JAOA BRIEF REPORT

Iliacus Tender Points in Young Adults: A Pilot Study

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Context: Recent studies have assessed iliacus tender point prevalence in outpatient clinics. However, studies on the prevalence of iliacus tender points in the young adult population and the correlation of its prevalence with daily activities are lacking.

Objectives: (1) To determine the prevalence of low back pain, iliacus tender points, and positive results of Thomas tests (ie, hypertonic iliopsoas muscles) in young adult participants. (2) To evaluate daily activities including prolonged sitting, exercise, and running or biking as predictive factors for low back pain, iliacus tender points, and positive Thomas test results. (3) To examine the relationship between iliacus tender points and positive Thomas test results.

Methods: Healthy students aged 18 to 30 years at Edward Via College of Osteopathic Medicine–Virginia Campus were recruited using e-mail, class announcements, and flyers. Data were collected for age, sex, amount of time spent sitting in a 24-hour period, type and frequency of exercise performed, and low back pain in the past 7 days. Patients underwent an iliacus tender point assessment and a Thomas test; results of each were recorded for the right and left sides.

Results: Twenty-five women and 24 men aged 22 to 30 years (mean, 24.39 years) were analyzed. Twenty-four participants (49%) had low back pain, 46 (94%) had an iliacus tender point, and 25 (51%) had a positive Thomas test result. There was no statistically significant difference between men and women with regard to low back pain, tender point presence, or a positive Thomas test result (P=.26, .99, and .78, respectively). Participants who reported sitting for 8 or more hours in a 24-hour period or who reported running or biking more than 3 times per week were more likely to have an iliacus tender point (P=.001 and .028, respectively).

Conclusion: The prevalence of iliacus tender points was high in the study population. Prolonged sitting and running or biking was associated with an increased risk of developing low back pain or an iliacus tender point.

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The iliopsoas muscle plays a major role in ambulation but is easily ignored as a source of pain. It is associated with low back pain, hip pain, and leg pain.[1] The iliopsoas muscle is composed of the iliacus and psoas major muscles, which join to each other laterally along the psoas tendon. The iliacus is a flat, triangular muscle that fills the iliac fossa. Compared with the well-known psoas muscle, the iliacus muscle is usually ignored.[2] In our experience, the iliopsoas muscle is not known or understood by most people. Patients whose pain originates in the iliopsoas muscle may find it difficult to describe the location of their pain any more specifically than the "low back."

The iliopsoas muscle is engaged when running, when ambulating uphill, and when increasing the speed of gait.[3-7] Running is a high-impact exercise that can easily lead to low back pain.[8] Prolonged sitting is also considered a risk factor for low back pain.[9] Studies have revealed that women are less active than men,[10] but, to our knowledge, it is unknown whether women are more likely to have low back pain or an iliacus tender point than men.

The iliacus tender point, 1 of 3 notable tender points related to the pelvis or sacrum, is located in the deep iliacus fossa in the low back. Besides the iliacus tender point's prominence in somatic pathology, it is often an indication of visceral pathology such as dysmenorrhea.[11] People who

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have iliacus tender points experience abnormal sensitivity when the tissues are engaged with light pressure. Patients with single or bilateral iliacus tender points may suffer from pain in the lower abdomen, groin, buttocks, lower extremity, hip, low back (from thoracolumbar junction to lumbosacral junction), and sacroiliac joint.[2]

Although some researchers have studied the iliacus tender point in great detail and have defined new examination techniques that isolate motion across the hip joint,[13] to our knowledge the prevalence of the iliacus tender point in young adults and the relationship between the presence of iliacus tender points and young adults' daily activities have not been investigated. Information regarding the prevalence of the iliacus tender points in this population may aid physicians in correlating daily activities to low back pain or hip pain.

The primary aim of the present study was to ascertain the prevalence of low back pain, iliacus tender points, and positive results of Thomas tests in the young adult population. By establishing the prevalence of iliacus tender points associated with low back pain, we may build a framework for a future study assessing the impact of the Strain-Counterstrain osteopathic manipulative treatment technique in patients with acute or chronic low back pain secondary to iliopsoas spasm. Although use of the Strain-Counterstrain technique to manage somatic dysfunction is well established, the data in support of using this method in the management of low back pain secondary to iliopsoas spasm are lacking.[13-19]

Our secondary aim was to evaluate daily activities including prolonged sitting, exercise, and running or biking as predictive factors for low back pain, iliacus tender points, and positive Thomas tests.

The third aim of the present study was to assess whether an iliacus tender point correlates with a positive Thomas test (ie, a hypertonic iliopsoas muscle). The Thomas test, named after Hugh Owen Thomas (1834-1891), a British orthopedic surgeon, is a reliable and well-established method of assessing the presence of contractors or hypertonicity in the iliopsoas muscle.[12,20,21] A correlation between a positive Thomas test and an iliacus tender point would support the assumption that an iliacus tender point is reflective of a hypertonic iliopsoas muscle.

We hypothesized that (1) the presence of tender points and low back pain would occur together; (2) the occurrence of the iliacus tender point would correlate to daily activities such as running, biking, and prolonged sitting; and (3) an iliacus tender point would be reflective of a hypertonic iliopsoas muscle.

Methods

The present prospective study was conducted at the Edward Via College of Osteopathic Medicine–Virginia Campus (VCOM-Virginia) on April 10, 2010. The study required participants to attend a 20-minute session, during which study information was collected at the various stations. The VCOM-Virginia Institutional Review Board approved the present study (#2009/006).

Participants

Healthy young participants were recruited from a sample of VCOM-Virginia's medical students through VCOM-Virginia's e-mail system, lecture time in the Principles of Primary Care/Osteopathic Manipulative Medicine class, and flyers displayed on VCOM-Virginia's campus. All participants were required to meet the following inclusion and exclusion criteria:

- □ aged 18 to 30 years
- □ no current skin infection at the inguinal region
- □ no current iliopsoas injury
- □ no history of inguinal hernia repair with mesh placement
- □ no pelvic pathology
- □ no history of pelvic surgery
- □ not pregnant at the time of the study

Intervention

After giving informed consent, the participants were assigned a participant number for randomization and blinding purposes. Participants received an explanation of the study and procedure and then completed a form that asked them to provide information including sex, age, amount of time spent seated in a 24-hour period, and amount and type of exercise performed in a week. They were also asked to indicate whether they ran or biked more than 3 times per week. The participants were then randomly assigned to either the iliacus tender point assessment station or the Thomas test station. After completing 1 station, participants immediately reported to the other station. Participants were not told the result of either the iliacus tender point assessment or the Thomas test.

Iliacus tender point assessment—The iliacus tender point was assessed by an osteopathic physician who is a board-certified clinical specialist in neuromusculoskeletal medicine/osteopathic manipulative medicine (J.L.P.). A research assistant, referred to as the pain assessment observer, recorded the assessment results. Both the physician performing the assessment and the pain assessment observer were blinded to the results of the Thomas test.

For the iliacus tender point assessment,[13] participants were required to lie on their backs with both hands over their epigastrium. The physician then assessed for a left iliacus tender point by finding the left anterior superior iliac spine, moving her right thumb pad 2 inches medial and

slightly caudal, and then palpating laterally into the area of the iliac fossa while asking the participant, "Is this left side tender?" The participant's verbalized response was documented by the pain assessment observer. The procedure was then repeated for assessment of the right tender point.

Thomas test—Two trained research assistants with experience in conducting the Thomas test instructed each participant to lay in a supine position on the examination table and bring both knees to his or her chest. The participant was then instructed to release 1 leg while the other leg remained flexed to his or her chest. The research assistants observed for (1) arching of the lumbar spine and (2) amount of hip extension allowed. The Thomas test was considered positive if the extended leg could not rest on the table or if there was arching of the lumbar spine, indicating a flexion contracture of the ipsilateral iliopsoas muscle.[22] Both research assistants at the Thomas test station were blinded to the results of the iliacus tender point assessment.

Data Analysis

We calculated descriptive statistics on the frequencies and percentages of men's and women's exercise habits, daily sitting duration, running and biking habits, low back pain, and results of the iliacus tender point assessment and the Thomas test. The data analysis was conducted using statistical analysis system, or SAS, for Microsoft Windows (version 9.1.3; SAS Inc, Cary, North Carolina). Because of the relatively small sample size, a Fisher exact test was applied to investigate the relationship between daily activities and low back pain, presence of an iliacus tender point, and positive Thomas test. A *P* value less than .05 was considered statistically significant for all tests.

Results

Data were collected from 49 participants who met the study criteria and consented to participate in this pilot study at VCOM-Virginia. Demographic data are summarized in *Table 1*. Participants—25 women and 24 men—were aged 22 to 30 years (mean [standard deviation], 24.39 [1.86]). No statistically significant differences were found between men and women with regard to prevalence of low back pain, iliacus tender points, and positive Thomas test results (*P*=.26, .99, and .78, respectively). Almost half (24 [49%]) of the recruited participants reported that they experienced low back pain during the 7 days prior to the study day.

Iliacus tender points were highly prevalent in this young adult population, occurring in 46 (94%) participants. The percentages of occurrence on the left side, right side, and both sides were 43 (88%), 35 (71%), and 32 (65%), respectively (*Table 2*). Twenty-five of 49 participants (51%) had a positive Thomas test result on at least 1 side, with 15 positive results (31%) occurring on the left side, 23 (47%) on the right side, and 13 (27%) on both sides (*Table 2*).

Table 1.
Baseline Characteristics of the Participants (N=49)

Characteristic	No. (%)
Women	25 (51)
Age, y	24.39 (1.86)[a]
Height, ft	5.65 (0.47)[a]
Weight, lbs	157.94 (35)[a]
Sit >8 h/d	47 (96)
Exercise	30 (61)
Running or biking >3 times/wk	27 (55)
Low back pain[b]	24 (49)

[a] Data reported as mean (standard deviation).

[b] Seven days prior to the study.

In the present study, 47 of 49 participants (96%) reported that they sit more than 8 hours in a 24-hour period. Thirty of 49 participants (61%) reported exercising, and 27 (55%) reported running or biking at least 3 times per week. The relationships among participants' reported daily activities (ie, hours spent sitting, exercise habits, and running or biking) with low back pain, occurrence of an iliacus tender point, and a positive Thomas test result are summarized in *Table 3*. Among those 24 participants who reported having low back pain during the 7 days prior to the study, 14 (58%) reported exercising regularly, 23 (96%) reported sitting for at least 8 hours daily, and 15 (63%) reported running or biking more than 3 times per week (*Table 3*). Among the 46 participants with an iliacus tender point present, 28 (61%) exercised, 44 (96%) sat 8 or more hours per day, and 26 (57%) ran or biked more than 3 times per week. Of those 25 participants with a positive Thomas test result, 15 (60%), 24 (96%), and 15 (60%) of them exercised regularly, sat for 8 or more hours per day, or ran or biked more than 3 times per week, respectively. Participants who reported prolonged sitting or running or biking more than 3 times per week were more likely to have low back pain, an iliacus tender point, or a positive Thomas test result (*P*<.05, *Table 3*).

Table 2.
Results of Iliacus Tender Point Assessment and Thomas Test in a Young Adult Population (N=49)

	No. (%)	
Variable	Iliacus Tender Point	Positive Thomas Test
Participants	46 (94)	25 (51)
Incidence		
Left side	43 (88)	15 (31)
Right side	35 (71)	23 (47)
Both sides	32 (65)	12 (27)

Table 3.
Relationships Between Daily Activities and Low Back Pain, Iliacus Tender Points, and Thomas Test Results

Daily Activity	No. (%) Low Back Pain (n=24)	Iliacus Tender Point (n=46)	Positive Thomas Test (n=25)
Exercise			
N	10 (42)	18 (39)	10 (40)
Y	14 (58)	28 (61)	15 (60)
P value	.056	.001	.021
Sit >8 h/d			
N	1 (4)	2 (4)	1 (4)
Y	23 (96)	44 (96)	24 (96)
P value	<.001	<.001	<.001
Running or Biking >3 times/wk			
N	9 (38)	20 (43)	10 (40)
Y	15 (63)	26 (57)	15 (60)
P value	.008	.028	.021

All participants reported sitting 8 or more hours daily or running or biking 3 or more times weekly. We noted an increase in the presence of low back pain, iliacus tender points, and positive results of Thomas tests in those participants who reported both of these activities, compared with those who reported only 1. Twenty-four of 49 participants reported 1 of these 2 activities and 25 participants reported both of them. The risk of low back pain, iliacus tender point, and a positive Thomas test result increased by 14%, 4%, and 10%, respectively, among those who engaged in running and biking, compared with those who participated in only 1 of these activities (*Table 4*). However, these increases were not statistically significant, with *P* values of .079, .386, and .162, respectively. Our findings regarding the relationships of low back pain and a positive Thomas test result with the presence of an iliacus tender point were also not statistically significant (*P*=.576 and .080, respectively).

Table 4.
Relationships Among Prolonged Sitting and Running or Biking and Low back Pain, Iliacus Tender Points, and Results of Thomas Test in a Young Adult Population (N=49)

Daily Activity	No. (%) Low Back Pain	Iliacus Tender Point	Positive Thomas Test
Sitting for >8 h/d or running/biking	10 (42)	22 (92)	11(46)
Sitting for >8 h/d and running/biking	14(56)	24(96)	14(56)

Comment

The present prospective study was conducted to explore the prevalence and relationship of low back pain, iliacus tender points, and positive Thomas tests among young adults and to determine if young adults' daily activities relate to the presence of low back pain, iliacus tender points, and positive Thomas tests. High prevalence of iliacus tender points in these osteopathic medical students may be a result of their daily activities. Prolonged sitting (⩾8 h/d) and running or biking more than 3 times per week were common activities among the study population. These daily activities require shortening of the iliopsoas muscle. This repetitive action may be considered a repetitive trauma to the muscle, overwhelming its ability to repair itself and leading to local inflammation and the potential for tissue degeneration.

With prevalence rates of around 50% each, low back pain and positive Thomas tests were found less frequently than iliacus tender points, which had a prevalence rate of 94%. The present study reveals that it is probable to have an iliacus tender point without contracture of the iliopsoas muscle. In the present study, the Thomas test was not conducted in such a way to differentiate between iliacus and psoas elements.

Causes of somatic dysfunction in the iliopsoas muscle can be somatic (eg, acute injury or chronic low grade inflammation that is a result of a somato-somatic reflex), visceral (eg, disease of the kidneys, ureters, ovaries, or colon), or metabolic (eg, deficiencies in the thyroid-stimulating hormone, electrolytes, 25-hydroxy vitamin D, or pro-inflammatory milieu associated with chronic inflammation).[23] From a viscerosomatic reflex perspective, it is important to remember that the inciting noxious stimuli may travel up and down several segments before impacting an interneuron that will have a reflexive effect on the iliopsoas muscle. Noxious sensory information from a historical or current visceral pathology could originate in the colon, gall bladder, or testicles and could lead to a viscerosomatic reflex on the iliopsoas muscle. The results of the present study suggest that it is not possible to infer an iliacus tender point using the presence of low back pain or a positive Thomas test.

The iliacus tender point was common in the present study's sample of osteopathic medical students. Periods of prolonged sitting make the iliopsoas muscle adaptive to the shortened position, causing it to change its resting tone. Running and biking involve repetitive impact and stress on the iliopsoas muscle, sometimes for a long duration. Identifying these risk factors may be crucial in preventing the development of or recommending a remedy for iliacus tender points and low back pain.

The present pilot study had certain limitations. The participants were VCOM-Virginia students aged 22 to 30

years. Because of this limited sample size, our findings cannot be generalized to all age groups or all young adults. Given the valuable findings in the present study, a future study should use a larger sample size, add more data from other age groups, and quantify and standardize the amount of pressure used in assessing for the iliacus tender point. Standardizing the pressure used in iliacus tender point assessment would allow for greater objectivity and ease of replicating the study. Low back pain is a classic symptom of an iliopsoas muscle spasm[1]; however, it is not the only symptom of iliopsoas muscle dysfunction. Several other pains from iliacus dysfunction, such as lower abdominal pain, hip pain, and sacroiliac joint pain, were not investigated, which may limit the applicability of the results.

Conclusion

In our study population, there was no statistically significant difference in iliacus tender point presence based on sex. Individuals who sat for 8 or more hours in a 24-hour period or who ran or biked more than 3 times per week had a greater chance of developing an iliacus tender point. An iliacus tender point did not always occur concomitantly with a positive Thomas test. Additional research is needed to identify the risk factors of iliacus dysfunction and to assess the effectiveness of managing the iliopsoas muscle with osteopathic manipulation.

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