

# Effect of Fascial Distortion Model on the Cobb's Angle in Adolescents with Idiopathic Scoliosis

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## Abstract

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### Purpose:

This study examined the effects of the fascial distortion model (FDM) on Cobb's angle.

### Methods:

Fourteen subjects participated in this study. The idiopathic scoliosis group performed FDM treatments eight times in four weeks. A Shapiro-Wilks test was used to verify the normality of a group of idiopathic scoliosis patients. A paired t-test was performed to determine the satisfaction with the normality.

### Results:

The difference in Cobb's angle was significant ( $p < 0.05$ ) by an average of  $5.72 \pm 2.24$  from  $15.51 \pm 1.81$  before the experiment.

### Conclusion:

This study found that the FDM method was effective in improving the Cobb's angle. The application of a FDM treatment appears to stabilize the fascia with decreased ability to adapt physiologically. The application of the CD and TB method of FDM treatment improved the asymmetry spine by dispersing moisture in fascia and improving the contraction and relaxation ability. The results suggest that the Cobb's angle is reduced when FDM is applied, thereby preventing the progression of curvature and avoiding psychological and physical problems.

**Keywords** : Fascial distortion model, Scoliosis, Cobb's angle

## Introduction

Other Sections ▼

Spine lateral bending is a three dimensional deformity of the spine. <sup>1</sup> Weinstein et al. <sup>2</sup> reported that AIS (adolescent idiopathic vertebrae) developed in children 10 years of age or older and that Cobb's angle was defined by at least  $10^\circ$  bend and radiographed in a standing posture using Cobb's technique. According to previous studies, 25-78% reported the prevalence of vertebra related diseases in Korea, 2-3% of vertebrae were diagnosed in 10-16 year old students, But the ratio between  $10-30^\circ$  is reported to be

higher in women. <sup>4</sup> <sup>5</sup> Especially in adolescence, the muscle skeleton system grows fast, and it takes a long time to sit and live. Bad learning conditions such as desks and chairs, insufficient exercise, and excessive use of mobile phones can negatively affect the spine. <sup>6</sup> Moon et al. [ <sup>7</sup> ] reported that the lower the bending of the vertebrae, the more effective the treatment. Therefore, only 10% of the patients with bony lateral bending were treated for lateral bending, and 90% The prognosis is only observed through repeated tests every year. <sup>8</sup>

Currently, treatment of idiopathic vertebral flexion is performed by surgical and conservative methods. <sup>9</sup> Moon et al. [ <sup>10</sup> ] reported that surgical bending of the lateral bending was greater than 40 °, but surgical treatment was considered to be possible. In addition, most patients have improved symptoms through conservative methods such as postural exercise, and few cases require orthodontic or surgical procedures. <sup>11</sup> In Lehnert-Schroth <sup>12</sup>, vertebral flexion has a left to right imbalance in the force transmitted from the feet, legs and pelvis to the upper side. The affected muscles are longer in proportion to the range of deviation from the center line in the forehead, The volume is small and weak in inverse proportion. The muscles in the concave direction, which appear to be strongly contracting, are also as ineffective as the over-stretched muscles in the convex direction, while the muscles in the convex side are thickened but not in increased strength and in contractility, And the inferior vestibular function was decreased as the lateral bending increased, but it was thought that it was changed more inefficiently due to the deterioration of the ability to relax.

Travell and Simons <sup>13</sup> reported that myofascial changes to various states due to recurrent chronic trauma resulting in dysfunction and abnormal normalization. The fascia is a tissue that keeps its shape connected with all the muscles of the human body as well as all the organs including the other internal organs, and has various forms such as wrapping muscle fibers, ligaments, and tendons. It also performs various functions such as separating, protecting and cushioning the bones and nerves, and protects the

body by contracting itself when an abnormal external force of <sup>14</sup> or <sup>15</sup> is applied, . Therefore, myofascial injury may result in decreased physiological adaptability, increased fascia tensions, and spreading to other areas, resulting in functional limitation, pain, trauma, and loss of flexibility and continuity. <sup>16</sup>

Typaldos <sup>14</sup> describes some types of fascia deformation as damage to the musculoskeletal system. We report a fascial distortion model in which the myofascial fascia is composed of the fascia surrounding the muscles, tendons, ligaments, and the fascia surrounding the joints. FDM is an evaluation method and treatment method that evaluates the cause of pain or dysfunction through the body language represented by the patient and restores the fascia deformity by using a hand or a tool. <sup>17</sup> In FDM, the transition zone (TZ) is defined as the connection between the ligament and the tendon, joint pocket and bone, and when the inefficiency increases in TZ, the fascia turns into continuum distortions (CD) And when the force is instantaneously generated in one direction to the bone or ligament, the transition state in the transition zone is lost. CD shows that the fascia is very hard as a result of the loss of the entire history, It is said that grain of rice hinders the function of surrounding tissues and affects the proprioceptive sensation. <sup>17</sup> In addition, the vertebrae may have deformed fascia due to various injuries. We believe that trigger bend (TB) type myofascial deformation occurs along the periphery of the vertebral body due to the long period of compression applied to the spine. And it is said that the treatment method is hard and the fascia obstructing the function is removed due to the strong physical pressure to loosen the fascia of the damaged part and to restore the torn or overlapping fascia back to the original shape. <sup>14</sup>

The purpose of this study was to investigate the effect of FDM CD and TB methods on the improvement of bending of patients with lateral bending, which improves the function of the transition zone between the bones and ligaments, which was not addressed in previous studies.

## Research method

Other Sections ▼

### 1. Research subjects

In this study, 14 elementary school students in grade 4-6 who were diagnosed with S-shaped idiopathic vertebrae with right flexion of the spine were included. The subjects underwent an adult forward bending test with a rib protrusion and a height difference between the right and left shoulder bones. Anterior and posterior radiographs of the spine were taken. Radiographs were taken from 14 patients with angle of 10-20 ° who did not undergo conservative treatment and had no back pain. The study period was from September 2, 2018 to November 30, 2018, twice a week on a single person basis, and 8 times over 4 weeks. All subjects were asked to explain the purpose and treatment method of the study before the experiment and the parents of the subject and the subject voluntarily agreed to the experiment. The selection criteria of the subjects were selected as those without any physical defects or neurological problems that could affect the balance, and those who experienced spinal surgery that could affect the results were excluded from the study.

### 2. Experimental Method

#### 1) Measurement tools and methods

In this study, X-ray was used to measure Cobb's angle. In the right posture, AP view of whole spine was taken and Cobb's angle was measured using the Cobb`s method.

#### 2) Experimental procedure

All subjects were observed by the same physical therapist and were treated with the FDM method. The therapist applied pressure to the posterior anterior (PA) points of the left and right spine with the bend of the vertebrae in the prone position and found the CD point in the part where the movement of the spine and spine rib joints (costovertebral articulation) He found a painful area and

applied a strong local pressure to the fingertip of his thumb. He reduced the pressure when the subject said the pain was gone. This procedure was repeated until you feel the person is not comfortable any more pain, <sup>17</sup> the end of the treatment fell sweep at the back of the head (occipital) to the ilium ridge (iliac crest) to the strong pressure of a fingertip.

### 3) Analysis of data

The difference between the Cobb's angle measurements of the subjects was compared using a paired t test. The collected data were analyzed using SPSS Statistics version 20, and  $p < 0.05$  was set to verify statistical significance.

## result

Other Sections ▼

### 1. General characteristics of subjects

The subjects participating in this study participated in the experiment with 14 patients diagnosed with idiopathic vertebral flexion. The mean age was 11.9 years, weighed 42.5 kg, and the height was 147.4 cm ( Table 1 ).

**Table 1**

Anthropometric data (n = 14)

Variable	Total
SEX	
M	8
F	6
Age (yr)	11.9 ± 0.73 <sup>a</sup>
Height (cm)	147.4 ± 6.94
Weight (kg)	42.5 ± 8.22

<sup>a</sup> Mean ± standard deviation.

### 2. Cobb's angle analysis

The subjects who participated in the study were selected for X-ray examination in the standing posture and students with a Cobb's angle of 10 ° or more and Adams's anterior flexion test with a simple scoliometer with a body rotation angle of 5 ° or more. The Shapiro-Wilks test was performed to verify the normality of the variables and the paired t-test was performed to satisfy the normality. 4 weeks 8 conference FDM after treatment difference Cobb's angle is the experiment before 15.51 ° ± experiment then was average 5.72 ° ± 2.24 decreased to 9.78 ° ± 3.61 eseo 1.81 which was a statistically significant difference statistically significant ( $p < 0.05$ ) ( Table 2 ).

**Table 2**

Comparison of Cobb's angle (Unit: degree)

	CB (pre)	CB (post)	t	p
FDMT (n = 14)	15.51 ± 1.81 <sup>a</sup>	9.78 ± 3.61	9.56	0.001

<sup>a</sup> Mean ± standard deviation.

CB: Cobb's angle, FDMT: Fascial distortion model therapy.

## Review

Other Sections ▼

The purpose of this study was to investigate the effect of FDM on the Cobb 's angle in patients with idiopathic vertebrae. Cobb's angle selects the upper vertebrae and the lower vertebrae, respectively, which are most inclined in the concave direction of the flexion of the lateral flexion, and two lines perpendicular to the lines along the upper and lower vertebrae of the upper vertebra intersecting angles. <sup>The</sup> authors concluded that the diagnosis of spinal bending in early childhood by early physical examination showed that spinal surgery was reduced by early diagnosis and early diagnosis and appropriate and continuous rehabilitation should be performed. <sup>19</sup> <sup>21</sup> Yu and Jung <sup>20</sup> reported that, based on domestic studies on vertebral flexion, conservative treatment

was applied to exercise, exercise therapy, exercise therapy, traction therapy, Physical therapy, 'correction' and 'chuna' were classified as chuna and orthodontic treatment. All the conservative treatments in the adolescents were effective in decreasing vertebral flexion and rapid early detection led to immediate conservative treatment And that this could inhibit the progression of vertebral flexion in adolescents.

To date, various treatment methods have been studied to improve the function of patients with vertebral flexion. John et al. [22] classified the fascia as a deep connective tissue with a three-dimensional, transparent white color from superficial to deep and deepest. The shallow layer is located beneath the dermis, and the deep layer is said to contain muscles, bones, nerves, blood vessels or intestines. Fascia are all organ preservation in the form of and is so in place, were said to have a role of protecting the engine against physical force exerted on the body<sup>23</sup> and by a biomechanical stimulation during the fascia damage receptor delivered to the central nervous system, The ability of the central nervous system to regulate and adapt to the receptor determines the duration of damage to the connective tissue by neural integration.<sup>24</sup> Typaldos<sup>14</sup> reported that symptoms such as pain or dysfunction could be caused by trauma, inflammation, or posture that would cause abnormal pressure on the fascia. The lateral flexion of the vertebrae creates an unbalanced posture, which has a significant effect on visual and postural changes.<sup>25</sup> and <sup>26</sup> When the fascia is abnormally pressurized, pain and functional problems may occur. And the muscular reattachment of the injured fascia.<sup>14</sup>

In this study, we investigated the change of Cobb's angle when applying FDM treatment to the deformed fascia in patients with vertebral flexion. As a result, the Cobb's angle of the patients with idiopathic vertebrae decreased from  $15.51 \pm 1.81$  before the experiment to  $9.78^\circ \pm 3.61$  after the experiment and  $5.72^\circ \pm 2.24$  after the experiment. There was a statistically significant difference. Chaitow<sup>28</sup> reported that when stimulation is given to the fascia of the human body, the mechanoreceptors respond to the muscles and fascia relaxed while suppressing the H reflex involved in muscle contraction. The lack of water disperses the fascia of the fascia To increase flexibility.<sup>27</sup> The application of the CD and TB methods of vertebral flexion FDM treatment is a gradual increase in the physiological adaptation ability of the fascia restricting the contraction of the thickened muscle of the convex region and the physiological compression of the fascia limiting the concave relaxation As a result, it is considered that asymmetry and spinal body flexion were improved by dispersing the water in the fascia of the body and improving the contraction and relaxation ability. Therefore, the application of FDM treatment to the patients with lateral bending of the spine is expected to reduce the Cobb's angle, thereby preventing the lateral bending of the spine and preventing the psychological problems of adolescents. In addition, we propose FDM treatment as a method of revitalizing the trunk muscles of patients with prolonged spinal bending patients who require long - term rehabilitation and treatment, and to improve and improve the abnormal spinal lateral bending of the spine. In this study, 14 patients with mildly growing juvenile vertebrae were studied. Before and after the experiment, only the test group was compared without setting the control group, and ROM, There is a limit to generalizing the results. Future studies will need to investigate the effects of adult subjects and objective measurement tools on the cardiorespiratory function and cardiorespiratory function in patients with vertebral flexion. In addition, it is expected that it will contribute to improve the quality of life of more patients by examining the effect of applying fascia deformity model treatment to various subjects.

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