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PREVENTION & REHABILITATION: ORIGINAL RESEARCH

Effect of stretching of piriformis and iliopsoas in coccydynia

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ABSTRACT

Pain in the coccyx is referred as coccydynia. The pain aggravates in weight bearing i.e. sitting. Total 48 persons with coccydynia diagnosed clinically were recruited and randomly assigned into one of the 3 groups. Experimental group I were treated by stretching of piriformis and iliopsoas muscles, experimental group II were treated by stretching of piriformis and iliopsoas muscles and Maitland's rhythmic oscillatory thoracic mobilization over the hypomobile segments and the conventional group were treated by seat cushioning + Sitz bath + Phonophorosis. All participants underwent an initial baseline assessment for Pressure Pain Threshold (PPT) by using modified syringe algometer and pain free sitting duration. All the subjects were advised to minimise sitting posture and use a seat cushion. Treatment was given for 3 weeks, 5 sessions per week and post-treatment evaluation was done after completion of 3 weeks. Follow up evaluation was done after 1 month.

Data analysis: The data was analyzed by using 3 × 3 ANOVA. Tukey's HSD post-Hoc analysis was used for all pair wise comparison.

Results: The overall results of the study showed that there was significant improvement in pain pressure threshold and pain free sitting in both the experimental groups with treatment and improvement continued after cessation of therapy, whereas the conventional group did not improve significantly.

1. Introduction

The term coccydynia or coccygodynia, first introduced by Simpson in 1859, refers to symptoms of pain in the tailbone, known as the coccyx. The name coccyx is derived from Greek word Cuckoo due to its resemblance to the beak of this bird (Lirette et al., 2014).

The coccyx is the terminal part of the vertebral column, consisting of 3–5 rudimentary vertebral units that are fused. The ventral side of the coccyx is slightly concave whereas the dorsal aspect is slightly convex. It serves as the attachment for the anterior and posterior sacrococcygeal ligaments, the anococcygeal ligaments as well as the levator ani muscles. Functionally coccyx may serves as a weight bearing structure when a person is seated, thus completing the tripod of weight bearing composed of the coccyx and the bilateral ischial tuberosities. The coccyx bears more weight when the seated person leans backward. Therefore persons with coccydynia prefer to sit leaning forward, which shifts more weight to the bilateral ischium rather than the coccyx (Johnson, 1981).

Coccydynia is a rare condition of various aetiologies. The condition affects females 5 times more than males. The most common cause is trauma as a result of falling on the buttocks, and childbirth pressure in women. Coccydynia may develop from repetitive or prolonged sitting on hard, narrow, or uncomfortable surfaces. Partial dislocation of the sacrococcygeal synchondrosis can possibly result in abnormal movement of the coccyx from excessive sitting and repetitive trauma of the surrounding ligaments and muscles resulting in inflammation of tissues and pain (Foegel et al., 2004).

Non-traumatic coccydynia can result from a number of causes, including degenerative joint or disc disease, hypermobility or hypomobility of the sacrococcygeal joint, infectious etiology, and variants of coccygeal morphology. Coccydynia can also be radicular or referred pain, although this type of pain usually is not associated with the hallmark coccygeal tenderness on physical examination. Coccygeal configuration is another important aetiological consideration. There are four different orientations for the coccyx. In type 1, the coccyx is curved anteriorly with its apex facing downward and caudally. In type 2, this forward curvature is more dramatic and the apex extends forward. Type 3 is where the coccyx angles forward sharply. Type 4 is characterized by the coccyx being subluxated at the sacro-coccygeal joint. Type 2, 3, 4 are more prone to become painful than those with type 1 (Nathan et al., 2010; Kerr

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et al., 2011). Moreover, it is more common in obesity; a body-mass index (BMI) of 27.4 in females and 29.4 in males increases the chance of developing coccygodynia. The female/male incidence ratio is 5:1.5 due to a more posteriorly situated os sacrum and coccyx, and longer coccyges relative to men (Patijn et al., 2010; Maigne, 2001).

Pain in the coccyx region can also be referred from the lumbar spine, pelvic floor muscles, degenerative disc, neoplasm, bony spurs, cysts, or infections (Nathan et al., 2010; Patijn et al., 2010; Emerson and Speece, 2012).

2. Clinical diagnosis of coccydynia

1) Most striking finding on examination is local tenderness upon palpation of the coccyx. If the coccyx is not tender on palpation then pain is referred from structures such as lumbosacral disc herniation or degenerative disc disease.
2) Pain during prolonged sitting or when pressure is applied to the tail bone such as sitting on a hard chair.
3) Pain during sitting to standing.
4) Symptoms improve with relief of pressure during standing or walking (Raghuram, 2009).

3. Review of literature

Nonsurgical management remains the gold standard treatment for coccydynia, consist of decreased sitting, seat cushioning, coccygeal massage, stretching, manipulation, local injection of steroids or anesthetics and postural adjustments. Those patients who fail these conservative modalities may potentially benefit from coccygectomy.

Khatri et al. evaluated the use of intrarectal manipulation combined with phonophoresis and TENS versus phonophoresis and TENS alone and found statistically significant improvement in VAS score and pain free sitting time for patients receiving intrarectal manipulation (Khatri et al., 2011).

Maigne et al. evaluated the efficacy of intrarectal manipulation combined with levator ani massage compared to SWD for chronic coccydynia using a global index score. At six month follow up they found that 22% of the patients in the manual therapy group versus 12% of patients in control group experienced a good outcome, i.e. decreased individual global score >50% at 1 month and >60% at 6 month 9 (Maigne, 2001).

Wu et al. assessed the patient's physiological response before and after manual treatment combined with short wave diathermy for coccydynia. They found significant differences in both numeric pain rating scale (NPRS) and surface temperature obtained by infrared therography (IRT) at 12 weeks (Wu et al., 2009).

The study was conducted to determine the efficacy of ultrasonic therapy in treating post partum coccydynia following vaginal delivery by Hanan et al. Patients were treated by US on coccygeal region in addition to pelvic floor exercises together with postural correction training 3 times per week for 2 sessions and in control group, only pelvic floor exercises and postural correction training was given. Pain and plasma cortisol level was decreased in both the groups, more pronounced decreased in study group as compared to control group (El-Mekawy et al., 2006).

3.1. Functions of piriformis

The piriformis laterally rotates the femur with hip extension and abducts the femur with hip flexion. Abduction of flexed thigh is important in the action of walking because it shifts the body weight to the opposite side of the foot being lifted, which prevents falling (Hansen, 2010). Piriformis anteriorly tilts and rotates the sacrum to the opposite side together with the ipsilateral gluteus maximus. Sacral rotation is one of the causes of coccydynia which may occur due to tightness of piriformis (Issac and Bookhout, 2006).

3.2. Functions of iliopsoas

The iliopsoas muscle is the strongest of the hip flexors and also rotates the thigh laterally. A unilateral contraction leads to a lateral flexion of the lumbar vertebrae column. Altogether the iliopsoas muscle plays a significant role in the movement of and stabilisation of the pelvis (Tatu et al., 2001).

It is however, a typical posture muscle dominated by slow twitch red type 1 fibre. Therefore, it is susceptible to pathological shortening or contracture, especially in older people with a sedentary lifestyle, and requires regular stretching to maintain normal length. Such shortening can lead to increased anterior pelvic tilt and lumbar lordosis (unilateral shortening) and limitation of hip extension (bilateral weakness). Counter nutation of the sacrum is associated with lumbar extension. So tightness of iliopsoas will lead to abnormal loads on the sacrum and coccyx and hence might be one of the causes of coccydynia (Thieme, 2006).

Therefore it was proposed to study the effects of stretching of piriformis and iliopsoas in reduction of pressure pain threshold and improvement in pain free sitting duration in persons with coccydynia as compared to conventional physiotherapy treatment (sitz bath, phonophorosis).

4. Methodology

A total of 48 subjects with coccydynia were recruited from musculoskeletal section of the Department of Physiotherapy, Swami Vivekanand National Institute of Rehabilitation Training and Research according to the inclusion and exclusion criteria.

4.1. Study design

A three group, experimental study design.

4.2. Inclusion criteria

1) Persons clinically diagnosed as coccydynia
2) Age should be 18 years or above, both the genders

4.3. Exclusion criteria

1) Patients with cancer or cysts in pelvic area
2) Any surgical interventions involving lumbar spine
3) Any tumor, surgery or fracture, recent trauma
4) Pain in coccyx region referred from lumbar spine, pelvic floor muscles, degenerative disc, neoplasms, bony spurs, cysts, or infections etc.

4.4. Procedure

Persons with coccydynia, diagnosed clinically, who fulfilled the inclusion and exclusion criteria were recruited by picking up chits marked 1, 2 and 3 randomly assigned into one of the 3 groups after signing the written informed consent.

- Experimental group I (16 subjects, 11 females + 5 males) treated by stretching of piriformis and iliopsoas muscles