A LITERATURE REVIEW: MOTOR CONTROL ACTIVATION OF GLOBAL MUSCLES IN ANTERIOR SACROILIAC JOINT DYSFUNCTION

Sarada devi.M¹, Pinky dutta²-Natasha verma³

ABSTRACT

Background

The major source of low back pain is dysfunction of the sacroiliac joint. Form closure and force closure are two main mechanisms that enhance SI joint stability. Biceps femoris & gluteus maximus are the key muscles contributing force closure of the SI joint, as well as promote stability through attachments with the Sacro tuberous ligament. Those with dysfunction of the anterior sacroiliac joint have been identified to have altered gluteus maximus function. However, there is a paucity of literature showing evidence on role of gluteus maximus and latissimus dorsi in SI joint dysfunction.

Purpose

To review the impact of motor control muscle activation on function, pelvic tilt, pain in anterior rotated SIJ dysfunction.

Search method

Articles were selected from PubMed, google scholar, pedro, research gate, science direct, Cochrane by using the key words.

Selection criteria

Articles emphasizing on motor control of gluteus maximus and latissimus dorsi activation in patients with anterior innominate SI joint dysfunction are the selection criteria.

Results

After reviewing the included articles, the motor control activation of global muscles will improve force closure of SI joint which provide great stability.

Conclusion

A literature review done on motor control activation on global muscles showed that they improve stability of the sacroiliac joint, enhancing physical function, reducing pain, and maintaining normal pelvic angle.

Key words

Motor control activation, global muscles, gluteus maximus, anterior sacroiliac joint dysfunction.
INTRODUCTION

Low back pain is caused primarily by the sacroiliac joint. Patients with low back ache often have 10% to 25% sacroiliac joint dysfunction. Form closure and force closure are the two basic mechanisms that increase SI joint stability. Form closure is caused mainly by the bony features of the sacrum and the surfaces of the joints, which allows the SIJ to withstand shear stresses. For such pelvis to remain stable, force closure must ideally generate a perpendicular reflex compressive force for preserving the pelvis stable. The musculature around the SI joint provide dynamic stability called force closure. The SI joint must be compressed in order to control the pelvis, which requires the muscle-ligament-fascia system. The biceps femoris, gluteus maximus, and erector spinae, latissimus dorsi are the main muscles that attach to the sacrotuberous ligament and thoracolumbar fascia, respectively providing the stability of SI joint.

Muscles that cause forceful closure

The pelvic stabilizers are composed of three main muscle slings: a longitudinal sling, a posterior oblique sling, and an anterior oblique sling.

- The posterior oblique sling is made up of the contralateral gluteus maximus, latissimus dorsi, as well as biceps femoris.
- The longitudinal sling is made up of the multifidus attaching to the sacrum, the depleyer of the thoracolumbar fascia, as well as the long head of the biceps attaching to the Sacrotuberous ligament.
- The pectoralis, external oblique, transverse abdominis, and internal oblique muscles constitute its anterior oblique sling.

The proper management of the neural system is essential for the muscle force to contribute to the active control of intrapelvic motion. The specific moment when lumbopelvic muscles contract to stabilize intrapelvic motion against vertical loading. The central nervous system regulates the timing and pattern of muscle recruitment in response to the stresses placed on the lumbar spine. This result in stability of intersegmental lumbar motion. Co-contraction of the transverse abdominis, oblique internus, and multifidus via connections to the posterior layer of the thoracolumbar fascia may help influence stability of intrapelvic motion during single leg standing.

Active daily activities require the trunk and pelvis to be twisted and lifted, which often causes anterior innominate rotation. The activation of the gluteus maximus during load transfer through the pelvis will be changed in SI joint dysfunction. In order to maintain stability, the electromyography study on individuals with sacroiliac joint dysfunction found that the gluteus maximus is delayed in activating and the biceps femoris is overactive as a compensatory muscle.

Coupled motion of contralateral latissimus dorsi and gluteus maximus. vleemin et al defined the posterior layer of the thoracolumbar fascia as a mechanism of load transfer from the ipsilateral latissimus dorsi and the contralateral gluteus maximus. the study focused on the effect of unilateral activation of biceps femoris, gluteus maximus and erector spinae and contralateral activation of latissimus dorsi muscle. Gluteus maximus and latissimus dorsi were found to be partially coupled by the posterior layer of the thoracolumbar fascia, creating
compressive forces acting perpendicularly on SIJ. This altered mechanics leads to pain around PSIS and lengthening of the affected limb making it difficult to maintain a neutral pelvic position. Enhancing physical function, reducing pain, and maintaining a normal pelvic angle are the key goals for individuals with dysfunction of the anteriorly rotated sacroiliac joint. This review was done to find out the motor control effects of activating the gluteus maximus and latissimus dorsi.\(^1\)

The most prevalent form of conservative treatment for anteriorly rotated sacroiliac joint problems is the MET muscular energy, joint mobilization, manipulations, electrotherapy modalities and flexion bias exercises.\(^1\)

Hence, the aim of the study is to review the effectiveness of motor control activation of gluteus maximus and latissimus dorsi on function, pain and pelvic tilt in anterior rotated SIJ dysfunction.

**METHODOLOGY**

An extensive literature search was done, the search was from PubMed, google scholar, Medline, Pedro, Cochrane. Included studies were randomized control trial, systematic reviews, comparative studies, experimental studies, case study, descriptive study, cohort and cross-sectional study. Key words used for search were sacroiliac joint dysfunction, gluteus maximus, motor control exercises, anterior innominate rotated SI joint dysfunction. Articles discussing the effectiveness of motor control activation of gluteus maximus muscle exercises and importance of gluteus maximus and latissimus dorsi in the sacroiliac joint dysfunction were included.

<table>
<thead>
<tr>
<th>Articles searched through database</th>
<th>n=50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articles after removed duplicates</td>
<td>n=44</td>
</tr>
<tr>
<td>Articles reviewed</td>
<td>n=34</td>
</tr>
<tr>
<td>Articles excluded</td>
<td>n=10</td>
</tr>
<tr>
<td>Full text articles met eligibility</td>
<td>n=30</td>
</tr>
<tr>
<td>Full text articles excluded</td>
<td>n=8</td>
</tr>
<tr>
<td>Articles included in this review</td>
<td>n=16</td>
</tr>
<tr>
<td>AUTHOR</td>
<td>YEAR</td>
</tr>
<tr>
<td>------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Siva kumar.s</td>
<td>2022</td>
</tr>
<tr>
<td>Jean Mapinduzi</td>
<td>2022</td>
</tr>
<tr>
<td>Vaidya sanika</td>
<td>2021</td>
</tr>
<tr>
<td>Upendra karki</td>
<td>2021</td>
</tr>
<tr>
<td>Farwa asad</td>
<td>2021</td>
</tr>
<tr>
<td>Aghalar javadov</td>
<td>2021</td>
</tr>
<tr>
<td>Andry vleeming</td>
<td>2019</td>
</tr>
<tr>
<td>Muammad salmanbashir</td>
<td>2019</td>
</tr>
<tr>
<td></td>
<td>Name</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Marco Aurélio N.</td>
</tr>
<tr>
<td>10</td>
<td>Daniel Feeney</td>
</tr>
<tr>
<td>11</td>
<td>Robyn A. Capobianco</td>
</tr>
<tr>
<td>12</td>
<td>Moayad Al- subahi1, Mohamed Alayat</td>
</tr>
<tr>
<td>13</td>
<td>Amir Massoud Arab</td>
</tr>
<tr>
<td>14</td>
<td>Won gyu yoo</td>
</tr>
<tr>
<td>15</td>
<td>P.gunnar Brolinson</td>
</tr>
</tbody>
</table>
RESULTS

16 articles were included in the study, 8 articles shown the motor control exercises along with other manual therapy and exercise therapy approaches were more effective. 5 articles proved the altered recruitment of gluteus maximus and latissimus dorsi in anterior SIJD. 3 articles proved delayed activation and coupling mechanism of gluteus maximus and latissimus dorsi in anterior SIJD.

DISCUSSION

Study aimed to review the effectiveness of activation of gluteus maximus and latissimus dorsi in patients with anterior rotated Sacro iliac joint dysfunction. In anterior SI joint dysfunction there is evidence of altered recruitment of gluteus maximus during load transfer through pelvis. The electromyography investigation on patients with sacroiliac joint dysfunction found that there is delayed activation of gluteus maximus and latissimus dorsi, EMG studies showed that ipsilateral gluteus maximus and contralateral latissimus dorsi were affected due to coupling mechanism in patients with anterior rotated SIJ dysfunction. So proper activation of ipsilateral gluteus maximus and contralateral latissimus dorsi will restore self-bracing mechanism of SI joint there by leading to increase in stability.

Total number of patients were included in the mentioned articles were around 700 and proven null hypothesis. The outcome measures used in the articles were VAS for pain, Oswestry disability index (ODI) for functional disability, PALM to evaluate pelvic tilt, leg length discrepancy with measuring tape.

CONCLUSION

This literature review analyzed the importance of global muscles in anterior SIJD, that proper activation of gluteus maximus and latissimus dorsi will restore self-bracing mechanism and increase stability of SI joint, since the results shown that motor control activation of these two muscles will reduce pain, improve function and restore normal pelvic tilt.
REFERENCES


23. Clifford AJ. Gluteus Medius Inhibition in Association with Sacroiliac Joint Dysfunction. 1995;

