Prevalence of Lower Crossed Syndrome in School Going Children of Age 11 to 15 Years

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Abstract: Introduction: School going children in the age group 11 to 15 years are seated for prolonged duration, which causes tightness of hip flexor muscles and lengthening of gluteal muscles. This progressed to weakness of abdominal muscles and tightness of back muscles which is known as lower crossed syndrome. Method: A total 369 subjects between age group 11 to 15 years were taken with parents consents. Each subject underwent for assessment of strength of abdominal muscles and gluteal muscles with the use of Manual Muscle Technique and measurement of tightness of hip flexor muscles with the use of Thomas test. Results: 21% of the total population have lower crossed syndrome i.e. 76 subjects out of 369 total subjects have lower crossed syndrome. Conclusion: Out of the total subjects 21% of subjects were found to be prevalent for lower crossed syndrome, 29% of the total subjects are at risk of developing lower crossed syndrome in future.22% of the total male subjects have lower crossed syndromes, 18% of the total female subjects have lower crossed syndrome.

Keywords: Lower crossed syndrome, School going Children, Sedentary lifestyle, muscular imbalance, Low back pain in school children

1. Introduction

With the recent development, low back pain is highly prevalent, which is the 2nd leading medical condition which results in lost productivity than any other medical condition. [1]

The Lower Crossed Syndrome is characterised by tight hip flexors and lower back muscles paired with weak abdominals and gluteus muscle.[2] The tightness of the thoraco-lumbar extensors on the dorsal side crosses with tightness of the iliopsoas and rectus femoris. Weakness of the deep abdominals ventrally crosses with weakness of the gluteus maximus and medius. This pattern of imbalance creates joint dysfunction, commonly at the L4-L5 and L5-S1 segments, SI joint and hip joint.[2]

It has been believed that low back pain is generally uncommon among children and adolescents before the age of 20.[3] According to a study, the annual incidence of low back pain in children of age between 11 to 15 gets increasing from 11.8% to 21.5% over a period of 5 years. The lifetime prevalence of low back pain increased from 11.6% at age 11 to 50.4% at age 15 years.[4]

There are mainly two types of muscle present in our body, which are postural muscles such as iliopsoas, quadrates lumborum and phasic muscles such as abdominals, hip extensors etc. Postural muscles have tendency to tighten and phasic muscle commonly develops weakness.[2,5] Lower crossed syndrome is one of the threatening combinations of biomechanical muscle imbalance due to excessive stress it places on the structures of lower back. This postural imbalances develops a chronic pain condition of lower back that becomes more difficult to correct in later stages.[6]

Nowadays, children spend more time in a seated position, both at school during class and at home in front of television.[7] Children become more sedentary with age & also accumulates their sedentary time in increasingly prolonged periods.[8] Objective data show that children aged 4-15 years are sedentary for an average 7-8 hours a day.[7] Nursery schoolchildren were seated for 37.2% of their time in the classroom through to 78.7% for senior school pupils aged 13 to 16 years.[9] Children under 11 years averaged approximately 1.3 hours less daily sedentary time than those aged 11 to 14 years of age & roughly 2 hours less than those 15 to 19 years of age.[8]

Prolonged sitting postures causes the hip flexors to shorten or tighten. Hence the brain will automatically starts to inhibit the activity of glutei muscles. This imbalance pattern promotes increased lumbar lordosis because of the anterior pelvic tilt and over activity of the hip flexors which compensates for the weak abdominals.[10]

The ergonomically designed sitting arrangement, resulted in more preferable postural alignment & decreased activity of muscles of the lower & middle back. If this is maintained for a prolonged period of time such as during school hours, it may reduce muscular fatigue.[11] Muscles are not actively used while sitting if compared to walking and running. Muscular function is replaced by the seat. Weakening of the corresponding muscle occurs due to muscular inactivation over long period of time.[7]

Children adopt different postures during classes regardless of postural variations created by ergonomically designed sitting arrangement.[12] Prevalence of low back pain did not reduced even if children preferred ergonomically designed furniture.[13]

2. Materials and Methodology

Research Design: survey.
Place of study: CBSE schools in Karad.
Inclusion Criteria
• Both boys and girls willing to participate in the study between the age group of 11 to 15 years.
• Both boys and girls diagnosed with Lower Crossed Syndrome by a Certified Physiotherapist / Orthopedician.

Exclusion Criteria
• History of spinal trauma, Joint dysfunction in past 3 months or congenital deformities at hip or lumbar region.
• Recent fracture to related joints in past 6 months.
• History of abdominal, hip or lumbar surgeries in past 3 months.
• Not willing to participate in the study.

Methodology
After getting ethical clearance from the institutional ethics committee informed consent were obtained from the parents of the 369 children. Boys and girls were assessed in two different rooms. Manual muscle testing of the abdominal muscles and gluteal muscles is done. And Thomas test is done for tightness of hip flexors.


1) Muscle Strength Test[14]
   a) Abdominal muscles:
   Isometric abdominal test is used to assess the strength of the abdominal muscles.
   Position- Patient is in supine with the hips at 45 degree and knees at 90 degree.
   Test- The patient is asked to assume the end position and hold it. The gradings of this test are:
   Normal 5= Hands behind neck, until scapulae clear table 20-30sec hold.
   Good 4= Arms crossed over chest, until scapulae clear table 15-20sec hold.
   Fair 3= Arms straight, until scapulae clear table 10-15 sec held.
   Poor 2= Arms extended, towards knees, until top of scapulae lift from table 1-10 sec held.
   Trace 1= Unable to raise more than head off table.

   b) Gluteal muscles:
   Position: The subject is placed in prone with the hips straight and the knee flexed to 90 degree.
   Test: The patient is asked to extend the hip, keeping the knee flexed.
   • Anterior force is applied to the posterior thigh.
   • The pelvis is stabilized during the movement.
   • Both legs are tested.

   The gradings of this test are:
   Normal 5= Complete hip extension and holds end flexion against maximum resistance.
   Good 4= Hip extension is possible and can be held against heavy to moderate resistance.
   Fair 3= Competes full hip extension and holds end position but takes no resistance.
   Poor 2= Completes full range of hip extension in side lying position.
   Trace 1= Palpable contractions of gluteus maximus will be seen as narrowing of the gluteal crease. No visible joint movement.

2) Thomas Test[14]
   a) Iliopsoas Tightness
   The Thomas test is used to assess the hip flexion contracture.
   Position: The patient lies supine while the examiner checks for excessive lordosis.
   Test: The examiner flexes one of the patient’s hips, bringing the knee to the chest to flatten out the lumbar spine and to stabilize the pelvis.
   • The patient holds the flexed hip against the chest.
   • If a contracture is present, the patient’s straight leg rises off the table and a muscle stretch end feel will be felt.
   • Now the angle of contracture is measured using a goniometer.
   • The test is done on both sides.

3. Result and Statistical Analysis

1) Total Prevalence of lower crossed syndrome:

<table>
<thead>
<tr>
<th>Normal</th>
<th>At Risk</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>47%</td>
<td>32%</td>
<td>21%</td>
</tr>
</tbody>
</table>

   Figure 3.1: Total prevalence

21% of the total population have lower crossed syndrome i.e. 76 subjects out of 369 total subjects have lower crossed syndrome. And 32% of the population are at risk of having it in near future i.e. 119 subjects out of 369 are at risk of having lower crossed syndrome.

2) Prevalence of male population:

<table>
<thead>
<tr>
<th>Normal</th>
<th>At Risk</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>48%</td>
<td>30%</td>
<td>22%</td>
</tr>
</tbody>
</table>

   Figure 3.2: Male Prevalence
After analyzing the data, it is found that out of the total 369 students, 32% students have abdominal weakness, 46% students have gluteal muscle weakness & 81% students have tight hip flexors.

Out of the 201 male students, 45% students have abdominal muscle weakness, 40% have gluteal muscle weakness & 87% have tight hip flexor muscles.

Out of 168 female students, 24% students have abdominal muscle weakness, 53% students have gluteal muscle weakness & 75% have tight hip flexor muscles.

Overall, 21% children showed the pattern of muscular imbalance. In this, 59% of male population found to have lower crossed syndrome & 41% of female population found to have lower crossed syndrome.

32% of total population is at risk for developing lower crossed syndrome in future in which 50% of male population & 50% of female population is involved.

Thus, it can be said that, the prevalence of having lower crossed syndrome in school going children in age 11 to 15 years is 21%.

5. Conclusion

The study concludes that there is 21% of school going students of age 11 to 15 years have incidence of lower cross syndrome and 32% are at risk of having lower crossed syndrome in near future.

6. Conflict of Interest

Do not have any conflicts of interest to declare.

References


