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Effect of Proprioceptive Neuromuscular Facilitation (PNF) in Improving Muscle Control in Patient with Sacroiliac Joint Dysfunction: A Case Report

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***Abstract*: *Introduction*: This report talks about of a 43-year-old female with severe Sacroiliac Joint dysfunction (SIJ). Having pain due dysfunction from last 5 months, for which already taking physiotherapeutic intervention from last 3 weeks after consultation with orthopedic surgeon. Pain was present on right side lower back region around Posterior superior iliac spine which is radiating down to right thigh and even getting worse with prolonged standing, sitting, long travelling hours, ascending and descending long flights of stairs. Moreover, she found difficulty in cooking in her kitchen after spending one hour of standing. She had a history of caesarian section 3 months ago, after that she gradually started having severe pain in her lower back which even started to radiate due to which limping on opposite side is seen. *Examination:* Local tenderness on posterior aspect of right side SIJ was observed on palpation. On examination limited lumbar flexion, extension, rotation and side bending was found due to pain bilaterally. VAS score shows 8 /10. Roland-Morris Disability questionnaire shows 16 out of 24 for functional disability scores. Special test like Gillet, Gaenslens, FABER, SLR and sacroiliac stress tests were performed on patient to confirm the diagnosis. Outcomes of treatment were assessed with same pre and posttest measures. *Treatment:* Physiotherapeutic intervention was given with Diagonal PNF pattern, Dynamic Tapping, hot fermentation applied pre and post intervention. After 2 months of intervention, improvement is seen in all the outcome parameters of patient. Evidence regarding the use of PNF as an intervention for correcting the SIJ dysfunction appears underreported so further research suggested. Patients complaining sacroiliac joint pain should be examined regularly to rule out sacroiliac component in LBP separately which usually not performed.**

***Keywords*: Sacroiliac Joint dysfunction (SIJ), Proprioceptive Neuromuscular Facilitation, Tapping, Muscle Control.**

1. Introduction

Dysfunction in Sacroiliac joint (SIJ) is considered as one of the primary source of LBP during pregnancy especially in late thirties [1]. Worldwide around 20% to 80% of the females having baby experience pain in posterior pelvic and lower back region commonly arising from the Sacroiliac dysfunction [2]. SI Dysfunction occurs because LOG is displayed anteriorly to the center of acetabulum due to heavy weight lifting, long standing, and excessive forward leaning in patient with excessive lumbar lordosis [3]. If sufficient muscle support sufficient anterior pelvic support is provided by muscles [4]. All this is very common in gestation period due to the presence of excessive relaxin hormone in body. Common causes for development of SIJ dysfunction are suddenly after accident, trauma, and repetitive shear around joint surface. Lumbar fusion, LLD, prolonged athletic activity, pregnancy, scoliosis, other common gait abnormalities, seronegative HLA-B27spondyloarthropathies [5].

Most of the patients with acute/chronic SI joint dysfunction should be advised to remain active with their activities of daily living. Nonspecific SI dysfunctions targeted at preserving functional activity by reducing pain and disability by multidisciplinary approach [6]. SIJ pain is generally localized around lower side of ipsilateral PSIS approximately 3cms * 10cms, when radiate usually extend till 5th lumbar and 1st Sacral nerve distributions, commonly seen in buttocks, groin, posterior thigh and lower leg [7]–[9]. The clinical manifestation of SIJ dysfunction increase health cost as it affects quality of life [10]. Although frequency of SIJ dysfunction is increasing but still treatment methods for its correction are not well defined in literature.

PNF technique is a type of stretching used for improving muscle elasticity and studies already down suggests positive effect on both AROM and PROMs [11]–[13]. In clinical set ups it is already used by therapists for restoring impaired functional ROM, increasing muscle control and strength in cases soft tissue damage / history of surgeries [11]–[13]. In a study already done by Etnyre et al in 1986 suggested that if target muscle is made to contract isometric ally to its maximum potential in a particular lengthened position that it is followed by relaxation of targeted muscle for shorter period [14]. Muscle performance has been improved in cases where PNF is performed as exercise. Autogenic inhibition, reciprocal inhibition, stress relaxation, and the gate control theory are the

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basic mechanisms which work in PNF technique to increase ROM [15,16]. Earlier done research work indicates that various PNF techniques are effective increasing muscular strength, power, athletic performance and in improving and maintaining ROM especially immediately after session. However, till now no proper protocol is deciding for giving PNF techniques to attain maximum benefits to the patient.

Tapping with elastic adhesive tape is a novel intervention used for improving symptoms like pain, misalignment, neuromuscular dysfunction, disorders of musculoskeletal system, and injuries occurred during sports. Kinesiology tape stretches maximum of170% from a minimum of 120% due to its elastic nature and later recoils to its original dimension [17]. Mal aligned joints are corrected when resistance is provided to them from opposite side due to application of elastic tape which gives 50- 75% of the existing tension to facilitates its position correction [17].

Till date, no such evident information regarding the effectiveness of PNF with Tapping for the treatment of Sacroiliac joint dysfunction is not there in literature. However, the exact effect of different exercise interventions on muscle control, strength, endurance, and ROM was not very clear. Moreover, earlier studies on PNF, tapping applied to different neuromuscular and orthopedic conditions with specific treatment protocol found to be effective in improving different muscle responses. If the main focus of treatment for SIJ dysfunction is to improve muscle control, strength, stabilization and flexibility, then present case report will be beneficial to see effectiveness of PNF techniques with tapping on SIJ dysfunction.

2. Case Presentation

A 43 years old female with diagnosed SI dysfunction referred to Physiotherapy department with history of pain from last 5 months. According to the patient her pain is radiating from her lower back to the right thigh. It gets worse with long sitting, standing or ascending & descending stairs. Moreover, it was making her ADL difficulty to such an extent that she can't work in kitchen beyond one hour. She had a history of caesarian section 3 months ago, after that she gradually having started severe pain in her lower back area which started to radiate on right side after some time.

A. On Palpation

Localized grade 3 tenderness was seen on the posterior aspect of the sacroiliac joint with swelling and inflammation.

B. On Examination

ROM of lumbar flexion, extension, side flexion and rotation was found to be limited on both the side due to pain. NPR (Numerical Pain Rating) score was around 8 out of 10 on Visual Analogue Scale and 16/24 on RMDQ (Roland-Morris Disability Questionnaire). Special test like Gaenslen, Gillet, FABER (Flexion Abduction External Rotation test), SLR (Single Leg Raise test) and Sacroiliac Stress test are positive on examination.

C. Intervention

Hot fermentation in the form of moist heat therapy is given to the patient in side lying position in such a way that it should be covering affected side of pelvis from PSIS to ASIS, covering gluteal region on affected side completely.

After that contact relax is performed on affected side of pelvis first in D1 pattern (anterior elevation and posterior depression) 3 times with 10 sec contractions and 5 sec relaxations in 1 set. Than in D2 pattern (posterior elevation and anterior depression) 3 times with 10 sec contractions and 5 sec relaxations in 1 set. 3 set of each diagonal pattern to be performed in 1 treatment session alternatively. Followed by application of hot fermentation in supine lying position, covering hip joint from posterior to anterior aspect.

After that medical tapping is applied over the affect SI joint covering it from posterior to anterior aspect to provide support and stability to the joint in order to improve and enhance muscle function, flexibility and mobility. Patient is advised not to remove this tape even while bathing. Treatment to given for a period of 4 days a week for (8 weeks) 2 months, along with home ergonomic modifications.

D. Outcome

After 2 months of intervention all the proactive special test was found to be negative. ROM for all the movement of lumbar spine, muscle flexibility, muscle tightness showed improvement post intervention. Pre and post scores of all the outcome measures assessed were shown in table 1.

Table 1
Pre and post scores for outcome measures

	Pre Scores	**Post Scores**
NPRS, VAS	8	4
RMDQ Score	16	4
ROM of Lumbar Spine		
Lumbar Flexion	35 °	45 °
Lumbar Extension	5 °	9 °
Lumbar Rotation R/L	5/20	10°/20°
Lumbar Side Flexion R/L	15°/25°	20°/25°

3. Discussion

Findings of the current study suggest that PNF exercises with tapping as an intervention significantly increases the lumbar ROM, muscle function and reduces radiating pain in patient with SIJ dysfunction. This result is supported by an earlier done study in which minimum 8 weeks of PNF exercises as intervention for CLBP significantly increases the lumbar spine ROM and endurance of spinal muscle [18]. These finding are in agreement with previous studies suggesting significant increase in ROM and endurance with CLBP after 4-week PNF intervention [19]. With the beneficial effects of the current study it is established that PNF patterns are also designed to maximize improvements in flexibility. These exercises take benefits from inhibitory reflexes to improve muscle relaxation.

During stretch training muscle relaxation allows greater stretch magnitude to, gain maximum flexibility. These results were supported by previous research findings which also suggests positive effects on joint flexibility of PNF technique [20]–[24].

Research finding of a previously done study suggests less increase in ROM of extension than in flexion of Lumbar spine after application of 4 week of combination of isotonic [18]. An earlier done study also suggests intensive training for at least 2 months is needed for effective reduction in pain [24]. In current study functional improvement is showed by RMDQ post score in term of muscle control, flexibility and endurance. Similar results were found in an earlier study which suggest PNF effectiveness for treating CLBP by comparing pre and post values of Oswestry Index [18]. A limitation of this study suggests that such intervention protocols programs are given for short period so improvements achieved may not be permanent. All though long term effect of PNF on reducing pain is still unclear. Improvements in control of muscle, strength and mobility might be reduced in the long term after discontinuing exercises, and so further intervention with ergonomic modification is required. Therefore, effectiveness of PNF in improving muscle control with SIJ dysfunction is not clear and required further examination.

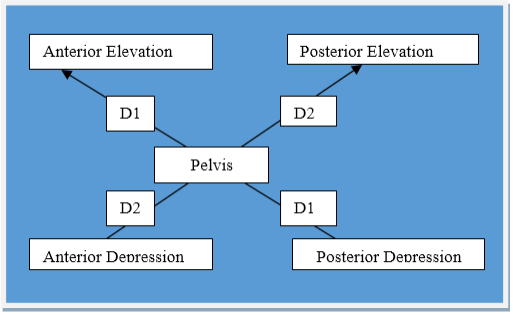

Fig. 1. Diagonal patterns for pelvis PNF

4. Conclusion

Eight weeks of Hold Relax diagonal PNF pattern around pelvis is helpful in increasing muscle control & endurance in case of sacroiliac joint dysfunction by 25 % - 80%. VAS scores for pain and functional disability were found to be significantly decreased in patient after intervention. The result of this study propose that static PNF exercises are very effective for improving muscle control & endurance around pelvic, mobility as well as in decreasing pain radiation symptoms. It was also concluded that it also improves functional independence in people with SIJ dysfunction. These changes are short term appeared to last only for a period of 3 months after discontinuing exercise. So evidence on PT management of people with SIJ dysfunction found to be under reported, so further studies need to be done to see the long-term effects of PNF. People with LBP should be regularly examined separately for back and SIJ dysfunction. Therapists are advised to report their research findings to strengthen the evidence available for treating sacroiliac joint pain.

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