Immediate effect of releasing psoas muscle on angles of hip extension in asymptomatic individuals

ผลทันทีการคลายกล้ามเนื้อ Psoas ต่อมุมการเหยียดข้อสะโพกในคนสุขภาพดี

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ABSTRACT

Background: Releasing psoas muscle can reduce symptom in the lower back and hip pain. However, there has not been any study that evaluated the effect of releasing the psoas muscle to hip angle.

Objective: To evaluate the immediate effect of releasing psoas muscle on hip extension angles in asymptomatic subjects.

Methods: Thirty asymptomatic male and female subjects(aged 20.40 +0.10 years) received a battery of tests for physical assessment to investigate the psoas muscle tension. Participants have released the psoas muscle on the most tension side by soft tissue releasing technique, with optimal direct force to the muscle, hold for five seconds then released, ten times repeated. The angle of a hip extension was measured before and after releasing the psoas muscle.

Results: Significant increase of the hip extension angles were found between before and after releasing psoas muscles.

Conclusion: The results of this study demonstrated that releasing the psoas muscle increased the angle of hip extension in asymptomatic subjects.

Keywords: Psoas muscle, Hip extension, Muscle release

บทคัดย่อ

ที่มาและความสำคัญ: การคลายกล้ามเนื้อ psoas สามารถลดอาการปวดหลังและสะโพกได้ แต่ยังไม่พบการศึกษาผลทันทีของการกดคลายกล้ามเนื้อ psoas ต่อมุมการเหยียดข้อสะโพก

วัตถุประสงค์: เพื่อศึกษาผลทันทีการคลายกล้ามเนื้อ psoas ต่อมุมการเหยียดข้อสะโพกในกลุ่มคนสุขภาพดี

วิธีการวิจัย: ผู้เข้าร่วมวิจัยสุขภาพดีทั้งชายและหญิง จำนวน 30 ราย ได้รับการตรวจร่างกายทางกายภาพบำบัด รวมถึงการตรวจการตึงตัวของกล้ามเนื้อ psoas โดยมีการตรวจวัดมุมการเหยียดข้อสะโพกร่วมด้วย ได้รับการคลายกล้ามเนื้อ psoas ข้างที่มีความตึงตัว และทำการวัดมุมการเคลื่อนไหวของการเหยียดข้อสะโพกหลังทำการกดคลายกล้ามเนื้อ

ผลการวิจัย: พบค่าที่เพิ่มขึ้นอย่างมีนัยสำคัญของมุมการเหยียดข้อสะโพกก่อนและทันทีหลังการกดคลายกล้ามเนื้อ psoas

สรุปผล: ผลการศึกษานี้แสดงถึงการกดคลายกล้ามเนื้อ psoas มีผลต่อการเพิ่มขึ้นของมุมการเหยียดข้อสะโพกในคนสุขภาพดี

คำสำคัญ: กล้ามเนื้อ psoas, กล้ามเนื้อเหยียดสะโพก, การคลายกล้ามเนื้อ

Introduction

Normal movements of the lower body of human-related to several structures including

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spine and lower limbs. As a result, the trunk and hip muscles function together as the linkage. Clinically, imbalance of the lumbar spine and lower limb movements can lead to dysfunction of lower back and knee[1,2]. Causes of this imbalance include shortening of surrounding tissues (e.g., psoas and quadratus lumborum muscles, sacrotuberous ligament) and weakness of muscles[3,4,5]. Moreover, the anatomical of the psoas muscle is most likely presenting the connecting between the lower trunk region and lower extremity region[6,7]. Consequently, this study decided to focus on the psoas muscle.

The psoas muscle consists of psoas major and psoas minor muscles. The psoas major runs from the bodies and transverse processes of T12-L5 passing down in front of to the hip joint to share its insertion with iliacus muscle at the lesser trochanter[1]. Previous pieces of evidence showed that shortening of the iliopsoas muscle often presents as externally rotated legs and feet. It can cause pain in the low or mid back, sacroiliac joint, hip, groin, thigh, knee, or any combination[8,9,10]. As a result, a clinician often releases the psoas muscle to solve the aforesaid symptoms[11,12,13].

The modified Thomas test is used for testing the length of the iliopsoas muscle. If this muscle is released, then the range of motion (ROM) of the hip joint would be increased. Using the modified Thomas test was found to be considered of the lumbopelvic movement that may influence the outcome. The hip extension angle is relevant to the length of the hip flexor muscles[14]. Thus, the shortened hip flexor muscles may lead to the limitation of hip extension ROM. However, the pelvic tilt was needed to be controlled to validate the hip extension angle evaluation[13,14].

Clinically, ROM measurement is one of the assessment processes in physical therapy evaluation. The universal goniometer is the most common used to assess the ROM of the joints which consistent to measure the hip joint. There are several positions of measuring the ROM of hip joints; hip extension ROM was measured in the prone position with the hip in 0° of abduction, adduction, and rotation. The pelvis was stabilized to prevent rotation or anterior tilting in prone position[15,16].

Previous evidence showed that releasing the psoas muscle can relieve the low back pain and combination symptoms[11,12,13]. Recently, there has been no study of investigating the effect of releasing the psoas muscle to the hip extension angle. This study conducted to compare hip extension angles between before and after releasing the psoas muscle. It hypothesized that the range of hip extension angle might increase after releasing the psoas muscle.

Methods

Participants

Thirty asymptomatic volunteers, 8 males and 22 females, were recruited. This study was approved by the Institutional Review Board, Mahidol University (MU-CIRB 2015/073.1405) and was registered at the Thai Clinical Trial Registry (TCTR) as an identification number TCTR20170411001. The inclusion criteria were 1) asymptomatic male and female volunteers and 2) aged between 21-30 years. The exclusion criteria were 1) having musculoskeletal symptoms (e.g.

fibromyalgia, pain at any regions, instability of lower extremities caused by ligamentous injury, injury or trauma to lower extremities) , endocrine disease, rheumatoid arthritis, 2) taking muscle relaxant or pain killer within one day prior to the data collection, 3) Having past history of low back and hip surgery, 4) pregnancy, and 5) having menstruation on the data collection day.

Procedure

The participants have explained the process of the data collection before signing the inform consent. Each participant initially received the physical assessment from the experienced physical therapist (more than 5 years in the musculoskeletal department). This physical assessment was aimed to evaluate which the participant's side had more psoas muscle tension by using the modified Thomas test, compared to the other side. This particular side was chosen to receive muscle release. The ROM of hip extension measurements were done before and after releasing the psoas muscle. The measurement of hip extension ROM was done by the blinded assessor (Figure 1). Passive ROM of hip extension; subjects were prone lying and the first assessor did the passive hip while the second assessor used the universal goniometer to measure the hip joint of that side (Figure 2).

To release the psoas muscle at the more tension side, the third physical therapist released the participant's psoas muscle. The details of fascia releasing this muscle were given as follows: the physical therapist placed both thumbs perpendicularly to the subjects' spines which would be the psoas muscle. The psoas muscle was located at the subjects' facet joint of L3-4. The participant was prone lying with pillow supported on the lower abdomen and both arms were beside. The physical therapist applied optimal direct force to the muscle, hold for five seconds then released, ten times repeated was applied. The physical therapist repeatedly applied the force until the muscle released (Figure 3).

Figure 1 Starting position for hip extension angle measurement

Figure 2 Passive hip extension for measuring the angle

Figure 3 Position of releasing the psoas muscle

The post-test of data collection was done. The second physical therapist measured the same angles as the pre-test using the same goniometer. Test-retest reliability of hip angle measurement of this study was ICC = 0.929.

Statistical analysis

Kolmogorov-Smirnov test was used for data distribution and the normal distribution of hip extension ROM was found in this study (p<0.05). The changes of hip extension ROM from pre-test to post-test were analyzed by using paired *t*-test. This study was registered in the Thai Clinical Trail registry (TCTR20170411001) and approved by the MU-CIRB 2015/073.1405.

Results

Thirty participants were recruited for this study. Mean and standard deviation of their age, weight, and height were recorded (Table 1). The mean of hip extension angle before and after releasing the psoas muscle was 8.66 ± 6.97 and 13.80 ± 7.99 degrees, respectively. The significant difference of the hip extension angle before and after releasing the muscle was found (p=0.00). The results were presented in Table 2.

Table 1. Participants' characteristics (N=30)

Characteristics	N=30 (8 males, 22 females) Mean ± SD
Age (years)	20.40 ± 1.10
Weight (kg.)	54.65 ± 9.62
Height (cm.)	162.42 ± 7.72
Body Mass Index (kg./m^2)	20.65 ± 2.90

Table 2 Data of hip extension before and after releasing the psoas muscle

Hip extension angle	N=30 (8 males, 22 females) Mean ± SD
Before releasing Psoas muscle	8.66+6.97
After releasing Psoas muscle	13.80±7.99
Difference of the angle	-5.13 + 5.67
p-value	<0.001*

Note: Comparisons of the means of hip extension angles between pre- and post-releasing the psoas muscle (n=30)

Discussion

The objective of this study was to compare hip extension angles between before and after releasing the psoas muscle. It was hypothesized that the range of hip extension angle would increase after releasing the psoas muscle. The findings revealed the highly significant difference in the hip extension angle between before and after releasing the psoas muscle.

The combination of the psoas muscle and iliacus muscles in the groin is called the iliopsoas muscle. The fascia covering the psoas muscle and iliacus pass down to the inguinal ligament, psoas, iliacus, and pectineus form a fan reaching up from the lesser trochanter, the hip joint, and lumbar spine. The iliacus muscle continues with the fascia on the anterior surface of the quadratus lumborum[8,9]. The psoas muscle has the largest cross-sectional area compared to other spinal muscles. The psoas muscle, working with deep erector spinae provide axial compressive forces for lumbar stability[7,10]. The study of Sajko & Stuber 2009 was shown that the psoas muscle also

maintained the femoral head in an acetabulum for hip stability in the range of 45-60 degrees of hip flexion[1,6]. Similarly, our study found that the hip extension angles were significantly increased after releasing the psoas muscle in healthy subjects.

As mentioned earlier, this study was aimed to investigate the change of psoas muscle length by measuring the hip extension angle. The plausible reason why the hip extension angle significantly changed after releasing the psoas muscle is due to the anatomical connection of the fascia. The present study showed the significantly increased hip extension angle after releasing the psoas muscle due to the force of releasing through facet joints L3-4 which was the area of its originated. Related to the study of Andersson et al.[9], which presented the psoas and iliacus muscles involved with the range of motion of the lumbopelvic region in asymptomatic subjects.

The study of Sajko et al. presented the shortening of psoas muscle with lumbopelvic instability in chronic low back pain patients[1]. Therefore, to release the psoas muscle was recommended for treating the chronic low back pain patients[4,5,9]. Further study should imply to release the psoas muscle in low back pain patients.

Limitation of the study

This study has some limitations which can be improved. First, only young adults age of 20-21 years were recruited. Thus, the ages of the participants were limited in young adults. Therefore, the results of this study may not imply in elders. Second, more validated equipment to measure the hip ROM may use for further study such as inclinometer. Lastly, the subject was only asymptomatic subjects. Therefore further study should evaluate in symptomatic subjects such as low back pain patients.

Conclusion

The results of this study demonstrated that releasing the psoas muscle increased the angle of hip extension in asymptomatic subjects. Clinically, releasing the psoas muscle could be one of the physical therapy manual technique to increase the angle of hip extension.

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