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Exploring the Impact of Total Knee Replacement on Quality of Life: A Narrative Review

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Abstract

INTRODUCTION: Total Knee Replacement (TKR) is a widely performed orthopedic procedure aimed at relieving pain and restoring function in patients with severe knee osteoarthritis or other degenerative joint diseases. Given the increasing prevalence of osteoarthritis due to aging populations and lifestyle factors, TKR plays a crucial role in improving mobility and overall quality of life. Evaluating the impact of TKR on quality of life is essential to determine its effectiveness and guide future improvements in surgical techniques and rehabilitation protocols.

OBJECTIVES: The objective of this review study is to find out the impact of TKR on quality of life of patients by evaluating improvements in pain levels, mobility, psychological well-being and daily activities post-surgery.

METHODOLOGY: This study is based on relevant reviews using Google Scholar, PubMed, Physiotherapy Evidences Database (PEDs) and Cochrane Databases. The search terms used were 'Total Knee Replacement,' 'Impact on Life,' 'after TKR impacts on life,' 'Mobility' and 'Post operative Recovery'. Studies were double checked and only full text articles were used in the review. These studies are explored narratively.

CONCLUSION: TKR significantly improves the quality of life in patients suffering from severe knee osteoarthritis by reducing pain, enhancing mobility, and improving psychological well-being. Most patients report high levels of satisfaction post-surgery, with increased participation in daily activities and social interactions. However, challenges such as post-operative complications, rehabilitation adherence, and long-term implant durability should be addressed to maximize benefits.

Keywords: Total Knee Replacement, Osteoarthritis, Quality of Life, Pain Management, Mobility, Post-operative Recovery.

Introduction

Chronic knee pain, most commonly caused by osteoarthritis (OA), is highly prevalent among the general UK population, affecting between 7 and 33% of adults. Many non-surgical therapeutic interventions are available to people with chronic knee pain, such as medications, self-management programmes and physiotherapy. However, these interventions have been shown to have only small effect sizes on knee pain [4]. When these conservative treatments fail, patients may be offered surgical interventions, such as osteotomy and arthroscopy, although these procedures also have only limited success in pain reduction [5]. The only intervention that has a large effect size on relieving chronic knee pain is total knee replacement (TKR) [4]. TKR is widely considered as an effective and successful end-stage surgical procedure for

relieving chronic knee pain and functional disability, based on results from surgeon-based outcome tools and survivorship analysis [6-7].

Background

Definition of Total Knee Replacement (TKR)

Total knee replacement (TKR), also known as total knee arthroplasty (TKA), is a surgical procedure in which the damaged or diseased surfaces of the knee joint are replaced with artificial components. This intervention aims to alleviate pain and restore function in individuals suffering from severe knee arthritis or other debilitating knee conditions. The procedure involves resurfacing the femoral condyles and tibial plateau—the articular surfaces of the knee joint—with smooth metal and highly cross-linked polyethylene plastic components. This replacement is intended to improve the quality of life by reducing pain and increasing function, enabling patients to resume daily activities with greater comfort and mobility. TKR has proven to be a consistent treatment, providing improved function and pain relief for end-stage knee arthritis. [8]

Prevalence and Increasing Demand for TKR

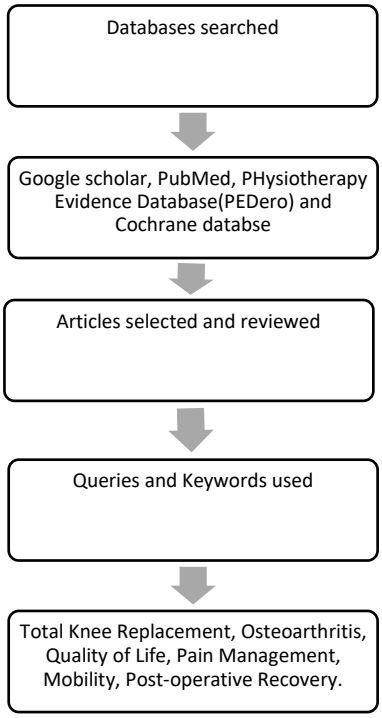
In Australia, the incidence of TKR surgeries is estimated to increase by 276% by 2030, highlighting a significant upward trend in the demand for these procedures. Several factors are driving the rising demand for TKR such as:

- **Ageing Population**: As life expectancy increases, a larger segment of the population is susceptible to degenerative joint diseases, leading to a higher need for joint replacement surgeries.
- **Obesity Rates**: The prevalence of obesity contributes to joint stress and accelerates the progression of osteoarthritis, thereby increasing the necessity for TKR.
- **Advancements in Surgical Techniques**: Improved surgical methods and prosthetic designs have enhanced the success rates of TKR, making it a more viable option for a broader patient demographic.
- **Expanded Indications**: TKR is now considered for younger patients and those with varying etiologies of knee pain, broadening the candidate pool for the procedure. [8]

Objective

The objective of this review study is to find out the impact of TKR on quality of life of patients by evaluating improvements in pain levels, mobility, psychological well-being and daily activities post-surgery.

Method:



This study is based on relevant reviews using Google Scholar, PubMed, Physiotherapy Evidences Database (PEDs) and Cochrane Databases. The search terms used were 'Total Knee Replacement,' 'Impact on Life,' 'after TKR impacts on life,' 'Mobility' and 'Post operative Recovery'. Studies were double checked and only full text articles were used in the review. These studies are explored narratively.

Research and Case Studies

Author, journal, year	**Objective**	**Design**	**Sample size**	**Method**	**Measure outcome**	**Result**
Núñez, M., Lozano, (2009) *Arthritis & Rheumatology [11]*	Assess HRQOL in osteoarthritis patients after TKR	7-year prospective study	112 patients (86 women, age 67 and 26 men)	WOMAC, SF-36 surveys; regression analysis	WOMAC (pain, stiffness, function), SF-36 domains, satisfaction, activity	There were significant differences between pre and post operative WOMAC (pain, stiffness, function). 14-32% variability were seen in the WOMAC dimensions. WOMAC Scores improved (pain, stiffness, function). 86% patients were satisfied with TKR. 80% would go for TKR for another knee. 56% engaged in regular physical activity and had better WOMAC scores

Tew M, Dalziel K, (2020) Medical Decision Making [12]	Evaluate QoL's role in survival modeling for TKR patients.	Retrospective registry analysis (parametric survival models)	2,858 TKR cases (2,309 patients; 2006–2015)	4 survival models (QoL baseline/change vs. no-QoL reference); LY/QALY calculations	Mortality risk, LY, QALYs, incremental effectiveness → Association between QoL and mortality.	Higher baseline and improved QoL reduced mortality. Compared to a model without QoL, differences of: 0.32 life years 0.53 QALYs 9.5% increase in incremental effectiveness. These differences were much larger as the strength of association between QoL and mortality increases.
Marcos E Fernandez-Cuadros, Olga S Pérez-Moro, Divers Equal Health Care (2016) [13]	Assess the impact of knee osteoarthritis (OA) and total knee arthroplasty (TKA) on Health-Related Quality of Life (HRQoL) before and after surgery	Quasi-experimental intervention study (before-and-after design)	125 patients with knee osteoarthritis (operated 2008–2012)	SF-36 questionnaire administered pre- and post-TKA	Mortality risk, LY, QALYs, incremental effectiveness → Association between QoL and mortality.	They have observed that knee osteoarthritis significantly affect all the dimension of HRQOL before the operation and after the operation. When the result of different scale of QOL from SF-36 are compared and it shows that 5 dimension of health shown an improvement except social dimension after the surgery therefore they can state that the operation of TKR significantly improved HRQOL in all its dimensions except for social functioning
HAWKER, GILLIAN M.D. The Journal of Bone & Joint Surgery (1998) [14]	Assess pain relief, physical function, and satisfaction after knee replacement	Cross-sectional, community-based survey	1,750 Medicare recipients (1985–1989); 1,193 respondents (80.3% response rate)	Stratified random sampling (national, Indiana, western Pennsylvania); validated questionnaires for pain, function, satisfaction (2–7 years post-surgery)	Pain severity, physical function, satisfaction rates.	85.2% patients were satisfied with the result of the knee replacement with persistent relief of pain, improved physical function and satisfaction with the result (2-7 years post operatively). Age and obesity to not have a negative impact on patient relevant outcome(pain and physical function) these finding has the potential to increase appropriate referral for knee replacement and reduce the pain and functional disability dure to OA of knee
Shan, Leonard(A Systematic Review and Meta-Analysis) The Journal of Bone and Joint	Evaluate intermediate /long-term health-related quality of life (HRQoL) after primary	Prospective study	19 studies (published 2000 onward; ≥3-year follow-up)	- Strict inclusion/exclusion criteria. - Narrative review + random-effects meta-analysis	- Postoperative HRQoL (WOMAC, KSS). - Function, pain, satisfaction vs. preoperative	This review states that intermediate and long term post operative quality of life was superior to the preoperative level. Most patients were satisfied with the surgery and derived substantial benefits for daily functional activities

Surgery(2015) [15]	total knee replacement (TKR) for osteoarthritis			(standardized mean differences). - Heterogeneity assessed via tau² and I² statistics.	status.	
F. Canovas, L. Dagneaux, Orthopaedics & Traumatology: Surgery & Research(2018) [16]	Analyze factors influencing quality of life (QoL) post-TKA, including patient-related factors, surgical techniques, and postoperative program.	Prospective study	N/A	Exhaustive literature review focusing on QoL determinants post-TKA	QoL, patient satisfaction, functional outcomes (return to work/sports), PROMs (Patient-Reported Outcome Measures)	- 30% dissatisfaction rate linked to unmet QoL expectations. - QoL influenced by physical, behavioral, social, psychological factors not captured by traditional functional scores. - TKA provides medium-to-long-term benefits in pain/function, but gaps exist in addressing holistic QoL factors.
Papakostidou, I., Dailiana BMC Musculoskelet Disord (2012)[18]	Evaluate self-reported QoL outcomes and identify factors influencing QoL at 6 weeks, 3, 6, and 12 months post-TKA	Prospective cohort study (12-month follow-up)	204 patients (162 females, mean age 69.2; 90% response rate at 1 year)	- Tools: WOMAC, KSS, CES-D10, VAS pain scale. - Assessments pre-TKA and at 4 postoperative time points. - General linear modeling for repeated measures; independent *t*-tests for group differences.	- QoL (pain, physical function, depression). - Sociodemographic/clinic factors (age, BMI, education, social support).	- 6 weeks: Improved pain/depression ($P<0.001$) but poor physical function. - Gender disparity: Females had lower QoL pre-TKA and at 6 weeks. - 3–12 months: Significant QoL improvement (all tools, $P<0.001$). Significant improvement was already experienced at 3 months post operatively. Pain VAS score was improved 12 months after TKA.
François Desmeules, Clermont E. Dionne Rheumatology (2010) [19]	Assess the impact of pre-surgery wait time on pain, function, HRQoL, and contralateral	Prospective cohort study	153 patients (awaiting knee replacement in Québec City, Canada)	- Pre-surgery wait categorized into 5 intervals (≤3, >3–6, >6–9, >9–12, >12 months).	- WOMAC pain/function scores. - SF-36 physical functioning. - Contralateral knee	- Mean wait time: 183 days (SD 121.9). - Wait >9–12 months: Significant deterioration in WOMAC pain score and function - SF-36 decline due to 9-12 month of wait time. - Contralateral knee pain

	knee pain			- Tools: WOMAC (pain/function), SF-36 (HRQoL).	WOMAC pain.	worsened due to 9-12 month of wait time.
Fernandes D. A., Poeta L. S., *Brasileira de Ortopedia (English Edition) (2018)* [21]	Evaluate changes in balance and quality of life (QoL) after total knee arthroplasty (TKA) for primary gonarthrosis	Prospective cohort study with pre-post assessment and age/gender-matched control group	28 patients with mean age 70.18	- Pre- and post-TKA assessments (6 months). - Tools: Motor Scale Test for the Elderly (balance), WOMAC, SF-36 (QoL). - Control group (healthy adults) for balance comparison.	- Balance (Motor Scale Test). - QoL (WOMAC, SF-36). - Comparison to healthy controls.	- All variables improved post-TKA - Balance: Improved but did not reach healthy controls' level - QoL: Significant improvement in all WOMAC/SF-36 domains.
Maren Falch Lindberg, Christine Miaskowski Acta Orthopaedica (2016) [17]	Identify factors influencing functional recovery and health-related quality of life (HRQoL) 1 year after total knee arthroplasty (TKA)	Prospective follow-up study	75 patients (aged 60–80 years; primary TKA	Pre- and postoperative assessments (12 months): - WOMAC (function, pain). - 15D HRQoL questionnaire. - Clinical exam (comorbidity, knee status). - OMERACT-OARSI criteria and population-standardized 15D scores.	WOMAC function score, 15D HRQoL, OMERACT-OARSI	This study states that 29.9% variability in WOMAC function score seen when the patient is osteoporotic having contralateral knee pain , gender and age playing a role in this. If the patient is having less contralateral knee pain and lesser age with absence of any pulmonary disease will increase the HRQoL level of the primary TKA

Gustavo Pacheco, Carlos Eduardo da Silveira, Ricardo de Paula Leite Cury, *Revista Brasileira de Ortopedia (2017) [22]*	Evaluate changes in balance and quality of life (QoL) after total knee arthroplasty (TKA) for primary gonarthrosis	Prospective cohort study with pre-post assessment and age/gender-matched control group	28 patients (70.18 ± 6.17 years; 37 TKAs)	- Pre- and post-TKA assessments (6 months). - Tools: Motor Scale Test for the Elderly (balance), WOMAC, SF-36 (QoL). - Comparison to healthy controls for balance.	- Balance (Motor Scale Test). - QoL (WOMAC, SF-36 domains).	- All variables improved post-TKA ($p \leq 0.05$). - Balance: Improved but did not reach healthy controls' level ($p \leq 0.05$). - QoL: Significant improvement in all WOMAC/SF-36 domains.

Discussion

In the study by Marcos Fernandez and Olga S Pérez-Moro, they observed that knee osteoarthritis significantly affects all dimensions of HRQOL before the operation. After surgery, results from the SF-36 scale showed improvement in 5 out of 8 health dimensions, except for the social dimension. Therefore, it can be stated that TKR significantly improves HRQOL in most dimensions except social functioning.

The same result is observed in many other studies reviewed, hence we can say that TKA significantly improves the lives of patients. However, challenges such as post-operative complications, rehabilitation adherence, and long-term implant durability should be addressed to maximize benefits.

Conclusion

TKR significantly improves the quality of life in patients suffering from severe knee osteoarthritis by reducing pain, enhancing mobility, and improving psychological well-being. Most patients report high levels of satisfaction post-surgery, with increased participation in daily activities and social interactions. However, challenges such as post-operative complications, rehabilitation adherence, and long-term implant durability should be addressed to maximize benefits.

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Conflict of Interest – None

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