Lordosis and Its Effect on Back and Hamstring Flexibility and Cardiovascular Endurance of School Going Children

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Abstract:
The purpose of the study was to examine the influence of lordosis on back and hamstring flexibility and cardiovascular endurance. Total two hundred ten boys and girls school going children of 13 to 14 years old were randomly selected for the study. All of them were resided at rural area of Howrah district, West Bengal. Among them, eighty girls students with normal posture (GNP), and sixteen girls students with Lordotic posture (GLP) were found. In the same way ninety five boys student having normal posture (BNP), and rest twenty-nine boys student lordotic posture (BLP) were noted. The selected postural variation was tested by using wall test method. The flexibility was measured by using sit and reach test. Result of the study, revealed that there were significant differences between BNP & BLP group; GNP & GLP group, BNP & GNP group on the back and hamstring flexibility. It can be concluded that incidence of lordosis has a significant negative influence on back and hamstring flexibility of the rural school going children.

Key Words: Lordosis, Normal posture, Flexibility, School going children, cardiovascular endurance.

I. INTRODUCTION:

Body posture is an individual characteristic for each and every person. It shows great differentiation in people especially during their progressive growth and development. Variability of the development and lack of physical activity impose defect body posture in children and youth [4]. Biomechanically improper physical activities also participate in creating and developing defective body posture. There are varied type of deform body posture. They can be categorized as lower extremity deformities and spinal cord deformities. Lumbar lordosis is one type of spinal cord deformities. Lumbar and cervical segments of the vertebral column are normally lordotic (convexity anteriorly and concavity posteriorly). Lordosis is an exaggeration or increase in the amount of the normal concavity of the lumbar region of the spine [5]. This state may come up as a compensatory adjustment to the deviations in the spine above this region [5]. Relaxation and poor tonus of the abdominals may allow the curve to spill [5]. Excessive lordosis may cause an extreme inward curve in the lower back [6]. Normal Patients with lordosis often show a visible arch in their lower backs. When we look at them from the side, their lower back forms a defined C-shape [6]. Bulging abdomen, forward tilt of the pelvic, and an awkward gait are the major characteristics of a person having excessive lordosis [3]. Lordotic curvatures, also known as secondary curvatures result in a difference in the thickness between the front and back parts of the inter vertebral disc [7]. Anterior pelvic tilt is a major factor of lordosis [6]. The muscles of the lower back are shortened and the abdominal muscles get elongated. As a result the body weight shifts to back ward [5]. Another cause of formation of lordotic posture is imbalance in muscle strength and length such as weak hamstrings, or tight hip flexors [7]. Lordosis may also increase at puberty sometimes not becoming evident until the early or mid-20s [6]. In the literature there is a great lack of measureable data on the influence of defective posture (lordosis) on physical fitness variables which are valuable part for performing daily living activity and growing as a wealth of our nation. So, the researchers would like to examine and represent the influence of lordosis on back and hamstring flexibility and cardiovascular endurance.

II. MATERIALS AND METHODS:

Total 210 boys and girls school going children of 13 to 14 years old were randomly selected for the study. All of them were resided in rural area of Howrah district, West Bengal. Among them, eighty girls students with normal posture (GNP) (posture without any deformities), and sixteen girls students with Lordotic posture (GLP) were found. In the same way ninety five boys student having normal posture [posture without any deformity] (BNP), and rest twenty-nine boys student lordotic posture (BLP) were noted. The selected postural variation was lordotic posture, tested by using wall test method. The personal data – age, height, and weight were measured by using birth certificate, stadiometer, and weighing machine. The fitness variables were flexibility and cardio vascular endurance. The flexibility was measured by using sit and reach test and cardiovascular endurance was measured by 600 yards run. Mean and standard deviation (SD) were used as descriptive statistics and ANOVA and lastly t test were used to compare the data of the study with the norm values.

Results and Discussion:

Table1: The mean and standard deviation of personal data of all the selected groups.
The main purpose of the study was to determine the effect of lordotic posture on hamstring flexibility and cardiovascular endurance of school going children. According to Fyfe (2016) of Sports Injury Bulletin, people with swayback often experience postural fatigue while standing for long periods. This is because the swayback posture prevents major muscle groups from working properly, including the glutes, abdominals, trapezius and deep neck flexors. These muscles may seem tight or weak in people with lordosis. Swayback can also cause problems in the hip flexors, external rotators and lower spine extensors, and stiffness in the midspine area. These characteristics often lead to limited mobility, increased injury, weakness and pain. The finding of the present study in respect of flexibility was close proximity with the other. The principle findings were that there were significant differences between normal posture boys and lordotic posture boys and also between normal posture girls and lordotic posture girls in flexibility, but there was no significant difference between lordotic posture boys and girls. Swayback can diminish the efficiency of entire organ systems. According to Rolfing Wellness (2016), 80% percent of people diagnosed with lordosis also experience decreased lung, heart and cardiovascular function. This is because the inward curvature of the spine limits the role of the diaphragm muscles. The spinal imbalance caused by swayback can affect the entire body, including the rib cage, head and pelvis, and even extend to the arms and legs. D. Aleksandar, Edward D.J. Cambridge, Stuart Mc Gill (2013) studied to examine mean values of isometric torso muscle profiles of four spinal postures (Good posture, Thoracic Kyphosis, Lumbarlordosis and scoliosis) among 743 children from the age of seven to fourteen years old. They observed posture was proved to be linked to endurance scores. They found hyper lordotic spines demonstrate a decrease endurance compared to the other three postures. Trends further suggested that hyper lordosis was detrimental in lateral chain torso endurance. Present study revealed that in case of cardiovascular endurance there was no statistical significant difference between normal posture and lordotic posture of boys and girls.

### Table 1: The mean and standard deviation of personal data of all the groups of boys and girls

<table>
<thead>
<tr>
<th>Group</th>
<th>Age</th>
<th>Height</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABNP</td>
<td>13.54±0.50</td>
<td>1.47±0.08</td>
<td>34.49±6.40</td>
</tr>
<tr>
<td>ABLP</td>
<td>13.66±0.48</td>
<td>1.46±0.08</td>
<td>36.44±8.93</td>
</tr>
<tr>
<td>AGNP</td>
<td>13.38±0.49</td>
<td>1.47±0.07</td>
<td>35.93±6.24</td>
</tr>
<tr>
<td>AGLP</td>
<td>13.38±0.50</td>
<td>1.44±0.08</td>
<td>33.50±6.05</td>
</tr>
<tr>
<td>F Ratio</td>
<td>1.349(NS)</td>
<td>1.395(NS)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 showed the mean and standard deviation of personal data of all the groups of boys and girls.

### Age:

Mean values and standard deviations of age of all the groups i.e. Normal Posture and Lordotic Posture of boys and girls were 13.54±0.50, 13.66±0.48 and 13.38±0.49, 13.38±0.50 respectively.

### Height:

Mean values and standard deviations of height of all the groups i.e. Normal Posture and Lordotic Posture of boys and girls were 1.47±0.08, 1.46±0.08 and 1.47±0.07, 1.44±0.08 respectively.

### Weight:

Mean values and standard deviations of weight of all the groups i.e. Normal Posture and Lordotic Posture of boys and girls were 34.49±6.40, 36.44±8.93 and 35.93±6.24, 33.50±6.05 respectively.

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P<0.05 level, F value= 2.651, 3.884.

From table 2 it was observed that Mean and SD of flexibility of four groups (ABNP, ABLP, AGNP and AGLP) were 4.77±5.23, 4.04±2.17, 7.15±5.02, and 0.27±3.75 respectively. For cardiovascular endurance (CVE) mean and SD of four groups were 152.24±6.49, 153.55±6.88, 174.99±11.13, 180.06±11.62 respectively. Table 2 showed F value of flexibility. It was found that F value was significant at both 0.05 and 0.01 level. That means there was a significant difference among the selected four groups in exhibiting their flexibility. From table 2 also revealed F value of cardio vascular endurance. It was observed that there was significant difference among the groups in cardio vascular endurance at 0.05 and 0.01 levels.

### Table 2: The mean and standard deviation (SD) of selected variables of four groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>ABNP</th>
<th>ABLP</th>
<th>AGNP</th>
<th>AGLP</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>CVE</td>
<td>4.77</td>
<td>±5.23</td>
<td>-0.04</td>
<td>±2.17</td>
<td>7.15</td>
</tr>
<tr>
<td>CVE</td>
<td>152.24</td>
<td>±6.49</td>
<td>162.9</td>
<td>±7.51</td>
<td>173.99</td>
</tr>
</tbody>
</table>

P*<0.05 level, F value= 2.651, 3.884.

From table 2 it was observed that Mean and SD of flexibility of four groups (ABNP, ABLP, AGNP and AGLP) were 4.77±5.23, 4.04±2.17, 7.15±5.02, and 0.27±3.75 respectively. For cardiovascular endurance (CVE) mean and SD of four groups were 152.24±6.49, 153.55±6.88, 174.99±11.13, 180.06±11.62 respectively. Table 2 showed F value of flexibility. It was found that F value was significant at both 0.05 and 0.01 level. That means there was a significant difference among the selected four groups in exhibiting their flexibility. From table 2 also revealed F value of cardio vascular endurance. It was observed that there was significant difference among the groups in cardio vascular endurance at 0.05 and 0.01 levels.

### Table 3. Comparisons of mean values of selected fitness variables.

<table>
<thead>
<tr>
<th>FLEXIBILITY</th>
<th>CVE</th>
<th>Table value of t</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABNP V ABLP</td>
<td>4.82**</td>
<td>2.38*</td>
</tr>
<tr>
<td>AGNP V AGLP</td>
<td>5.19**</td>
<td>2.04*</td>
</tr>
<tr>
<td>ABLP V AGLP</td>
<td>0.35(NS)</td>
<td>5.99**</td>
</tr>
<tr>
<td>ABNP V AGNP</td>
<td>3.04**</td>
<td>16.24**</td>
</tr>
</tbody>
</table>

* = Significant at 0.05 level, ** = Significant at 0.01 level; NS = Not significant. From table 3 it was observed that there were significant differences between ABNP and ABLP group, AGNP and AGLP groups and also between ABNP and AGNP in flexibility at 0.05. But there were no significant difference between ABLP and AGLP groups in flexibility. From table 4 it was also found that in case of cardio vascular endurance there were significant differences between ABNP & ABLP, and between AGNP & AGLP; ABNP & AGNP and between ABLP & AGLP. The main purpose of the study was to determine the
III. CONCLUSION:
1) Normal Posture of boys and girls carries a good health specifically on flexibility and cardiovascular endurance.
2) Incidence of lordosis had an adverse impact on back and hamstring flexibility for both boys and girls.
3) There were significant differences in cardiovascular endurance between normal posture and lordotic posture groups of both boys and girls.

So, ultimately it can be concluded that lordotic posture cause deterioration in gait quality.

IV. REFERENCES:


[6]. Lordosis: Causes, Symptoms, Diagnosis, Treatment & Exercises. Spina Bifida HQ

