

Comparison of Post Isometric Relaxation of Gluteus Maximus and Static Stretching of Hip Flexors on Pain and Functional Status in Patients with Anterior Innominate Dysfunction

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ABSTRACT

Objective: To compare the effects of Post Isometric Relaxation (PIR) of gluteus maximus and Static Stretching (SS) of hip flexors on pain and functional status in patients with Anterior Innominate Dysfunction.

Methodology: A quasi experimental trial was conducted on thirty six patients of Anterior Innominate Dysfunction. All were randomly allocated to post isometric relaxation group and static stretching group. Both groups were treated with 12 treatment sessions in 4 weeks at frequency of 3 sessions per week. Numeric Pain Rating Scale (NPRS) and Modified Oswestry Disability Index (MODI) were used to measure the treatment effect at baseline, after 2 weeks and after 4 weeks. Data was analyzed by SPSS 21.

Results: Mean Age of Group A (PIR) was 34.28 ± 7.76 and Group B (SS) was 35.72 ± 7.16 . Mean BMI of participants was 23.84 ± 3.29 . Across group, both post isometric relaxation and static stretching had shown significant results with P value < 0.05 . But within group, post isometric relaxation had shown more significant results as compared to static stretching with P value < 0.05 .

Conclusion: Both treatment techniques; Post isometric relaxation and Static stretching are effective and produced significant difference in NPRS and MODI score to improve pain and functional status but PIR had shown more promising results in patients with anterior innominate dysfunction.

Key words: Sacroiliac Joint Dysfunction (SIJD), Muscle Energy Technique (MET), MODI (Modified Oswestry Disability Index).

INTRODUCTION

Sacroiliac joint (SIJ) is a diarthrodial synovial joint which provide connection among vertebral column and pelvis.(1) The elements liable for balance of sacroiliac joint consist of form closure, force closure and motor control. Self- locking mechanisms like form closure and force closure play role to keep away from any SIJ pathology.(2) The prevalence of Sacroiliac joint involvement in idiopathic LBP is set at 15% to 30% of population (3)

Sacroiliac joint dysfunction (SIJD) is a condition evolved through altered biomechanics because of both increase and decrease in normal every day movement of sacroiliac joint (4). Controversy in assessment and management of SIJD exists because of its complicated anatomy and biomechanics (5). The SIJD is recognized by following pain provocation test: Faber, Gaenslen's test, thigh thrust test, compression test, distraction test and sacral thrust test. At least three out of these test must produce painful stimuli for the analysis of SIJD (6).

Sacroiliac joint dysfunction is in addition labeled into 5 types; Anterior innominate dysfunction (Anterior rotated SIJD), Posterior innominate dysfunction (posterior rotated SIJD), down slip, up slip and Sacral torsion.(7) Anterior innominate dysfunction is defined as dysfunction wherein anterior superior iliac spine shifts anterior and inferior in comparison to contralateral landmark. For final diagnosis of anterior innominate dysfunction following special tests are performed; Gillet test, Standing flexion test, Sitting flexion test and Supine to sit test (8). The distance among umbilicus and ASIS is measured to exclude out flare and in flare disorder of ilium. On further examination; anatomical surface landmark like iliac crest height, level of ASIS and

level of PSIS is compared (9). The patho-mechanics behind the anterior innominate dysfunction outcomes in release of self-locking mechanism, PSIS rises, higher iliac crest on affected side and leg on that aspect seems lengthy in supine. (10). There is inhibition of gluteus maximus which alter the stabilizing effect of Gluteus maximus on pelvis. Pelvis is no longer maintained its impartial role at some point of weight bearing in ambulation. The stabilization of pelvis is maintained crucially through proper activation of Gluteus maximus(11).

The incapacity and disability in everyday activities is expressed in terms of Modified Oswestry Disability Index(12). The occurrence of sacroiliac joint disorder is higher among female gender. Up to 30% of female with LBP is stricken by Sacroiliac joint dysfunction (13). The risk of SIJD in females is three to four times higher as compared to male gender. Being overweight is one of the primary threat components for SIJD which could cause pain, stiffness and confined the activity of axial musculature. Weight gain can result in the alteration of pelvic anatomy(14).

Treatment decision for anterior rotated innominate focuses recuperation of normal pelvis role through rotating innominate in posterior direction. Treatment interventions are installed at the precept of biomechanical corrections of sacroiliac joint. Physiotherapy is one of the treatment of preference for the control of pain and functional drawbacks in the patients with anterior innominate dysfunction.(15) Muscle energy technique is one of the common intervention to treat malalignment(16).

Iliopsoas is one of the hip flexor crossing the pelvis. Theoretically the limited length of hip flexor will reduce the

neuromuscular recruitment of hip extensor (Gluteus maximus). Therefore excessive activity of hip flexor will cause the Gluteus maximus to be inhibited by each other and increase dependence on the secondary extensor such as hamstring called synergistic dominance (17, 18). Static stretching of hip flexors is crucial not only for iliopsoas extensibility but also for recruitment of gluteus maximus indirectly (19).

METHODOLOGY

The study was quasi experimental trial performed in physiotherapy department of Jinnah hospital, Lahore. Ethical approval was taken from ethical committee of Riphah International University Lahore. Non-Probability consecutive sampling technique was used to gather the data. Sample size was thirty six calculated by online EPITOOL sample size calculator with 10% attrition rate. Both male and female Participants of age range 25 to 45 year with unilateral pain of degree at least 6 on Numeric Pain Rating Scale were recruited in study. Participants with three out of five test of pain provocation for Sacroiliac joint dysfunction positive (Distraction test, Compression test, Thigh thrust test, Sacral thrust test and Gaenslen's test); Positive Special test for Anterior Innominate Dysfunction (Standing flexion test, Seated flexion test, Supine to sit test and Gillet test) were included in study. Participants were excluded having history of paresthesia, numbness, motor weakness, any back surgery, spondylolisthesis, pregnancy and previous history of any physiotherapy intervention like manipulation past few weeks.

So, total thirty six patients (male: 12, female: 24) were eligible to meet the inclusion criteria and selected by lottery method of randomization process into two groups; Group A (Post isometric relaxation) and Group B (Static Stretching). Prior to treatment consent was taken from patients and clarified treatment strategy were given. When patient came for the first visit; the patient was asked to complete demographics, Numeric Pain Rating Scale (NPRS) and Modified Oswestry Disability Index (MODI) measurements. Hot pack for fifteen minutes on respective muscle group in both study groups was applied as conventional treatment.

Participants in Group A got Post isometric relaxation of gluteus maximus along with hot pack. Pelvic muscles on posterior side were used for correction of anterior rotated innominate to rotate innominate posteriorly. The subjects were requested to lie in supine position and bending the knee and hip of affected side. Therapist standing in front of affected person and locked the flexed knee with its shoulder and moved the leg till the limit and instructed the subject to push knee towards therapist's shoulder by contracting the Gluteus maximus isometrically for ten seconds with contraction force below maximum upto twenty percent. Patient breathed in during course of this effort. After isometric contraction affected person was requested to relax. Along this margin, flexed the hip a new limit had been reached. Starting from this new limit, the technique is repeated three to five times till no limit felt with 5 second resting time with each repetition (20).

Patients in Group B got static stretching of hip flexors close along with hot pack for fifteen minutes. For static stretching of hip flexor, the subjects turned into request to lie in prone position. Therapist was standing towards the

affected side of patient. Therapist placed one hand on buttocks to stabilize the pelvis and slowly bending and lifting the thigh up by other hand for low intensity stretch and sustained for thirty seconds. This was repeated three times with fifteen seconds rest period. (21, 22).

Complete treatment session was given to each patient with specific allotted technique and given three session per every week for about a month. Following one month of post treatment plan of care, the patients of anterior innominate dysfunction were assessed with NPRS scale and MODI scale surveyed at baseline, 2nd week, and 4th week post treatment results (23). After collection of data, analysis was done by SPSS version 21. Normality of data was tested by using Shapiro-Wilk test. Inter group difference evaluated with Mixed Model ANOVA and Intra group pre and post treatment values evaluated with repeated measure ANOVA.

RESULTS

Table-I showed there were 12(33.3%) males and 24(66.7%) females. Mean age of participants was 35 years with S.D 7.39. Mean BMI of participants was 23.84 with S.D 3.29. The level of significance was accepted as $p < 0.05$. Normality of data was tested by using Shapiro-Wilk test was greater than 0.05, so the data was normally distributed and parametric tests were applied for analysis.

Table-II showed group A produced more significant improvement in NPRS and MODI score as compared to group B. Table-III showed across the group comparison of NPRS and MODI and indicated that p-value was less than 0.05 which means there was statistically significant difference between two groups.

Table-I: Descriptive statistics of Participants

		N	MEAN	S.D
Gender of Participants	Male	12 (33.3%)		
	Female	24 (66.7%)		
Age of Participants	Group A	18 (50.0%)	34.28	7.76
	Group B	18 (50.0%)	35.72	7.16
BMI of participants	Underweight	3 (8.3%)	23.84	3.29
	Normal	19 (52.8%)		
	Overweight	11 (30.6%)		
	Obese	3 (8.3%)		

Among 36 participants, mean age of group A was 34.28 ± 7.76 and group B was 35.72 ± 7.16 years. In this study minimum age was 25 years and maximum age of the participants was 45 years. Out of total 36 participants 3(8.3%) were fall in category of underweight (<18.5). 19(52.8%) participants were normal or healthy weight in between (18.5-24.9). 11(30.6%) participants were with fall in overweight category (25.0-29.9). Only 3 participants were obese with BMI (30.0 or above).

Both groups showed significant results as p value < 0.05 but group A showed more significant improvement with mean difference of 4.83 in NPRS score and 40.42 in MODI from baseline to week 4.

Across the group comparison of NPRS and MODI showed p-value was less than 0.05 indicated that there was statistically significant difference between two groups.

Table-II: Within Group's Comparison of NPRS and MODI (Repeated Measure ANOVA)

Variable	Group	Mean ±SD			p-value
		Baseline	Week 2	Week 4	
NPRS	Group A (PIR)	7.77 ± 0.64	5.11 ± 0.90	2.94 ± 0.93	<0.05
	Group B (SS)	7.66 ± 0.68	6.11 ± 0.83	4.55 ± 1.28	<0.05
MODI	Group A (PIR)	64.55 ± 13.68	42.42 ± 15.52	24.13 ± 14.14	<0.05
	Group B (SS)	64.11 ± 13.41	64.11 ± 13.41	50.55 ± 13.66	<0.05

Table-III: Across the group comparison of NPRS and MODI (Mixed Model ANOVA)

		Mean (I-J) Diff	p-value
Baseline - Week 2	NPRS	2.10	<0.05
	MODI	17.85	
Week 2 -Week 4	NPRS	1.87	<0.05
	MODI	16.01	
Week 4 -Baseline	NPRS	3.97	<0.05
	MODI	33.86	

DISCUSSION

In the current study, the outcomes of Post isometric relaxation of Gluteus maximus and Static stretching of hip flexors on pain and functional status are compared in subjects with anterior innominate dysfunction. The variations observed in this study from baseline to 4th week of intervention were noteworthy. The current study suggested that both treatment techniques i.e., Post isometric relaxation and Static stretching was effective and produced significant difference in NPRS and MODI score to improve pain and functional status.

The results of current study were in accordance with study conducted by Vaidya et al. (2019) in which Post isometric relaxation was shown more significant results in reduction of pain and disability as compared to Mulligan after 1 week intervention (24). But in current study long term effect of muscle energy technique was evaluated after 1 month of intervention and concluded that post isometric relaxation was also effective in long term for pain and functional status. Vaseghnia et al. in 2019 claimed that Post isometric relaxation in short term significantly reduced the VAS and MODI in females with anterior innominate dysfunction also supported my study. On recommendation of this study, long term effects of Post isometric relaxation for treatment of anterior innominate dysfunction for better outcomes were checked in current study both in males and females gender (13)

The current study contrasts together with a study conducted by Urko Jose et al. (2019) on muscle energy technique contrasted with osteopathic manipulations in management of SIJD in players concluded that Thrust approach produced significantly improvement in pain and disability in long term and muscle energy technique was effective for short term (25). But current study claimed that post isometric relaxation was also effective for pain and disability in long term as compared to static stretching. Faryal Zaidi and Ishaq Ahmed in 2017 claimed that MET and Maitland approach each has powerful effect on pain and disability with stabilizing exercises in long term(26). The current study also concluded that PIR was effective for pain and functional status in long term. Sewani et al. in 2017 claimed that Post isometric relaxation in addition to hot pack significantly reduced VAS and MODI in accordance with current study.(27)

Static stretching was also effective for reduction of pain and disability in anterior innominate dysfunction as shown in current study supported by study of Swanepoel et al. (2017) on SIJ manipulations in contrasted with Static stretching in which The group with static stretching had shown more evident results in reduction of NPRS and MODI (28). In current study, static stretching was also effective for pain and functional status but post isometric relaxation had shown more significant results.

CONCLUSION

Both treatment techniques; Post isometric relaxation and Static stretching are effective and produced significant difference in NPRS and MODI score to improve pain and functional status but PIR had shown more promising results in patients with anterior innominate dysfunction.

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