ORIGINAL ARTICLE

Effects of Motor Control Training of Hip Muscles on Pain and Physical Function After Total Hip Arthroplasty

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ABSTRACT

Objective of Study: To determine the effects of motor control training on pain and physical function after total hip arthroplasty

Methodology: A quasi-experimental trial was conducted to find out the effects of motor control training in terms of pain alleviation and functional improvement after total hip arthroplasty. The non-probability purposive sampling technique was used with a sample size of 22.The participants were divided into two groups. Group A received conventional Physiotherapy and hip muscles motor control training while group B received only conventional Physiotherapy. The participants were assessed thrice. The initial data was collected at the start of treatment (Pre-treatment week 0), the second data was collected at the end of second week (Post treatment week 2) and the final data was collected at the termination of week four (Post treatment week 4) by using standardized outcome measures including hip disability and osteoarthritis outcome score (HOOS), numeric pain rating scale (NPRS) and 30sec chair stand test (30 sec CST). After data collection, it was analyzed by IBM SPSS version 25.

Results: The mean (±S.D) age of the participants was 51±8.89 vs. 50±4.47 years in Group A vs. Group B, respectively. The mean HOOS score was 36.58±9.52 vs. 36.45±9.20 at the start of treatment in Group A vs. Group B, respectively while it was 57.06±6.51 vs. 45.40±9.39 at the end of treatment in Group A vs. Group B, respectively. The mean NPRS score was 5.64±0.67 vs. 5.45±1.13 at the start of treatment in Group A vs. Group B while it was 2.36±0.81 vs. 3.55±0.82 at the end of treatment in Group A vs. Group B. Mean score for 30-second chair stand was 15.82±1.94 vs. 14.91±2.12 at the start of treatment in Group A vs. Group B while it was 18.45±1.21 vs. 16.27±1.20 at the end of treatment in Group A vs. Group B.

Conclusion: Motor control training with conventional physiotherapy effectively restores physical functioning and decreases pain symptoms after total hip arthroplasty compared with conventional physiotherapy alone.

Keywords: Osteoarthritis, Arthroplasty, Hip Joint, Motor Control.

INTRODUCTION

Osteoarthritis is likely the most predominant constant joint sickness with the hip, knee, and hand as the most frequently influenced joints(1). Almost everybody has OA in at least one or more joints as the age advances by eighty years(2). The hallmark features of hip OA are discomfort, inflammation, joint deformation,reduced musculoskeletal strength in the hip and thigh muscles(3). At the beginning phase of osteoarthritis, hip joint agony is generally familiar after much weight-bearing action; however, at the advanced phase, the diseased individuals ordinarily portray the agony as pervasive in most exercisespain may likewise happen even without activity(4).There is no known explicit remedy for OA. Like this, medicines are pointed toward decreasing agony and activity restrictions. A mix of drug and non-drug remedies is frequently needed(5). Training projects and exercise regimen are typically started augmenting the drug intervention. The instruction strategies focus on pain reduction, weight reduction and joint assurance. Such projects have been discovered powerful in lessening pain and activity limitations.(6)

Patients treated with complete hip replacement get physiotherapy while they are in hospital, and the more significant part of them is getting physiotherapy in the initial months after the medical procedure to improve their physical work. The stability of the hip joint is contributed by dynamic, static and neural components(7). Functional deficits associated with muscles make joint instability and exercises specifically targeting hip stabilizer muscles restore mobility and alleviate agony(7). An investigation on a cadaveric specimen found that the hip joint's posterior capsule is augmented with obturator externus adding to hip joint security.(8)

THA is perhaps the most widely practiced orthopedic technique. In 2012, there were 7,786 THAs in Pakistan, with 68% of working women(9). Seventy thousand one hundred thirty-eight critical THA procedures were conducted between 1995 and 2006, with 79% cemented. Today, for all ages and forms of the prosthesis, Norway has a durability of 10 years, of 93 percent(9).A survival of seven to nine years was accounted among 98 % of patients who had undergone cemented prostheses(10). In this manner, a superior comprehension ofphysical activity's recuperation and functionality to move toward such assumptions are significant(10). Motor control training includes 3 phases: cognitive stage, associative stage and autonomous stage. The cognition stage required significant degrees of mindfulness from the individuals. The phase of association includes the identification and correction of faulty movement patterns. The last phase is fusing the corrected patterns into day-to-day activities(11). It was accepted that walking increments are better accomplished

if the diseased individualsare rehearsed identical to the action being promoted.[12]

METHODOLOGY

The design adopted for this study was a quasi-experimental trial. The Study was conducted at the Physiotherapy department of Ghurki Trust Teaching Hospital, Lahore, after approval from the ethical review board. Through non-probability purposive sampling technique 22 patients, including both males and females with age range of 40-85 years were included as sample that had undergone cemented total hip arthoplasty and were excluded if they exhibited postoperative complications, red flag signs, neurological signs consistent with nerve root compression and bilateral and revision total hip arthroplasty. The participants were divided in two groups; with group, A patients were treated with Conventional Physiotherapy and Hip Muscles Motor Control Training while group B patients were treated with Conventional Physiotherapy alone. The participants were assessed thrice. The initial data was collected at the start of treatment (Pre-treatment week 0), the second data was collected at the end of second week (Post treatment week 2) and the final data was collected at the termination of week four (Post treatment week 4) by using standardized outcome measures including hip disability and osteoarthritis outcome score (HOOS), numeric pain rating scale (NPRS) and 30sec chair stand test (30 sec CST). All twenty-two patients received a total of twenty treatment sessionsfor four weeks with a frequency of five sessions per week. Statistical analysis was done by using IBM SPSS version 25. The normality of the hypothesis was tested by using the Shapiro Wilk test. Categorical and demographic features were presented in the form of frequency percentages, mean and standard deviation. Repeated Measure ANOVA was used to find the within-group differences while an independent t-test was used to show the change in subjective/objective measurements and differences across the groups.

RESULTS

The mean (±S.D) age of the participants was 51±8.89 vs. 50±4.47 years in Group A vs. Group B respectively. The mean HOOS score was 36.58±9.52 vs. 36.45±9.20 at the start of treatment in Group A vs. Group B, respectively while it was 57.06±6.51 vs. 45.40±9.39 at the end of treatment in Group A vs. Group B, respectively. THE mean NPRS score was 5.64±0.67 vs. 5.45±1.13 at the start of treatment in Group A vs. Group B while it was 2.36±0.81 vs. 3.55±0.82 at the end of treatment in Group A vs. Group B. Mean score for 30-second chair stand was 15.82±1.94 vs. 14.91±2.12 at the start of treatment in Group A vs. Group B while it was 18.45±1.21 vs. 16.27±1.20 at the end of treatment in Group A vs. Group B.

Table No. 1: Demographics of patients in both groups

Variable	Group A Conventional Physiotherapy along with hip muscle training	Group B Conventional Physiotherapy only
Gender		
Male	9 (81.18%)	7 (63.63%)
Female	2 (18.18)	4 (36.36%)
Age (Years)	51±8.89	50±4.47
BMI (kg/m2)		
25-29.9 (Overweight)	7	9
>30 (Obese)	4	2

Table No. 2: Within Group Comparison of HOOS, NPRS and 30 sec CST

	Group A Conventional Physiotherapy along with hip muscle training		Group B Conventional Physiotherapy only	
Variable	MEAN±S.D	P-value	MEAN±S.D	P-value
HOOS Pre Treatment (Week 0)	36.58±9.52	0.00	36.45±9.20	0.00
HOOS Post Treatment(Week 2)	47.81±9.22		42±8.97	
HOOS Post Treatment (Week 4)	57.06±6.51		45.40±9.39	
NPRS Pre Treatment (Week 0)	5.64±0.67	0.00	5.45±1.13	0.00
NPRS Post Treatment(Week 2)	4.45±0.69		4.82±0.75	
NPRS Post Treatment(week 4)	2.36±0.81		3.55±0.82	
30 sec CST Pre Treatment (Week 0)	15.82±1.94	0.00	14.91±2.12	0.01
30 sec CST Post Treatment (week 2)	16.55±1.81		15.45±1.81	
30 sec CST Post Treatment (week 4)	18.45±1.21		16.27±1.20	

Table No. 3: Across the Group Comparison of HOOS, NPRS and 30 Sec CST

	GROUPA Conventional Physiotherapy along with hip muscle training	GROUPB Conventional Physiotherapy only		
VARIABLE	Mean± S.D	Mean± S.D	Mean Difference	P-value
HOOS Pre Treatment (Week 0)	36.58±9.52	36.45±9.20	0.13	0.97
HOOS Post Treatment (Week 2)	47.81±9.22	42±8.97	5.80	0.15
HOOS Post Treatment (Week 4)	57.06±6.51	45.40±9.39	11.66	0.00
NPRS Pre Treatment (Week 0)	5.64±0.67	5.45±1.13	0.18	0.65
NPRS Post Treatment (Week 2)	4.45±0.69	4.82±0.75	0.36	0.25
NPRS Post Treatment (week 4)	2.36±0.81	3.55±0.82	1.18	0.00
30 sec CST Pre Treatment (Week 0)	15.82±1.94	14.91±2.12	0.90	0.30
30 sec CST Post Treatment (week 2)	16.55±1.81	15.45±1.81	1.00	0.21
30 sec CST Post Treatment (week 4)	18.45±1.21	16.27±1.20	2.18	0.00

DISCUSSION

The current study explored the impact of motor control on the preparation of hip muscle on pain and actual capacity after hip arthroplasty post three months. Training of Motor control promoted the results on all outcome tools in this trial. Retch ford et al.[7] suggested that local muscle dysfunction is joint-related to agony and pathology. The particular muscle training can reestablish the functional status of hip stabilizer muscles. The strength of hip joint can be upgraded by training thelateral rotators of the hip. The current study results agree with this Study showing more pain and function with hip core muscles training after total hip arthroplasty.

Kristi Elisabeth Hoiberg[10] investigated the impact of a twelve treatment session of walking skill training program ofweight-bearing exercises on physical activity and self-efficacy initiated in patients post three months total hiparthroplasty (THA). The experimental group showed more significant benefit than the control group at the post-test. This Study's results are in concordance with this one as our Study showed significant improvement in pain and function with hip core muscle training after total hip arthroplasty.

Jan et al. performed low-impact workouts in non-weight-bearing postures and daily outside strolls for half an hour following one and a half years of complete hip arthroplasty. The training group improved their strolling pace by almost fifty meters, contrasted with the control group. This Study corroborates the same findings regarding pain alleviation and functional improvement with hip core muscles training and conventional physiotherapy treatment after total hip arthroplasty.

CONCLUSION

Motor control training with conventional physiotherapy effectively restores physical functioning and decreases the pain symptoms after total hip arthroplasty compared with conventional physiotherapy alone.

Author's contributions

BF conceived, designed and did statistical analysis and editing of manuscript

SR, RRK, MAJ, MS and HK did data collection and manuscript writing

SR and RRK did final review and approval of manuscript

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