Comparative Study of Functional Outcome at Six Months Following TKA in Low and High Socio-Economic Population

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ABSTRACT

Introduction: Osteoarthritis is one of the most common causes of knee pain and it affects millions of people around the world. Majority of population undergoes total knee arthroplasty at varied ages of their life. We plan to compare the functional outcome at six months following total knee arthroplasty in low and high socio-economic population.

Material and Methods: A prospective study conducted duration from Aug 2012 to April 2014 which consisted of 46 patients were divided into two groups: Group A High socioeconomic – 24; Group B Low socioeconomic – 22. Inclusion criteria were patients with primary osteoarthritis of the knee and patients with Rheumatoid arthritis and revision TKA were excluded. Evaluation was done using Knee society score, VAS Score and Modified Kuppusamy Socioeconomic status scale.

Results: VAS score decreased from 8.18 to 1.18 in low socioeconomic group and 8.13 to 1.58 in high socioeconomic group. KSS score showed significant difference ($p<0.001$ and $p<0.01$) between the two groups at pre-operative time, but were similar by the send of six month post-operatively. The range of movements mean differences ranged from 115.45-113.33degrees. DVT prophylaxis was required for a longer time due to poor pain tolerance and delay in mobilization in high socioeconomic group when compared to low socioeconomic group.

Conclusions: Knee society score was varied at the pre-op time but by the end of six month it was similar. Low socioeconomic group required lesser duration of prophylaxis as they had better pain tolerance and early mobilization. VAS Score higher in high socioeconomic patients. Both groups at the end of six months similar range of movements.

Keywords: Knee Society Score, Visual Analog Score, Total Knee Arthroplasty

INTRODUCTION

Osteoarthritis is one of the most common causes of knee pain and it affects millions of people around the world. It is characterized by pain (commonly over the medial joint line) and associated with varus or valgus deformity. It is commonly seen in obese individuals, people who squat for longer periods and in those who frequently use staircase.[1]

It usually presents with pain over the knee joint which aggravates on squatting, sitting cross-legged and climbing stairs. Other symptoms such as night pain, numbness, tingling and radiating pain are rare. The physical examination is marked by joint line tenderness, crepitus and painful range of movements. In severe cases, fixed flexion deformity, restricted range of movements with varus or valgus deformity can be present. The pathological features are characterized by progressive cartilage destruction, subchondral cyst formation with sclerosis of the surrounding bone, osteophyte formation and capsular fibrosis. The histological appearance is characterized by increased cellularity, appearance of clusters of chondrocytes. In late stages, there is complete loss of cartilage in some areas exposing the bone. We planned to compare the functional outcome at six months following TKA in low and high socio-economic population.

Literature review of long term follow up of many TKA designs suggests that TKA improves the overall functioning of otherwise painful degenerative knee. This alleviates the pain and improves the function and has positive impact over patient's psycho-social status.

This study is aimed at understanding the functional outcome in low and high socio-economic population after a period of six months following TKA. This study will also help in learning the difficulties faced by the low socioeconomic population post operatively if any.[2-4]

MATERIAL AND METHODS

It was a prospective study carried out from August 2012 to April 2014. The study consisted of 46 patients, selected based on inclusion exclusion criteria and divided into two groups: Group A High socioeconomic – 24; Group B Low socioeconomic – 22. Inclusion criteria were patients with primary osteoarthritis of knee and exclusion criteria included patients with rheumatoid arthritis and revision TKA. Evaluation was done clinically using Knee society score (KSS), VAS Score and Modified Kuppusamy Socioeconomic status scale.

Surgical technique

All patients were operated under spinal and epidural anaesthesia with the patient in supine position. Patient in supine position with knee in 90 degrees of flexion, under tourniquet control a midline parapatellar approach was used to expose knee joint. Following the soft tissue balancing, tibial and femoral surfaces were prepared. Patella was prepared. Appropriate size of components was used. The tourniquet is deflated, hemostasis is secured. Wound is closed in layers with interrupted sutures and overlaid by continuous sutures. Suction drain is fixed. Sterile dressing and compression bandage are applied with knee brace. Post-OP rehabilitation protocol followed as Day 1: Deep Vein Thrombosis (DVT) prophylaxis with Low Molecular Weight (LMW) heparin, in bed mobilization, deep breathing exercises. Day 2: Continuous Passive Movement (CPM), wound inspection and drain removal, patients were on epidural catheter for minimum of two to four days post operatively. Mobilize the

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patient to make them stand/walk with walker support. Day 5, 8 11: Wound inspection. Day 14: Suture removal.

Factors constant

- Single surgeon
- Surgical technique
- Surgical approach – Midline para patellar approach
- Post-operative rehabilitation protocol
- Implants – Smith and Nephew Genesis II with Deep dished polyethylene / PCL sacrificing

STATISTICAL ANALYSIS

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and the mean and S.D were used for continuous variables. To find the significant difference between the bivariate samples in Paired groups the Paired sample t-test was used. For the multivariate analysis in repeated measures the Repeated measures of ANOVA was used with Bonferroni correction to control the type I error on multiple comparison. In all the above statistical tools the probability value .05 is considered as significant level.

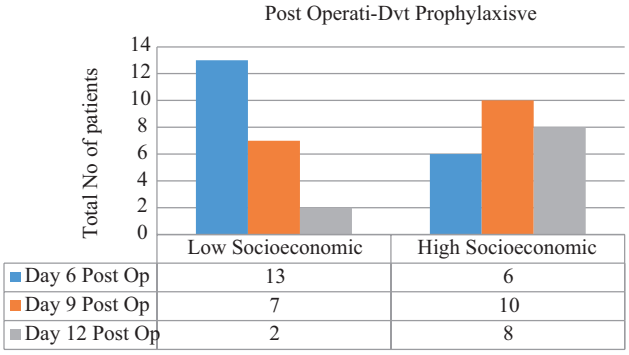

Figure-1: Showing duration of post-op DVT prophylaxis in low and high socioeconomic groups.

RESULTS

In our study, sex distribution was 11 males and 13 female patients in high socioeconomic group while 10 males and 12 female patients in low socioeconomic group.

The VAS scores were then compared between the two socioeconomic groups and significance level was computed. The data shows that there was a tremendous decrease in the VAS score from the 2nd post-operative day and significant difference was noted between these groups p (<0.001). The VAS came down from 7.59 (1st day post-operative) to 5.77 (2nd day post-operative) in low socioeconomic group. But the decrease from the 2nd day to the 5th day post-operative was gradual in low socioeconomic group. Contrastingly, the decrease in the values of VAS scores of high socioeconomic groups was gradual from the 1st day to the 24th week post-operative period. VAS scores of both high and low socioeconomic groups reached similar levels at 24th weeks post operatively and were not significantly different.

The Knee society scores given in Table 1 showed significant difference ($p<0.001$ and $p<0.01$) between the two groups at pre-operative, time of discharge, 3rd week and 6th week post-operative with a 't' value of 4.62,4.24,3.85, and 3.05 respectively. There were no significant differences between the 18th week and 6th month post-operative period between the low and high socioeconomic groups.

The range of movement showed significant difference between the two socioeconomic groups at the pre-operative and the 6th week post-operative period at ($p<0.01$) with 't' values of 2.91 and 2.89 respectively. There was significant difference with a

Knee society score	Low socio –economic (n=22)		High socio-economic (n=24)		Mean Difference	't'-value	p-value
	Mean ± SD	SE	Mean ± SD	SE			
Pre-operative	44.05±5.78	1.23	51.25±4.78	0.98	7.21	4.62	0.000***
Time of discharge	64.32±2.77	0.589	60.37±3.46	0.71	3.94	4.24	0.000***
3rd week Post-operative	72.05±3.76	0.802	68.46±2.48	0.51	3.59	3.85	0.000***
6th week Post-operative	79.86±4.70	1.003	76.13±3.57	0.73	3.74	3.05	0.000**
18th week Post-operative	87.14±3.39	0.725	85.21±3.92	0.80	1.93	1.77	0.083
6th month Post-operative	92.32±2.63	0.56	91.83±2.76	0.56	0.49	0.61	0.546
** p<0.01 and *** p<0.001							

Table-1: Significance of mean difference between low and high socio-economic groups - (Knee society score)

	Our study	Davis et al[6] study	Jasvinder et al[11]study (ODDS RATIO)	Papakostidou et al[16] study
Pre op VAS score	8.13 High 8.18 Low	(WOMAC - PAIN) 47.2 High income Low income	1.0 High income 0.68 Low income	(WOMAC) 11.7 High 12.3 Low
Post op VAS Score	1.58 High 1.18 Low	WOMAC – PAIN 76.5 High income 69.6 Low income	0.9 High income 0.9 Low income	WOMAC-Pain 1.7 High 1.1 Low
Pre-op KSS Score	51.25 High 44.05 Low	WOMAC – FUNCTION High income 44.0 Low income	0.99 High income 1.1 Low income	WOMAC-Function 41.6 High 38.9 Low
Post op KSS Score	91.83 High 92.32 Low	WOMAC – FUNCTION 69.0 Low income High income	2.0 High income 1.2 Low income	WOMAC-Function 88.7 High 92.3 Low

Table-2: Comparison of our study with various other studies

Figure-2 (a, b, c, d): Pre-operative and post-operative radiograph of patient

p-value of 0.028 ($p<0.05$) at the 3rd week after the TKA surgery. The requirement of DVT prophylaxis was decided upon post-operative mobilization status of the patient. We found that high socioeconomic group patients were on DVT prophylaxis for a longer time due to poor pain tolerance and delay in mobilization when compared to low socioeconomic group as shown (Figure-1).

DISCUSSION

Our results demonstrated that patients from low and high socio-economic group did not have significant difference in pre-op VAS scores but had significant differences in pre-op Knee society scores and Range of Motion. This is in accordance with the results by Davis et al[6] where the authors have demonstrated that patients in low socio-economic group had a significantly worse preoperative WOMAC pain and function scores than that of higher socioeconomic group.

Our study also demonstrated that the low socioeconomic group outperformed the high socioeconomic group on second post-operative day with a lower VAS score of 5.77±0.75 compared to 7.29±0.86 of the high socioeconomic group ($p<0.001$). This result is in concordance with the results demonstrated by Davis et al.[6]

Jasvinder et al[11] (2013) did a prospective study in 974 patients undergoing TKA. Pre-operative of the details of the patient demographics, socio-economic status, income and education were assessed. They found that lower income patients had better pain tolerance and functional activity at two years. Our study results were in accordance with this study.

Papakostidou et al[16] did a study on place of residence, level of education and social support of the patients following TKA. The results of our study and this study were in accordance with respect to the parameters compared.

A comparative table of our study with various other similar studies is given in Table 2.

CONCLUSION

In this short-term analysis, we found that low socioeconomic group have early better outcome compared to high socioeconomic group. The low socioeconomic group, had poor pre-operative knee society score when compared with high socioeconomic group, but their (low socioeconomic group) scores were significantly high at 3rd and 6th week post-operatively. In low socioeconomic group, the post op VAS score is comparatively lower than high socioeconomic group, which in turn reflected in the less usage of post-operative analgesia in low socioeconomic group. At six months both groups had similar range of movements, but low socioeconomic group achieved early range of movements compared to high socioeconomic group (within six weeks). Duration of DVT prophylaxis was less in low socioeconomic group because of early mobilization and functional recovery.

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