

Original Research Article**Factors Affecting Functional Outcome after Total Knee Arthroplasty**Dr. Md. Harun-Or-Rashid Paramanik¹, Dr. Bijon Kumar Saha^{2*}, Dr. Saurav Sikder³¹Registrar, Department of Orthopaedics, Uttara Adhunik Medical College, Dhaka, Bangladesh²Associate Professor, Department of Orthopaedics, Uttara Adhunik Medical College, Dhaka, Bangladesh³Assistant Registrar, Department of Orthopaedics, Uttara Adhunik Medical College Hospital, Dhaka, Bangladesh**Article History****Received:** 02.08.2026**Accepted:** 26.09.2026**Published:** 30.09.2026**Journal homepage:**<https://www.easpublisher.com>**Quick Response Code**

Abstract: Background: Total knee arthroplasty (TKA) is an established treatment for advanced knee disease, but functional recovery varies among patients. Identifying factors associated with postoperative function may help improve patient assessment and rehabilitation planning. **Methods:** This hospital-based observational study included 90 patients who underwent TKA from July 2024 to June 2026 at the Department of Orthopaedic Surgery, Uttara Adhunik Medical College, Dhaka, Bangladesh and selected private clinics within and outside Dhaka. Demographic and clinical characteristics, including age, sex, BMI, comorbidities, preoperative range of motion (ROM), deformity and functional status, were recorded. Postoperative functional outcome, pain improvement, ROM and walking ability were assessed. Data were analyzed using SPSS version 25, with $p < 0.05$ considered statistically significant. **Results:** Good functional outcome was observed in 48 (53.3%) patients, moderate in 29 (32.2%) and poor in 13 (14.4%). Satisfactory pain improvement occurred in 67 (74.4%), while 43 (47.8%) achieved postoperative ROM $> 110^\circ$. Age was significantly associated with outcome ($p = 0.041$), with good outcome in 66.7% of patients aged < 60 years versus 44.4% aged ≥ 60 years. BMI ($p = 0.047$), preoperative ROM ($p = 0.031$) and comorbidity ($p = 0.006$) were also significantly associated with functional outcome. Sex was not significantly associated ($p = 0.248$). **Conclusion:** Functional recovery after TKA was generally favorable. Younger age, lower BMI, better preoperative ROM and absence of comorbidity were associated with better functional outcomes.

Keywords: Total Knee Arthroplasty, Functional Outcome, Osteoarthritis, Range of Motion, BMI, Comorbidity, Rehabilitation.

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Total knee arthroplasty (TKA) is an established surgical treatment for patients with advanced knee osteoarthritis and other debilitating knee disorders who have persistent pain, functional limitation and reduced quality of life despite appropriate conservative management [1]. The principal goals of TKA are to relieve pain, correct deformity, restore knee function and enable patients to return to activities of daily living [2]. Although modern surgical techniques, implant designs, perioperative care and rehabilitation protocols have improved outcomes, functional recovery following TKA remains variable among individual patients [3].

Functional outcome after TKA is influenced by a combination of patient-related, disease-related, surgical and rehabilitation-related factors [4]. Advanced age, obesity, comorbid conditions, prolonged duration of

symptoms, preoperative pain, restricted range of motion and severe knee deformity may affect postoperative recovery [5]. Preoperative functional status is also considered an important determinant because patients with substantial disability before surgery may require longer rehabilitation to achieve satisfactory function [6]. Psychological and social factors, adherence to rehabilitation and access to appropriate postoperative care may further contribute to differences in recovery [7].

Assessment of functional outcome provides important information beyond pain relief alone. Evaluation of knee range of motion, walking ability, activities of daily living, pain and patient-reported functional status can provide a broader understanding of the effectiveness of TKA [8]. Identifying factors associated with favorable or unfavorable functional

*Corresponding Author: Dr. Bijon Kumar Saha

Associate Professor, Department of Orthopaedics, Uttara Adhunik Medical College, Dhaka, Bangladesh

recovery can assist clinicians in preoperative counseling, patient selection, individualized rehabilitation planning and postoperative monitoring [9].

In routine orthopedic practice, understanding these factors is particularly relevant because patients undergoing TKA have diverse demographic and clinical characteristics [10]. Recognition of potentially modifiable factors may also facilitate targeted interventions before and after surgery [11]. Therefore, evaluating functional outcomes and examining their association with relevant demographic and clinical characteristics can provide useful evidence for improving the overall management of patients undergoing TKA [12]. This study was undertaken to assess functional outcome after total knee arthroplasty and to identify factors associated with postoperative functional recovery.

METHODOLOGY & MATERIALS

This hospital-based observational study was conducted among 90 patients who underwent total knee arthroplasty during the period from July 2024 to June 2026 at the Department of Orthopaedic Surgery, Uttara Adhunik Medical College, Dhaka, Bangladesh and selected private clinics within and outside Dhaka. The study aimed to assess functional outcome after total knee arthroplasty and identify factors associated with postoperative functional recovery. Patients aged 18 years

or above who underwent primary total knee arthroplasty for symptomatic end-stage knee osteoarthritis or other degenerative knee conditions and who completed the required postoperative follow-up were included. Patients undergoing revision knee arthroplasty, those with previous major surgery of the affected knee, acute traumatic knee conditions, active or recent knee infection, severe neurological disorders affecting lower-limb function, or incomplete clinical records and follow-up data were excluded. Relevant demographic and clinical information, including age, sex, body mass index, duration of symptoms, affected side, comorbidities, preoperative range of motion, knee deformity and preoperative functional status, was recorded using a structured data collection form. Postoperative functional outcome was assessed during follow-up using a standardized functional assessment of the knee, along with evaluation of pain, range of motion and walking ability. Data were checked for completeness, coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Categorical variables were expressed as frequency and percentage, while continuous variables were presented as mean $\pm$ standard deviation. Associations between relevant clinical factors and functional outcome were assessed using appropriate statistical tests and a p-value of <0.05 was considered statistically significant.

RESULTS

Table I: Demographic and Clinical Characteristics of the Studied Patients (N=90)

Variable	Category	n	%
Age (years)	<50	9	10.0
	50–59	27	30.0
	60–69	35	38.9
	≥ 70	19	21.1
Sex	Male	29	32.2
	Female	61	67.8
BMI (kg/m ²)	<25	18	20.0
	25–29.9	43	47.8
	≥ 30	29	32.2
Duration of knee symptoms	<5 years	31	34.4
	5–10 years	42	46.7
	>10 years	17	18.9
Affected side	Right	47	52.2
	Left	31	34.4
	Bilateral	12	13.3

Table I presents the demographic and clinical characteristics of the 90 studied patients. The majority were aged 60–69 years ($n=35$, 38.9%), followed by 50–59 years ($n=27$, 30.0%), while only 9 patients (10.0%) were under 50. Females predominated ($n=61$, 67.8%) compared to males ($n=29$, 32.2%). Regarding BMI, 43 patients (47.8%) were overweight (25–29.9 kg/m²), 29

(32.2%) were obese (≥ 30 kg/m²) and only 18 (20.0%) had normal BMI (<25 kg/m²). The duration of knee symptoms was 5–10 years in 42 patients (46.7%), less than 5 years in 31 (34.4%) and more than 10 years in 17 (18.9%). The right knee was affected in 47 patients (52.2%), the left in 31 (34.4%) and bilateral involvement was noted in 12 patients (13.3%).

Table II: Preoperative Clinical Characteristics of the Studied Patients (N=90)

Variable	Category	n	%
Primary diagnosis	Primary osteoarthritis	78	86.7
	Rheumatoid arthritis	7	7.8
	Post-traumatic arthritis	5	5.6
Preoperative deformity	Varus	57	63.3
	Valgus	21	23.3
	No major deformity	12	13.3
Preoperative ROM	<90°	24	26.7
	90–110°	48	53.3
	>110°	18	20.0
Comorbidity	None	34	37.8
	Diabetes mellitus	23	25.6
	Hypertension	21	23.3
	Diabetes + hypertension	12	13.3
Preoperative functional status	Poor	28	31.1
	Moderate	47	52.2
	Good	15	16.7

Table II shows the preoperative clinical characteristics of the 90 studied patients. Primary osteoarthritis was the most common diagnosis (n=78, 86.7%), followed by rheumatoid arthritis (n=7, 7.8%) and post-traumatic arthritis (n=5, 5.6%). Varus deformity was present in 57 patients (63.3%), valgus in 21 (23.3%) and no major deformity in 12 (13.3%). Preoperative ROM was 90–110° in 48 patients (53.3%),

<90° in 24 (26.7%) and >110° in 18 (20.0%). Regarding comorbidities, 34 patients (37.8%) had none, 23 (25.6%) had diabetes mellitus, 21 (23.3%) had hypertension and 12 (13.3%) had both diabetes and hypertension. Preoperative functional status was moderate in 47 patients (52.2%), poor in 28 (31.1%) and good in only 15 patients (16.7%).

Table III: Functional Outcome after Total Knee Arthroplasty (N=90)

Functional outcome	Category	n	%
Functional outcome at follow-up	Poor	13	14.4
	Moderate	29	32.2
	Good	48	53.3
Pain improvement	Satisfactory	67	74.4
	Unsatisfactory	23	25.6
Postoperative ROM	<90°	11	12.2
	90–110°	36	40.0
	>110°	43	47.8
Walking ability	Independent	59	65.6
	With walking aid	24	26.7
	Unable to walk independently	7	7.8

Table III shows the functional outcome after total knee arthroplasty in the 90 studied patients. At follow-up, 48 patients (53.3%) had a good functional outcome, 29 (32.2%) had moderate outcome and 13 (14.4%) had poor outcome. Pain improvement was satisfactory in 67 patients (74.4%) and unsatisfactory in

23 (25.6%). Postoperative ROM was >110° in 43 patients (47.8%), 90–110° in 36 (40.0%) and <90° in 11 (12.2%). Regarding walking ability, 59 patients (65.6%) were independent, 24 (26.7%) required a walking aid and 7 patients (7.8%) were unable to walk independently.

Table IV: Association between Selected Factors and Functional Outcome after Total Knee Arthroplasty (N=90)

Factor	Category	Good outcome n (%)	Moderate/Poor outcome n (%)	p-value
Age	<60 years	24 (66.7)	12 (33.3)	0.041
	≥60 years	24 (44.4)	30 (55.6)	
Sex	Male	18 (62.1)	11 (37.9)	0.248
	Female	30 (49.2)	31 (50.8)	
BMI	<30 kg/m ²	37 (60.7)	24 (39.3)	0.047
	≥30 kg/m ²	11 (37.9)	18 (62.1)	

Factor	Category	Good outcome n (%)	Moderate/Poor outcome n (%)	p-value
Preoperative ROM	≥90°	39 (59.1)	27 (40.9)	0.031
	<90°	9 (37.5)	15 (62.5)	
Comorbidity	Absent	24 (70.6)	10 (29.4)	0.006
	Present	24 (42.9)	32 (57.1)	
Preoperative functional status	Good/Moderate	37 (59.7)	25 (40.3)	0.073
	Poor	11 (39.3)	17 (60.7)	

Table IV shows the association between selected factors and functional outcome after total knee arthroplasty. Age was significantly associated with outcome ($p=0.041$), with 66.7% of patients aged <60 years achieving a good outcome compared to 44.4% of those aged ≥60 years. Sex showed no significant association ($p=0.248$). BMI was significant ($p=0.047$), as 60.7% of patients with BMI <30 kg/m² had a good outcome versus 37.9% with BMI ≥30 kg/m². Preoperative ROM was also significant ($p=0.031$), with 59.1% of patients with ROM ≥90° achieving good outcome compared to 37.5% with ROM <90°. Comorbidity was strongly associated with outcome ($p=0.006$), with 70.6% of patients without comorbidity achieving good outcome versus 42.9% with comorbidity. Preoperative functional status was significant ($p=0.073$), with 59.7% of patients with good/moderate status achieving good outcome compared to 39.3% with poor status.

DISCUSSION

In the present study, functional recovery after total knee arthroplasty was generally favorable, with 48 patients (53.3%) achieving a good functional outcome, while 29 (32.2%) had a moderate and 13 (14.4%) had a poor outcome. Similarly, satisfactory pain improvement was observed in 67 patients (74.4%) and 43 patients (47.8%) achieved postoperative knee ROM of >110°. These findings indicate that TKA provided meaningful improvement in pain and physical function for a substantial proportion of patients, although a considerable group continued to have moderate or poor functional recovery.

The demographic profile showed that most patients were 60–69 years old (38.9%) and females constituted 67.8% of the study population. Age was significantly associated with functional outcome ($p=0.041$), with a good outcome observed in 66.7% of patients aged <60 years compared with 44.4% among those aged ≥60 years. This finding is consistent with Ashoorion *et al.*, who identified younger age as a factor associated with persistent postsurgical pain after TKA [13]. Their meta-analysis also demonstrated associations between persistent pain and higher preoperative or acute postoperative pain, supporting the importance of preoperative clinical status in postoperative recovery.

BMI was another significant factor in the present study ($p=0.047$). A good functional outcome was

achieved by 60.7% of patients with BMI <30 kg/m² compared with 37.9% of those with BMI ≥30 kg/m². This finding suggests that greater body weight may be associated with less favorable functional recovery, potentially because of greater mechanical loading and rehabilitation demands. The finding is clinically relevant because functional outcome after TKA is influenced by multiple interacting patient-related and perioperative factors rather than the surgical procedure alone.

Preoperative knee function was also important. Patients with preoperative ROM ≥90° had a good outcome in 59.1% of cases compared with 37.5% among those with ROM <90° ($p=0.031$). In addition, preoperative functional status showed a difference between groups, although the reported association was not statistically significant ($p=0.073$). These findings emphasize that the condition of the knee before surgery may influence the level of functional recovery that can be achieved. Graenicher *et al.*, reported that prehabilitation can improve knee functioning before surgery and during the first year following TKA, supporting the relevance of optimizing physical function before arthroplasty [14].

Comorbidity demonstrated the strongest association in this study ($p=0.006$). Among patients without comorbidity, 70.6% achieved a good outcome compared with 42.9% of those with comorbid conditions. This difference suggests that coexisting medical conditions may complicate rehabilitation and functional recovery. Changjun *et al.*, in a contemporary systematic review of enhanced recovery after total joint arthroplasty, reported that enhanced recovery pathways were associated with improvements in pain, functional recovery and complications, with early mobilization being a consistent component of these pathways [15].

Sex was not significantly associated with functional outcome in our study ($p=0.248$), despite the predominance of females. This suggests that sex alone may not be sufficient to explain differences in postoperative functional recovery. DeFrance and Scuderi emphasized that outcomes and satisfaction after TKA are multifactorial, with sociodemographic, preoperative and postoperative factors contributing to patient experience [16]. Their systematic review found that persistent pain, stiffness, complications and unmet expectations were important contributors to dissatisfaction after TKA.

The present findings indicate that age, BMI, preoperative ROM and comorbidity were significantly associated with functional outcome after TKA, whereas sex was not. The results support careful preoperative assessment and optimization of modifiable factors, together with structured rehabilitation and early mobilization [17,18].

Limitations of the Study

The study was conducted with a relatively small sample of 90 patients, which may limit the generalizability of the findings. The observational design also limits the ability to establish causal relationships between the identified factors and functional outcomes.

CONCLUSION

Functional outcome after total knee arthroplasty was generally favorable, with more than half of the patients achieving a good outcome. Older age, higher BMI, limited preoperative ROM and the presence of comorbidities were significantly associated with less favorable functional recovery, highlighting the importance of comprehensive preoperative assessment and appropriate postoperative rehabilitation.

Financial Support and Sponsorship: No funding sources.

Conflicts of Interest: There are no conflicts of interest.

REFERENCES

1. Clement ND, Scott CE. factors influencing the outcome of total hip and knee arthroplasty. *Arthroplasty*. 2023 Dec 6;5(1):64.
2. 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 Mar 21;17(1):175.
3. Alvarez PM, McKeon JF, Spitzer AI, Krueger CA, Pigott M, Li M, Vajapey SP. Socioeconomic factors affecting outcomes in total knee and hip arthroplasty: a systematic review on healthcare disparities. *Arthroplasty*. 2022 Oct 3;4(1):36.
4. Edwards RR, Campbell C, Schreiber KL, Meints S, Lazaridou A, Martel MO, Cornelius M, Xu X, Jamison RN, Katz JN, Carriere J. Multimodal prediction of pain and functional outcomes 6 months following total knee replacement: a prospective cohort study. *BMC musculoskeletal disorders*. 2022 Mar 29;23(1):302.
5. Fontalis A, Kayani B, Asokan A, Haddad IC, Tahmassebi J, Konan S, Oussedik S, Haddad FS. Inflammatory response in robotic-arm-assisted versus conventional jig-based TKA and the correlation with early functional outcomes: results of a prospective randomized controlled trial. *JBJS*. 2022 Nov 2;104(21):1905-14.
6. Salimy BM, Paschalidis BA, Dunahoe MJ, Alpaugh MK, Bedair MH, Melnic MC. Patients consistently report worse outcomes following revision total knee arthroplasty compared to primary total knee arthroplasty. *The Journal of Arthroplasty*. 2024 Feb 1;39(2):459-65.
7. Cozzarelli MN, Khan MI, Sherman MB, Zaid MM, Lonner MJ. Improvements in noise symptoms, forgotten joint scores and functional outcomes with greater time following total knee arthroplasty. *The Journal of Arthroplasty*. 2025 Feb 1;40(2):386-91.
8. Olsen U, Lindberg MF, Rose C, Denison E, Gay C, Aamodt A, Brox JI, Skare Ø, Furnes O, Lee KA, Lerdal A. Factors correlated with pain after total knee arthroplasty: A systematic review and meta-analysis. *PLoS One*. 2023 Mar 24;18(3):e0283446.
9. Ruangsomboon P, Ruangsomboon O, Pornrattanamaneewong C, Narkbunnam R, Chareancholvanich K. Clinical and radiological outcomes of robotic-assisted versus conventional total knee arthroplasty: a systematic review and meta-analysis of randomized controlled trials. *Acta Orthopaedica*. 2023 Feb 20;94:60.
10. Alrajeb R, Zarti M, Shuia Z, Alzobi O, Ahmed G, Elmhiregh A. Robotic-assisted versus conventional total knee arthroplasty: a systematic review and meta-analysis of randomized controlled trials. *European Journal of Orthopaedic Surgery & Traumatology*. 2024 Apr;34(3):1333-43.
11. Clark GW, Steer RA, Khan RN, Collopy DM, Wood D. Maintaining joint line obliquity optimizes outcomes of functional alignment in total knee arthroplasty in patients with constitutionally varus knees. *The Journal of arthroplasty*. 2023 Jul 1;38(7):S239-44.
12. Riantho A, Butarbutar JC, Fidiastianto K, Elson E, Irvan I, Haryono H, Prasetyo JN. Radiographic outcomes of robot-assisted versus conventional total knee arthroplasty: a systematic review and meta-analysis of randomized clinical trials. *JBJS Open Access*. 2023 May 15;8(2):e23-00010.
13. Ashoorion V, Sadeghirad B, Wang L, Noori A, Abdar M, Kim Y, Chang Y, Rehman N, Lopes LC, Couban RJ, Aminilari M. Predictors of persistent post-surgical pain following total knee arthroplasty: a systematic review and meta-analysis of observational studies. *Pain Medicine*. 2023 Apr 1;24(4):369-81.
14. Graenicher P, Mulder L, Lenssen T, Scherr J, Swanenburg J, De Bie R. Prehabilitation improves knee functioning before and within the first year after total knee arthroplasty: a systematic review with meta-analysis. *journal of orthopaedic & sports physical therapy*. 2022 Oct;52(11):709-25.
15. Changjun C, Jingkun L, Yun Y, Yingguang W, Yanjun R, Debo Z, Kaining Z, Pengde K. Enhanced recovery after total joint arthroplasty (TJA): a contemporary systematic review of clinical outcomes and usage of key elements. *Orthopaedic surgery*. 2023 May;15(5):1228-40.

16. DeFrance MJ, Scuderi GR. Are 20% of patients actually dissatisfied following total knee arthroplasty? A systematic review of the literature. *The Journal of arthroplasty*. 2023 Mar 1;38(3):594-9.
17. Seetharam A, Deckard ER, Ziemba-Davis M, Meneghini RM. The AAHKS clinical research award: are minimum two-year patient-reported outcome measures necessary for accurate assessment of patient outcomes after primary total knee arthroplasty?. *The Journal of Arthroplasty*. 2022 Aug 1;37(8):S716-20.
18. Konishi T, Hamai S, Tsushima H, Kawahara S, Akasaki Y, Yamate S, Ayukawa S, Nakashima Y. Pre-and postoperative Coronal Plane Alignment of the Knee classification and its impact on clinical outcomes in total knee arthroplasty. *The bone & joint journal*. 2024 Oct 1;106(10):1059-66.

Citation: Paramanik, M. H.-O.-R., Saha, B. K., & Sikder, S. (2026). Factors Affecting Functional Outcome after Total Knee Arthroplasty. *EAS J Orthop Physiother*, 8(5), 121-126. <https://doi.org/10.36349/easjop.2026.v08i05.002>
