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ORIGINAL ARTICLE

Effects of iliopsoas and piriformis muscle stretching along with Maitland's mobilizations in postpartum Coccydynia; A randomized control clinical trial

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[1-5]Conception and design, [3-5]Collection and assembly of data, [1,2,,6,7]Analysis and interpretation of the data, Statistical expertise, [3-4]drafting of article, [3-5]Critical revision of the article for important intellectual content, [1-2]Final approval and guarantor of the article.

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ABSTRACT

Background: Childbirth is a well-known cause of Postpartum Coccydynia associated with pain and tenderness at the tip of the tailbone between buttocks and is a renowned source of maternal morbidity if left untreated.

Objective: To explore effect of piriformis and iliopsoas muscle stretching along with mobilization of sacro-iliac joint and coccyx in patients suffering from postpartum Coccydynia.

Methodology: In a randomized control clinical trial, fifty-six females with clinically diagnosed postpartum coccydynia were recruited and randomly divided into two groups G1=intervention group (n=28), G2=control group (n=28). All participants have similar characteristics in that they had >2 child deliveries, aged between 25-35 years, with a visual analogue scale ≥ 6 in a sitting position. The experimental group was treated with heat therapy (10 mints), along with piriformis and iliopsoas muscle stretching, Baseline measurements include the Intensity of pain measured by the visual analogue scale, tenderness by algometer, and duration of pain-free sitting. Post-treatment effects were measured after two weeks, and follow-up was carried out every month for three months to check the recurrence or continuous recovery.

Results: The experimental group showed a significant improvement in pain intensity, pain pressure threshold and pain free sitting compared to the control group ($p<0.05$). Visual analogue scale 6.87±2.07 had improved 3.9±1.37 after treatment compared to the control group 6.87±1.9(pre study) to 6.2±1.8(post study).

Conclusion: Stretching exercise, mobilization, and medicine (NSAIDs) were effective in relieving pain and complete recovery of postpartum Coccydynia.

Key words: Postpartum Coccydynia, visual analogue scale, pain pressure threshold, pain intensity

Introduction

Coccydynia was first described by Simpson in 1895, most common in females than in males.[1] Etiology remained relatively undefined in most cases, but according to previous information, it may result from a direct injury such as a fall or indirect as after parturition, due to pelvic infection, cyst, or tumors. Coccydynia related to childbirth might be considered traumatic.[2] However, in many cases, Coccydynia cannot be related to any objective, radiological or other pathological

findings and is classified as idiopathic. Traumatic thought occurs more frequently than idiopathic type.[3] Female gender and obesity are considered the most critical risk factors for tailbone pain.[4] The angle between the coccyx and sitting surface may cause coccyx hypermobility and Coccydynia.[5]

Prevalence of musculoskeletal dysfunction as muscle cramps, low back pain, and Coccydynia found in pregnant women, reported higher in second and third trimester [6, 7], and aggravated by childbirth.[7, 8] Pelvic floor muscle weakness occurs during multiple pregnancies, complicated as involuntary leakage of urine while coughing, urge incontinence, diastasis recti, uterus collapse and pelvic pain. The internal location of the child during childbirth may increase the susceptibility to pelvic injury during difficult caesarean or instrumental delivery[9]. Lumbar and rectal surgeries and epidural anesthesia injection are considered the cause of coccydynia.[3] Classical symptoms of Coccydynia presented as localized pain over coccyx. Physical examination revealed tenderness over coccyx.[10] Radiographs provide valuable clinical diagnosis. Dynamic radiographic images were taken in both sitting and standing positions may be more valuable than static x-rays as they provide measurements of pelvic rotation and angle of incidence (normal angle is 5°-25°). Deviated angle sowed hypomobility (<5°), or hypermobility (>25°.)[11]

Conservative management included Analgesics, ring-shaped cushions, steroid injections, local anesthesia for relief of pain [12]. Temporary and permanent nerve blocks by injection at ganglion.[13] Osteopathic manipulative treatment and stability ball exercise have determined that exercise had improved pain and activities of daily living. Core stability exercises produced better outcomes as compared to external stabilizers in from of maternity support belts. Pelvic floor muscle strengthening and low intensity aerobics may also lessen the coccyx pain.[14] Coccygectomy is performed after failure of conservative management to relieve pain.[15]

Postpartum Coccydynia was a neglected topic in previous maternal care research. The study needed for better knowledge about the condition, risk factors, and evidence-based treatment plan. As physical therapy is a merging treatment in the conservative domain, and showed good results in Europe, it was hypothesized that mobilization, and stretching exercises along with medicine can be helpful in treatment of postpartum Coccydynia and prevent a recurrence.

Methodology

Coccydynia is a common condition that is self-remitting and usually causes mild health complications. Although postpartum coccyx pain irritates the patient, most of them require medical attention and respond well to conservative treatments. A clinical trial was conducted on patients with a complaint of postpartum Coccydynia, referred by their gynecologist at Niazi Hospital Sargodha. The sample size was calculated by using random number generator (G power analysis software version 3.1.9.2) with 0.80 power of study, at 0.5 margin of error and 95% confidence.

56 participants were randomly divided into intervention group (G1) and control group (G2) To manage attrition, the total recruited participants were sixty-one before completion of study. The duration of the study was from November 2021-February 2022. Purposive sampling technique was used to select sample after fulfilling inclusion criteria. Inclusion criteria was aged 25-35 years multigravida females with VAS ≥ 6 in sitting position from last two weeks of postpartum, no history of postpartum exercise, manual therapy, and coccygeal steroid injection. Exclusion included a history of systemic disease (Diabetes, RA, SLE, Ankylosing spondylitis), malignancy, coccygeal dislocation, chronic low back pain, and skin problems.

Once the participants have screened, they were randomly divided (by lottery method) into two intervention and control group. All participants were taking NSAIDS prescribed by their gynecologist for pain relief were asked to continue their medicine, as well apply heat on affected area for 10 mints. In the intervention group treatment regimen included heating for 10 mints, stretching of pisiformes, and iliopsoas muscle with 5-second stretch hold, 5 repetitions/session for 5 sessions/week for two weeks. Maitland grade I- oscillations of Sacro-Iliac joint and coccyx were performed as intermittent oscillations (like vibrations) for 6-7 seconds with a few second rest interval for several cycles/session. The physical therapist applied all interventions. The Control group received no treatment, and the participants were asked to apply heat to the affected area and take NSAIDs regularly for two study weeks. Patients were advised to avoid prolonged sitting, standing, and supine lying, and they were educated to frequently change their posture and use air-filled cushions to avoid extra pressure on the coccyx during sitting. The data was collected before and after two weeks of study period.

A self-developed questionnaire was used to collect data at baseline and end of treatment. Apart from demography data, height and weight were measured to calculate participants' BMI. Questions related to different risk factors were asked, and three main leading questions were included in the questionnaire and inquired before and after the treatment as, Intensity of pain by using a visual analogue scale, duration of pain-free sitting by a simple time clock, pain pressure threshold (pound per square inch) by pressure algometer. A follow-up evaluation was done

every month for 3 months to check the recurrence or continuous recovery.

Informed consent was obtained from participants after explaining the whole study procedure, and confidentiality of data was assured to keep information fully secured. Study was approved by ethical review committee of Sargodha Medical College, UOS (**Ref no: SU/AHS/1052**). Data were statistically analyzed through an independent T-test by using software SPSS by considering level of significance p<0.05.

Results

Average age of patients was 29 ± 2.9 years. 79% of female's BMI was 31 showed that most women who suffered from Coccydynia were obese (Table I).

Table I: Demographics of intervention and control group.

Variables	Intervention group	Control group
Age of patients	Mean = 29 years SD = 2.9 years	Mean = 29 years SD = 2.9 years
BMI	Underweight = 00% Normal= 21% Obese = 79%	Underweight = 00% Normal = 25% Obese = 75%
Number of deliveries	>2 = 66% >3 = 23% >4 = 1%	>2 = 65% >3 = 23% >4 = 2%
Type of deliveries	C-section = 23% Vaginal = 67%	C-section = 22% Vaginal = 68%

Coccydynia susceptibility increased by 46% with an increasing number of childbirths due to increased coccyx luxation seen more in vaginal delivery than C-sections 23% (Table I).

Independent T test was used to compare baseline data of both groups, revealing that both groups were similar and comparable. There was no notable distinction between intervention and control groups. Table II

Results obtained from independent T-test between both groups showed that intervention group varied statistically, significant in expression of post-treatment VAS, and pain pressure threshold (figure 3 A, 3 B, Table III), respectively (P<0.05). The VAS score improved by 44% after treatment. Similarly, PPT in the experimental group improved by 19.5p%. The duration of pain-free sitting improved by 53% in the intervention group.

Discussion

Many females experienced low back or pelvic girdle pain during pregnancy of sufficient Intensity to interfere with activities and limit their work performance. There were many etiologies to tailbone trauma. This article highlights the risk factors predisposing to coccygeal bone injury and its conservative treatment to relieve pain.

Different risk factors were evidenced to increase the chances of Coccydynia. Gender is a risk factor, as the ratio of women suffering from coccyx pain was higher than men. The tendency of postpartum coccydynia was two times greater in obese women than in lean women. This eventually linked us to the fact that high body mass index may increase prolific threat of coccyx injury during delivery.[14] Coccygeal lesion pattern observed in obese and lean individuals markedly differs, as obese patients have mainly posterior subluxation, decreased degree of rotation during sitting, increased pressure posteriorly,

Table II: independent samples T-test for VAS, PPT and pain free sitting duration.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAS	Equal variances assumed	.318	.575	.280	54	.781	.142	.51	-.88	1.16
	Equal variances not assumed			.280	53.718	.781	.14	.51	-.88	1.1
PPT	Equal variances assumed	.005	.942	-.414	54	.681	-1.1	2.67479	-6.4	4.25
	Equal variances not assumed			-.414	53.915	.681	-1.1	2.67479	-6.4	4.2
Pain-Free Duration	Equal variances assumed	.014	.907	.285	54	.776	.07	.25028	-.43	.57
	Equal variances not assumed			.285	53.982	.776	.07	.25028	-.43	.57

Table III: VAS, PPT, and Pain-free duration in experimental and control groups before and after the study.

	VAS		PPT (lb)		Pain-free Duration (Hour)	
	Pre Study	Post Study	Pre Study	Post Study	Pre Study	Post Study
Experimental group	6.8±1.8	3.6±1.7	46.3±9.8	57.76±17.2	2.25±0.9	4.87±0.35
Control Group	6.7±1.9	6.2±1.8	47.3±10.3	46.30±15.1	2.15±0.9	2.32±0.71

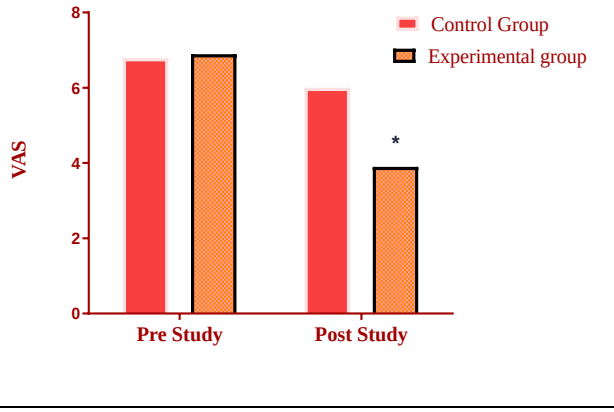

Fig 3A. VAS score at baseline and after treatment in intervention and control group.

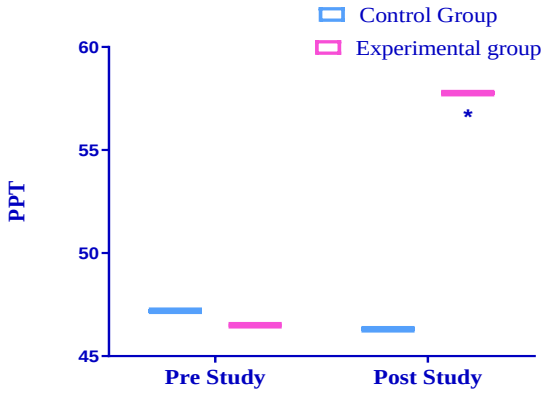

Fig 3B. Pain pressure threshold at baseline and after treatment in intervention and control group.

and increased chances of coccyx injury. Furthermore, Coccygeal pain was seen more in women having more than one normal delivery. [16] Coccydynia signifies pain in coccyx and is exasperated by prolonged sitting on hard surface, rising from sitting, with hip extension activities such as stair

climbing and sexual intercourse.[17] The situation found to be the same as obesity and the increased number of deliveries correlated with coccyx bone trauma. moreover, sitting on hard surface for extended period of time increased pressure and shearing forces on coccyx induced further damage and pain.

Exercise therapy is a common treatment in conservative options, and accumulated evidence suggests that exercise therapy can reduce pain intensity, stabilize the pelvis, and improve function[18]. Some data provide information about the role of osteopathic manual therapy, including soft tissue release[19], range of motion, and muscle energy techniques that were helpful in lumbopelvic pain. However, studies showed contradictory outcomes.[18] This discrepancy gave rise to a risk of detection bias and other difficulties that might create hesitation in drawing conclusions and implementing osteopathic techniques in treating pain.[20] Further, there was very limited evidence supporting exercise therapy[21, 22], manual therapy[18], electrotherapy, and yoga in postpartum pelvis pain[21] due to the small number of RCTs in a particular area.

A study comparing spinal manipulation, a neuro-emotional technique, with active and passive spinal mobilization, and exercise with the improvement of function in all treatment groups showed promising results in the relief of low back and lumbopelvic pain.[23] However, little evidence is available on all the above techniques in pregnancy-induced lumbopelvic pain. There was no evidence about the applications of such methods in postpartum Coccydynia. Gathering all the above information and observing the beneficial effects of conservative treatment on different musculoskeletal disorders, it was decided in the current study to provide evidence-based treatment techniques, stretching of the piriformis and iliopsoas muscles along with mobilization to correct alignment of bone and relief of muscles spasm that may cause coccygeal pain in females after childbirth. The current study provides information on pain relief and improved functional capacity in patients within 2-weeks of treatment. Treatment also showed a continuous rate of recovery even after three months.

Conclusion

Stretching exercise and mobilization effectively relieved pain and improved postpartum Coccydynia's recovery time.

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