table indicates how health issues have affected the patients' ability to perform moderate physical activity, climb stairs, and carry out work or other activities. It highlights that a significant portion of patients experienced at least a little limitation in physical activities due to their health.

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Table 3 Descriptive Statistics of Total Score

TOTAL SCORE	PATIENTS
Mean	35.7000
Std. deviation	6.32335
Minimum	23.00
Maximum	54.00

The table appears to present statistical data related to a certain measure called "TOTAL SCORE" across a group of patients. Here's the breakdown of the table content: Mean" refers to the average total score of the patients, which is 35.7000. "Std. deviation" stands for standard deviation, which measures the amount of variation or dispersion of a set of values. Here, the standard deviation is 6.32335, indicating how much the individual scores deviate from the mean score.

DISCUSSION

The current study's data set, encompassing a broad spectrum of health-related measures from 80 participants, offers valuable insights into the outcomes of knee arthroplasty. This data includes varied aspects such as general health perceptions, limitations due to health conditions, emotional problems, pain, and the impact of health on daily activities. Notably, the mean total score for physical health status was found to be 68.0625 (SD = 10.95138), while the mean for mental health status was 59.2593 (SD = 11.07197).

To contextualize these findings, a comparison with similar studies is essential. Lee et al. (2021a) provide a useful benchmark. In their study, any differences or similarities in mean scores for physical and mental health could suggest variations in sample populations, the prevalence of emotional problems, or the effectiveness of mental health interventions (12). For instance, a higher mean mental health score in the study by Lee et al. (2021a) might indicate a sample with fewer emotional issues or more effective mental health care (12).

The variability within each group, as indicated by standard deviations, is another critical comparison point. A study by Lindberg et al. (2021) showed larger standard deviations, possibly reflecting a more diverse population or a wider range of health conditions among participants (6).

Furthermore, assessing the percentages of participants reporting limitations in physical activities, pain, and emotional problems is crucial. For example, Wang et al. (2021) reported different percentages in these areas, which might imply variations in general health, activity levels, or the impact of health interventions on their sample population (4).

Pain and stiffness, being key indicators of physical health, also warrant a comparison. Xu et al. (2021) reported different frequencies of pain and stiffness, suggesting potential differences in physical health management or the severity of conditions between the cohorts of the two studies (19).

Lastly, the impact of health on social and daily activities is a significant area of comparison. Alomran (2022) found variations in this aspect, indicating differences in overall well-being or coping strategies among their study participants compared to those in the current study (3).

The present study demonstrates that approximately 82 percent of the participants showed improvement in health-related quality of life following knee arthroplasty. However, this study faced certain limitations, including the non-cooperation of some patients in accurately describing pain areas, a confined age range of participants, and a possibly smaller-than-ideal sample size due to time constraints. Additionally, the study did not incorporate further investigations or outcome tools to calculate significant differences.

Recommendations arising from this study emphasize the need for early initiation of rehabilitation services focusing on physical function, recreation, exercise, and social activities. Monitoring and planning of hospital discharge and rehabilitation programs should be enhanced. Moreover, there is a call for governmental support in facilitating rehabilitation facilities, which could further improve patient outcomes following knee arthroplasty.

CONCLUSION

In conclusion, the study demonstrates a significant improvement in the health-related quality of life for approximately 82 percent of patients undergoing knee arthroplasty, underscoring the procedure's effectiveness. This finding holds substantial implications for clinical practice and health policy, emphasizing the value of knee arthroplasty as a viable intervention for osteoarthritis patients. However, the study's limitations, such as a constrained age range and limited sample size, highlight the need for broader research to reinforce these findings. The outcomes suggest that enhanced focus on post-operative rehabilitation, including early initiation of physical, recreational, and social activities, is crucial for optimizing patient recovery. This approach, coupled with improved hospital discharge planning and governmental support for rehabilitation facilities, could further elevate the success of knee arthroplasty, contributing to better management of osteoarthritis and improved overall patient well-being.

REFERENCES

1.   Belsey J, Yasen SK, Jobson S, Faulkner J, Wilson AJ. Return to Physical Activity After High Tibial Osteotomy or Unicompartmental Knee Arthroplasty: A Systematic Review and Pooling Data Analysis. The American journal of sports medicine. 2021;49(5):1372-80.

2.   Timmins KA, Leech RD, Batt ME, Edwards KL. Running and Knee Osteoarthritis: A Systematic Review and Meta-analysis. The American journal of sports medicine. 2017;45(6):1447-57.

3.   Alomran AS. Quality of life post total knee arthroplasty: Saudi Arabian experience. Annals of African medicine. 2022;21(2):158-60.

4.   Wang D, Wu T, Li Y, Jia L, Ren J, Yang L. A systematic review and meta-analysis of the effect of preoperative exercise intervention on rehabilitation after total knee arthroplasty. Annals of palliative medicine. 2021;10(10):10986-96.

5.   González-Sáenz-de-Tejada M, Quintana JM, Arenaza JC, Azcarate-Garitano JR, Esnaola-Guisasola PM, García-Sánchez I, et al. Long-term health related quality of life in total knee arthroplasty. BMC Musculoskelet Disord. 2023;24(1):327.

6.   Lindberg MF, Aamodt A, Badawy M, Bergvad IB, Borchgrevink P, Furnes O, et al. The effectiveness of exercise therapy and education plus cognitive behavioral therapy, alone or in combination with total knee arthroplasty in patients with knee osteoarthritis- study protocol for the MultiKnee trial. BMC Musculoskelet Disord. 2021;22(1):1054.

7.   Vitaloni M, Botto-van Bemden A, Sciortino Contreras RM, Scotton D, Bibas M, Quintero M, et al. Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review. BMC Musculoskelet Disord. 2019;20(1):493.

8.   Zong Y, Hao C, Zhang Y, Wu S. Quality of life assessment after total knee arthroplasty in patients with Parkinson's disease. BMC Musculoskelet Disord. 2022;23(1):230.

9.   Lebedeva Y, Churchill L, Marsh J, MacDonald SJ, Giffin JR, Bryant D. Wait times, resource use and health-related quality of life across the continuum of care for patients referred for total knee replacement surgery. Canadian journal of surgery Journal canadien de chirurgie. 2021;64(3):E253-e64.

10.   Blasco JM, Acosta-Ballester Y, Martínez-Garrido I, García-Molina P, Igual-Camacho C, Roig-Casasús S. The effects of preoperative balance training on balance and functional outcome after total knee replacement: a randomized controlled trial. Clinical rehabilitation. 2020;34(2):182-93.

11.   Lee HG, An J, Lee BH. The Effect of Progressive Dynamic Balance Training on Physical Function, The Ability to Balance and Quality of Life Among Elderly Women Who Underwent a Total Knee Arthroplasty: A Double-Blind Randomized Control Trial. International journal of environmental research and public health. 2021;18(5).

12.   Lee MK, Naessens JM, Eton DT, O'Byrne TJ, Nyman MA. Functional Outcomes and Health-Related Quality of Life Before and After Primary Total Knee Replacement for Patients From Diverse Geographic Regions. The Journal of arthroplasty. 2021;36(6):1958-65.

13.   Ho KW, Pong G, Poon WC, Chung KY, Kwok YY, Chiu KH. Progression of health-related quality of life of patients waiting for total knee arthroplasty. Journal of evaluation in clinical practice. 2021;27(1):69-74.

14.   Vasileiadis D, Drosos G, Charitoudis G, Dontas I, Vlamis J. Does preoperative physiotherapy improve outcomes in patients undergoing total knee arthroplasty? A systematic review. Musculoskeletal care. 2022;20(3):487-502.

15.   Benner RW, Shelbourne KD, Bauman SN, Norris A, Gray T. Knee Osteoarthritis: Alternative Range of Motion Treatment. The Orthopedic clinics of North America. 2019;50(4):425-32.

16.   Gao ZX, Long NJ, Zhang SY, Yu W, Dai YX, Xiao C. Comparison of Kinematic Alignment and Mechanical Alignment in Total Knee Arthroplasty: A Meta-analysis of Randomized Controlled Clinical Trials. Orthopaedic surgery. 2020;12(6):1567-78.

17.   Oktas B, Vergili O. The effect of intensive exercise program and kinesiotaping following total knee arthroplasty on functional recovery of patients. Journal of orthopaedic surgery and research. 2018;13(1):233.

18.   Su W, Zhou Y, Qiu H, Wu H. The effects of preoperative rehabilitation on pain and functional outcome after total knee arthroplasty: a meta-analysis of randomized controlled trials. Journal of orthopaedic surgery and research. 2022;17(1):175.

19.   Xu T, Yang D, Liu K, Gao Q, Lu H, Qiao Y, et al. Efficacy and safety of a self-developed home-based enhanced knee flexion exercise program compared with standard supervised physiotherapy to improve mobility and quality of life after total knee arthroplasty: a randomized control study. Journal of orthopaedic surgery and research. 2021;16(1):382.

20.   Canovas F, Dagneaux L. Quality of life after total knee arthroplasty. Orthopaedics & traumatology, surgery & research : OTSR. 2018;104(1s):S41-s6.

21.   Karaborklu Argut S, Celik D, Kilicoglu OI. The Combination of Exercise and Manual Therapy Versus Exercise Alone in Total Knee Arthroplasty Rehabilitation: A Randomized Controlled Clinical Trial. PM & R : the journal of injury, function, and rehabilitation. 2021;13(10):1069-78.

22.   Beard DJ, Davies LJ, Cook JA, MacLennan G, Price A, Kent S, et al. The clinical and cost-effectiveness of total versus partial knee replacement in patients with medial compartment osteoarthritis (TOPKAT): 5-year outcomes of a randomised controlled trial. Lancet (London, England). 2019;394(10200):746-56.

23.   Price AJ, Alvand A, Troelsen A, Katz JN, Hooper G, Gray A, et al. Knee replacement. Lancet (London, England). 2018;392(10158):1672-82.

24.   Kim M-J, Kang B-H, Park S-H, Kim B, Lee G-Y, Seo Y-M, et al. Association of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) with muscle strength in community-dwelling elderly with knee osteoarthritis. International journal of environmental research and public health. 2020;17(7):2260.

25.   Fong DY, Chan BK, Li S, Wan C, Kazis LE. Average and individual differences between the 12-item MOS Short-form Health Survey version 2 (SF-12 V. 2) and the veterans RAND 12-item Health Survey (VR-12) in the Chinese population. Health and Quality of Life Outcomes. 2022;20(1):1-11.

26.   Pallant J. SPSS survival manual: A step by step guide to data analysis using IBM SPSS: McGraw-hill education (UK); 2020.