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## **Comparative analysis of functional outcome in patients who undergo total knee arthroplasty with or without patellar resurfacing**

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**Abstract**--TKA is one option to relieve pain and to restore function to an arthritic knee. The decision to resurface the patella during TKA remains controversial. We have performed this clinical trial study to examine the efficacy and short term outcomes of TKA with and without patellar resurfacing. To compare -the functional outcome in patients who underwent TKR with patellar resurfacing or without patellar resurfacing. To compare frequency and severity of anterior knee pain and other complications in both groups (TKA with or without PR). The study was conducted on 68 patients in department of orthopedics at DMC Ludhiana. The study was divided into two groups. Patients who underwent resurfacing(n=14) and who did not undergo resurfacing of patella(n=54) Pre-op and Post-op pro forma (at minimum six months of follow up), and WOMAC score was recorded to assess various factors which affect patient satisfaction. Significant difference was observed on comparing the WOMAC score preoperative and 4 weeks after surgery with WOMAC score after 4 weeks being significantly less then preoperative WOMAC score. At 24 weeks follow up the WOMAC score in patients with patellar resurfacing was significantly less ( $1.29\pm 2.16$ ) than the other group ( $3.35\pm 3.19$ ).

However, at 6 months post op follow up the score did not show any significant difference. There is no statistically significant difference in 24 weeks post-operative WOMAC score in both groups so we concluded that it is not necessary on a regular basis to resurface the patella during primary TKA.

**Keywords**--TKR, WOMAC, VAS, anterior knee pain.

## **Introduction**

Every year, more than one in every five people suffers from knee discomfort, with one-third of these people seeking medical help[1]. These complaints comprise a large spectrum of ailments including sports injuries, trauma, infectious diseases, and degenerative diseases. Osteoarthritis (OA) of the knee is one of the most prevalent causes of knee discomfort, especially in older people. It is a joint condition in which degeneration and loss of articular cartilage occurs, leading to pain, impairment in performing daily activities, and worsening of quality and quantity of gait[2].

Non-surgical management is the mainstay of treatment for patients who initially present with patello-femoral osteoarthritis. A stepped care approach consisting of painkillers (usually non-steroidal anti-inflammatory drugs (NSAIDs), shoe inlays, muscle strength exercises and intra-articular injections with corticosteroids can give (temporary) relief and allow patients to function satisfactorily for a longer period of time. Additionally, specialized programs in which orthopaedic surgeons work together with physical therapists both before and after TKA surgery can improve muscle strength postoperatively [3]. When nonoperative treatment fails, surgical options can be considered.

TKA is the most performed and most extensively researched surgical treatment of knee OA worldwide[4]. TKA has extensively been used to treat end-stage OA of the knee for the last half century. During TKA surgery, the destructed bone and cartilage surface is removed and replaced with a metal femoral and tibial component with a polyethylene (PE) insert in between. If necessary, the articular surface of the patella can also be replaced with an inlay or onlay patella component. With TKA, most patients experience significant pain reduction and regain knee function [5]. The most effective treatment of the patello-femoral joint during total knee arthroplasty (TKA) remains controversial, and according to different national arthroplasty registries there is a remarkable variation between countries in whether the patella is resurfaced or not[6].

Whether resurface the patella or not in total knee arthroplasty (TKA) is still controversial. Due to different school of thoughts and results of studies done, it is necessary to establish the strongest evidence available in support of the procedure. The present study was conducted with the aim of comparing the functional outcome in patients who underwent TKR with patellar resurfacing or without patellar resurfacing and also frequency and severity of anterior knee pain and other complications in both groups were compared using WOMAC score at

0,4.24 weeks respectively.

## **Material and Method**

This prospective study was conducted on 68 patients in department of orthopedics at DMC Ludhiana from 1st Sept 2019 to 7th July, 2021 (Including 6 month Follow-up). After obtaining clearance and approval from the institutional ethical committee, patients were enrolled on the basis of the inclusion / exclusion criteria after obtaining informed consent.

### **Inclusion criteria**

- Patients undergoing primary TKR for knee arthritis.
- Patients willing to participate in the study.

### **Exclusion criteria**

- Patients undergoing revision knee replacement.
- Patients not willing to participate in the study

The study population was divided into two groups. Patients who underwent resurfacing (n=14) and who did not undergo resurfacing of patella(n=54) Pre-op and Post-op proforma (at minimum six months of follow up), and WOMAC score was recorded to assess various factors which affect patient satisfaction.

## **Results**

Out of the total 68 patients majority were in the age group of 61-70 year (32 patients, 47.1%), with mean age being  $62.72 \pm 7.53$  years. study population predominantly consisted of females (79.4%). It was observed that in 98.5% of patients were diagnosed with osteoarthritis while 1.5% were diagnosed with osteoarthritis and rheumatoid arthritis. 55.9% patients (38) underwent bilateral knee replacement, 26.5% patients (18) with left side total knee replacement and 17.6% patients (12) with right sided total knee replacement. Maximum patients in present study had symptoms for less than 2 years. The mean pre-op WOMAC score of patients was  $82.38 \pm 1.99$  (out of 68 patients) with a range of 75-88. Mean post op- WOMAC score at 4 week was  $29 \pm 5.97$  with a range of 17-43, at 24 weeks was  $2.93 \pm 3.11$  with a range of 0-11 (fig 1). It was observed that WOMAC score at 4 and 24 weeks was significantly less than preoperative score. Also highly significant difference was observed between score at 4 weeks and 24 weeks (Table 1). It was observed that on comparing two groups with respect to age, gender and duration no significant difference was observed between two groups (Table 2). It was observed that on comparing the WOMAC score between the patients who underwent patellar resurfacing and did not underwent patellar resurfacing, it was observed that at 24 weeks follow up the WOMAC score in patients with patellar resurfacing was significantly less ( $1.29 \pm 2.16$ ) than the other group ( $3.35 \pm 3.19$ ). However, at 4 months post op follow up the score did not show any significant difference (Table 3).

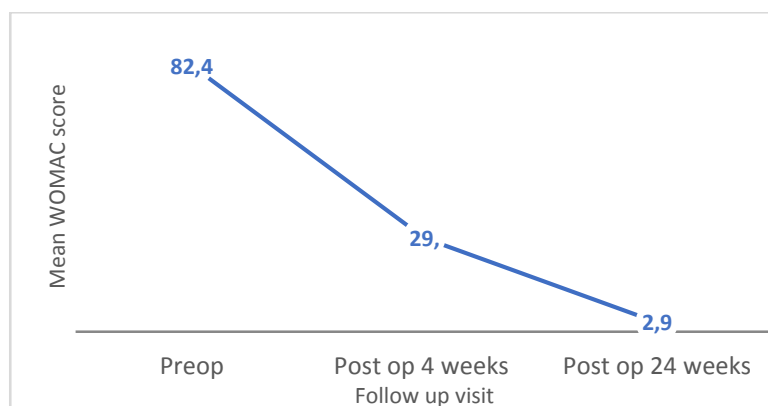


Figure 1. Preoperative and postoperative WOMAC score

Table 1  
Comparison of WOMAC score at different time interval

WOMAC SCORE		Mea n	SD	t	p- value
WOMAC PREOP (82.38±1.99)	WOMAC POSTOP 4 WEEKS	29	5.97	76.438	0.001
	WOMAC POSTOP 24 WEEKS	2.93	3.11	0.38	0.001
WOMAC POSTOP 4 WEEKS (29±5.97)	WOMAC POSTOP 24 WEEKS	2.93	3.11	48.102	0.001

Table 2  
Comparison of Various parameters between the 2 groups

Parame ters	PATELLAR RESURFACING		p- value
	NO	YES	
Age	62.85±7.43	62.21±8.16	0.780
Gender (Female)	42(77.8%)	12(85.7%)	.513
Duratio n (>2years)	30(55.6%)	9(64.3%)	.556

Table 3  
Comparison of WOMAC score in patient with and without patellar resurfacing

PATELLAR RESURFACING	NO		YES		t-value	p-value
	Mean	SD	Median	SD		
WOMAC PREOP	82.48	2.05	82.00	1.71	0.807	0.423
WOMAC POSTOP WEEKS 4	29.61	5.92	26.64	5.77	1.681	0.098
WOMAC POSTOP WEEKS 24	3.35	3.19	1.29	2.16	2.286	0.025
WOMAC POSTOP WEEKS difference 4	52.87	5.71	55.36	5.73	-1.452	0.151
WOMAC POSTOP WEEKS difference 24	79.13	3.39	80.71	2.20	-1.655	0.103

## Discussion

TKA is one option to relieve pain and to restore function to an arthritic knee[7-9]. The most common reason for knee replacement is that other treatments such as: weight loss, exercise/physical therapy, medicines, and injections have failed to relieve arthritis-associated knee pain. The decision to resurface the patella during TKA remains controversial. We have performed this clinical trial study to examine the efficacy and short term outcomes of TKA with and without patellar resurfacing [10-12]. In the present study the age range of the patient was 44-79 years with mean age being  $62.72 \pm 7.53$  years. A study conducted by Kaseeb et al.[13] on 50 patients comparing results between Patellar Resurfacing and Non-resurfacing in Total Knee Arthroplasty also reported the mean age of the  $64.8 \pm 7.8$  years. In a study by ha et al the mean age was  $65.2 \pm 5.4$  with age range 58–70 years[14].

In present study the female predominance was observed with Male to female ratio of 1:3.8. Kaseeb et al.[13] in their study observed male:female to be 1:5. Ha et al.[14] in their study reported that there were 38(63.3%) women and 22 (32.7%) men in their study. OA is the most prevalent chronic disease affecting more than 59% of Americans older than 65 years, and this disease affects a higher

percentage of women than men [15,16]. The number of women undergoing TKA continues to rise at a higher rate than men[15]. Meta-analysis and meta-regression have been used to better define site-specific gender differences in prevalence, incidence, and severity of OA [17]. Men tend to have a reduced risk of OA of the knees, whereas women, especially those older than 55 years, reportedly have more severe disease in the knees at presentation. This gender difference in disease presentation has been associated with a number of factors, including hormonal influences [18] and cartilage thickness[19]. Both men and women have an increased risk of developing OA of the knees with increased body weight [20-22].

Majority patients (42.5%) in present study had symptoms for less than 2 years in present study. The patients desire to move to the surgical treatment early in disease could be due to awareness regarding the procedure. Also being a common and cost-effective intervention associated with generally favorable outcomes it is now being preferred by population suffering with a chronic and disabling knee pain. It has been observed that in India there has been a steady rise in the number of TKRs being reported to the registry from a mere 1019 in 2006 to around 27,000 in 2019. Also analysis of operation funding brings light to the fact that of the reported surgeries to the IJR in the period from April 2016 to August 2017 and April 2019, majority of surgeries were covered under insurance [23].

In present study 98.5% of patients were diagnosed with osteoarthritis while 1.5% were diagnosed with osteoarthritis and rheumatoid arthritis. This data was in accordance to the survey done by Vaidya et al.[23] where also an overwhelming majority of the patients (approx. 98.5%) were diagnosed with osteoarthritis knee and 1.15% patients had rheumatoid arthritis. In a study by Metsna et al. also reported majority (90.7%) of the knees involved in the study suffered from osteoarthritis, 8.2% from rheumatoid arthritis, and the remaining 1.1% were impaired either by ankylosing spondylitis, psoriatic arthritis or knee dysplasia [24]. In present study in 54 (79.4%) patients patellar resurfacing was not performed while in 14(20.6%) it was performed. No significant association was observed on comparing two groups with respect to age groups, gender and duration of symptoms in patients who underwent patellar resurfacing and who did not underwent patellar resurfacing. Similar findings were obtained by Ikejiani et al.[25], who observed no significant difference between two groups with respect to these parameters. In a study by kaseeb et al.[14] also No significant differences were seen in the baseline characteristics between the resurfaced and non-resurfaced groups, including age (P=0.92), gender (P=1.00). In a study by Aunan et al also the baseline characteristic were same for both the groups[8]. WOMAC score was used in the present study to evaluate the functional outcome. The WOMAC (Western Ontario and McMaster Universities) osteoarthritis index 5-point Likert version was used to detect patients for OA. The WOMAC index is the best validated and most widely used outcome measure in subjects with knee osteoarthritis[26].

In present study Significant difference was observed on comparing the WOMAC score preoperative and WOMAC score after 4 weeks and 24 weeks of surgery with WOMAC score after 4 weeks ( $29 \pm 5.97$ ) and 24 weeks ( $(2.93 \pm 3.11)$ ) being

significantly less than preoperative WOMAC score ( $82.38 \pm 1.99$ ). Also on comparing WOMAC score after 4 weeks and 24 weeks significant improvement in the pain was seen at 24 weeks after surgery. Budhiparama et al.[27] did a retrospective cohort study in which WOMAC scores were improved significantly from mean of 70.25 to 33.36. In our study WOMAC score pre-operative was  $82.38 \pm 1.99$  and postoperatively at 24 weeks reduced to  $2.93 \pm 3.11$ . In a study by Vina et al.[28] also the baseline score was  $35.52 \pm 17.03$  which decreased to  $11.86 \pm 13.04$  after surgery. According to Zoe H. et al study conducted on total 204 patients there was significant improvement with WOMAC scores preoperatively  $54.3 \pm 14.4$  to postoperatively  $14.5 \pm 12.1$ [29]. Chi Jin et al.[30] compared WOMAC score pre operatively and at 1 month, 3 months and 6 months the mean of which was 45.03 preoperatively and 32, 25 and 21.58 respectively postoperatively. All these studies were in accordance to the present study. According to Baker et al [31] WOMAC scores rose from 39.9 points before surgery to 77.7 points one year after surgery which is in contrast to our study[32].

It was observed that on comparing the WOMAC score between the patients who underwent patellar resurfacing and did not undergo patellar resurfacing, at 24 weeks follow up the WOMAC score in patients with patellar resurfacing was significantly less ( $1.29 \pm 2.16$ ) than the other group ( $3.35 \pm 3.19$ ). However at 4 weeks post op follow up the score did not show any significant difference. This implies that patients who underwent patellar resurfacing were more satisfied than who did not undergo resurfacing at 4 weeks. The results of the present study were in accordance to study done by Kaseeb et al[32] who showed no significant difference in WOMAC score between the two groups pre and postoperatively. The WOMAC score post operatively in their study of patients who underwent resurfacing was 23.80 (16.7) while who did not undergo resurfacing it was 18.79 (15.7). Though it was less for patients who underwent resurfacing the difference was not significant, but in present study we obtained the significant difference. Feng et al. in their study demonstrated that, the non resurfacing group had a higher rate of AKP (13.2% vs 5.2%) and higher rate of postoperative subluxation, the clinical outcome evaluations with the HSS knee score, the patellar score, AKP, patellar complications, and the postoperative WOMAC score were not statistically significantly different after more than 10 years of follow-up between the patellar resurfacing and non-resurfacing groups [32].

## Conclusion

Our result was consistent with studies of the outcome of patellar resurfacing after TKA. Regarding the studies, more knee surgeons have concluded that it is not necessary on a regular basis to resurface the patella during primary TKA.

## References

1. Picavet HSJ, Schouten JSAG. Musculoskeletal pain in the Netherlands: prevalences, consequences and risk groups, the DMC(3)-study. *Pain*. 2003;102:167-78.

2. Wilson R, Blakely T, Abbott JH. Radiographic knee osteoarthritis impacts multiple dimensions of health-related quality of life: data from the Osteoarthritis Initiative. *Rheumatology (Oxford)*. 2018;57:891–9.
3. Calatayud J, Casaña J, Ezzatvar Y, Jakobsen MD, Sundstrup E, Andersen LL. High-intensity preoperative training improves physical and functional recovery in the early post-operative periods after total knee arthroplasty: a randomized controlled trial. *Knee Surgery, Sport Traumatol Arthrosc*. 2017;25:2864–72.
4. W-Dahl A, Robertsson O, Lidgren L. Surgery for knee osteoarthritis in younger patients. *Acta Orthop*. 2010;81:161–4
5. Van Egmond JC, Verburg H, Mathijssen NMC. The first 6 weeks of recovery after total knee arthroplasty with fast track. *Acta Orthop*. 2015;86:708–13
6. Schindler OS. The controversy of patellar resurfacing in total knee arthroplasty: Ibisne in medio tutissimus?. *Knee Surgery, Sports Traumatology, Arthroscopy*. 2012;20:1227–44.
7. Wood DJ, Smith AJ, Collopy D, White B, Brankov B, Bulsara MK. Patellar resurfacing in total knee arthroplasty: a prospective, randomized trial. *J Bone Joint Surg Am*. 2002;84-A:187–93.
8. Barrack RL, Wolfe MW. Patellar resurfacing in total knee arthroplasty. *J Am Acad Orthopaed Surg*. 2000;8:75–82.
9. Fu Y, Wang G, Fu Q. Patellar resurfacing in total knee arthroplasty for osteoarthritis: a meta-analysis. *Knee Surg Sports Traumatol Arthrosc*. 2011;19:1460–6.
10. He JY, Jiang LS, Dai LY. Is patellar resurfacing superior than nonresurfacing in total knee arthroplasty? A meta-analysis of randomized trials. *Knee*. 2011;18:137–44.
11. Epinette JA, Manley MT. Outcomes of patellar resurfacing versus nonresurfacing in total knee arthroplasty: a 9-year experience based on a case series of scorio PS knees. *J Knee Surg*. 2008;21:293–8.
12. Ong K, Lau E, Manley M, Kurtz SM. Patient, hospital, and procedure characteristics influencing total hip and knee arthroplasty procedure duration. *J Arthroplasty*. 2009;24:925–31.
13. Kaseb MH, Tahmasebi MN, Mortazavi SJ, Sobhan MR, Nabian MH. Comparison of clinical results between patellar resurfacing and nonresurfacing in total knee arthroplasty: a short term evaluation. *Archives of Bone and Joint Surgery*. 2018;6:124.
14. Ha C, Wang B, Li W, Sun K, Wang D, Li Q. Resurfacing versus not resurfacing the patella in one-stage bilateral total knee arthroplasty: a prospective randomized clinical trial. *International orthopaedics*. 2019;43:2519–27.
15. Hootman JM, Sniezek JE, Helmick CG. Women and arthritis: burden, impact and prevention programs. *J Womens Health Gend Based Med*. 2002;11:407–416.
16. Peyron J, Altman R. The epidemiology of osteoarthritis. In: Moskowitz R, Howell D, Goldberg V, Mankin J, eds. *Osteoarthritis: Diagnosis and Medical/Surgical Management*. 2nd ed. Philadelphia, PA: WB Saunders; 1992:15–37.
17. Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex differences prevalence, incidence and severity of osteoarthritis.



- Osteoarthritis and Cartilage/OARS, Osteoarthritis Research Society. 2005;13:769-81.
18. Richmond RS, Carlson CS, Register TC, Shanker G, Loeser RF. Functional estrogen receptors in adult articular cartilage: estrogen replacement therapy increases chondrocyte synthesis of proteoglycans and insulin-like growth factor binding protein 2. *Arthritis Rheum.* 2000;43:2081-90.
  19. Faber SC, Eckstein F, Lukasz S, Muhlbauer R, Hohe J, Englmeier KH, et al. Gender differences in knee joint cartilage thickness, volume and articular surface areas: assessment with quantitative three-dimensional MR imaging. *Skeletal Radiol.* 2001;30:144-50.
  20. Felson DT, Zhang Y, Hannan MT, Naimark A, Weissman BN, Aliabadi P, et al. The incidence and natural history of knee osteoarthritis in the elderly. The Framingham Osteoarthritis Study. *Arthritis Rheum.* 1995;38:1500-05.
  21. Franklin PD, Li W, Ayers DC. Functional outcome after total knee replacement varies with patient attributes. *Clin Orthop Relat Res.* 2008;466:2597-2604.
  22. Hochberg MC, Lethbridge-Cejku M, Scott Jr WW, Reichle R, Plato CC, Tobin JD. The association of body weight, body fatness and body fat distribution with osteoarthritis of the knee: data from the Baltimore Longitudinal Study of Aging. *J Rheumatol.* 1995;22:488- 493
  23. Vaidya SV, Jogani AD, Pachore JA, Armstrong R, Vaidya CS. India Joining the World of Hip and Knee Registries: Present Status-A Leap Forward. *Indian J Orthop.* 2020;55:46-55.
  24. Metsna V, Vorobjov S, Märtson A. Prevalence of anterior knee pain among patients following total knee arthroplasty with nonreplaced patella: a retrospective study of 1778 knees. *Medicina (Kaunas).* 2014;50:82-6.
  25. Ikejiani CE, Leighton R, Petrie DP. Comparison of patellar resurfacing versus nonresurfacing in total knee arthroplasty. *Can J Surg.* 2000;43:35-8.
  26. Sathiyarayanan S, Shankar S, Padmini SK. Usefulness of WOMAC index as a screening tool for knee osteoarthritis among patients attending a rural health care center in Tamil Nadu. *Int J Community Med Public Health* 2017;4:4290-5.
  27. Budhiparama NC, Gaudiani MA, White PB, Satalich J, Nelissen RG, Ranawat AS, et al. A comparison of clinical and patient-reported outcome measures of TKR: Comparison of Asian to North American patients. *Journal of Orthopaedic Surgery.* 2019;27:2309499019844551.
  28. Vina ER, Hannon MJ, Kwok CK. Improvement following total knee replacement surgery: exploring preoperative symptoms and change in preoperative symptoms. *Semin Arthritis Rheum.* 2016;45:547-55.
  29. Dailiana ZH, Papakostidou I, Varitimidis S, Liaropoulos L, Zintzaras E, Karachalios T, et al. Patient-reported quality of life after primary major joint arthroplasty: a prospective comparison of hip and knee arthroplasty. *BMC musculoskeletal disorders.* 2015;16:366.
  30. Jin C, Feng Y, Ni Y, Shan ZL. Virtual reality intervention in postoperative rehabilitation after total knee arthroplasty: a prospective and randomized controlled clinical trial. *Int J Clin Exp Med.* 2018;11:6119-24.
  31. Baker P, Muthumayandi K, Gerrand C, Kleim B, Bettinson K, Deehan D. Influence of body mass index (BMI) on functional improvements at 3 years

- following total knee replacement: a retrospective cohort study. *PLoS one*. 2013;8:e59079.
32. Feng B, Ren Y, Lin J, Jin J, Qian W, Weng X. No difference in clinical outcome and survivorship after total knee arthroplasty with patellar resurfacing and nonresurfacing after minimum 10-year follow-up. *Medicine (Baltimore)*. 2020;99:e19080.