



EFFECTIVENESS OF CORE STRENGTHENING EXERCISES ON LUMBAR MOBILITY AND CORE STRENGTH IN ADULTS WITH NUTATION DYSFUNCTION – A PILOT STUDY

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ABSTRACT Nutation of the sacrum is the anterior tilting and rotatory motion of the sacrum wherein the articular surfaces of the innominate move posterior-inferior. When the force is greater than the ligaments can withstand, they sprain, and the joint goes past its normal end point, which is Sacroiliac Nutation Syndrome. It is important to strengthen the inhibited muscles or stretch the tight, without first stabilizing the joint. Core strengthening improves muscular control, which is required around the lumbar spine for maintenance of functional stability. Nineteen participants with nutation dysfunction were selected. All the participants were assessed for lumbar mobility with modified schobers test and core strength with pressure biofeedback. 4 weeks of core strengthening exercise was given. pre and post intervention data was collected. The pre and post values were compared and analyzed using wilcoxon ranked test, which concluded that Core strengthening exercises is more effective in lumbar mobility and core strengthening the patient with nutation dysfunction.

KEYWORDS : Nutation dysfunction, core strengthening, modified schobers test, pressure biofeedback.

INTRODUCTION:

The sacrum, pelvis and spine are functionally interrelated through muscles, fascia and ligamentous interconnections. The main function of the SI joint is to provide stability and attenuate forces to the lower extremities^[1]. In Nutation, sacrum goes in anterior tilting and rotatory motion whereas the articular surface move posterior-inferiorly. Muscles of nutation are Deep and Superficial Erector Spinae, Transverse Abdominis, Multifidus, Rectus Abdominis and Hamstrings, Gluteus Maximus, External Oblique. The reported prevalence of sacroiliac joint pain in cases of chronic low back is estimated to be between 10-25%^[2]. when this force is transfer from superiorly or from inferiorly through the body then it act as spring. Due to which upper body weight sacrum anteriorly and ground reaction forces the ilium to rotate posteriorly. At the sacroiliac joint forceful nutation take place^{[3][4]}. Three factors produce nutation torque:

- hip joint compression by the body
- weight because of gravity,
- passive tension of the ligaments which are stretched, and active muscle forces

When the force is greater than the ligaments can withstand, they sprain, and the joint goes past its normal end point. Failure of this mechanism to maintain ligamentous integrity is the weight bearing lesion of the sacroiliac joint, which is named as Sacroiliac Nutation Syndrome. It is important to strengthen the inhibited muscles or stretch the tight muscles, without first stabilizing the joint.

Main signs and symptoms are:

- Persistent lumbosacral and gluteal pain
- Pain worse with forward bending, walking, standing, walking down stairs
- Prefers to lie prone
- Stands with accentuated lordosis
- Uncomfortable sitting
- Lumbar flexion limited^{[5][6][7][8]}.

Weak core muscles and increase in lumbar curvature, puts more stress on the entire back. This leads to abnormal spine mechanics and poor lumbar spine mobility. Core strengthening is an approach which is important for the spinal stabilization. As muscular control is required around the lumbar spine for maintenance of functional stability.

METHOD AND MATERIAL:

Subjects:

The study began after receiving ethical clearance from P.E.S Modern college of Physiotherapy, Pune. Nineteen participants were selected, according to the inclusion and exclusion criteria, from clinics in and around Pune. The inclusion was: Age(20-30) males and female, Nonspecific low back pain, Gillet test positive, Core strength (2-4 mm of hg)^[9]; Lumbar mobility (less than 6.2 cms)^[10]; BMI (18.5-24.9). Players with any kind of spine pathology, previous leg and spinal surgery, past history of vertebral fracture, deformities of leg and spine, any leg length discrepancy, neurological, cardiovascular, vestibular and visual conditions were excluded. The whole study was explained to the players and written informed consent was taken from all the players.

Players who were satisfied the inclusion and exclusion criteria were selected in the study. All the player were assessed for the lumbar mobility and core strength.

1.Modified schobers test for lumbar mobility (r-0.96)^[10]:

we put a mark 5 cm below and 10 cm above the junction i.e at S2 vertebra.

The subject was asked to bend forward as far as possible and distance between the two point was measured. flexion and extension ranges were measured.

2.Pressure biofeedback (ICC-0.87)^[9]:

Patient in prone lying. Place a blood pressure cuff or the stabilizer pressure biofeedback unit horizontally under the abdomen with the lower edge just below the anterior superior iliac spine (navel at center of unit).

Inflate to 70mm of Hg and instruct the patient to perform the drawing in manuever.

Protocol^{[11][12][13]}:

1.FOR TRUNK FLEXORS AND EXTENSORS:

For 2 weeks-10 repetitions for next 2 week-20 repetitions under the supervision of the therapist

1 week:

Curl up exercises – with one leg bent to about 90 degree and other leg relaxed.

Side bridges – lift off the hip on the floor. Repeat to both sides.

Leg and Arm Extension {Brid Dog Exercises} – In quadruped position, take your one arm up then return and take one leg up and then return to beginning position.

2 week:

Curl up exercise – with both knees bent about 90 degree with raise the elbow off the floor.

Side Bridges – lift off both the leg from the floor.

Leg and Arm Extension – with alternate arm and leg extension from quadruped position.

3-4 Week:

Curl ups – with hand on forehead.

Side bridges – progression with right hand extended.

Leg and arm extension – Take alternate arm and leg from quadruped position.

2.FOR HIP FLEXORS AND EXTENSORS:

- To strengthen the hip extensors:

1st week:

bilateral bridge,
unilateral bridge,
hip extension in prone position with the knee flexed at 90 degrees.

2nd week:

abduction and external rotation in a quadruped position “fire hydrant” exercise weight-bearing hip extension (known as “deadlift” exercise) Each exercise for 10 repetitions.

3 and 4th week:

Elastic resistance was added.

- To stretch hip flexors:

static-stretching on the target muscle i.e on the hip flexors will performed for 20-sec. The participants first positioned their left lower limb into stretch positions slowly and attentively, and after 10-sec rest, the same stretch was performed on the right lower limb. Stretch was done for 20 sec 3 times with 10 sec rest in between.

DATAANALYSIS:

The data was analyzed using “SPSS 16” software for windows version.

Mean and standard deviation of all the variables were calculated.

The data was then statistically analysed using Wilcoxin Ranked test.

Mean comparison of lumbar flexion, lumbar extension and core strength was done.

Descriptive Statistics			
	N	Mean	Std. Deviation
PRE_LFLEX	19	20.05	2.297
PRE_LEXT	19	11.58	1.677
PRE_CORE	19	3.00	0.943
POST_LFLEX	19	23.53	1.982
POST_LEXT	19	9.95	1.311
POST_CORE	19	7.00	1.563

Test Statistics ^a			
	POST_LFLEX - PRE_LFLEX	POST_LEXT - PRE_LEXT	POST_CORE - PRE_CORE
Z	-3.844 ^b	-3.492 ^c	-3.844 ^b
Asymp. Sig. (2-tailed)	0.000	0.000	0.000
a. Wilcoxin Signed Ranks Test			
b. Based on negative ranks.			
c. Based on positive ranks.			

All tests have p<0.05, so results are significant

RESULT:

The difference between the pre and post modified schobers test and the pressure biofeedback values were compared to both the groups and analyzed using Wilcoxin Ranked test.

The Z value of lumbar flexion in the study showed -3.844, Z value of lumbar extension in the study showed -3.492 and Z values of core strength in study showed -3.844.

P value <0.05 which is statistically significant.

Thus, core strengthening is effective in improving range of motion and core strength.

DISCUSSION:

The objective of this study was to determine the effectiveness of core strengthening on lumbar mobility and core strength with patient with nutation dysfunction-A pilot study. A total of 19 individual (n=19) with nutation dysfunction participated in the study. The result of current study showed that core strengthening is effective in increasing the lumbar mobility and core strength in the patient with nutation dysfunction.

Hodges and Morris et al. concluded from their study that, as the contraction of transverse abdominis take place intraabdominal pressure develop within the abdominal cavity, which will separate diaphragm and pelvic floor muscle.so this will create distraction between the lumbar spine that will decrease compressive load on it.

Thus, in my study core musculature help in stabilizing the lumbar spine and the sacroiliac joint thus it help to improve the joint mobility.^[14]

Liebenson stated that multifidus is a primary inter segmental stabilizer of the spine. Increase in the lumbar lordosis indicates poor pattern of hip extension movement. Multifidus has short reaction time because it is located near the center of rotation of the vertebrae. Multifidus has short reaction time because it is located near the center of rotation of the vertebrae^[14].

Vogt et al. concluded that Glutes maximus produce stability to the sacroiliac joint which is provides compression which produce self-bracing mechanism. Due to its proximal attachment on the sacrotuberous ligament, gluteus maximus is thought to cause tightening of the ligament, gives dynamic joint stability and reduces the joint mobility.^[147]

Core stability is improved by exercising global and local stabilizers in abdominals and lumbopelvic region. Core stability is improved by exercising global and local stabilizers in abdominals and lumbopelvic region^[15].

As we discussed above nutation of sacroiliac joint is under control of transverse abdominis, gluteus maximus, multifidus, erector spine, hamstring. Which are important for the mobility and the stabilization. In my study core strengthening exercises increase lumbar mobility and core strength which helps in the restoration of function.

CONCLUSION:

The present study concluded that,Core strengthening exercises is more effective in lumbar mobility and core strengthening the patient with nutation dysfunction.

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