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ASSOCIATION BETWEEN ANTERIOR PELVIC TILT, POSTERIOR PELVIC TILT AND LOW BACK PAIN

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ABSTRACT

To evaluate the association between anterior pelvic tilt, posterior pelvic tilt and physical dysfunction among low back pain patients. OBJECTIVE: To investigate the association between anterior pelvic tilt, and physical dysfunction among back pain patients. To investigate the association between posterior pelvic tilt and physical dysfunction among back pain patients. METHODOLOGY: A total 60 male subjects Aged between 45- 60 years were selected based on the inclusion and exclusion criteria using quota sampling. In this study for all the participants anterior pelvic tilt assessment, posterior pelvic tilt assessment and low back pain disability evaluation by Modified Oswetry Disability Questionnaire (MODQ) were performed. Strengthening exercises was given for the weakened structures and stretching exercise was given for shortened structures, if it is identified from anterior pelvic tilt, posterior pelvic tilt.RESULT: From Data Analysis made with the quantitative data revealed that both groups are statistically significant between Anterior and posterior pelvic tilt. Statistical Analysis of post test for functional disability revealed that there is slight moderate disability between groups. CONCLUSION: Results of the study shows that there is a significant difference exists in bothanterior and posterior pelvic tilt exercise regimes more patients having anterior pelvic tilt than posterior pelvic tilt.

KEYWORDS:*Anterior Pelvic Tilt, Posterior Pelvic Tilt, Low Back pain, Dysfunction.*

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INTRODUCTION

When the pelvis is aligned in a neutral position weight is distributed and balanced evenly up onthe vertebrates and discs of the spine, as a result, injury is less likely to happen.[9]If the pelvis is tilted forward or backwards, the spine is placed in a mechanically disadvantaged position. Individuals whose pelvis tilts either forwards or backwards are therefore more likely to experience back pain due to excessive pressure and muscle imbalances that occur with pelvic abnormalities.[1]Anterior pelvic tilt is explained as forward tilt of the pelvis involves the hip, or iliac bones rotating forwards also known as anterior tilt, this condition is usually accompanied by excessive lordosis of the spine. [8]Lordosis is a condition in which the spine arcs backwards creating a hollow cavern in the low back area. Some lordosis occurs naturally in the lower back or lumbar region of a neutral spine. Anterior Pelvic Tilt an angle of inclination in which anterior superior iliac spine (ASIS) is inferior to the posterior superior iliac spine (PSIS) in relation to the horizontal plane. [2]Posterior pelvic tilt is explained as backward tilt that is opposite of anterior tilt. The hip or iliacbones are rotated backwards in this condition.Posterior tilt is usually accompanied by excessivekyphosis of the spine. Kyphosis the opposite of lordosis, involves a rounding or slouching of thelower back resulting in more of a hump in the lumbar region of the spine.[3]Physical dysfunction- If you refer to a dysfunction in something such as relationship or someone's behavior, you mean that is different from what is considered to be normal. If someone has a physical dysfunction, part of their body is not working properly.Excessive kyphosis or lordosis in the lumbar region of the spine results in a widening or narrowing of the intervertebral foramen[4]. The intervertebral foramen is the opening through which nerves exit from the spinal cord to innervate muscles and return sensory signals from theappendages[5]. the nerves exiting the intervertebral foramen are impinged, or pinched, nerve pain or loss of muscle control can result. Gaining a better understanding of whether pelvic orientation is indeedassociated with greater hamstring extensibility and reduced hamstring strength will advance ourunderstanding of factors contributing to postures in both asymptomatic and symptomatic populations that may lead to an increased risk for injury. [6]Spondylosis is a term referring to degenerative osteoarthritis of the joints between the centreofthe spinal vertebrae and/or neural foramina. Lumbar spondylosis, lumbar spondylolisthesis ,lumbar canal stenosis, lumbar disc prolapsed are the indications for the study. Injury, degeneration or trauma to the motion segment may lead to Spondylosis, spondylolisthesis, or retrolisthesis. Side flexion, extension and flexion can occur in the lumbar spine ,but facet joints control the direction of movement. The close packed position of the facet joints in the lumbar spine is extension. However if only one facet joint in the lumbar spine has a capsular restriction, the amount of observable restriction is minimal. The first sacral segment is usually included in discussions of the lumbar spine and it is at this joint that the fixed segment of the sacrum joins with the mobile segments of the lumbar spine. In some cases S1 segment may be mobile[7]. Lumbar spinal stenosis is caused by narrowing of the spinal canal or neural foramina producingroot ischemia and neurogenic claudication. [8]Stenosis of the spinal canal is most often caused bya combination of loss of disc space, osteophytes and a hypertrophic ligamentumflavum, not all patients with narrowing develop symptoms. Lumbar spinal stenosis, therefore, refers to a clinical syndrome of lower extremity pain causedby mechanical compression on the neural elements or their blood supply. According to Kendall et al 2005, Link et al 1990 Anterior pelvic tilt can be the result of acombination of weak anterior abdominal muscles, tight hip flexors, tight low back musculature and weak hip extensor muscles.[9]

METHODS

A total 60 male subjects Aged between 45- 60 years were selected based on the inclusion and exclusion criteria using quota sampling. Subjects were selected among patients in the orthopaedic and physical therapy clinics. All the subjects signed an informed consent form approved by the scientific review board and Institutional human ethical committee at the Saveetha University before participating in the study.Selection criteria for participants: Participants with lumbar degenerative disease more than 3 months like Lumbar spondylosis, lumbar spondylitis, degenerative disc disease, disc herniation, Facet joint degeneration, spinal stenosis. And subjects with History of spine surgery, Osteoporosisand Total hip replacement were excluded from the study

Procedure

Selectedsubjects were explained about the procedure and informed consent was obtained from all the participants. In this study for all the participants anterior pelvic tilt assessment, posterior pelvic tilt assessment and low back pain disability evaluation by Modified Oswetry Low Back Pain Disability Questionnaire were performed. Strengthening exercises was given for the weakened structures and stretching exercise wasgiven for shortened structures, if it is identified from anterior pelvic tilt, posterior pelvic tilt.

Thomas Test

The Subject lies supine on a firm surface, legs are straight and using physiotherapist hand, patient's right knee is pulled into your chest. The left leg is kept flat on the surface you are lying on. Switch legs and repeat this test with your left leg going into your chest[10]

Modified Sit and Reach Test or Lower back Flexibility test

Subject Reach arms toward the box, without taking your back or head away from the wall. The other person places the ruler on the box with zero measurement touching your finger tips. This is the starting position for the test. The ruler should not move during the test. The patient slowly bends forward, head and back off the wall. The patient's knees and hands level with each other. Then return to starting position.The patient is asked to repeat this stretch thrice[11].

Intervention

All the participants with anterior and posterior pelvic tilt underwent exercise program towards their respective

poor posture.ie. For patient with anterior pelvic tile were given hip flexor stretching and gluteus and abdominal strengthening exercise. Whereas for patients with posterior pelvic tilt were given lower back strengthening and gluteus stretching exercise. The exercise parameters for both the group of participants were one session a day for 3-5 days per week for 4 weeks.

Outcome Measure

Modified Oswestry disability Questionnaire: The Modified Oswestry disability Questionnaire will be used to measure disability and consistsof 6 questions. A total score of 50 is thus possible and would indicate 100% disability.

Data Analysis

The collected data were tabulated and analyzed using chi squared statistics. The test value result shows that P value is about 0.122 which means that it is statistically significant that association between Anterior and posterior pelvic tilt and physical dysfunction among low back pain patients are statistically significant according to the P value results.

STATISTICAL ANALYSIS

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RESULTS

Data collected from both groups were analyzed using Paired‘t’ test to measure the changes of pre-test and post-test values of MODQ(%) within the group(Table 1 & Table 2) and Independent ‘t’ test to measure the changes between the groups. From statistical analysis made with the quantitative data, revealed statistically significant difference between experimental than control group (Table 3) with a mean difference of groups and standard deviation quoted ‘P’ value is <0.0001.

Table 1

Pre Test & Post Test Measurements of Anterior Pelvic Tilt

Group A		Mean (%)	Standard deviation (%)	t value	p value
MODQ (%)	Pre test	40.53	5.43	1.7565	<0.001
	Post test	31.50	7.25		

The pre-test mean value of MODQ(%) is 40.53 (SD-5.43) and post-test mean value is MODQ(%) is31.50 (SD-7.25),this shows that MODQ(%) are gradually increasing with the P value (0.0001) significant.

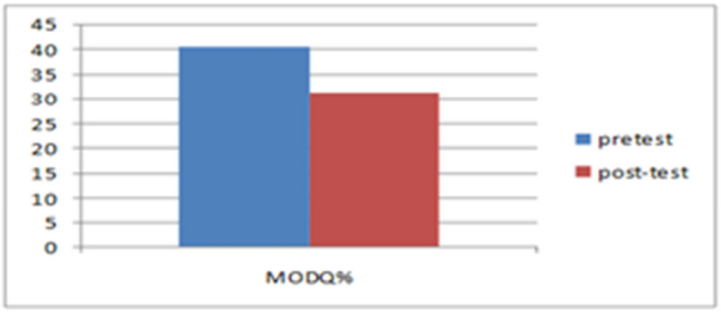

Figure 1

Pre-test and Post-test measurement of Anterior Pelvic Tilt

Table 2

Pre –Test and Post -Test Measurements of Post Pelvic Tilt

Group B		Mean (%)	Standard deviation (%)	t value	p value
MODQ (%)	Pre test	42.50	6.25	18.756	<0.001
	Post test	16.50	4.75		

The data from above table shows the pre-test and post-test values MODQ(%) in Post Pelvic Tilt.The pre-test mean value of MODQ(%) is 42.50 (SD-6.25) and post-test mean value is MODQ(%) is 16.50 (SD-4.75) This shows that MODQ(%) are gradually increasing with the P value (0.0001) significant.

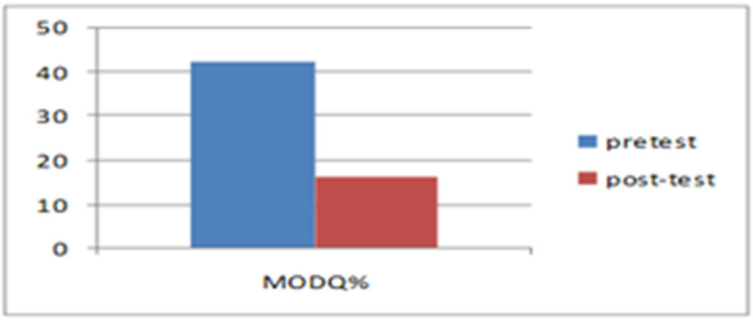

Figure 2
Pre-test and post-test measurements of post pelvic tilt

QUESTIONNAIRE

Modified Oswestry Low Back Pain Disability Questionnaire
This questionnaire has been designed to give your therapist information as to how your back pain has affected your ability to manage in everyday life. Please answer every question by placing a mark in the one box that best describes your condition today. We realize you may feel that 2 of the statements may describe your condition, but please markonly the box that most closely describes your current condition.

Pain Intensity
□ The pain is bad, but I can manage without having to take pain medication.
□ Pain medication provides me with complete relief from pain.
□ Pain medication provides me with moderate relief from pain.
□ Pain medication provides me with little relief from pain.
□ Pain medication has no effect on my pain.

Personal Care (e.g., Washing, Dressing)
□ I can take care of myself normally, but it increases my pain.
□ It is painful to take care of myself, and I am slow and careful.
□ I need help, but I am able to manage most of my personal care.
□ I need help every day in most aspects of my care.
□ I do not get dressed, I wash with difficulty, and I stay in bed.

Lifting
□ I can lift heavy weights, but it causes increased pain.
□ Pain prevents me from lifting heavy weights off the floor, but I can manage if the weights are conveniently positioned (e.g., on a table).
□ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
□ I can lift only very light weights.
□ I cannot lift or carry anything at all.

Walking
Pain prevents me from walking more than 1 mile. (1 mile = 1.6 km).
□ Pain prevents me from walking more than 1/2 mile.
□ Pain prevents me from walking more than 1/4 mile.
□ I can walk only with crutches or a cane.
□ I am in bed most of the time and have to crawl to the toilet.

Sitting
□ I can only sit in my favorite chair as long as I like.
□ Pain prevents me from sitting for more than 1 hour.
□ Pain prevents me from sitting for more than 1/2 hour.
□ Pain prevents me from sitting for more than 10 minutes.

□ Pain prevents me from sitting at all.

Standing
□ I can stand as long as I want, but it increases my pain.
□ Pain prevents me from standing for more than 1 hour.
□ Pain prevents me from standing for more than 1/2 hour.

□ Pain prevents me from standing for more than 10 minutes.
□ Pain prevents me from standing at all.

Sleeping
□ I can sleep well only by using pain medication.
□ Even when I take medication, I sleep less than 6 hours.
□ Even when I take medication, I sleep less than 4 hours.
□ Even when I take medication, I sleep less than 2 hours.
□ Pain prevents me from sleeping at all.

Social Life
□ My social life is normal, but it increases my level of pain.
□ Pain prevents me from participating in more energetic activities (e.g., sports, dancing).
□ Pain prevents me from going out very often.
□ Pain has restricted my social life to my home.
□ I have hardly any social life because of my pain.

Traveling
□ I can travel anywhere, but it increases my pain.
□ My pain restricts my travel over 2 hours.
□ My pain restricts my travel over 1 hour.
□ My pain restricts my travel to short necessary journeys under 1/2 hour.
□ My pain prevents all travel except for visits to the physician / therapist or hospital.

Employment / Homemaking
□ My normal homemaking / job activities increase my pain, but
I can still perform all that is required of me.
□ I can perform most of my homemaking / job duties, but pain prevents me from
performing more physically stressful activities (e.g., lifting, vacuuming).
□ Pain prevents me from doing anything but even light duties
Pain prevents me from doing even light duties
□ Pain prevents me from performing any job or homemaking chores

DISCUSSION

This study reveals a strong association exists between anterior pelvic tilt and posterior pelvic tilt that is with patients with low back pain. Anterior pelvic tilt tests reveal that more patients have anterior pelvic tilt than posterior pelvic tilt . In this study also more patients have anterior pelvic tilt and patients affected with low back pain. The previous studies reveal that relationships in more depth by accounting for hip muscle tightness, hamstring tightness are some of the factors influencing the patients with low back pain to have more of anterior pelvic inclination. A possible relationship may have been found if subjects with longer hamstring muscles were investigated, our results over a range of hamstring extensibility and pelvic angles were consistent with their original findings. The Thomas test and straight leg raising showed some positive results and in case of posterior pelvic tilt showed some positive results for flat back. The increased pelvic angle places the hamstrings in a more lengthened position. According to Toppenberg and Bullock[30] reported a negative but not significant correlation between pelvic inclination and hamstring extensibility and concluded that hamstring muscle was not associated with pelvic inclination. In fact these muscle lengths only accounted for approximately 5.2% of the variance of pelvic inclination. According to Work by Li et al provides another potential explanation for the lack of significant finding between hamstring extensibility and pelvic angle. When standing with hips in neutral position and knees in extension, the hamstrings are not likely under tension.

CONCLUSION

According to our results of the study shows that there is a significant difference exists in bothanterior and posterior pelvic tilt towards strengthening and stretching exercise tailored for respective poor posture .Also,This study shows that more patients have anterior pelvic tilt than posterior pelvic tilt. So these patients should be given intervention as muscle strengthening and stretching the affected muscle and postural correction can be thought to the patient .

CONFLICT OF INTEREST

Conflict of interest declared none.

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