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Research Article

Influenze of Prolonged Sitting Posture in the Occurrence of Lower Crossed Syndrome in College Students

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Abstract

Background of the study: Lower crossed syndrome is a postural dysfunction where there is an imbalance occur in the musculoskeletal system due to the alternative tightness and weakness of the muscles in the anterior and posterior of the body. The tightened muscles are thoracolumbar extensors on the dorsal side and iliopsoas on ventral side. similarly, the weakened muscles are deep abdominal muscles ventrally and gluteus maximus dorsally. These forms in a specific cross pattern anteriorly and posteriorly, hence the name lower crossed syndrome.

Objective: To find the influence of prolonged sitting postures in the occurrence of lower crossed syndrome in college students

Methods: An observational study conducted with 34 college students within the age group of 18-25 years. After selection students were divided into two groups- group A contains students with forward lean sitting posture and group B contains students with slouched sitting posture. The manual muscle test (MMT) was used to assess the muscle strength and Thomas test and Modified-modified Schober test are used to evaluate the length of hip flexor muscle and trunk extensors respectively.

Results: Both groups show features of Lower cross syndrome. The gluteal and abdominal muscle strength decreased in both groups. Difference between mean scores of MMST shows much differences in both groups. There was marked mean differences in the Thomas test showing that hip flexor length is more decreased in forward lean sitting posture when compared to slouched sitting posture.

Conclusions: The study concludes that both forward lean sitting and slouched sitting postures have an in occurrence of lower crossed syndrome, where forward lean sitting posture have more influence on the occurrence.

Keywords: Lower Crossed Syndrome; Forward Lean Sitting Posture; Slouched Sitting Posture; Thoracolumbar Extensors; Iliopsoas, Deep Abdominal Muscles Gluteus Maximus

Introduction

Lower crossed syndrome is a condition affecting the lower segments of the body due to the muscular imbalance in lower body segments. The condition is also known as pelvic crossed syndrome. The characteristic features are alternative tightness and weakness of the muscles in the anterior and posterior of the body. The tightened muscles are thoracolumbar extensors on the dorsal side and iliopsoas on ventral side. similarly, the weakened muscles are deep abdominal muscles ventrally and gluteus maximus dorsally. These forms in a specific cross pattern anteriorly and posteriorly, hence the name lower crossed syndrome. The muscular imbalances in lower crossed syndrome results in musculoskeletal dysfunctions such as joint dysfunction in lumbosacral segment, SI joint, anterior pelvic tilt, hip joint tightness overactivity of the lower back extensors and hip flexors and compensatory lumbar spine hyper lordosis [1].

Among school-going children, 21% have lower crossed syndrome and 29% are at risk of developing lower crossed syndrome [2]. Patients with lower cruciate syndrome suffer from back pain at any point in their lives. The prevalence of occurring backpain in patients with lower crossed syndrome is around 32-51% [2].

Pelvic cross syndrome is also caused by variety of factors such as sedentary lifestyle, bad posture, sitting for long periods of time, wearing high-heeled shoes, pregnancy, and obesity. Sitting for long periods of time is one of the main predisposing factors for lower cross syndrome. Long periods of sitting leads to hip flexor muscles shortening. Therefore, the brain automatically begins to suppress the activity of the buttocks [7]. This imbalance pattern results in increased lumbar lordosis as weaker abdominal muscles are compensated for by anterior pelvic tilt and overactive hip flexors [3].

Students spent most of their time sitting. While sitting for long periods of time, students adapted to different types of sitting postures, but leaning forward and slouching were the most prominent [4]. Forward lean posture is described by forward rotation of the pelvis, extension of the thoracic and lumbar spine, and a more than 10 degree forward bending of the trunk relative to sitting upright. In the slouched position, the subject sits with the pelvis centered in the seat and the trunk and spine leaning against the backrest. Extended period of sitting, such as in a desk can lead to hip flexor muscle shortening [5].

The ergonomically designed sitting position improves postural coordination and reduces muscle activity in the lower back and midsection. If this is maintained over an extended period of time, such as during study hours, muscle fatigue may be reduced.

As compared to walking and running, the muscles are not used as much when sitting where muscle function is replaced by seat. Long-term muscle inactivation results in corresponding muscle weakness [6].

Regardless of the differences in posture caused by ergonomically designed seating arrangements, students may adopt a variety of postures during the lesson. The trunk thigh angle is decreased in forward lean sitting posture, whereas the angle is increased in slouched sitting posture[8.] The backpain also affects family responsibilities [9].

There are many tests available for identifying and examine the length of muscle[10]. The Thomas test or iliac test/iliopsoas test is used to measure hip flexor flexibility. This includes the iliopsoas, rectus femoris, pectineus, sartorius, and tensor fasciae latae and sartorius. The patient should lie on his back in the examination table with the knees flexed as much as possible and the arms used to flex the lumbar spine so that it lies flat on the table and the pelvis does not tilt backwards [11].

Modified Thomas test is also used to assess hip flexion contracture [12]. A modified version of the test is one in which the patient lies down on their back, at the very edge of the table, with both legs hanging freely. The patient must then flex their knee and pull it back to their chest as close as they can, using both arms while doing so. The other leg can be hang down. Schober test, modified Schober test, modified- modified Schober test are used to measure flexibility of lumbar spine with subject bending forward [13].

Goniometry is the measurement of angles. In particular, when measuring the angles that human joints make through the bones of the body, and when the examiner obtains these measurements by placing pieces of a measuring device called a goniometer along the bones immediately proximal and distal to the joint under investigation, goniometry can be used to determine both the position of a particular joint and the total range of motion available at that joint.

Manual muscle testing is one of the most commonly used forms of muscle testing by physicians. In MMT, the patient is instructed to hold the tested limb or body part at the edge of the available range while the exerciser manually applies resistance. Manual muscle test scores are recorded as a number ranging from zero (0), indicating no activity, to 5, indicating a "normal" or best possible response to the test, or as good as can be assessed by manual muscle testing [14].

Break test is a form of manual muscle test in which resistance applied to a body part at the extreme end of the available range of motion. This is called a break test because when the therapist resists, the patient's goal is to prevent the therapist from "breaking" the muscle hold [15]. In active resistance testing of manual muscle testing is that resistance applied to body parts through available range of motion. This type of manual muscle testing requires skill and experience and is not recommended.

Rationale of the study

In a college environment, you will encounter two types of sitting postures: leaning forward and slouching. Most students spend most of their waking hours in college, most of them sitting for about six hours a day. Sitting for long periods of time is a major cause of lower crossed syndrome. High school students are at risk of developing lower crossed syndrome due to their sitting posture. Lower crossed syndrome caused by prolonged sitting may predispose children and adolescents to low back pain. The aim of this study was to examine the effects of different sitting styles on the development of lower crossed syndrome in college students.

Aim and Objectives

Aim

To find the influence of prolonged sitting postures in the occurrence of lower crossed syndrome in college students.

Objectives

- To find the influence of prolonged sitting posture in the occurrence of lower crossed syndrome in college students.
- To compare the influence of forward lean sitting posture and slouched sitting posture in the occurrence of lower crossed syndrome in college students.

Materials and Methodology

Materials

- Measuring tape
- Body markers
- Goniometer
- Couch
- Laptop
- Paper

Methodology

Study design

Observational study

Study setting

KMCT COLLEGE OF ALLIED HEALTH SCIENCES, MUKKAM, KOZHIKODE.

Sample size

A total of 34 subjects with 17 in forward lean sitting and 17 in slouched sitting posture

Duration of study

2 months

Sampling technique

Convenience sampling

Criteria for sample selection

Inclusion criteria

- Both gender
- Between 18 and 25 years of age
- Duration of more than 4 hours of sitting per day
- Subjects observed with forward lean sitting postures and slouched sitting postures.

Exclusion criteria

- Subjects with scoliosis and kyphosis
- Subjects with erect sitting posture
- History of any neurological or orthopedic disorder
- Fractures of the spine and related joints within the last 6 months
- Not willing to participate in the study.
- Congenital deformity at hip or lumbar region
- Subjects participating in any other exercise or fitness program.

Method of data collection

Primary data will be collected in the study setting using the outcome measures.

Outcome measures

- Manual Muscle Testing for assessing abdominal and gluteal muscles strength.
- Modified-Modified Schober's test for assessing thoracolumbar extensors length
- Thomas Test for assessing hip flexors tightness.

Procedure

The study takes a duration of 2 months from November to December. After receiving a declaration of consent, 34 out of 100 college students of both gender who met the inclusion criteria participated in this study. Demographic data were collected. Then divided the subjects into two groups, one group of students sitting in a forward leaning position and the other group of students sitting in a crouching position. All were screened for lower cross syndrome by assessing abdominal and gluteus maximus muscle strength using manual strength testing. Muscle length was measured using the Thomas test (Figure 1) and the modified Schober test (Figure 2) for hip flexors and thoracic extensors, respectively.

Figure 1: Thomas Test.

Figure 2: Schober's Test.

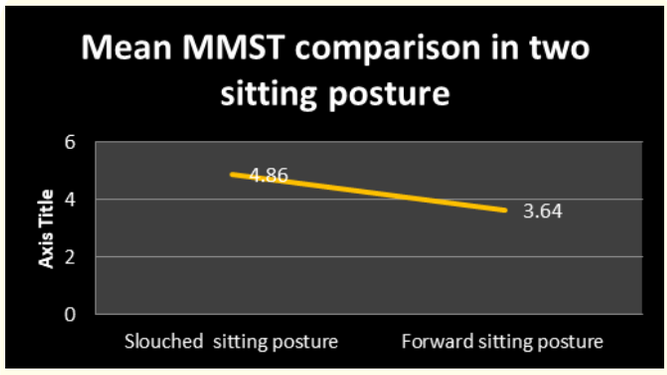
Results and Analysis

Results

The aim of the study was to find out the influence of prolonged sitting postures in the occurrence of Lower Crossed Syndrome in college students.

MMST	Mean	SD	P value
Slouched sitting posture	4.86	0.87	0.002
Forward sitting posture	3.64	1.2	

Table 1: Modified Schober test.



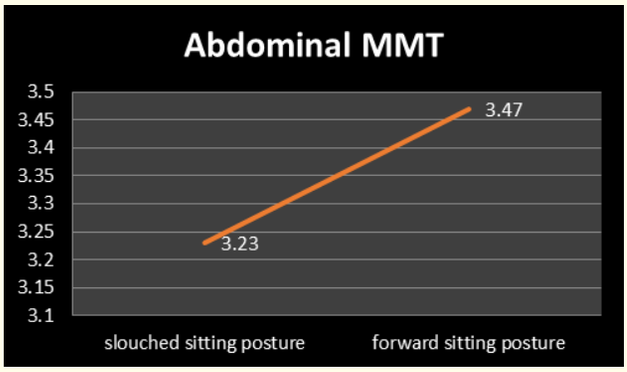
Graph 1: Modified Schober test.

The mean and standard deviation of abdominal MMT for forward lean sitting posture is 3.47 ± 0.51 and for slouched sitting posture is 3.23 ± 0.43, P value 0.020, as shown in table 2 and graph 2.

Table 3,4 and graph 3,4 show that the mean and standard deviation scores of gluteal MMT of right and left sides for forward lean sitting posture is 3.94 ± 0.65 and3.88 ± 0.69 slouched sitting posture is 4.47 ± 0.51 and 4.52 ± 0.51respectively.

Abdominal MMT	Mean	SD	P value
Slouched sitting posture	3.23	0.43	0.02
Forward sitting posture	3.47	0.51	

Table 2: Abdominal MMT.



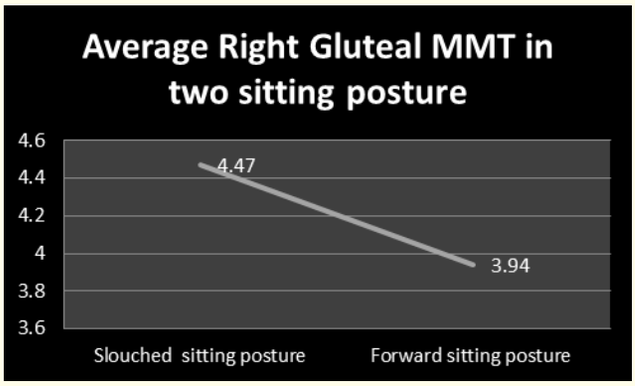
Graph 2: Abdominal MMT.

Right gluteal MMT	Mean	SD	P value
Slouched sitting posture	4.47	0.51	0.014
Forward sitting posture	3.94	0.65	

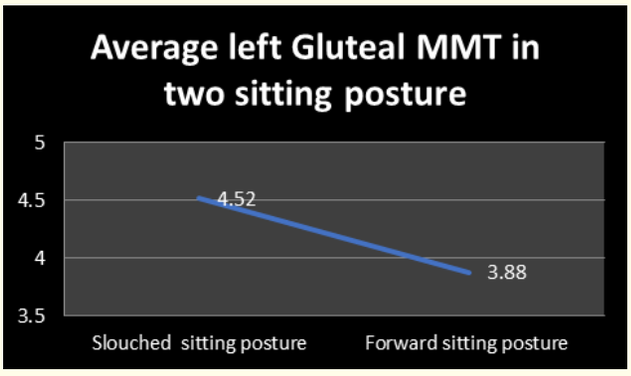
Table 3: Right gluteal MMT.

Left Gluteal MMT	Mean	SD	P value
Slouched sitting posture	4.52	0.51	0.004
Forward sitting posture	3.88	0.69	

Table 4: Left Gluteal MMT.



Graph 3: Right gluteal MMT.



Graph 4: Left Gluteal MMT.

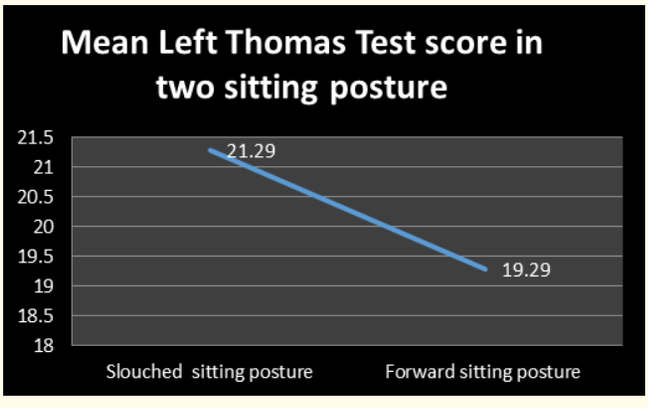
The mean and standard deviation of Thomas test for forward lean sitting posture of right and left leg is 17.94 ± 3.83 and 19.29 ± 3.11respectively, and for slouched sitting posture is 20.76 ± 2.33 and 21.29 ± 1.49 respectively, as mentioned in table 5,6 and graph 5,6 respectively.

Left Thomas Test	Mean	SD	P value
Slouched sitting posture	21.29	1.49	0.023
Forward sitting posture	19.29	3.11	

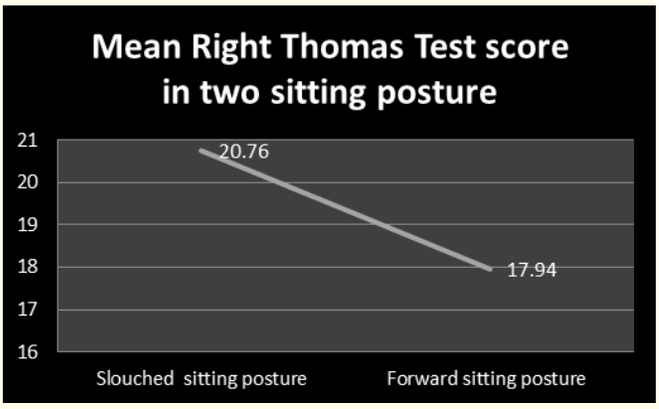
Table 5: Left Thomas Test.

Right Thomas test	Mean	SD	P value
Slouched sitting posture	20.76	2.33	0.014
Forward sitting posture	17.94	3.83	

Table 6: Right Thomas Test.



Graph 5: Left Thomas test.



Graph 6: Right Thomas Test.

Both groups showed features of Lower Crossed Syndrome. The gluteal and abdominal muscles strength was decreased in both groups. Differences between the mean scores of MMST did show much difference in both groups. But there was marked mean difference in Thomas test showing that hip flexors length is more decreased in forward lean sitting posture when compared to slouched sitting posture.

Discussion

This study was primarily aimed at investigating the effects of prolonged sitting posture on the development of lower cross syndrome in college students. Subjects were divided into two groups: forward leaning and slouched sitting. Abdominal and gluteal muscle strength was assessed using MMT. The Thomas test was performed to measure hip flexion tension and trunk extensor MMSE. Results showed decreased gluteal and abdominal muscle strength in both groups. Tightness was also seen in the lumbar extensors and hip flexors. Lower crossed syndrome is a condition affecting the lower segments of the body due to the muscular imbalance in lower body segments. The condition is also known as pelvic crossed syndrome. The characteristic features are alternative tightness and weakness of the muscles in the anterior and posterior of the body. The tightened muscles are thoracolumbar extensors on the dorsal side and iliopsoas on ventral side. similarly, the weakened muscles are deep abdominal muscles ventrally and gluteus maximus dorsally. In a slouched sitting position, the pelvis is centered in the seat and the torso rests against the backrest. Here the LOG is behind the spine and hips. The main activity of the axial extensor muscles and the weakness of the abdominal muscles and the unbalanced simultaneous activation of the muscles of the trunk are seen in the sloppy sitting posture leading to the features of lower crossed syndrome, but with forward leaning, anterior pelvic rotation, dorsal thorac-

ic extension, trunk position in stretch, trunk position forward in stretch, trunk extended by 10 degrees, stretch and trunk extended by 10 degrees, stretch and bend forward by 10 degrees stretch and stretch. Stockings, 10 degree stretches and 10-degree core stretches. Shortening of hip flexors and lumbar spine. The results showed that both forward-bent and forward-bent sitting postures are characteristic of crossed-bottom syndrome. No clear difference was observed in muscle strength and thoracolumbar tension values. However, there was a clear difference in mean score between groups for hip flexor tension, which was more pronounced in forward sitting than slouched sitting. Extended period of sitting is one of the main predisposing factors that cause Lower Crossed Syndrome in college students. Janda has noticed that shortened hip flexors automatically close or constrain the hips when sitting for long periods of time. These imbalances promote increased lumbar lordosis to compensate for weak abdominal muscles. For this reason, both sitting postures were characterized by lower crossed syndrome. However, the results suggest that the forward lean sitting causes more pronounced tightening of the hip flexors than the slouched posture. Sitting with a forward lean reduces the angle between your torso and thighs, thus further shortening your hip flexors. Mills M., *et al*. theoretically proposed that restriction of hip flexor length leads to decreased neuronal activity in the hip extensors. Specifically, there is reciprocal inhibition of the gluteus maximus secondarily to the 'overactivity' of the hip flexor group. Mutual inhibition is thought to increase reliance on secondary hip extensors such as the hamstrings and hip adductors. Women reported sitting with more anterior pelvic rotation, less lumbar flexion, and very little trunk flexion. Conversely, men sat with more posterior pelvic rotation and more lumbar flexion. Subjects with forward-lean sitting were more likely to be female than those with slouched sitting, so this may have had an effect on the mean hip flexor score. Thus, the study comes to the conclusion that forward lean sitting posture have more influence in the occurrence of lower crossed syndrome in college students when compared to slouched sitting postures.

Conclusion

The result of the study revealed that tightness of hip flexor is more in group 1, forward lean sitting posture than group 2, slouched sitting posture. Hence the study concluded that forward lean sitting posture has more influence in the occurrence of Lower Crossed Syndrome in college students.

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