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Original article

Comparison of health-related quality of life among patients before and one month after total hip arthroplasty in a selected hospital in Sri Lanka

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ABSTRACT

Background & Aim: Total hip arthroplasty (THA) is one of the most widely performed orthopaedic surgeries to alleviate pain and restore full range of motion. This study aims to determine health-related quality of life (HRQOL) and the percentage of patients who received physiotherapy before and one month after total hip arthroplasty at the National Hospital in Sri Lanka.

Methods: A total of 52 patients awaiting THA for advanced hip osteoarthritis or avascular necrosis were recruited through convenience sampling at the National Hospital of Sri Lanka. This prospective observational short follow-up study assessed changes in HRQOL before and one month after surgery using the 36-Item Short-Form Survey (SF-36) and Modified Harris Hip Score (MHHS). Sociodemographic and clinical data, including the percentage of patients who received physiotherapy, were collected using an interviewer-administered questionnaire. Statistical analysis was done using SPSS version 23.0.

Results: The mean age (SD) of participants was 59.00 years (5.47). General health, bodily pain, vitality, social functioning and mental health subscales except physical functioning, role limitation due to physical and emotional functioning of the SF-36 were significantly improved following the surgery. Pain and activities of daily living subscales except gait of MHHS were significantly improved following the surgery. The total MHHS score was poor in both pre- and post-operative periods, but there was a significant improvement in the post-operative group.

Conclusions & Recommendations: Overall HRQOL improved in most of the assessed aspects over a short period. None of the patients received physiotherapy interventions before surgery; however, all received physiotherapy following the surgery. Necessary steps to introduce pre-operative physiotherapy and monitor post-operative physiotherapy to improve HRQOL are suggested.

Keywords: *total hip arthroplasty, health-related quality of life, osteoarthritis*

Introduction

Total hip arthroplasty (THA) is one of the most effective and widely performed orthopaedic surgeries in the world (1). It involves a reconstructive surgical procedure in which both femoral head and acetabulum are replaced by prosthetic components, removing the worn-out acetabular cartilage and subchondral bone for advanced hip diseases that have poorly responded to conservative management (2). THA plays a significant role in alleviating pain and restoring motion in patients with end-stage hip osteoarthritis and avascular necrosis (2,3).

Osteoarthritis (OA) is a major source of pain and disability (1). The progressive erosion of articular cartilage results in pain and functional impairments. One of the most significant risk factors for the development of OA is age (4). According to the United Nations, the global population is ageing rapidly, with the number of people over 60 years old expected to double from 11% to 22% (2 billion) by 2050. As a result, the incidence of OA will increase (1). The global burden of disease data from 2019 shows a 115.40% increase in hip OA incidence over the past 30 years (5). As there are no disease-modifying treatments currently available for osteoarthritis, only joint replacement surgery remains the ultimate treatment method at the end stage of hip pathology; thus, the demand for THA will increase (4).

In addition to OA, avascular necrosis (AVN) of the femoral head is a prevalent condition among middle-aged and elderly populations. It results from a long-term reduction in blood flow to the femoral head, leading to necrosis of the bone (6). High doses of corticosteroids, alcohol abuse, trauma, and chronic inflammatory conditions are some of the common causes (7). AVN is one of the most common sequelae of femoral neck fractures, occurring in 11% to 80% of cases (8). It is also responsible for joint

pain and a reduction in quality of life. To preserve the joint surface in the early stages of the disease, conservative treatments are recommended. However, in the more advanced stages, the main treatment is joint replacement surgery due to the collapse of the articular surface (9).

THA is performed mainly to alleviate hip pain and restore the full range of hip joint motion, maintaining hip stability (10). However, the patients' satisfaction is not higher since THA has been linked to a few post-operative complications, lowering the patients' quality of life. Wound complications, periprosthetic fractures, joint infections, dislocations or prosthesis instability, implant loosening, abductor muscle disruption and limb length discrepancy are some of the reported complications that lead to surgical revision in many cases (11). Although total hip replacement is linked to a significant reduction in health-related quality of life (HRQOL), several studies are showing improvement in HRQOL following THA (12). The discrepancies emphasise the need to assess HRQOL as a core outcome measure.

Further, limited studies exist regarding the evaluation of HRQOL of patients following THA worldwide (3). Although a few Sri Lankan studies have examined hip fracture incidence, future projections of fragility hip fractures, clinical outcomes and current clinical practices, including case studies and studies on quality of life in hip fracture patients (8,13,14), there is no previous prospective study reported specifically evaluating health-related quality of life before and after total hip arthroplasty in Sri Lankan patients. Hence, the main objective of this study was to assess the health-related quality of life among patients before and one month after total hip arthroplasty.

Methods

Ethical consideration

Ethics approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka (ERC reference number: UCP/AL/17/397). Informed written and verbal consent were obtained from all the participants before the data collection.

Study design and participants

Participants for this prospective observational short follow-up study were recruited from orthopaedic wards at the National Hospital of Sri Lanka (NHSL) from the 10th of January 2022 to the 10th of April 2022. Fifty-two participants were recruited using a non-probability convenience sampling method. Data were collected through face-to-face interviews by the principal investigator before the surgery. Both males and females aged 50 years or above, awaiting unilateral THA due to severe hip osteoarthritis or avascular necrosis, able to understand instructions given for the assessment, were included. Those with cognitive and communicative impairments or a history of traffic accidents were excluded from the study. During the 1-month follow-up, 12 subjects dropped out of the study due to cancellation of surgeries (n=9), loss of contact (n=1), revision surgery (n=1) and being too sick to participate (n=1). In total, 40 subjects successfully completed both pre-operative and post-operative questionnaires in the study.

Data collection and analysis

Sociodemographic data, surgery-related data, surgical side, history of total hip arthroplasty, principal diagnosis, date of surgery and proportion of patients who received physiotherapy were recorded using an interviewer-administered questionnaire.

Health-related quality of life was the primary outcome and was assessed at the baseline and one

month after surgery. Generic health-related quality of life was measured using the 36-item Short-Form Health Survey (SF-36) to obtain general health outcomes. The items in SF-36 are arranged into eight subscales namely, physical functioning, role limitation due to physical functioning, bodily pain, general health, vitality, social functioning, role limitations due to emotional functioning and mental health. Each subscale is transformed into a 0–100 scale, with a higher score indicating better HRQOL. Disease-specific health-related quality of life was measured using the Modified Harris Hip Score (MHHS) to obtain physical function and hip pain outcomes. It consists of hip pain (0-44 points) and physical function (0-46 points), which is subdivided into gait (0-33 points) and activities of daily living (0-13 points). Gait has three subscales, including limp (0-11 points), walking aids (0-11 points), and distance walked (0-11 points). The activities of daily living section has 3 subscales, which are sitting (0-5 points), climbing stairs (0-4 points), and putting on shoes and socks (0-4 points). The total MHHS score ranges from 0-90 points. MHHS values <70 points indicate poor, 70-79 points indicate fair, 80-89 points indicate good, and 90 points indicate excellent.

All the questionnaires were administered by the principal investigator through face-to-face interviews immediately before the surgery and through the telephone at the end of one month following total hip arthroplasty.

The validity and reliability of both questionnaires have been confirmed for patients undergoing total hip replacement surgery (15,16). The SF-36 questionnaire is culturally validated in Sri Lanka using Sinhala and Tamil translations (17,18). Since the MHHS questionnaire has not been validated in Sinhala and Tamil, a back translation procedure was used to translate the questionnaires into Sinhala and Tamil. The same psychometric properties were preserved and remained unchanged.

Statistical analysis

Data analysis was performed using the Statistical Package for Social Science (SPSS) version 23. The Shapiro-Wilk test was used to check the normality of the distribution of the continuous variables. Data

were normally distributed. Hence, the continuous data were presented as means (standard deviations), and the categorical variables were presented as frequencies and percentages. A paired sample t-test was used to test comparisons. A significance level was considered when the p-value <0.05.

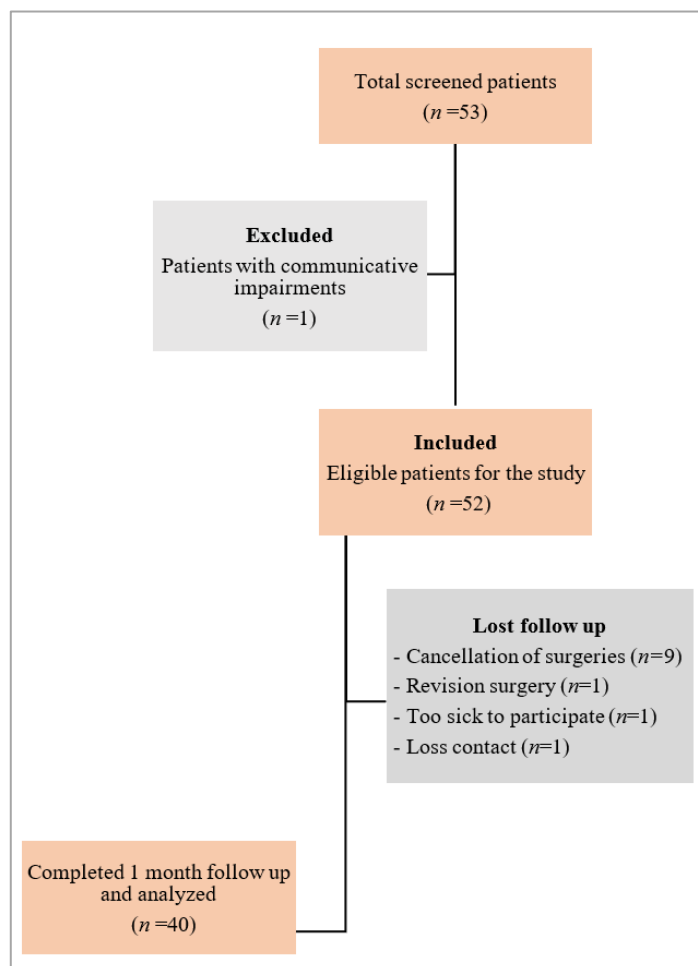


Figure 1. Flow diagram of the participant selection in the study

Results

Demographic and disease characteristics

The study sample consisted of 52 participants at baseline, with mean age (SD) of 59.00 years (5.47), ranging from 50-70 years. The majority of participants were female (63.5%, n=33) and had an education level up to G.C.E O/L (46.2%, n=24). Approximately 57.7% (n=30) of THA patients had a principal diagnosis of osteoarthritis, and 42.3%

(n=22) had avascular necrosis. The surgical side of THA performed in 36 (69.2%) patients was the left side (Table 1).

Generic health-related quality of life

Table 2 indicates that all the other SF-36 subscale scores increased after the surgery except for the physical functioning, role limitations due to physical functioning and role limitations due to emotional functioning subscales.

Disease-specific health-related quality of life

The mean (SD) of the total score of MHHS was 38.12 (13.16) before the surgery and 48.48 (2.45) at 1-month follow up, which represents poor quality of

life. Although the hip pain and activities of daily living subscale scores improved after the surgery, the mean value (SD) for the gait subscale 10.15 (0.66) was lower than the pre-operative period 14.37 (5.43) (Table 3).

Table 1. Descriptive statistics of demographic and clinical characteristics at baseline (N=52)

Variable	Mean (SD)	No.	Percentage (%)
<u>Demographic characteristics</u>			
Age ^a (years)	59.00 (5.47)		
Sex ^b	Male	19	36.5
	Female	33	63.5
Level of education ^b	Not completed O/L	13	25.0
	Completed O/L	24	46.2
	Completed A/L	12	23.1
	Completed bachelor's degree or equivalent	3	5.8
<u>Clinical characteristics</u>			
Principal diagnosis ^b	Osteoarthritis	30	57.7
	Avascular necrosis	22	42.3
Surgical side ^b	Right	16	30.8
	Left	36	69.2

a. Continuous variable, presented with mean and standard deviation (SD)

b. Categorical variables, presented with frequency (n) and percentage (%)

Table 2. The mean and standard deviation of the SF-36 subscales for THA patients during pre-operative and post-operative periods

Parameter	Time, Mean (SD)	
	Pre-operative (n=52)	First month (n=40)
General health	40.38 (10.07)	54.58 (6.18)
Physical functioning	33.65 (6.19)	24.00 (2.03)
Bodily pain	34.28 (17.62)	75.25 (4.23)
Mental health	52.06 (16.06)	72.40 (6.77)
Role limitation due to physical functioning	9.62 (14.14)	3.75 (10.67)
Role limitation due to emotional functioning	30.13 (29.72)	12.49 (17.99)
Vitality	40.29 (15.32)	71.25 (7.32)
Social functioning	44.71 (18.75)	70.63 (7.78)
General health	40.38 (10.07)	54.58 (6.18)

Data are presented with mean and standard deviation (SD)

SF-36: Short-Form 36; SD: Standard deviation

All subscales: 0 indicates extreme symptoms and 100 indicates no symptoms

Table 3. The mean and standard deviation of the MHHS subscales for THA patients in pre-operative and post-operative periods

Parameter	Time, Mean (SD)	
	Pre-operative (n=52)	First month (n=40)
Pain	19.81 (7.79)	29.50 (2.21)
Gait	14.37 (5.43)	10.15 (0.66)
ADL	3.94 (2.23)	8.83 (0.39)
Total	38.12 (13.16)	48.48 (2.45)

Data is presented with mean and standard deviation (SD)

MHHS: Modified Harris Hip Score; Pain: Hip pain; ADL: Activities of daily living

Total score <70 indicates poor, 70-79 points indicate fair, 80-89 points indicate good, 90 indicates excellent quality of life

Table 4. Paired sample t-test results for pre-operative and post-operative subscales of SF36M

Characteristic	Pre-operative value Mean (SD)	Post-operative value Mean (SD)	Mean Difference (SD)	95% confidence interval of the difference		t value (df =39)	p value
				Lower	Upper		
General health	40.05 (10.70)	54.58 (6.18)	-14.53 (13.83)	-18.952	-10.109	-6.647	<0.001*
Physical functioning	33.75 (6.28)	24.00 (2.03)	9.75 (5.77)	7.905	11.595	10.691	<0.001*
Bodily pain	34.38 (19.05)	75.25 (4.23)	-40.88 (16.38)	-46.112	-35.638	-15.788	<0.001*
Mental health	51.78 (16.64)	72.40 (6.77)	-20.63 (15.99)	-25.739	-15.511	-8.158	<0.001*
Role limitations due to physical functioning	9.38 (13.50)	3.75 (10.67)	5.63 (11.99)	1.789	9.461	2.966	<0.001*
Role limitations due to emotional functioning	30.83 (29.62)	12.49 (17.99)	18.34 (16.80)	12.969	23.716	6.904	<0.001*
Vitality	40.05 (10.70)	54.58 (6.18)	-14.53 (13.83)	-18.952	-10.109	-6.647	<0.001*
Social functioning	33.75 (6.28)	24.00 (2.03)	9.75 (5.77)	7.905	11.595	10.691	<0.001*

SF-36: Short-Form 36; SD: Standard deviation; df: degrees of freedom

* $p < 0.05$ denotes a significant difference between the pre-operative and post-operative periods

Comparison of generic health-related quality of life between pre-operative and post-operative periods

Table 4 shows that all mean differences were statistically significant at $p < 0.05$. Except for physical functioning, role limitations due to physical health

and role limitations due to emotional problems, all SF-36 subscale scores showed significant improvement one month after surgery.

Comparison of disease-specific health-related quality of life between pre-operative and post-operative periods

There were significant differences in mean values of each MHHS parameter, after 1 month of follow up compared to before the surgery. Pain and ADL improved significantly except for gait in the first month after the surgery. The overall MHHS score improved remarkably from the preoperative period (Mean = 37.73, SD = 13.53) to the end of the first

month after the surgery (Mean = 48.48, SD = 2.45), $t(39) = -5.170$, $p < 0.05$. The mean increase in the scores was 10.75 with a 95% confidence interval ranging from -14.956 to -6.544 (Table 5).

Percentage of patients who received physiotherapy

Table 6 shows that all fifty-two patients (100%) did not receive physiotherapy before the surgery and all forty patients (100%) who underwent THA received physiotherapy both after the surgery and during the follow-up period of over 1 month.

Table 5. Paired sample t-test results for pre-operative and post-operative subscales of MHHS

Characteristic	Pre-operative value Mean (SD)	Post-operative value Mean (SD)	Mean difference (SD)	95% confidence interval of the difference		t value (df = 39)	p value
				Lower	Upper		
Pain	20.00 (8.17)	29.50 (2.21)	-9.50 (8.15)	-12.106	-6.894	-7.373	<0.001*
Gait	13.90 (5.69)	10.15 (0.66)	3.75 (5.70)	1.928	5.572	4.164	<0.001*
ADL	3.83 (2.23)	8.83 (0.39)	-5.00 (2.10)	-5.672	-4.328	-15.058	<0.001*
Total	37.73 (13.53)	48.48 (2.45)	-10.75 (13.15)	-14.956	-6.544	-5.170	<0.001*

MHHS: Modified Harris Hip Score; Pain: Hip pain; ADL: Activities of daily living; SD: Standard deviation; df: degrees of freedom

* $p < 0.05$ denotes a significant difference between the pre-operative and post-operative periods

Table 6. Percentage of patients who received physiotherapy at the pre-operative and post-operative periods

Variable	No.	Percentage (%)
Pre-operative physiotherapy (n=52)	No	52 100
Post-operative physiotherapy (n=40)	Yes	40 100

Data are presented with frequency (n) and percentage (%)

Discussion

The current study assessed the health-related quality of life among people before and one month after total hip arthroplasty in the National Hospital of Sri Lanka. Results revealed that total hip arthroplasty significantly improved general health, bodily pain, vitality, social functioning and mental health subscales, except physical functioning, role limitation due to physical functioning, and role limitations due to emotional functioning of generic HRQOL.

These results were in contrast with previous studies (19), where they reported that at the third month following THA, there were substantial increases in all subscales of health-related quality of life measures. One study reported similar results where the follow-up duration was 15 days (20). The lower mean differences in physical functioning, role limitation due to physical and emotional functioning in our study might be due to the differences in follow-up times because the presence of pain first few weeks after surgery leads to a less active period with reduced limb movements. Our study results indicated

that less improvement in hip pain and activities of daily living (sitting, climbing stairs and putting shoes and socks) in the MHHS parameters one month after surgery. These findings are supported by prior literature that identified similar low improvements in hip pain and mobility scales 15 days after total hip arthroplasty (20). One reason for less improvement in ADL following surgery compared to the pre-operative stage could be the reduction of stair climbing in the early stages of rehabilitation (21), and patients are strictly advised to always use a highchair to prevent the risk of hip dislocation following THA. Therefore, the ADL of patients following THA over a short follow-up is limited. In Sri Lanka, orthopaedic surgeons recommend using aspirin until up to six weeks following surgery (11). Because of that, the authors were not able to detect people with slight or occasional pain without using aspirin or similar medications, which gives 40 points in the MHHS questionnaire. As a consequence of the above practice in Sri Lanka, the maximum point they could achieve at one month following surgery was 30 points, indicating less improvement in hip pain score.

In our study, the gait subscale (limp, walking aids and distance walked) of the MHHS questionnaire showed the worst performance one month after surgery. This is consistent with findings from a previous randomised controlled trial that compared a standard THA protocol group with a THA physiotherapy care protocol group, which also reported the worst gait outcomes at a 15-day follow-up (20). The gait limitations may be due to the use of assistive devices such as walkers and crutches at the initial stages of rehabilitation. Moreover, one study reported that patients with unilateral hip osteoarthritis exhibit gait dysfunctions and asymmetries, such as a slight limp in both before and after total hip arthroplasty (21). Normal gait cannot be achieved over a short period of follow-up time. Therefore, the distance that patients can walk has been limited to within the house only.

There is a scarcity of published evidence from Sri Lanka on this topic. The findings of this study can

serve as preliminary data for future research and may help medical practitioners make more informed clinical decisions by providing insights into patients' quality of life. However, the study was limited by a relatively small sample size, a short follow-up period, and the use of only subjective assessments through questionnaires, which limited evaluation of gait and activities of daily living (ADL). Additionally, sociodemographic and clinical characteristics were not assessed. Therefore, future studies should address these limitations to generate more comprehensive and generalizable evidence within the Sri Lankan context.

Conclusions

The findings of this study provide information on the health-related quality of life among patients before and one month after total hip arthroplasty and the percentage of patients who received physiotherapy in pre- and post-operative stages in the Sri Lankan context. Overall health-related quality of life improved in most of the assessed aspects over a short period of time. None of the patients received physiotherapy interventions before surgery; however, all received physiotherapy following the surgery. These findings emphasise the need to take necessary steps to introduce pre-operative physiotherapy interventions as an approach to improve health-related quality of life through monitoring patients' adherence to it. Also, the post-operative physiotherapy exercises should be monitored to ensure that patients are adhering to the recommended exercise guidelines.

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Author Declarations

Competing interests: The authors declare that they have no competing interests.

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