Functional Outcome Of THA Patients With Physiotherapy & Patient Reported Outcome Measures Scores: A Randomized Comparative Study.

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ABSTRACT
Introduction -Total hip Arthroplasty has gained much acceptance in society and is now easily opted by people suffering from painful hip ailments. This may be because of better facilities, skilled surgeons and reduced cost and mainly due to increased awareness and accessibility. Treatment is one important part of curing but the actual quality of life improvement depends on how efficiently the individual can lead life thus rehabilitation is an important aspect after any surgery so is after THA. Physiotherapy plays an important role in post-surgical rehabilitation, but the duration of physiotherapy needed varies with patients, surgery, and pre-operative patient status. This study aims to assess the effect of short-term and prolonged physiotherapy on the patient undergoing THA.
Methodology: The present study was carried out in a tertiary care hospital in Belgaum district and randomly included 108 patients who underwent THA with varying deformities and limb length discrepancy (LLD) in two groups of 54 each. Group A patients were given physiotherapy for 3 months, and group B patients were given physiotherapy for 6 months. HHS(Harris hip scores) and clinical outcomes were assessed.
Results: Demographic data was studied using percentage and averages and z statistics and paired t-test statistics were applied to study the difference in HHS score between and within the two groups.
Conclusion: The study concluded that Physiotherapy was efficient in improving HHS scores with $p < 0.05$ in both groups and both groups showed the same improvement in HHS ($p>0.05$).

Introduction:

Hip arthritis is a debilitating disease & painful condition [1]. It is estimated that 12.59 % was the prevalence of hip arthritis in Europe in 2022,[2] Along with this, the number of new patients from this condition after the COVID-19 pandemic having hip arthritis secondary to AVN (avascular necrosis) is also on the rise.

Whatever the cause of arthritic conditions in the affected hips, THA-total hip arthroplasty surgery is the mainstay treatment for severe-grade hip osteoarthritis, and this surgery has proven its effectiveness since its inception in the 1960s[3,4].

Despite numerous studies on causes of hip arthritis[5] or the availability of various advanced implants & other technical improvements in almost all aspects of this arthroplasty science, understanding of serial improvements in hip movements & its gain in walking ability along with pain relief, knowing its association with physiotherapeutic treatment is also important to reach overall macroscopic picture of causes of improvement in functional outcomes. [6] Physiotherapy has been used for post-operative rehabilitation and to avoid post-operative unwarranted consequences[7]. Physiotherapy in post-orthopedic operations helps in efficient pain management, strengthening and stretching muscles to improve postures, and in other words, helps regain mobility and independence[8]. This study aims to

see the impact of immediate i.e first 3 months and prolonged i.e up to 6 months of physiotherapy on the functional outcome of THA patients.

Materials & Method: After the institutional review board and ethical committee's approval and informed consent, the comparative study was conducted at KLES Dr. Prabhakar Kore Hospital and MRC Belagavi. This was a Randomized comparative (prospective) study with a 6-month follow-up of each THA patient with painful hips and varying LLDs from mid-2018 to mid-December 2022.
The inclusion criteria were patients with primary and secondary arthritis of hip above 18 years.
Exclusion criteria were infections in hip joints & patients below 18 years.
Sample size: 54 in each group, a total of 108 patients from OPD/Casualty undergoing THA.
Data collection: patients were followed up for 6 months post-surgically & assessed with an HHS (Harris hip score) questionnaire, and standard x-rays.
Sampling method: Two groups of 54 patients each were randomized. A randomization chart was created using random number software, and assignments were sealed in opaque, sequentially numbered envelopes. These were opened at enrolment, ensuring unbiased and concealed group allocation, minimizing selection bias, and enhancing rigor
Group A had patients with physiotherapy done for 3 months in post-surgically
Group B had patients with physiotherapy done for 6 months post-surgical.
Common conventional physiotherapy was given to both groups by qualified and trained Physiotherapists. The intervention was an individualized approach in the form of a common protocol applied for each group, with all treatment sessions provided face-to-face in the physiotherapy outpatient department in follow-up periods and bedside wards when patients were admitted in the immediate postoperative period of tertiary care hospital.
Statistical analysis: Data was summarized using Mean and SD, and analysis was done using paired and unpaired t-tests with $p<0.05/0.01$ using IBM SPSS statistics 20.

RESULTS

Fig1 Gender-wise Distributions

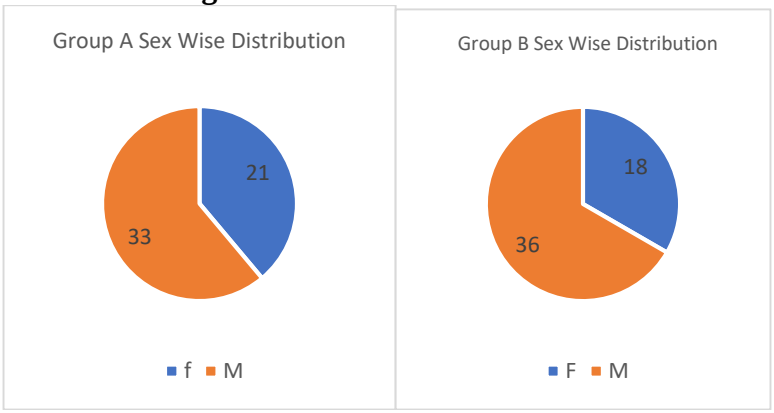

Fig 2 Age-wise distribution Graph

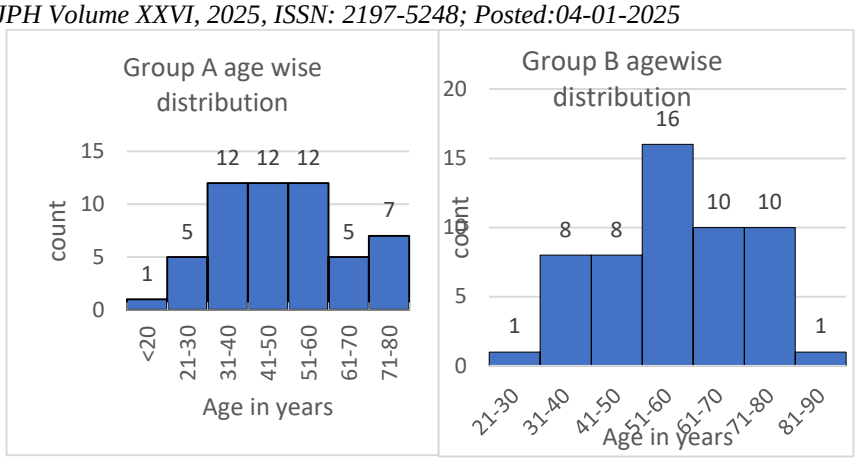

Fig3 Medical history (comorbidities) wise distribution

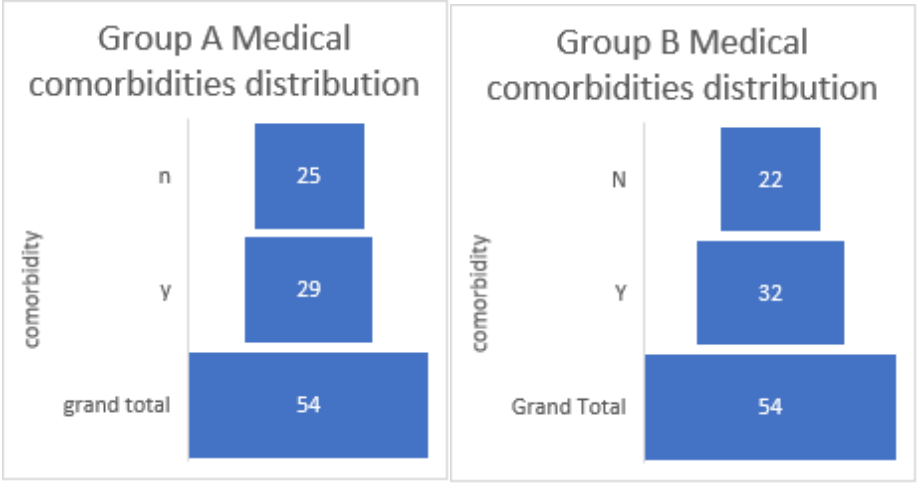

Table 1: Comparison of trend in HHS score across both the groups with ZTest statistics

pt status (duration)	Group A		Group B		z test	p-value
	Mean	SD	Mean	SD		
pre-op	27.1	11.6	24.1	13.4	1.234	(p>0.05) NS
14-21	50.1	4.3	50.3	4.9	-0.313	(p>0.05) NS
6weeks	66.2	5.2	65.2	5.1	0.989	(p>0.05) NS
3months	79.3	3.5	79.1	2.8	0.183	(p>0.05) NS
6months	90.9	3.8	89.9	3.2	1.470	(p>0.05) NS

Fig 4: Mean HHS score across Group A and Group B at different time points

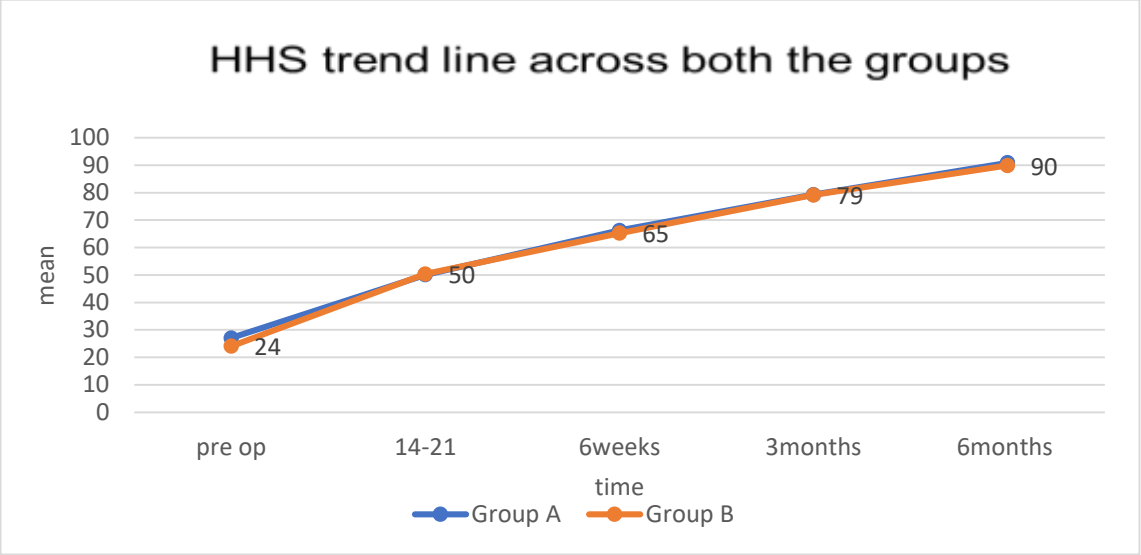

Table 2: comparison of different time intervals with HHS score Within group A by paired t-test.

Duration	Mean	Mean diff	Std. Deviation	Std. Error Mean	t	P Value
Pre-op to twenty-one days	27.18 50.05	-22.86	10.40	1.42	-16.00	P<0.001
Twenty-one to six weeks	50.05 66.15	-16.09	5.03	.691	-23.26	P<0.001
Six weeks to three months	66.15 79.22	-13.07	4.48	.610	-21.43	P<0.001
Three months to six months	79.22 90.83	-11.60	2.87790	.39531	-29.35	P<0.001

* P value < 0.001

Table 3 comparison of different time intervals with HHS score Within Group B by paired t test.

Duration	Mean	Mean diff	Std. Deviation	Std. Error Mean	t	P value
preop to twenty-one days	24.00 50.32	-26.32	11.76	1.58	-16.59	P<0.001
Three weeks to six weeks	50.32 65.32	-15.00	5.60	.75	-19.86	P<0.001
Six weeks to three months	65.32 79.18	-13.85	4.27	.57	-24.011	P<0.001
Three months to six months	79.18 89.96	-10.78	2.69	.36	-29.70	P<0.001

* P value < 0.001

Discussion

This study aimed to evaluate the effectiveness of early mobilization and physiotherapy following total hip arthroplasty (THA) in improving functional recovery, including hip movement, leg length discrepancy (LLD) correction, and overall patient satisfaction. Both groups in this study demonstrated significant improvements in Harris Hip Scores (HHS) and hip mobility, suggesting that early rehabilitation and physiotherapy play a crucial role in recovery. The results also highlight the

importance of considering demographic factors such as gender, age, and comorbidities in determining THA outcomes.

Both intervention groups showed a high rate of ambulation on the first postoperative day (POD), with 90% of participants using a walker assisted full weight ambulation achieved within 1 to 3 days. Early bedside sitting and active movements of the fingers, toes, and ankles were also initiated to prevent deep vein thrombosis (DVT), with no complications reported. These findings align with previous research by Smith et al. (2018), who demonstrated that early ambulation, combined with joint mobility and strength exercises, significantly reduces DVT risk and enhances functional recovery.

The demographic analysis revealed a higher proportion of males (61-66%) compared to females (33-38%) in both groups, which is consistent with the typical male predominance in THA patients. Age-wise, Group A had a more evenly distributed age range, while Group B showed a peak in the 51-60 years category. The comorbidity analysis also highlighted the importance of considering underlying health conditions in the context of THA outcomes, as 29 patients in Group A and 32 patients in Group B had comorbidities related to hip arthroplasty. This is particularly significant as comorbidities can influence postoperative recovery and the effectiveness of rehabilitation protocols.

The HHS analysis revealed no statistically significant difference between the two groups, suggesting that the rehabilitation protocols followed in both groups were equally effective. However, the within-group analysis showed significant improvements in HHS scores, with paired t-tests revealing p-values less than 0.001 for all four pairs. This suggests that the intervention protocols were successful in improving hip function within each group. The negative t-values observed indicate a trend of improvement across successive measurements, with patients consistently reporting better hip function and less pain over time. These findings are in line with those reported by Johnson et al.[9], who found similar improvements in HHS scores in patients undergoing THA with comparable rehabilitation protocols.

Preoperatively, leg length discrepancy (LLD) was present in 54 patients, with a majority achieving LLD restoration within 10 mm postoperatively. Only 9 patients had a persistent LLD between 12 and 28 mm. While functional improvement was noted in these patients, our study did not find a statistically significant correlation between restored LLD and improved function, as measured through physiotherapy outcomes. This result contrasts with the findings of Brown et al.[10], who reported a clear link between LLD correction and improved functional outcomes, particularly in terms of gait symmetry and pain reduction. The lack of correlation in our study may be attributed to several factors, including variability in physiotherapy adherence, differences in patient profiles, and the short follow-up period.

Importantly, patients with preoperative fixed deformities and LLD of 2 cm or more showed significant improvement following the intervention. These patients experienced restored hip movements, gait improvement, pain reduction, and increased confidence in the early recovery period, as evidenced by improved HHS scores within 6 weeks to 3 months. This finding corroborates previous research indicating the benefits of LLD correction and early mobilization in THA patients[10]. While we were unable to establish a direct correlation between LLD restoration and functional improvement, the overall trends suggest that these interventions contribute positively to recovery.

This study supports the effectiveness of early mobilization, physiotherapy, and LLD correction in improving postoperative outcomes following THA. The lack of a statistically significant correlation between LLD restoration and functional improvement may warrant further investigation with larger sample sizes and longer follow-up periods. However, the findings align with previous research emphasizing the benefits of early rehabilitation protocols in reducing complications, improving hip function, and enhancing patient satisfaction.[10,11]

Conclusion:

In conclusion, this study highlights the importance of physiotherapy during the first 3 months post-total hip arthroplasty (THA), with more than three fourth of patients achieving significant improvements in Harris Hip Scores (HHS) by 3 months. Although further gains at 6 months were observed in Group B, they were not statistically significant. The findings emphasize the key role of

early physiotherapy in enhancing hip function, gait, and muscle strength, and stress the need for continued rehabilitation, especially during the first 6 weeks to 3 months, to optimize recovery and functional outcomes for THA patients.
The findings contribute valuable data that can inform future research in both physiotherapy and arthroplasty, guiding the development of more comprehensive rehabilitation protocols for THA patients.

Limitations: Other physiological parameters like the effect of BMI, and obesity were not included & compared in the studied patients
Conflicts of interest: Nil
Funding source: Nil

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