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**Dr. Parthasarthy M Pandian**  
Assistant Professor, Department  
of Orthopaedics, Meenakshi  
Medical College and Research  
Institute, Enatur, Kanchipuram,  
Tamil Nadu, India

**Dr. K Arul Vignesh**  
Post Graduate, Department of  
Orthopaedics, Meenakshi  
Medical College and Research  
Institute, Enatur, Kanchipuram,  
Tamil Nadu, India

**Dr. D Thulasi Raman**  
Assistant Professor, Department  
of Orthopaedics, Meenakshi  
Medical College and Research  
Institute, Enatur, Kanchipuram,  
Tamil Nadu, India

## Analysis of functional outcome of total hip arthroplasty in lower socio economic people

**Dr. Parthasarthy M Pandian, Dr. K Arul Vignesh and  
Dr. D Thulasi Raman**

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### Abstract

**Background & Objectives:** Total hip arthroplasty is one of the most successful and cost-effective treatment for end-stage arthritis. An individual's socioeconomic status, typically based on income and educational level, occupation and cultural practices has been shown to have an effect on the long term functional outcomes of total hip arthroplasty. Previous studies have shown that patients from a lower socioeconomic class had surgery at a relatively earlier age, had more comorbidities, frequently presented late with severe symptoms and less optimal patient's satisfaction with surgery. Most of the studies on lower socio economic status and total hip Arthroplasty have been reported from western literature. The purpose of this study was to investigate the functional outcome of total hip arthroplasty and to analyze specific dimensions of total hip arthroplasty in lower socio economic population from Tamil Nadu.

**Materials & Methods:** we analysed a total of 45 patients [22 females and 23 males] in the age group of 25-70 yrs. with a mean age of 49 years, who had undergone total hip replacement in our hospitals and other private hospitals had been followed up in our hospital due to various reasons including financial constraints for a period of 6 months to 2 years. These people are categorized by modified Kuppusamy classification-2007. Outcome measures used were Harris hip score; visual analogue scale and patient's level of satisfaction.

**Results:** There was a significant improvement in Harris hip scores at 6 months compared to pre-operative scores in 50% of patients. Of the forty five patients, five had dislocation, two patients had infection. Seven patients had radio lucent areas in the acetabular zone and femoral zones, three patients had underwent secondary procedures for complications following THR. In our study Nearly 60 % (Twenty Seven in number) of our patients had suffered from complications. Functional outcome of the patients was evaluated using modified Harris hip score, thirteen had excellent outcome, eighteen patients had good and ten had fair outcome, four patients had poorer outcome. The mean pre op Harris hip score was 38 and the post-operative mean Harris hip score was 84. The mean visual analogue scale was improved from pre op score of 9.5 to 1.6 post operatively.

**Conclusion:** Total hip arthroplasty is increasingly done for the patients from lower socio economic status because of state funding and health insurance. There is a relative lack of evidence from Indian literature on the functional outcome of total hip arthroplasty in this sector of people. People with lower socioeconomic status had a greater severity of hip disease with mean Harris hip score of 38 and pre op visual analogue scale of 9.5. Lower income and lesser education contribute to poorer outcome and adverse complications after total hip arthroplasty. We had wide range of complications in 60% of our patients. Persistent pain being the commonest one. Thirty one patients have obtained good to excellent functional outcome and about 30% of patients have not been satisfied after surgery.

By proper health education, thereby creating awareness among them and providing improved access to health care for those with lower income and education, we can decrease the disparity in the outcome in this specific population.

**Keywords:** Total hip arthroplasty, lower socio economic status, complications, functional outcome

### Introduction

Total hip arthroplasty is one of the most successful and cost effective treatments for end-stage arthritis.1 Incidence of total number of hip replacements for past one decade is exponentially increasing in India. Till recent past, people with cost affordability and people from higher socio economic status with sedentary lifestyle were under went replacement surgery. Lately, total hip replacement surgeries were increasingly done for lower socio economic class people

### Correspondence

**Dr. Parthasarthy M Pandian**  
Assistant Professor, Department  
of Orthopaedics, Meenakshi  
Medical College and Research  
Institute, Enatur, Kanchipuram,  
Tamil Nadu, India

in south India. An individual's socioeconomic status usually depends on income and educational level, which have been shown to have an impact on the outcomes of total hip arthroplasty. Recognizing the differences in outcomes and identifying ways to reduce the differences will be beneficial to individuals undergoing total hip arthroplasty, which will build a better foundation for future orthopaedicians. In this region, people from lower socio economic status where many of them are manual labourers, agriculture workers, industrial workers and the life style of them are entirely different; which are very unusual and force a relatively higher demand on their prosthesis, which ultimately influences the outcome of total hip arthroplasty. Because of state funding, cost is no longer a determinant factor hence, total hip replacements have been increasing in numbers in lower socio economic group people. Our study mainly evaluates the problems following total hip arthroplasty in relation to the people who are economically backward. These people are categorized by modified kuppusamy classification-2007.

This paper studies the follow up results and complications of total hip replacements in lower socio economic condition and how their daily routine activities like sitting cross-legged, squatting, carrying heavyweights, strenuous physical activity are influencing the outcome. The patients had been operated for total hip replacement and they have been followed up periodically at regular intervals. The outcome analyzed based on the clinical, radiographic assessment and hip scoring systems, and factors like pain relief, function, activities of daily living and early complication like infections, dislocation, loosening and difficulties in activities related to low socio economics status. This study also paves a channel for planning a protocol for selection of patient, technique of surgery & rehabilitation in this sector of people.

**Materials & Methods**

**AIMS & objectives of the study**

1. To analyse the functional outcome of total hip arthroplasty in people belonging to lower socio economic group people.
2. To analyse specific problems of hip arthroplasty in lower socio economic group people.

**Source of Data**

This prospective study was carried out from June 2016 to November 2018 in patients who underwent total hip Arthroplasty for various hip problems in the Department of Orthopedics, Meenakshi Medical College & Research Institute, Kanchipuram. The patients were operated in our hospital and who were underwent hip replacement under the state government scheme at other hospitals and had followed up at our hospital. The patients who had been operated at other private hospitals, followed up in our hospitals due to heavy costs involved or due to complications. A total of 45 patients [22 females and 23 males] with a mean age of 49 years were operated and followed for a period of 6 months to 2 years.

**Scoring system**

The careful assessment of pre operative hip status and the results is necessary to evaluate and compare different methods of treatment in hip surgery this is difficult because of the many factors involved. Modified Harris Hip Scoring System is a reliable method of assessment based on simple and well defined objective and subjective criteria which includes Pain, Function, Range of Motion, and Absence of deformity. The maximum score with this system is 100 with 44 points for

pain, 47 points for function, 5 points for range of motion, 4 points for absence of deformity. Based on the Harris Hip Score (HHS), the results were divided into excellent, good, fair and poor as below:

- Excellent: > 90 points
- Good: 80-89 points
- Fair: 70-79 points
- Poor: <70 points

In India socio economic classification is done using the modified kuppusamy scale it uses three criteria which are enumerated below

<b>(A) Education</b>	<b>Score</b>
1. Profession or Honours	7
2. Graduate or post graduate	6
3. Intermediate or post high school diploma	5
4. High school certificate	4
5. Middle school certificate	3
6. Primary school certificate	2
7. Illiterate	1
<b>(B) Occupation</b>	<b>Score</b>
1. Profession	10
2. Semi-Profession	6
3. Clerical, Shop-owner, Farmer	5
4. Skilled worker	4
5. Semi-skilled worker	3
6. Unskilled worker	2
7. Unemployed	1

**(C) Family income per Month (in Rs)**

S. No	Modified for 1998	Modified for 2007	Income per Month	Score
1	2000	13500	19575	12
2	1000-1999	3750-13499	9788-19574	10
3	750-999	5050-6749	7323-9787	6
4	500-749	3375-5049	4894-7322	4
5	300-499	2025-3374	2936-4893	3
6	101-299	676-2024	980-2935	2
7	<100	<675	< 979	1

<b>Total Score</b>	<b>Socioeconomic class</b>
26-29	Upper (I)
16-25	Upper Middle (II)
11-15	Middle Lower middle (III)
5-10	Lower Upper lower (IV)
<5	Lower (V)

**Surgical procedure**

Patient preparation: patient is prepared extending from the anterior superior iliac spine to the toes with sterile betadine scrub. Antibiotic prophylaxis: Give the first dose or antibiotics within an hour before the skin incision. Anesthesia: epidural/spinal Position the patient in either the lateral or supine position.

**Exposure**

In the anterolateral exposure, make an incision directly over the proximal lateral femur centered on the greater trochanter. The iliotibial band is divided in the direction of its fibers and the interval between the tensor fascia lata and gluteus maximus is Splitted, a retractor is placed over the ilium to hold the soft tissues out of the field. In the posterior exposure, incision is made centered over the greater trochanter. The

distal limb is parallel to the femur and the proximal limb is parallel to the gluteus maximus muscle fibers. The iliotibial band is splitted in the direction of its fibers and the fascia of the gluteus maximus in the direction of its fibers in line with the skin incision gluteus maximus is split using a muscle-splitting technique. Sciatic nerve is Identified and preserved. The piriformis tendon is Identified and its fascia is divided. The short external rotators from the posterior femur is cut and retracted to expose the posterior hip capsule. Then capsular incision made inferiorly and superiorly that extends from inferior to superior, then take the capsule down from the femur, leaving it attached to the posterior wall of the acetabulum.

**Hip joint**

Dislocate the hip and identify the lesser trochanter. With the neck guides, femoral neck is osteotomized with an oscillating saw. Retractors are placed carefully all around the acetabulum to avoid injury to neurovascular structures.

**Acetabular cup**

Cemented Acetabulum, All remaining soft tissues and cartilage are removed from the acetabulum. Transverse acetabular ligament is preserved. sequential reaming of the acetabulum done to create a hemisphere of bleeding subchondral bone. Holes for cement fixation made in the ilium, pubis, and ischium. Trial reduction done. Cement is inserted into the socket and the bone. Socket is inserted into the acetabulum. The optimal inclination of the socket is 45 degrees. The optimal degree of ante version is 20 degrees.

**Uncemented acetabulum**

Osteophytes and soft tissues are removed to visualize the acetabulum. Transverse ligament is excised. Sequential larger reamers were used to expose a bleeding hemisphere of subchondral bone. Trial reduction done. Prosthesis of size 1 or 2 mm larger than the size of the last reamer to obtain a good press-fit. Acetabular screws is used to augment the fixation. The best area is the superior dome of the acetabulum in the ilium. Trial liner in the socket is placed.

**Femoral preparation**

**Cemented femur**

Femur is prepared with broaches. Trial reductions is Performed and anterior and posterior hip stability, leg length, and soft-tissue tension is verified. The intramedullary canal is cleaned with pulsatile lavage and dried. The cement is introduced into the canal by finger packing technique. Femoral component is Introduced into the canal and held it improper position until all cement has hardened.

**Uncemented**

Femur is prepared with broaches. Trial reductions is Performed and anterior and posterior hip stability, leg length, and soft-tissue tension is verified. Press fit fixation of femoral stem obtained. Irrigation of the wound and fragments of cement or bone are removed. Good hemostasis obtained.

**Wound closure**

In anterolateral approach, the gluteus minimus, medius, and vastus lateralis muscles to their beds is reattached using strong absorbable or nonabsorbable sutures passed through

bone. In posterolateral approach, capsule and short external rotators to the posterior aspect of the abductors and the greater trochanter is reattached.



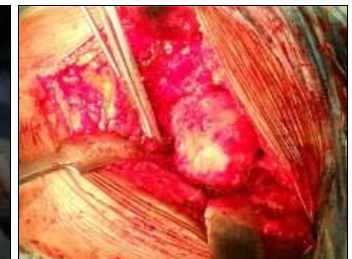
Lateral Position



Skin Incision



Arthritic femoral head



acetabular preparation



Uncemented Acetabular Cup



Acetabular Cup Insertion



Uncemented Stem



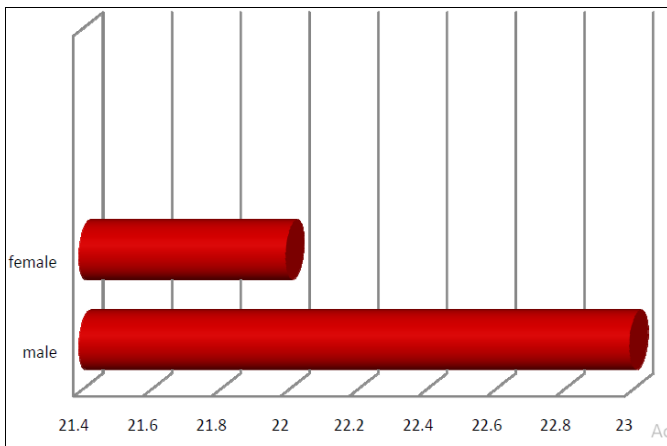
Stem Insertion



Femoral Head Placement

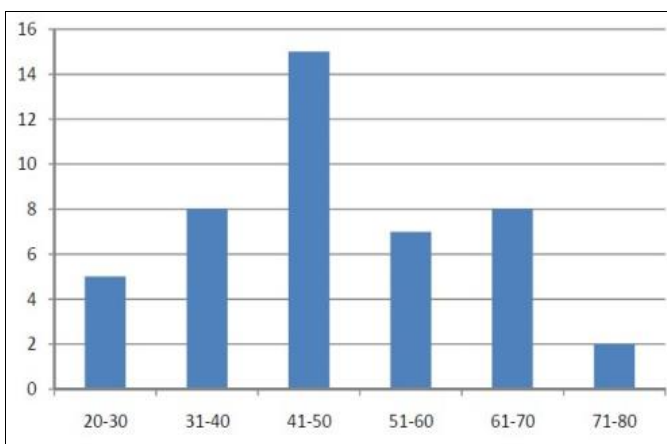


Wound Closure



**Fig 1:** Sex distribution

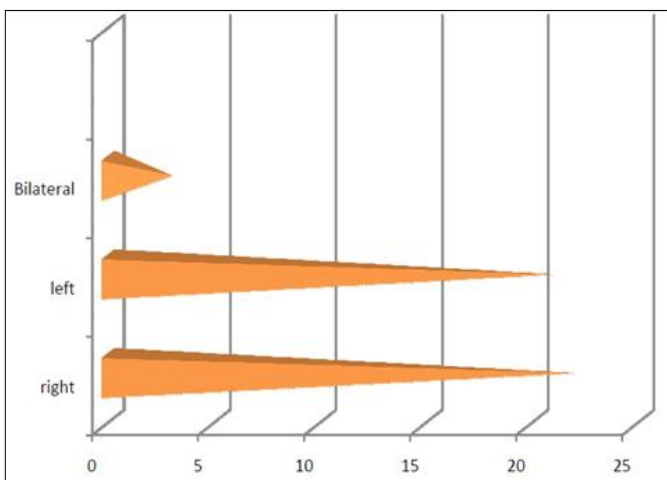
A total of 45 patients [22 females and 23 males] with a mean age of 49 years.



**Fig 2:** Age distribution

The above chart shows the age distribution of patients in our study, majority of our patients were between forty to fifty, age group.

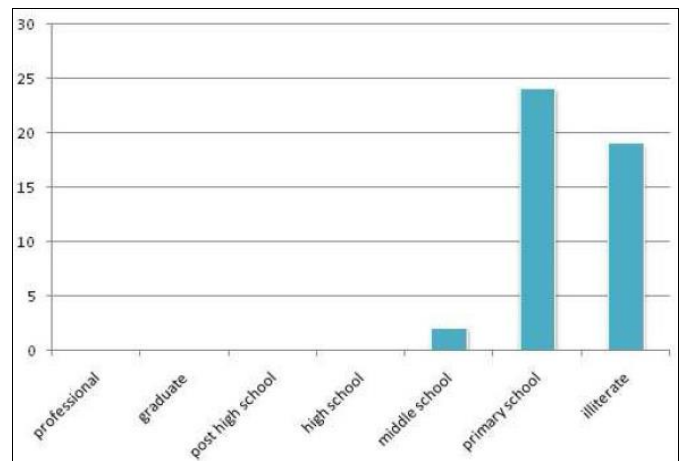
**Results**



**Fig 3:** Side

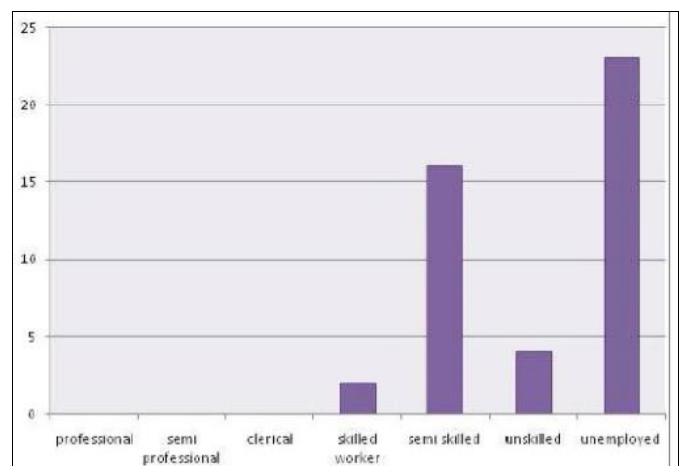
In our study we had seen twenty one patients with right and left hip replacement, each and three patients had bilateral hip replacement. Of the forty five patients who had underwent total hip

arthroplasty, Underwent thirty two patients had degenerative arthritis, eleven patients had fracture neck of femur and one patient had tuberculosis hip and one patient inflammatory arthritis (Ankylosing Spondylitis).

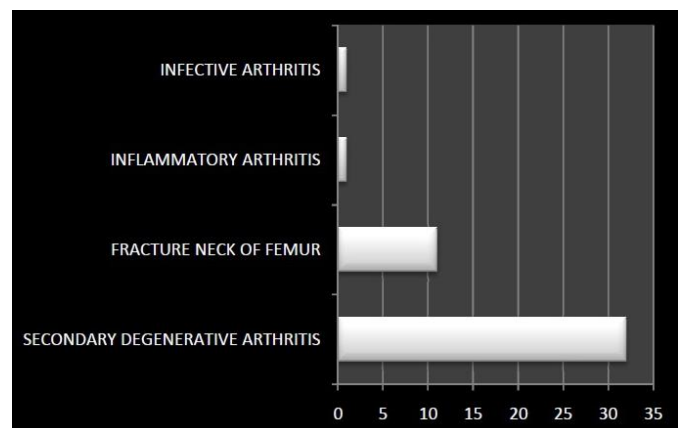


**Fig 4:** Education status

SECO Due to the importance of education in evaluating the socioeconomic status of the person, we found that majority of our patients had finished primary school and illiterate, In our study nineteen patients were illiterate, twenty four had attended primary school.



**Fig 5:** Occupation



**Fig 6:** Diagnosis

Also a detailed questioning of the patients employment was done, majority of the patients employed either as semiskilled

or unskilled workers contributing to about three fourth of our study population. Ten patients have become unemployed due to the severe disease had quit working, who were previously employed as unskilled labourers.

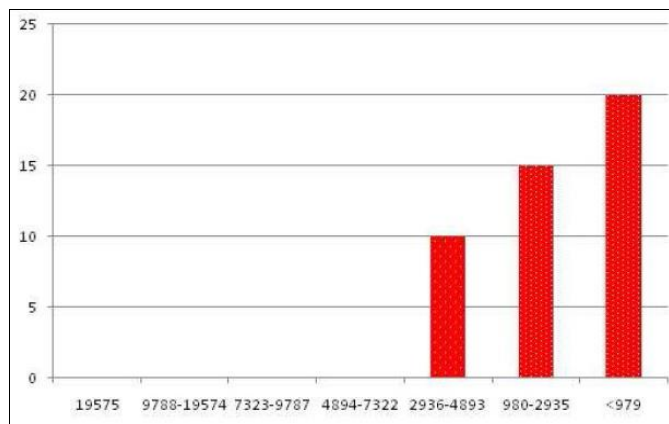


Fig 7: Income per month

Majority of our patients earning less than 3000 rupees per month. Most of them engaged in hard physical work which imposes on heavy demand on the prosthesis and leads to prolonged preoperative disability.

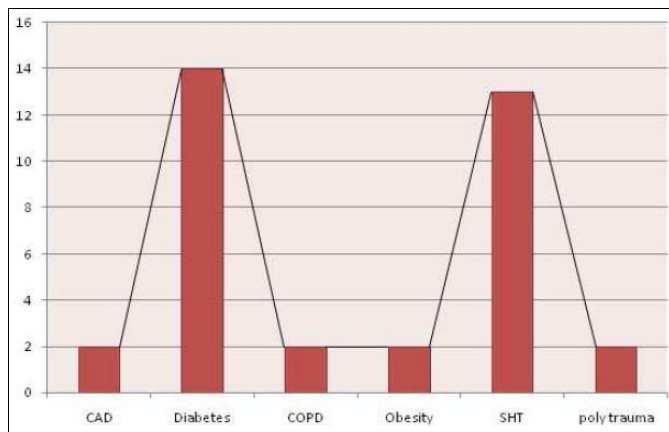


Fig 8: Associated comorbid condition

In our study group we had also evaluated the presence of other comorbid conditions we found that most patients had diabetes and systemic hypertension, half of which were found during the evaluation for surgery. Diabetes was the most common associated condition. Comorbid conditions are an important determinant influencing the outcome of socioeconomic status on total hip Arthroplasty.

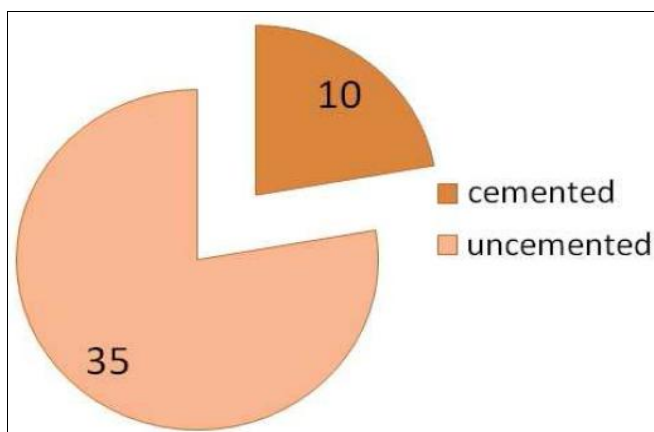


Fig 9: Types based on cementation

Thirty five patients had underwent uncemented total hip Arthroplasty and ten patients had cemented total hip Arthroplasty

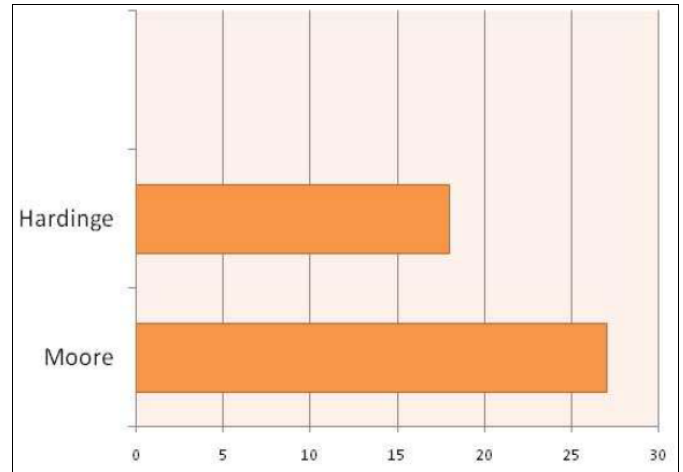


Fig 10: Approach

Of the 45 patients. Twenty seven patients had underwent total hip Arthroplasty by Moore approach and eighteen patients had total hiparthroplasty by Hardinge approach. The patients were and in the period following it. The patients who had developed complications were reevaluated and appropriate treatment was started. The precise identification of complication is inappropriate treatment and explaining the prognosis to the patient. Complications arising following surgery can reduce the functional outcome of replacement surgery.

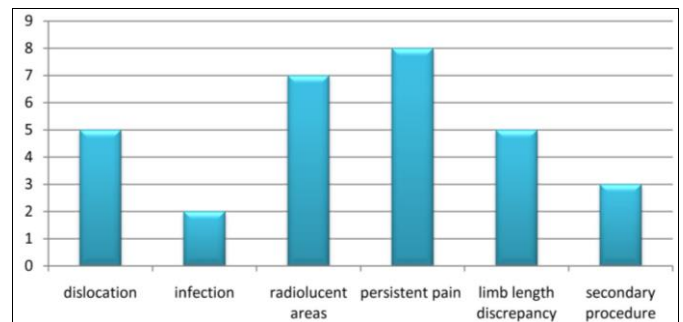


Fig 11: Complications

Of the forty five patients, five had dislocation with two dislocation occurred in the immediate post op period and three had later. Two patients had infection. Seven patients had radio lucent areas in the acetabular zone and femoral zones, eight had persistent pain, five had limb length discrepancy and three patients had underwent secondary procedures for complications following THR.

In our study nearly 60% (Twenty Seven in number) of our patients had suffered from complications. Dislocations were found in five patients (11.1%) These patients were found to have a decreased satisfaction following surgery. Dislocations had decreased the overall functional outcome of the Arthroplasty. Two patients was not able to strictly adhere to the rehabilitation programme. Two patients had dislocation in the immediate post operative period, one patient had gotaway with closed reduction and another one had undergone open reduction. Another presentation was combined acetabular cup dislocation and infection, one patient with uncemented cup had dislocation had been revised with acetabular component, one had recurrent dislocation.

Infection was another dreaded complication, in our study we observed two patients with infection (4.4%). A patient had infection in the early post operative period and he was successfully treated with antibiotics and dressing. Another had infection leading to chronic state, cup dislocation, and persistent pain.

Loosening was another set of specific complication encountered in total hip arthroplasty. Post operatively, seven of our patients (15.5%) had developed radiolucent areas in the acetabular and femoral zones, and not compelling to the diagnosis of loosening and these patients were on aregular follow up.

Five of our patients (11%) had post operative limb length discrepancy which leads to walking difficulties and preventing from returning to their job.

Three of our patients (6.6%) had undergone secondary procedures. one patient underwent closed reduction under anesthesia, one underwent open reduction, one patient had revision of the acetabular component.

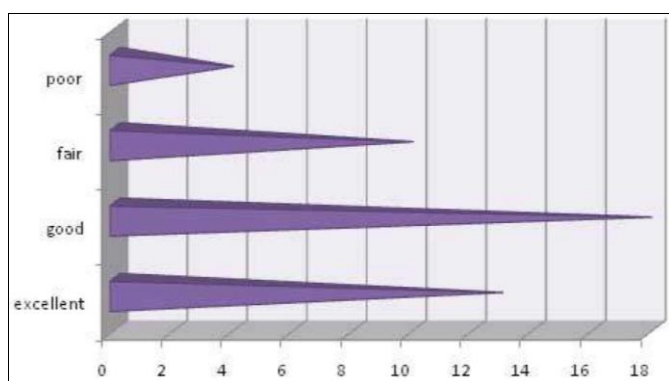


Fig 12: Functional outcomes

Functional outcome of the patients was evaluated using modified Harris hip score, thirteen had excellent outcome, eighteen patients had good and ten had fair outcome, four patients had poorer outcome.

## Discussion

Total hip replacement (THR) is a cost-effective elective procedure undertaken to relieve pain and improve quality of life for patients suffering from severe end-stage arthritis. Our study evaluates the functional outcome of THR in people from lower socioeconomic status, and to identify the factors contributing to the discrepancy in the functional outcome. The impact of lower socioeconomic status in total hip replacement is described from the west and the scarcity of the data in Indian studies is noteworthy to mention it.

Nelson<sup>[2]</sup> identified factors contributes to health care discrepancy revealed that more than 30% were attributed to socioeconomic status. Gomes concluded that the disparity in the functional outcome could be influenced by racial, ethnic and socioeconomic determinants. We defined our study people as per modified kuppusamy classification which includes occupation, income and education<sup>[3]</sup>.

Nath *et al.*<sup>[4]</sup> states that the demands and need of our Indian patients is entirely different from what is described in literature. He also states that the Indian patients are having the greater pain tolerance than western patients which were related to the prolonged pre-operative hip disease, which were comparable to the results in our series where mean preoperative Harris hip score is 38 and mean visual analogue scale is 9.5. Agabiti *et al.*<sup>[5]</sup> concludes from his study that People with lower socioeconomic status experience a greater

severity of hip symptoms and poorer preoperative hip status due to delayed presentations, which could be attributed to their socio economic status.

In our study nearly 30 patients comes under the class of lower socioeconomic class, with nineteen patients are illiterate and twenty four patients had completed the primary school. Many of the Lower socio economic group people living in remote areas, where there is an access to standard health care facilities are difficult and distant, and high pain tolerance, subsequently leading to delayed presentations are one of the important contributing factors for the poorer outcome of total hiparthroplasty. Nearly 46% of our patients were illiterate in our study which leads to lack of awareness of effective intervention for arthritis. This prevented them from getting an earlier expert consultation.

This finding correlates lesser education and low income contributes to poorer outcome which were substantiated by studies by fort in *et al.*<sup>[6]</sup> and Cummings *et al.*<sup>[7]</sup> They stated that patients with lesser education had poorer outcomes after total hip arthroplasty and by means of poorer nutrition; income may contribute to poor health status. In our series we had nearly seventy percent of patients earning less than 3000 rupees per month which significantly influenced the functional outcome of Total hip arthroplasty. Wang<sup>8</sup> and Dixon<sup>9</sup> concludes Income may also have on impact on the outcome of arthroplasty via its indirect influence on fall prevention. Greater income may allow for the easier correction of mutable factors like glasses for poor vision and walkers for individuals with walking difficulties.

We had 33% of patients with co morbid conditions with majority of them had diabetes and hypertension who had lower level of satisfaction after Total hip arthroplasty. Jenny Eachus *et al.*<sup>[10]</sup> Nera Agabiti *et al.*<sup>[11]</sup> Pasqualina *et al.*<sup>[12]</sup> states clear association between greater comorbidity and decreasing socioeconomic status. Comorbid conditions generally assumed to affect the prosthesis longevity leading to lower functional outcome and sub optimal satisfaction scores. In our series we had 50 % of patients who were heavy manual laborers imposing greater biomechanical stress on the prosthesis, substantiated by Gomes who concludes more vigorous physical activities involved the daily routine are characteristic of this particular population which leads to greater mechanical demand on the prosthetic components.

Majority of our patients had undergone Total hip arthroplasty by state health insurance scheme. Zhan *et al.*<sup>[13]</sup> Ellis B *et al.*<sup>[1]</sup> reports that people operated with private insurance tends to have lesser complications. People with these private insurance have been reporting at an earlier state, prolonged hospital stay, easily accessible to standard health care, ability to undergo multiple health visits after surgery.

Mahomed NN *et al.*<sup>[14]</sup> Webb BG *et al.*<sup>[15]</sup> Thierry Scheerlinck *et al.*<sup>[16]</sup> concludes Complications are one of the finest ways of assessing the functional outcomes after THR. When complications do occur like wound infection, deep vein thrombosis, hematoma, dislocations, and pneumonia. They reported that the increased incidence of adverse complications inpatients with lower income and education level. In our study Nearly 60 % (Twenty Seven in number) of our patients had suffered from complications. Dislocations were found in five patients (11.1%). Our dislocation rates are relatively high when compared to the results found in literature which is 5% which clearly shows that lesser education plays an adverse role in the functional outcome of total hip arthroplasty.

Clement<sup>[17]</sup> concludes from his study that socioeconomic status is an independent variable affecting the early patient

assessed outcome, rate of dislocation and ninety day mortality after THR.

In our study we have experienced five dislocations of which one went for revision, two patients who had sustained in the immediate post op period, one patient successfully went away with closed reduction and another had underwent open reduction, one patient had recurrent dislocation, another had loosening leading to acetabular cup dislocation. Both of them deferring the further intervention due to financial restraints and non-compliance.

Infection was another dreaded complication, in our series, two patients developed infection (4.4%), our results were comparable with Nath *et al.* [4], who reported an infection rate of 6.4%. we had two patients developed infection; one was successfully treated with antibiotics addressing and another had developed deep infection with secondary complications, subsequently leading to poorer outcome. Our results were correlated with Mahmood *et al.* [18] who concludes that Individuals with lower income have higher rates of mortality and wound infections. An increased risk of infection is a complication with increased prevalence rates in those people with a lower income or education level.

### Conclusion

- Total hip arthroplasty is increasingly done for the patients from lower social economic status because of state funding and health insurance.
- There is a relative lack of evidence from Indian literature on the functional outcome of total hip arthroplasty in this sector of people.
- People with lower socioeconomic status had a greater severity of hip disease with mean Harris hip score of 38 and pre op visual analogue scale of 9.5.
- Lower income and lesser education contribute to poorer outcome and adverse complications after total hip arthroplasty.
- We had wide range of complications in 60% of our patients Persistent pain being the commonest one.
- Thirty one patients have obtained good to excellent functional outcome and about 30% of patients were not satisfied after surgery.
- By proper health education, thereby creating an awareness among them and providing improved access to health care for those with lower income and education, we can decrease the disparity in the outcome in this specific population.

Ex 1:47yrs. old female working as construction labourer and an illiterate suffering from chronic arthritis left hip had undergone uncemented total hip arthroplasty.



**Fig 13:** Shows the fixed flexion deformity of left hip.



**Fig 14:** Pelvic radio graph shows the reduced joint space in the left hip.



**Fig 15:** Shows the Post-operative radio garph at one month follow up



**Fig 16:** Shows patient had returned to her previous job

### References

1. Ellis Henry BA, Howard Krista JB, Khaleel Mohammed. Influence of socioeconomic status on outcome of joint replacement surgery. *Current Orthopaedic Practice*. 2010; 21(2):132-137.
2. Nelson A. Unequal treatment: confronting racial and ethnic disparities in health care. *J Nat Med Assoc*. 2002; 94:666-668.
3. Kumar N, Shekhar C, Kumar P, Kundu AS. Kuppaswamy's Socioeconomic Status Scale Updating for Indian J Pediatr. 2007; 74:1131-2.
4. Rajendra Nath, Anil Kumar Gupta, Unmesh Chakavarthy, Rohit Nath. Primary cemented total hip arthroplasty: 10 years follow up. *Indian journal of orthopaedics*. 2010; 44(3):283-288.

5. Nera Agabiti *et al.* The influence of socioeconomic status on utilization and outcomes of elective total hip replacement: a multicity population-based longitudinal study. *International Journal for Quality in Health Care.* 2006-2007; 19(1):37-44.
6. Clement ND. Socioeconomic status affects the early outcome of total hip replacement. *Journal of Bone and Joint Surgery British.* 93-B(4):464-469.
7. Cummings SR, Nevitt MC, Browner WS, Stone K, Fox KM, Ensrud KE *et al.* The Study of Osteoporotic Fractures Research Risk factors for hip fracture in white women. *N Engl. J Med.* 1995; 332:767-774.
8. Wang MC, Dixon LB. Socioeconomic influences on bone health in postmenopausal women: findings from NHanes III, 1988-1994. *Osteoporos Int.* 2006; 17:91-98.
9. Dixon T, Shaw M, Ebrahim S *et al.* Trends in hip and knee joint replacement: socioeconomic inequalities and projections of need. *Ann Rheum Dis.* 2004; 63:825-830.
10. Jenny Eachus, Philip Chan, Nicky Pearson, Carol Proper, George Davey Smith. An additional dimension to health inequalities: disease severity and socioeconomic position *J Epidemiology Community Health.* 1999; 53:603-611.
11. Cummings SR, Nevitt MC, Browner WS, Stone K, Fox KM, Ensrud KE *et al.* The Study of Osteoporotic Fractures Research Risk factors for hip fracture in white women. *N Engl J Med.* 1995; 332:767-774.
12. Pasqualina LS *et al.* Patient characteristics affecting the prognosis of total hip and knee joint arthroplasty: a systematic review. *Can J Surg.* 2008; 51(6):428-436.
13. Zhan C, Kaczmarek R, Loyo-Berrios N *et al.* Incidence and short-term outcomes of primary and revision hip replacement in the United States. *J Bone Joint Surg.* 2007; 89:526-533.
14. Mahomed NN, Barrett JA, Katz JN *et al.* Rates and outcomes of primary and revision total hip replacement in the United States Medicare population. *J Bone Joint Surg.* 2003; 85-A:27-32.
15. Webb BG, Lichtman DM, Wagner RA. Risk factors in total joint arthroplasty: comparison of infection rates in patients with different socioeconomic backgrounds. *Orthopedics.* 2008; 31:445.
16. Fortin PR, Clarke AE, Joseph L *et al.* Outcomes of total hip and knee replacement: preoperative functional status predicts outcomes six months after surgery. *Arthritis Rheumatism.* 1999; 42:1722-1728.
17. Thierry Scheerlinck, William Duquet, Pierre-Paul Casteleyn. Socioeconomic aspects of total hip arthroplasty A one-year survey in a Belgian university hospital. *Acta Orthop. Belg.* 2004, 70:525-533.
18. Mahomed NN, Liang MH, Cook EF *et al.* The importance of patient expectations in predicting functional outcomes after total joint arthroplasty (see comment). *J Rheumatol.* 2002; 29:1273-1279.