Abstract

The spine is a column of our body and dissymmetry of the spine can cause problems on our health.

In this study, the origin of idiopathic spine dissymmetry among adolescents is explained that physical force does not flow fully so that chilly draft comes into being.

The main purpose of this study is to analyze the effect of the spine dissymmetry improvement program. X-ray examination on the thoracic vertebrae and the lumbar vertebrae was applied before and after 12-week Dahn Taekwondo program to each participant.

In this study, we apply the Dahn-Taekwondo 'Spinal Asymmetry Improvement Program' to 18(9-18 year old) adolescents with spinal asymmetry 3 times per week and 1 hour per 1 day for 12 weeks. The results are as follows.

First, the Dahn-Taekwondo spinal asymmetry improvement program brings significant reduction(p <.001) of the Cobb's angle of thoracic asymmetry in adolescents.

Second, in the Taekwondo lumbar asymmetry improvement program, the lumbar asymmetry Cobb's angle of adolescents decreased significantly(p <.001).

These findings indicate that the Dahn Taekwondo spine improvement program is effective for the juveniles with spine dissymmetry and can be recommended to prevent and treat spine dissymmetry among juveniles.

Therefore, Dahn-Taekwondo spinal asymmetry improvement program can be used as a body correcting exercise for young people who do little physical activity and especially sit long time with unstable postures.

[Keywords] Juveniles, Dahn Taekwondo, Cobb's Degree, Spine Dissymmetry, Thoracic Vertebrae

1. Introduction

Scoliosis which is frequently seen in adolescents among spinal-related diseases refers to a state in which the vertebrae are bent to the right or left side of the vertebra when viewed from the back, which is often referred to as Cobb's angle in clinical practice. Scoliosis was defined as more than 5 ° in the past, but recently, scoliosis is generally defined as the case that Cobb's angle is larger than 10 ° [1].

According to a report by the Kyunghyang Shinmun[2], the National Health Insurance Corporation(NHIC) reported that 4 out of 10 people with a spinal column bending back and forth that visited the hospital in 2014 were teenagers. In 2012, 144,413 patients were treated due to bending of the spine(including scoliosis and spinal column with bending back and forth), and women(92,454) were nearly twice as many as men(55,459). By age, teenagers were the most common (53,562, 38.3%). Patients in their 20s(19,885, 13.7%) followed, and 6371(4.4%) children under 9 years accounted for 56.3% of the patients below 20 years old. The number of teenagers was 1183 in 100,000 patients, 4.1 times more than the average(291), and 62% of teenagers were female.
According to the Korean Society of Orthopedic Surgery[3], the types of scoliosis are largely divided into idiopathic, congenital, and muscle neurogenic scoliosis. Of these, 85 to 90% are reported as idiopathic scoliosis with unknown cause. It occurs mainly before puberty, and to female students twice as often as to boys. In previous studies, it is reported that one of the causes of idiopathic scoliosis is about the causes of idiopathic scoliosis, Chae & Lee & Shin & Kim & Lee & Kim[4], suggests the use of computers for a long period of time with mental stress and inappropriate posture related to study, the height of desks and chairs neglecting the physique, heavy backpacks, and lack of exercise. Kang[5] reported that deformation of the vertebrae caused by incorrect posture management in the growing phase progressed to abnormal spinal deformity. In addition, Park & Park[6] stated that it is important to maintain the function of the spine and the spine correctly in order to prevent scoliosis. Kim[7] and Mun[8] also pointed that young people need education and practice for correct posture for spinal health. Therefore, exercise therapy for the treatment of juvenile idiopathic scoliosis is the mostly research attempting to correct the wrong posture into exercise. As exercise therapy, there are Qigong Gymnastic[9], mat exercise[10], lumbar stabilization exercise[11], lumbar stretching[12], gyoitonic exercise program[13], exercise with bands[14] jimbol[15] and Pilates[16]. These exercises focus on strengthening muscles and improving flexibility around the spine. However, Lee[17] reported that skeletal or muscular distortion is more than 70% due to organ problems. This is because the organs are the roots supplying energy to the muscles and bones, and they are also acting as the physical centers supporting the human body. Therefore, before correcting the posture of the youth, the belly and organs shall be warmed and removed from the cold. When the warm air enters the lower belly, the muscles around the vertebrae are relaxed smoothly, and the posture would be corrected naturally. In adolescents, spinal scoliosis can be developed if they leave a common spinal asymmetry during the growing season and can become serious problems when they become adults. Therefore, early screening and proper correction exercise are very important for preventing and early treatment of scoliosis in adolescents. Among the methods for the youth to become the Suseunghwagang(水升火降), we applied the Dahn-Taekwondo training method. Dahn-Taekwondo was born in 2004 to restore the original value of martial arts with the spirit of ‘Hongik Human Ewha World’ as the core value of the Koreans’ core philosophy. The only Taekwondo training in Korea is being carried out, which utilizes the bio energy "気" in the body, based on the “lead” training, a traditional training program of the Korean people. The purpose of this study is to develop the ‘juvenile spinal asymmetry improvement program’ based on the principle of Korean lead training represented with Suseunghwagang.

2. Method

2.1. Subjects

The subjects of this study were 18 Taekwondo trainees from 9 to 16 years old living in S city. The subjects were selected by the visual inspection of the spinal asymmetry. The visual inspection was performed by Adam’s forward bending test and X-ray examination was performed in Y hospital orthopedic surgeon to who was judged to be spinal asymmetry at first inspection. Cobb’s scoliosis less than 10° and asymmetry of thoracic 18 spinal asymmetry(15 males, 3 females) were selected at second examination in the hospital. For the subjects, we explained the study before the experiment fully and they and their parents participated voluntarily in the study. The demographic characteristics of the selected subjects are shown in Table 1.

Table 1. Demographic characteristics of subjects.

<table>
<thead>
<tr>
<th>Number</th>
<th>Age (yrs)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=18</td>
<td>11.8±1.76</td>
<td>149.27±9.12</td>
<td>44.18±9.19</td>
</tr>
</tbody>
</table>

Note: Value are mean±SD
2.2. Dahn-taekwondo ‘juvenile spinal asymmetry improvement program’

The subjects of this study participated in Taekwondo Spinal Asymmetry Improvement Program for 1 hour per day for 12 weeks (36 times) three times a week. The contents of training are shown in <Table 2>.

Table 2. Dahn-taekwondo ‘juvenile spinal asymmetry improvement program’.

<table>
<thead>
<tr>
<th>Step</th>
<th>Program</th>
<th>Time</th>
<th>Training effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step I</td>
<td>Lower abdomen strike</td>
<td>1,500 times 20 minutes</td>
<td>Remove cold air by heat arising from relaxing danjeon and bowel</td>
</tr>
<tr>
<td></td>
<td>Bowel movement</td>
<td>500 times 20 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step II</td>
<td>Temple training</td>
<td>30 times 5 minutes</td>
<td>Balance left and right side of spine</td>
</tr>
<tr>
<td></td>
<td>Wagong platform</td>
<td>5 minutes</td>
<td>Strengthen muscles around danjeon and lumbar</td>
</tr>
<tr>
<td>Step III</td>
<td>Hoop</td>
<td>5 minutes</td>
<td>Relax left and right muscles of spine</td>
</tr>
<tr>
<td></td>
<td>Relax</td>
<td>5 minutes</td>
<td>Relax the whole body</td>
</tr>
</tbody>
</table>
2.3. Research procedure

18 subjects who were classified as spinal asymmetry by first visual inspection and secondary X-ray inspection performed the same test twice before and after the program. This research procedure is shown in <Figure 6>.

**Figure 6.** Research procedure.

<table>
<thead>
<tr>
<th>Selection of research subjects</th>
<th>N = 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dictionary first visual inspection</td>
<td>Adam’s forward-bending test</td>
</tr>
<tr>
<td>Dictionary secondary inspection</td>
<td>X-ray filming</td>
</tr>
<tr>
<td>Post-test</td>
<td>X-ray filming</td>
</tr>
<tr>
<td>Results analysis</td>
<td>SPSS/PC (Version 19.0)</td>
</tr>
</tbody>
</table>

2.4. Items and methods to measure

1) Adam’s forward-bending test

In the Adam’s forward-bending test, two feet are gathered together as shown in <Figure 7>, and the knees shall be bent and brought into close contact with the floor. Afterwards, both hands shall be leaned forward and head shall extended straight over and bow down. At this time, the researchers selected a trainee who had spinal asymmetry for a secondary test(X-ray) by measuring the rib hump and lumbar hump at the same height as the thoracic spine at the back of the subject.

**Figure 7.** Adam’s forward-bending test.

2) Measurement of spinal asymmetry Cobb's angle through X-ray

A X-ray of full-spine(A-P) spine of the trainees who had spinal asymmetry in the Adam’s forward-bending test was taken at a standing posture using Digital X-ray (provision 1600C, Korea). Cobb’s angle measurement method is as follows: draw a line from the top of the vertebrae which is most curved to the bottom of the curve at the bottom of the vertebra and draw a perpendicular line from angle line at a right angle(90°) to find the intersected angle. Then this angle is the magnitude of the curvature at Cobb’s angle [18][19]. In general studies, scoliosis is diagnosed in above method. However, in this studies, the angle of the asymmetry was measured by directly substituting the angle of the vertebrae or lumbar vertebrae with the straight line of the vertebrae in order to judge the direct vertebral asymmetry <Figure 8>.

**Figure 8.** Measurement of Cobb’s spinal asymmetry angle through X-ray.
2.5. Data processing

The data collected through X-ray from the subjects participating in Dan-Taekwondo 'Youth Spinal Asymmetry Improvement Program' were analyzed using SPSS Version 19.0. Demographic data of all subjects were subjected to frequency analysis and paired sample t-test was conducted to examine the effect before and after the program. The statistical significance level was 5%.

3. Results

3.1. The change of thoracic asymmetry angle before and after application of dan-taekwondo juvenile vertebral asymmetry improvement program

Table 6 shows the results of the pre- and post-thoracic X-ray examinations for the 12-week Taekwondo program 'Juvenile Spinal Asymmetry Improvement Program'. The Cobb's angle of the thoracic vertebrae was 7.73 ± 2.03 in the pre-test and 1.59 ± 0.79 after the participation in the program to appear statistical significance(p < .001).

Table 6. The change of asymmetric angle of the thoracic vertebrae before and after application of dan-taekwondo juvenile asymmetry improvement program (°).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre</th>
<th>Post</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic</td>
<td>7.73 ± 2.03</td>
<td>1.59 ± 0.79</td>
<td>7.13</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Note: Value are mean ± SD, ***p<.001

3.2. The change of asymmetric angle of the lumbar before and after application of dan-taekwondo juvenile asymmetry improvement program

Table 7. The change of asymmetric angle of the lumbar before and after application of dan-taekwondo juvenile asymmetry improvement program (°).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre</th>
<th>Post</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar</td>
<td>4.19 ± 1.62</td>
<td>1.84 ± 0.89</td>
<td>6.19</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Note: Value are mean ± SD, ***p<.001

4. Discussion

Dan-Taekwondo ‘Juvenile Spinal Asymmetry Improvement Program’ is expected to help the research subjects maintain their correct posture and settle it in daily life. For adolescents, neglecting spinal asymmetry which is common during the growing season can lead to scoliosis and lead to serious problems with spinal diseases when they became adults. Spinal deformity caused by erroneous posture management during the growing season causes pain and stiffness in physical activity as well as physical problems, resulting in disruption of daily activities. The difference from advanced studies is that Dan-Taekwondo ’s Program for the Improvement of Juvenile Spinal Asymmetry deals with energy in the body. We consider the cause of spinal asymmetry as chilling discomfort, so it is possible to balance the energy by exercising so that it can be healed by oneself. It is also different from other exercises in that it allows the energy of each organs to be turned by using meridians, making the body to be rigid by circulating the cold and unclear energy stagnant in the body. In previous studies on sciatic scoliosis exercise Lee[20] reported that 70% of scoliosis prevention during growth period and 50% of correction is possible as a result of muscle strengthening and pelvic muscle strengthening around the spine.

Chae, et. al.’s[14] reported that the Cobb's angle decreased from 13°(average) to 6°(average) after 5-month(average) stretch of 30-40 minutes four times a week for elementary school students. Moon[21] reported that the Cobb’s angle measured after a 12-week, 36-week correction exercise program was reduced from 13°(average) to 9°(average) in the thoracic spine and reduced from 13° to 6° in the lumbar spine. Kwon[22] reported that
the Cobb's angle measured after 30 times of training programs which consisted of stretching, orthodontic treatment and massage for 8 weeks reduced by 8° (thoracic vertebrae average) from 19° (thoracic vertebrae average) to 11° (thoracic vertebrae average). The results of the 12-week exercise program which is consisted of stretching and theraband showed that the thoracic Cobb's angle was reduced from 15.7 ± 1.1 to 8.84 ± 1.4 and that of the lumbar Cobb's angle was reduced from 16.6 ± 1.0 to 11.0 ± 1.2.

In this study, the effectiveness of the Dan-Taekwondo Spinal Asymmetry Improvement Program for 12 weeks for adolescents with vertebral asymmetry before progressing to scoliosis is evaluated. The thoracic Cobb's angle was reduced significantly (p < .001) from 7.73 ± 2.03 to 1.59 ± 0.79, and the lumbar Cobb's angle was reduced significantly from 4.19 ± 1.62 to 1.84 ± 0.89 (p < .001). The Cobb's angle of the thoracic vertebra was reduced by 6.14° and the Cobb's angle of the lumbar vertebra was reduced by 2.35°. Dan-Taekwondo Spinal Asymmetry Improvement Program can be considered as a practical exercise program for prevention and improvement of scoliosis. Many children who spend most of their time at school and at school can get help against spinal scoliosis by relieving them of extra curricular activities or after school hours. It is more important to prevent and treat with early diagnosis and proper orthodontic treatment than post–diagnosis treatment. Therefore, it is considered that the 'Dan-Taekwondo Spinal Asymmetry Improvement Program' applied in this study will be useful and helpful in this regard.

What significant point in this study is that 12 out of the 18 students who participated in the experiment were the parents who died or were divorced and are raised by the parents or grandparents. 66.7% of the subjects were suffering from instability in the home environment. Therefore, it is necessary to investigate the relationship between the causes of spinal asymmetry and psychological factors. In addition, additional studies shall be conducted on the persistence of changes in Cobb's angle, whether the effect is maintained even after several years, and whether 'Dahn-Taekwondo Spinal Asymmetry Improvement Program' affects Cobb's each scoliosis above 10° C.

4. Conclusion

In this study, we applied the Dahn-Taekwondo 'Spinal Asymmetry Improvement Program' to 18(9-18 year old) adolescents with spinal asymmetry 3 times per week and 1 hour per 1 day for 12 weeks. The result are as follows.

First, the Dahn-Taekwondo spinal asymmetry improvement program brought significant reduction (p < .001) of the Cobb's angle of thoracic asymmetry in adolescents. Second, in the Taekwondo lumbar asymmetry improvement program, the lumbar asymmetry Cobb's angle of adolescents decreased significantly (p < .001).

Therefore, Dahn-Taekwondo spinal asymmetry improvement program can be used as a body correcting exercise for young people who do little physical activity and especially sit long time with unstable postures.

5. References

5.1. Journal articles


5.2. Thesis degree


5.3. Books


5.4. Additional references


Lead Author
Choi Man-gyu / Dahn Taekwondo Institute Researcher
B.A. Kyunghee University
M.A. Dankook University
Ph.D. University of Brain Education

Research field

Major career
- 2019~present. International Society for Martial Arts, Member

Corresponding Author
Park Ju-sik / Keimyung University Professor
B.A. Keimyung University
M.A. Keimyung University
Ph.D. Keimyung University

Research Field

Major Career
- 2005~2014. Gyeongju University, Professor
- 2015~present. Keimyung University, Professor