Biomedical Sciences
2022; 8(1): 49-52
http://www.sciencepublishinggroup.com/j/bs
doi: 10.11648/j.bs.20220801.18
ISSN: 2575-3924 (Print); ISSN: 2575-3932 (Online)

Outcomes of Total Knee Replacement: A Prospective Observational Study in Bangladesh

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To cite this article:

Mohammad Abdullah Al Muti, Naresh Kumar Roy, Syed Shamsul Arefin, Abdullah Al Mamun, Mohi Uddin Aslam. Outcomes of Total Knee Replacement: A Prospective Observational Study in Bangladesh. *Biomedical Sciences*. Vol. 8, No. 1, 2022, pp. 49-52.
doi: 10.11648/j.bs.20220801.18

Received: January 12, 2022; **Accepted**: January 28, 2022; **Published**: March 15, 2022

Abstract: World-wide, total knee replacement (TKR) is a standard and definitive treatment option following failed adequate non-operative management of knee. After completing total knee replacement for the patients, it is necessary to assess the clinical and functional outcomes of the procedure. We have very few research-based information outcomes of total knee replacement. Aim of the study: The aim of to this study was to assess the clinical and functional outcomes of total knee replacement in patients with knee osteoarthritis. Methods: This prospective observational study was conducted in the Department of Orthopedics, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh during the period from March 2019 to December 2019. In total 37 patients with knee osteoarthritis attended and selected for total knee replacement in the mentioned hospital, maintained proper documentations were finalized as the study subjects. The outcomes of the patients were measured in terms of treatment excellent and good rate, incidence rate of complications, KSS, Hss, VAS and NRS scores. All data were processed, analyzed and disseminated by using MS Office and SPSS version 22 as per need. Results: In this study, the mean (±SD) Hss scores of pre and post TKR among the participants were 56.06±4.17 and 89.83±6.76 respectively. The mean (±SD) KSS scores of pre and post TKR among the participants were 54.17±5.27 and 85.79±8.32 respectively. The mean (±SD) VAS scores of pre and post TKR among the participants were 5.54±1.11 and 1.17±0.23 respectively. The mean (±SD) NRS scores of pre and post TKR among the participants were 5.44±1.05 and 1.25±0.33 respectively. In comparing all the scores between pre and post stages the P values were '<0.0001'. In analyzing the final outcomes among the participants, we observed that, 27.03%, 45.95%, 21.62% and 5.41% participants got 'Excellent', 'Good', 'Acceptable' and 'Poor' results respectively. Conclusion: Total knee replacement (TKR) significantly relieves pain of patients with knee osteoarthritis and ensures improves knee joint function with fewer complications. Considering the prompt healing, less complication and effectiveness of total knee replacement method physicians can take TKR as a prominent treatment option for the knee arthritis patients.

Keywords: Outcomes, Total Knee Replacement, TKR, VAS, Osteoarthritis

1. Introduction

Total knee replacement (TKR) is a standard and definitive treatment option following failed adequate non-operative management of knee. After completing total knee replacement for the patients, it is necessary to assess the clinical and functional outcomes of the procedure. Total knee replacement (TKR) and total hip replacement (THR) have revolutionized the treatment of disabling lower extremity osteoarthritis (OA) [1]. Although more than 90% of patients experience substantial pain relief, THR and TKR are not without risks. [2] Moreover, while THR and perhaps also TKR may be cost saving from a societal perspective [3], the health care system in the United States (US) bears a short-term cost of $20,000/case. Generally, traditional orthopedic practice has been to "delay surgery" until the pain as well as the functional limitation are intolerable.

[2] It has been suggested and reported that, the earlier surgery can decrease the length of hospital stays and can prevent loss in quality of life and function [4]. In a study, they claimed that, knee osteoarthritis is very common in the middle-aged and elderly aged people, generally characterized by degeneration of the knee articular cartilage, complicated with osteophyte formation and osteosclerosis usually accompanied by walking difficulties, arthralgia, limitation of motion and arthrocele. [5] With some main clinical features of severe pain, the disease causes injury of the keen joints and even hyperosteogeny, that has a severe adverse effect on one's work and daily-life [6]. But both drug therapy as well as traditional surgery cannot meet the current clinical needs for such patients [7]. With the development of the awareness of the society, the economic strength and medical technology in China, TKA or total knee arthroplasty, compared with traditional debridement of knee joint, is gradually applied to the treatment of SKOA and significantly it reducing the pain for the patients and also expanding the range of motion (ROM) [8]

2. Methodology

This prospective observational study was conducted in the Department of Orthopedics, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh during the period from March 2019 to December 2019. In total 37 patients with knee osteoarthritis attended and selected for total knee replacement in the mentioned hospital, maintained proper documentations were finalized as the study subjects. As per the inclusion criteria of this study, patients with a HSS score (Hospital for special surgery knee score) less than 60 points, with severe limitation of motion were included. On the other hand, as per the exclusion criteria patient with kidney, heart, brain, liver and other organic diseases, patients with and coagulation disorders and immunological dysfunction, receiving relevant treatment before, patients of mental depression and illness, patients with poor skin conditions or severe osteoporosis or obesity and those patient with latent and active infections were excluded. Routine monitoring of vital signs of patients were ensured. General or epidural anesthesia were applied as per need. Proper incision as well as operative approach were performed in the middle of the knee joints and surfaces were washed with the normal saline immediate after synovium of "suprapatellar bursa" along with "medial and lateral meniscal tissues" were completely removed. The cruciate ligaments were excised, the contracture tissues were released and osteophyte at "proximal and distal tibia" were completely excised to completely expose the tubercle of tibia. The articular surface of tibia was removed through intramedullary positioning. Besides this, the bone with a thickness of 9 to10 mm was cut off to confirm the surface of the osteotomy tilted back by 5 degrees. Then, the lateral sides were released and the deformities were corrected in time with a "rectangular gap" of the femorotibial joint. As per the posterior and anterior diameter of the distal femur, the optimal femoral prosthesis was measured through the debugging and the patella tracking was measured. The knee joints were repeatedly extended and flexed and the "rotational alignment of tibial prosthesis" was marked with the test mold removed and the tibial medullary cavity was treated properly. The limb alignments were defined and the "stability of the joints" were observed in detail at the time of varus and valgus extension and flexion. The prosthesis was inserted into the "medullary cavity" after which was repeatedly washed and the "bone cement" was injected at the same time for fixing the prosthesis. Finally, the incisions ware sutured and bandaged. After three months of treatment, the knee joint functions were assessed with the Hss scores [9], with a total score of 100 points. There 10 points were for joint instability, 10 points for flexion deformity, 10 points for muscle strength, 18 points for ROM, 22 points for function and 30 points were for pain. Higher scores indicate stronger knee joint function [9]. The excellent and good rate was assessed with the Hss scores also. Hss score $\geq$ 60 points and less than 69 points was acceptable. Hss score $\leq$59 points were poor. [10] Hss score $\geq$ 85 points was the indicator of excellent. Pain, swelling, heat, and redness on the incision with exudation of purulent fluid, or exudation of the fluid after suture removal, regardless of whether there was bacteriological evidence were also assessed. In this study, "shortening of lower limb" accompanied by "deformity of external and internal rotation" diagnosed by X-ray. The knee joint functions were assessed with the KSS (Knee society score) also with a total score of 100 points, where 50 points were for pain, 25 points were for stability, 25 points were for ROM. This high defect (deduction) score indicates a strong knee joint function [11]. Besides these, all the Patient's pain was assessed with the VAS (Visual Analogue Scale) with a total score of 10 points. Here lower scores indicate milder pain [12]. After three months of treatment, patient's pain was assessed with NRS (Numerical Rating Scale) [13] also, where 0 indicated painless, 1-3 points indicated mild pain, 4-6 points indicated moderate pain, 7-10 points indicated severe pain. The lower score indicates milder pain. All data were processed, analyzed and disseminated by using MS Office and SPSS version 22 as per need.

3. Result

In this study, among total 37 participants, 43% were male whereas the rest 57% were female. Each of the participants underwent total knee replacement (TKR) in their single limbs. The highest number of the participants were from > 50 years' age group. Besides this, 5.41%, 13.51%, 21.62% and 24.32% participants were from < 20, 20-30, 31-40- and 41-50-years' age groups respectively. As the distribution of the TKR performed the limbs among the participants we observed that, for majority of the participants (57%) TKR was performed for their right knees. Besides this, for 32% and 11% patients TKR was performed for their left and bilateral knees respectively. In this study, the mean (±SD) Hss scores of pre and post TKR among the participants were found 56.06±4.17 and 89.83±6.76 respectively where the P value was less than 0.0001. The mean (±SD) KSS scores of pre and post TKR among the participants were found 54.17±5.27 and 85.79±8.32 respectively where the P value was less than

0.0001. The mean (±SD) VAS scores of pre and post TKR among the participants were found 5.54±1.11 and 1.17±0.23 respectively where the P value was less than 0.0001. The mean (±SD) NRS scores of pre and post TKR among the participants were found 5.44±1.05 and 1.25±0.33 respectively where the P value was less than 0.0001. In analyzing the final outcomes among the participants, we observed that, 27.03%, 45.95%, 21.62% and 5.41% participants got 'Excellent', 'Good', 'Acceptable' and 'Poor' results respectively. In analyzing the complications among the participants, prosthetic loosening, infection and prosthetic dislocation were found in 3, 2 and 1 patients respectively.

Table 1. *Age distribution of the participants (N=37).*

Age (Year)	n	%
<20	2	5.41
20-30	5	13.51
31-40	8	21.62
41-50	9	24.32
>50	13	35.14

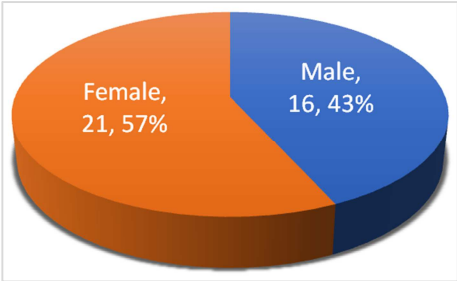

Figure 1. *Gender distribution of the participants (N=37).*

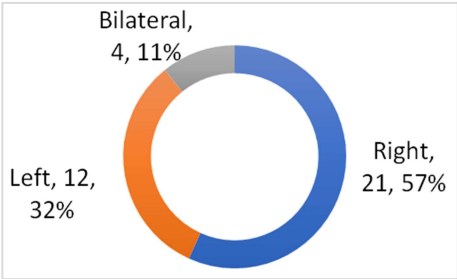

Figure 2. *Distribution of the TKR performed for the limbs among the participants (N=37).*

Table 2. *Changes of mean (±SD) Hss, KSS VAS and NRS scores after TKR among participants (N=37).*

Stages of treatment	Scores	P value
Comparison of Hss scores		
Before treatment	56.06±4.17	<0.0001
After treatment	89.83±6.76	
Comparison of KSS scores		
Before treatment	54.17±5.27	<0.0001
After treatment	85.79±8.32	
Comparison of VAS scores		
Before treatment	5.54±1.11	<0.0001
After treatment	1.17±0.23	
Comparison of NRS scores		
Before treatment	5.44±1.05	<0.0001
After treatment	1.25±0.33	

Table 3. *Final outcomes among the participants (N=37).*

Results	n	%
Excellent	10	27.03
Good	17	45.95
Acceptable	8	21.62
Poor	2	5.41

4. Discussion

The aim of to this study was to assess the clinical and functional outcomes of total knee replacement in patients with knee osteoarthritis. In Bangladesh, the frequency of total knee replacement is increasing day by day. Even, in a study, it was reported that, 10% to 20% of the patients with primary knee osteoarthritis (OA) may need bilateral TKR in less than a year interval [14]. In our study, among total 37 participants, 43% were male whereas the rest 57% were female. Each of the participants underwent total knee replacement (TKR) in their single limbs. The highest number of the participants were from >50 years' age group. In in another study of 45 knees with TKR from 38 patients showed similarity with the findings of us regarding gender, duration of symptoms before TKR, limbs involved, age distribution among the patients [15]. Katchy et al. studied on 52 (20 males and 32 females) patients [16] which also reported a similar distribution of gender, age distribution, laterality and symptoms duration before TKR among patients like ours'. In this current study, the mean (±SD) Hss scores of pre and post TKR among the participants were found 56.06±4.17 and 89.83±6.76 respectively where the P value was less than 0.0001. Besides these, the mean (±SD) KSS scores of pre and post TKR among the participants were found 54.17±5.27 and 85.79±8.32 respectively where the P value was less than 0.0001. The mean (±SD) VAS scores of pre and post TKR among the participants were found 5.54±1.11 and 1.17±0.23 respectively where the P value was less than 0.0001. The mean (±SD) NRS scores of pre and post TKR among the participants were found 5.44±1.05 and 1.25±0.33 respectively where the P value was less than 0.0001. In an Indian study, reported in one-year follow up for function and clinical and outcome of 60 TKRs applying Posterior cruciate substituting prosthesis the improvement of pre-operative clinical score as well as functional KSS score of 24.7 and 41.2 to post-operative score of 89.9 and 87.8 respectively with significant association of improvement of KCS (Knee clinical score) and KFS (Knee functional score) post-operatively [17]. Relationships between mean of preoperative KSS and Postoperative KSS mean using one-way ANOVA in Table 2 reported the progressive increment in the mean of total KSS from preoperative and postoperative respectively with a statistically significant relationship (improvement) p value < 0.05. Along with our study findings, these findings were also similar to some other previous studies [18]. In our study in analyzing the final outcomes among the participants, we observed that, 27.03%, 45.95%, 21.62% and 5.41% participants got

'Excellent', 'Good', 'Acceptable' and 'Poor' results respectively. In analyzing the complications among the participants, prosthetic loosening, infection and prosthetic dislocation were found in 3, 2 and 1 patients respectively. All these findings may be helpful in further similar studies and in the treatment arena of knee osteoarthritis.

Limitation of the study:

This was a single centered study with a small sized sample. So, findings of this study may not reflect the exact scenario of the whole country.

5. Conclusion & Recommendation

Total knee replacement (TKR) significantly relieves pain of patients with knee osteoarthritis and ensures improves knee joint function with fewer complications. Considering the prompt healing, less complication and effectiveness of total knee replacement method physicians can take TKR as a prominent treatment option for the knee arthritis patients. For getting more specific findings we would like to recommend for conducting similar more studies with larger sized samples in several places.

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