The effect of osteopathy therapy for curvature and pain of cervical spine on patients with cervical hypolordosis

Kwak Hun

ID S2309015

goodbody4you@naver.com

January 15, 2024

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ABSTRACT

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The purpose of this study is to examine the effects on angular change, degree of pain and quality of life after osteopathy treatments for patients with cervical hypolordosis, by investigating the effects before and after osteopathy treatment with X-ray photography for 20 patients with cervical hypolordosis, to promote health of cervical spine diseases and rehabilitation of pathological disorders, and furthermore, to promote public health and be effectively utilized for alternative medicine studies.
The researcher performed osteopathy treatment and muscle care for hypolordosis patients for 12 weeks, and obtained the following results through X-ray analysis and pain related survey on the displacement of the cervical vertebrae.

In summary of the overall result, the change in Cobb's angle in the cervical vertebrae before and after the experiment showed a significant increase ($p < 0.001$). In addition, the change of pain threshold of the right levator scapulae muscle, right trapezius muscle, left levator scapulae muslce, left triceps muscle, and suboccpital muscle showed a significant increase ($p < 0.001$).
Also, a statistically significant difference was examined in the average quality of life ($p < 0.001$).
Therefore it is conceivable that the treatment of osteopathy of this study for hypolordosis patients is useful for improving the normal angle of the cervical vertebrae and also effective for alleviating the pain.

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Ⅰ. Introduction

1. Necessity for Study

Musculoskeletal disorders are increasing due to repeated work, unstable attitude, stress, inappropriate work environment, etc., with the development of industrialization, automation and computerized civilization of modern times Excessive work and inconvenient work posture due to work specialization and subdivision resulted in muscle rigidity and atrophy of the body.

In addition, the wrong posture persistently caused problems with the arrangement of the spine, and pain increased from the joint structure and soft tissue around the spine (Calliet, 1991). Since cervical spine of the spinal cord is different from thoracic and lumbar spine in that it has less loading on the spinal cord with greater motility, and it functions to support the head and protect the vertebral artery and spinal nerve, stability is important. The imbalance of cervical spine affects the occipital artery and C2 ganglion, causing autonomic symptoms, which affects the shoulder blades, humerus and thoracic curvature (Baesungsu. 2004). In addition, specific segmental of cervical vertebrae or joint dysfunction affects adjacent segments as a compensation effect, and produces pathological cranial motion throughout the spine (Munsangeun, 2004).

Cervical spine pain is a common disorder for about 70% of the total population is subjected to the disorder at least once in a lifetime (Cote et al., 1998), and chronicity can pose serious problems to the patient's life. Many patients complain of headache, dizziness, pain in shoulder, arm, shoulder blade, and these symptoms are directly or indirectly related to cervical spine problems (Na Beom-Joo, 2007).

Cervical spine injuries and motor function abnormalities may show symptoms such as avoidance defensive posture of the human body, abnormal head inclination, compensating shoulder sublation, and with inclined head, the disorder of the nervous system is likely to cause overall structural torsion and dysfunction (Nabumjoo, 2007).

Especially, the cervical hypolordosis with cervical lordosis reduction is a clinical finding that can be easily seen from many hospitalize patients in orthopedics, and according to a study by Lee Byung-lyul, 33.8% of patients who came to hospital with headache showed symptoms of cervical hypolordosis. Cervical hyperlordosis increases muscle fatigue more easily than a normal neck, increases the cervical disc pressure, and increases spinal nerve root pressure with stimulation of the spinal facet joint. Also, it can increase the risk of thoracic outlet syndrome (TOS) by colliding with the neurovascular bundle.

However, there is much debate about the effect of decreasing cervical curvature on actual clinical symptoms. There is the claim that cervical hypolordosis does not affect clinical symptoms and it is part of a normal mutation (Matsumoto et al., 1998; Grob et al., 2007), and there is the other claim that it can cause a negative prognosis of upper thoracic vertebrae, shoulder pain, chronic headache, and neck surgery (Bergmann et al., 2000). Although there are various studies conducted on the relationship between change in the cervical vertebrae and pain when a frequency treatment was applied to Cervical spine as a treatment for various problems occurring in the cervical vertebrae (Kimhyungsoo 2004, Kimjungseok 2006 , Nabumju 2007 etc.) studies on cervical spine treatment other than frequency treatment is rarely reported.

Osteopathy, as a spinal treatment method, is reported as an alternative medicine study of treating the site causing neuropathy due to the skeletal structure of the human body, in particular the structural posture displayed on the spine pelvis through bare hand calibration in order to promote recovery of neurophysiological function, enhance nerve conductivity that contributes to health improvement, and to improve smooth blood circulation and oxygen supply source and restore health through autonomous power (Kimdaejae, 2000). Therefore, the researcher designed this study to investigate the effects on the cervical spine curvature and the accompanying cervical spine muscle force through treatment of osteopathy in patients with cervical hypolordosis.

2. Purpose of Study

The purpose of this study is to investigate the effects after performing osteopathy treatment for patients with cervical hypolordosis, to be effectively utilized for promotion of health of cervical spine disorders, rehabilitation treatment, and furthermore, promotion of public health and alternative medicine studies.

3. Hypotheses of Study

The hypotheses of this study are as follows.

1) There will be a change in cobb's angle on X-ray with osteopathy treatment for 12 weeks.

2) There will be a change in pain threshold with 12 weeks of osteopathy treatment.

3) There will be a change in the assessment of quality of life with 12 weeks of osteopathy treatment.

4. Limitations of Study

The limitations in conducting this research are as follows.

1) Since research is conducted without age restriction for this study, advance research with age limit must be conducted in the future.

2) The genetic factors and environmental factors of the participants were not considered.

3) Since it was applied in a short research period to small number of people, there is a limit for long-term and comprehensive analysis.

Ⅱ. Research Methodology

1. Subject of Study

The subjects who participated in this study were selected at a hospital in Gyeonggi-do, Korea for three months from July 2023 to December 2023. Subjects were selected for 20 patients with Cervical hypolordosis without cervical vertebral curvature with radiological examination. The experimental group of 20 patients who had cervical hypolordosis were subjected to adjustment treatment for 12 weeks. These 20 subjects had no bone fractures, radiculopathy, and inflammatory disease, and no experience of hernia surgery, and no other conservative treatment were performed.

Conditions for subject selection are as follows. Physical characteristics of subjects are as shown in <Table 1>.

Table 1. Physical features of subjects

Subject	Sex	Age(years)	Height(cm)	Weight(kg)
A	Male	19	176	59.7
B	Male	19	182	64
C	Male	21	177.7	70.8
D	Male	26	176.6	73
E	Female	61	162.2	43.4
F	Female	17	162.5	75.1
G	Female	28	162.3	57
H	Female	29	165.3	51.2
I	Female	37	164.5	65.4
J	Female	48	160.7	49.7
A	Male	26	175.3	65.7
B	Male	26	175.8	70.2
C	Male	26	171	67
D	Male	22	184	96
E	Male	42	166	65
F	Female	31	169.8	61.4
G	Female	35	159.5	51
H	Female	40	163.4	55
I	Female	44	161.2	53.2
J	Female	11	144	46.1
Mean±SD		32.1±2.59	167.99±1.96	61.99±2.71

2. Experimental Procedure and Method

1) Experiment Design

In this study, the researcher performed a total of 36 treatments over a three-month period, twelve weeks for each individual patient who complained of pain due to cervical hypolordosis. In order to investigate the range of motion of the joint and the degree of pain before and after treatment, the subject performs the examination after performing radiography. In order to investigate the degree of pain in the subjects, measurement with Algometer was performed to measure the degree of pain before and after treatment via WHOQOL - BREF to evaluate the quality of life after pain improvement.

Table 2. Experimental Design

Experiment Design
⇩
Preliminary Inspection Cervcal hypolordosis classification, analgesia examination, and quality of life evaluation
⇩
Experimental Treatment Adjustment treatment and muscle care for 20 subjects.
⇩
Post Inspection Evaluation of cervical vertebral angle, pain sensation examination, and quality of life evaluation after X-ray examination.
⇩
Result

2) Treatment Program

(1) Composition of Osteopathy Treatment Time

Subject	Muscle care 25 min + Osteopathy treatment

Fig 1. Program Treatment Time Composition

(2) Muscle Care Program

Neck muscles are connected to ligaments between the neck bones and small tight muscles. Since continuous stimulation for a long period is necessary in order to relax this muscle, the subject is repeated several times for each part by using effleurage, stroking, kneading and compression methods, and the applied pressure, strength, duration, etc., were adjusted according to the condition of each subject <Table 3>. (Yoon Chi-soon, 2012)

Table 3. Muscle Care Program

Posture	Treatment Site	Muscle care Method	Duration (min)
Prone Position	splenius capitis muscle	effleurage, kneading, compression, effleurage, stretch	2
	trapezius muscle	effleurage, stroking, kneading, compression, stroking, effleurage, stretch	5
	erector spinae muscle	effleurage, stroking, kneading, compression, stroking, effleurage, stretch	3
	levator scapulae muscle	effleurage, stroking, kneading, compression, stroking, effleurage, stretch	5
Supine Position	rhomboid muscles	effleurage, stroking, kneading, compression, stroking, effleurage, stretch	2
	suboccpital muscle	effleurage, kneading, compression, effleurage, stretch	3
	sternocleidomastoid muscle	effleurage, kneading, effleurage, stretch	3
	scalene muscle	effleurage, kneading, compression, effleurage, stretch	2

(3) Osteopathy Adjustment Treatment Program

Osteopathy adjustment, as a technique that directly effects the displacement of the cervical vertebrae, is a technique to allow displacement to occur on displaced joints by applying a momentary thrust by hand to the displaced parts.

Table 4. Cervical vertebrae extension method

1. Prone position.
2. Stand to the side of the table.
3. Contact between thumb and index finger at the back of cervical spinal cords.
4. Under the table.
5. Extend from the foot to the head from back to front at a tilt angle of 45 degrees.
6. Using the lower part of the table, bending the table 2.5 m to 10 cm while pulling towards the head with contact between thumb and index finger on the back of cervical spinal cords. At this time, the extension duration is 5 seconds, and turn the table to the middle position after extension for 5 seconds. This was repeated 3 times.

① Cervical Distraction

Photo 1. Cervical vertebrae extension method

② Cervical Hypolodosis Malposition

Photo 2. Cervical Lordosis Reduction Malposition

Table 5. Cervical Lordosis Reduction Malposition

1. Prone position.
2. Stand to the side of the table.
3. Contact pisformis to madibulae of the acanthi of the 5th cervical vertebral (C5)
4. The treatment is performed from the back to the front and from the bottom to the top at an angle of 45 degrees.
5. Drop of cervical spine is set to fall off from the front. By performing light extension along with 4. adjustment was carried out by contacting so as to remove the loosening of the joint. The number of times the thrust is applied at this step is about 1 to 3 times.

③ C1, C2 Adjustment

Photo 3. Thrust treatment of Cervical Lordosis

Table 6. Thrust treatment of Cervical Lordosis

1. Supine position
2. Stand at the side where patient's head is positioned.
3. Contact 1st and 2nd lamina of the cervical vertebra and perform adjustment for one time for each right and left side displacement via thrust.

4. Data Analysis Method

Data processing for this study is done by performing descriptive statistics using the SPSS 12.0 statistical program, and in order to examine the degree of change and the degree of pain of cervical hypolordosis patients between before and after chiropractic treatment, a corresponding specimen t-test was performed. All significance levels for analysis were set to $p < .05$.

Ⅳ. Research Results

In this study, 12-weeks osteopathy treatment of the cervical spine for patients with Cervical hypolordosis was performed, and the change in X-ray analysis, comparison of pain level before and after, and comparison of quality of life are as follow.

1. Change in Cobb's angle

Cobb's angle is the angle at which a vertical line is drawn to each horizontally drawn line that touches the schmorl node of the 7th cervical vertebral and the line between two points that connects the anterior tubercle and posterior tubercle of the atlas. The normal average value is 40°, and normal range is 35 ° to 45 ° (Cobb JR, 1948). The results of analyzing the front angle difference of the cervical vertebrae before and after the experiment measured by Cobb's angle with paired t-test are shown in <Fig. 2> and <Table 7>.

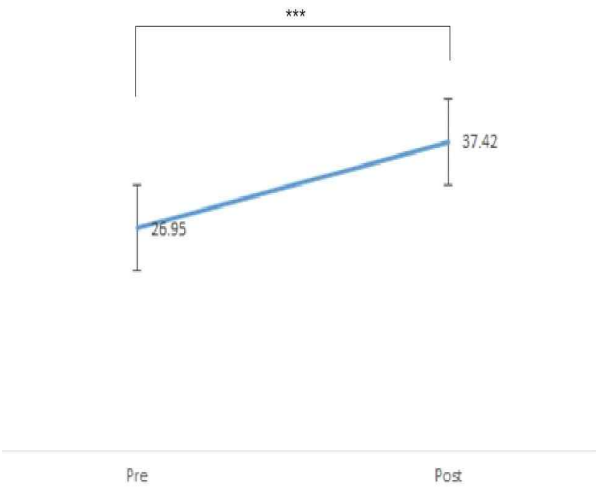


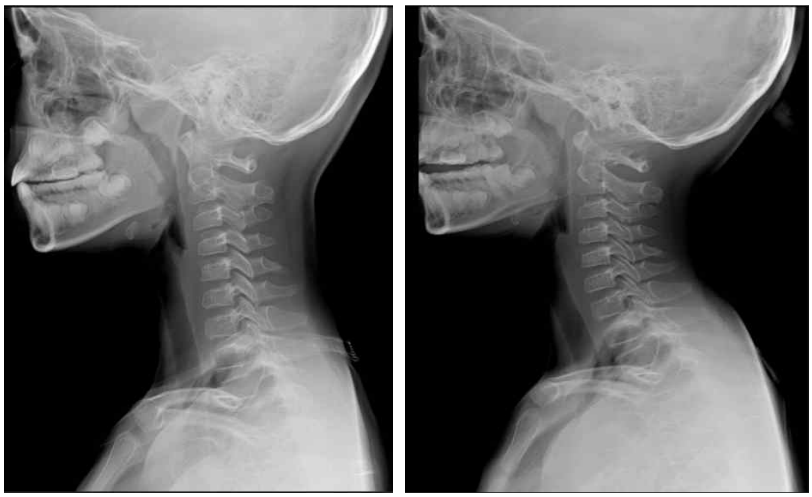
Fig 2. Before and After Comparison of Cobb's angle

Table 7. Before and After Comparison of Cobb's angle (N=20)

Classification	Pre (M±SD)	Post (M±SD)	Difference (M±SD)	t	p
Cobb's angle	26.95±3.02	37.42±1.93	10.46±3.73	-12.51	.000

M: Average, SD: Standard Deviation, ***p<0.001

There was a cervical lordosis angular change of 10.46 ± 3.73 from the average of 26.95 ± 3.02 before the treatment and 37.42 ± 1.93 after the treatment, a statistically significant difference of p <0.001 was examined for before and after the experiment.



Before Experiment After Experiment

Photo 4. Cervical lordosis angle change between before and after treatment

In the case of subject J, a positive change to 39.1 ° within the normal range of 35 to 45 ° was examined after 8 weeks of manipulation treatment at 21.6 °, which is the abnormal cervical lordosis angle of the Cobb's angle before treatment <Photo 4>.

2. Change in Pressure Pain Threshold

1) Right Levator Scapulae Muscle

By examining the changes in the pressure pain threshold value, it showed a significant increase of 3.06±0.26lb/㎠ from 7.07±1.07lb/㎠ before adjustment to 10.13±0.95lb/㎠ after adjustment (p = .001).

Table 8. Right Levator Scapulae Muscle Change in Pressure Pain Threshold

Pre	Post	Difference	t	p
7.07±1.07	10.13±0.95	−3.06±0.26	-36.175	.001

M: Average, SD: Standard Deviation, *** p <0.001

2) By examining the changes in pressure pain threshold at the right upper trapezius muscle, a significant increase of 3.77±0.50lb/㎠ from 7.30±1.12lb/㎠ before adjustment to 11.07±1.12lb/㎠ after adjustment (p = .001) was shown.

Table 9. Right Upper Trapezius Muscle Change in Pressure Pain Threshold

Pre	Post	Difference	t	p
7.30±1.12	11.07±1.12	−3.77±0.50	-23.682	.001

M: Average, SD: Standard Deviation, *** p <0.001

3) By examining the changes in pressure pain threshold at the levator scapulae muscle, a significant increase of 3.09±0.33lb/㎠ from 6.20±1.28lb/㎠ before adjustment to 9.29±1.20lb/㎠ after adjustment (p = .001) was shown.

Table 10. Left Levator Scapulae Muscle Change in Pressure Pain Threshold

Pre	Post	Difference	t	p
6.20±1.28	9.29±1.20	−3.09±0.33	−28.898	.001

M: Average, SD: Standard Deviation, *** p <0.001

4) By examining the changes in pressure pain threshold at the Left trapezius muscle, a significant increase of 3.62±0.46lb/㎠ from 7.61±1.32lb/㎠ before adjustment to 11.23±1.52lb/㎠ after adjustment (p = .001) was shown.

Table 11. Left Trapezius Muscle Change in Pressure Pain Threshold

Pre	Post	Difference	t	p
7.61±1.32	11.23±1.52	−3.62±0.46	−24.431	.001

M: Average, SD: Standard Deviation, *** p <0.001

5) By examining the changes in pressure pain threshold at the suboccpital muscle, a significant increase of 3.98±0.55lb/㎠ from 5.28±1.03lb/㎠ before adjustment to 9.26±0.96lb/㎠ after adjustment (p = .001) was shown.

Table 12. Suboccpital Muscle Change in Pressure Pain Threshold

Pre	Post	Difference	t	p
3.18±1.03	7.16±0.96	−3.98±0.55	−22.661	.001

While the pressure pain threshold represents the threshold of pain caused by pressure exerted on a specific site, a higher numerical value means that the

threshold of pain due to pressure of the applied region is lower. After adjustment treatment, it increased significantly in all parts and the threshold of pressure pain decreased.

3. Change in Quality of Life Before and After Osteopathy Treatment

The quality of life of the subjects is assessed using WHOQOL - BREF Korean version, which is questionnaires of quality of life distributed by the World Health Organization (WHO), and a total of 24 questions are classified into general, physical, psychological, social relations, and environment. All questions are based on a 5 points scale, from a minimum of 24 points to a maximum of 120 points, the higher the score, the better the quality of life. <Table 13>, <Fig. 3> shows the results of comparative analysis of the changes in the quality of life of the entire group before and after application of adjustment treatment to patients with Cervical hypolordosis using t-test.

Table 13. Change in Quality of Life Before and After Treatment (N=20)

Classification	Pre	Post	Difference	t	p
quality of life	81.15±8.95	85.95±8.70	4.61±4.61	4.45	.000

M: Average, SD: Standard Deviation, *** p <0.001

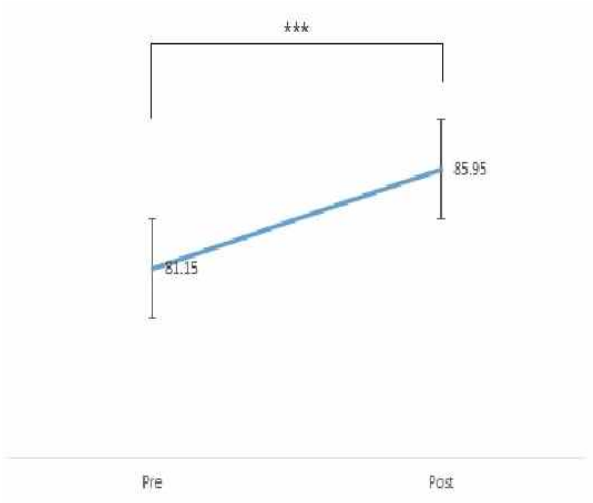
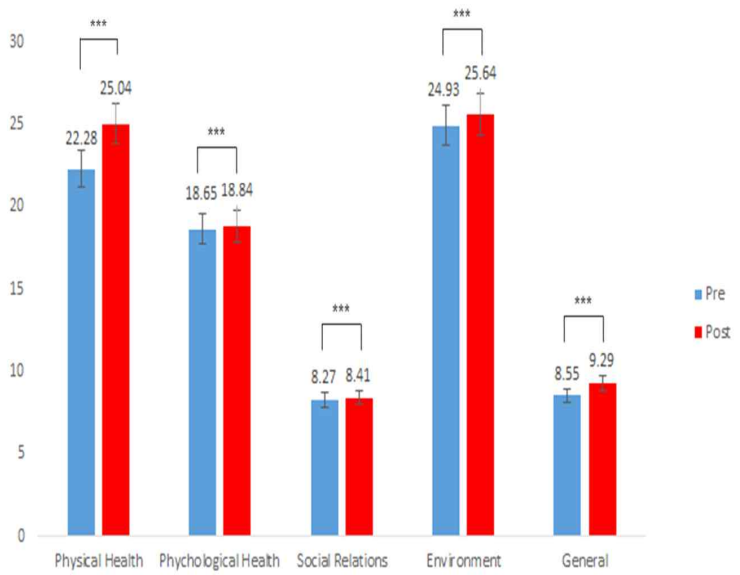


Figure 3. Comparison of Quality of Life Pre and Post Treatment

The average quality of life pre-treatment was 81.15 ± 8.95, post-treatment was 85.95 ± 8.70, with a change of 4.61 ± 4.61, and the quality of life

post-treatment was higher than pre-treatment, and a statistically significant difference (P <0.001) was examined.

By examining the changes in the quality of life for each subclass, from an average of 22.28 ± 2.13 at pre-treatment to 25.04±2.57 at post-treatment in "physical health" area, from an average of 18.65±3.03 at pre-treatment to 18.84±2.13 at post-treatment in "psychological health" area, from an average of 8.27±1.52 at pre-treatment to 8.41±1.78 at post-treatment in "social relations" area, from an average of 24.93±4.55 at pre-treatment to 25.64±3.35 at post treatment in "environment" area, and from an average of 8.55±1.25 at pre-treatment to 9.29±1.05 at post-treatment in "general" area were observed, and resulted in positive changes of the quality of life for 5 areas of assessment <Fig. 4>, <Table 14>.



*** p <0.001

Fig 4. Changes in Quality of Life Pre and Post-Treatment for Each Area

Table 14. Changes in Quality of Life Pre and Post-Treatment for Each Area (N=20)

Classification	Pre	Post	Difference	t	p
Physical Health	23.28±2.15	26.04±2.58	2.76±1.23	-11.25	0.000
Psychological H.	18.67±3.04	18.84±2.14	0.17±0.35	-3.76	0.000
Social Relations	9.28±1.52	9.42±1.78	0.14±0.27	-0.15	0.000
Environment	23.93±4.55	24.64±3.35	0.71±1.39	-2.54	0.002
General	7.54±1.25	29±1.07	0.75±0.85	-9.48	0.000

M: Average, SD: Standard Deviation, *** $p < 0.001$

Ⅴ. Discussion

The spine, as the axis of the human body, is composed of three curvatures of cervical lordosis, thoracic kyphosis, and lumbar lordosis, and such curvature of the spine plays an important role in maintaining the stability and equilibrium of the trunk by protecting against gravity and exterior impact (Kim Dong-min et al., 2008). While the curvature of the spine is maintained by the morphology of the intervertebral disc with the difference in the height of the vertebral body and the angle of the joint surface of each cervical spine, thoracic vertebra, and lumbar vertebra, if a change is indicated due to a degenerative disorder or a stress response among these structure, a deformation of the normal structure may occur (Bergmann, 2000). Cervical pain, especially headache, shoulder pain and neck pain, are common symptoms that one is highly likely to experience more than once in a lifetime. Although the pathological causes of such cervical disorder was not clearly elucidated to date, spinal subluxiation and muscle endurance around the spine to fix the head in multiple postures, and increased fatigue due to weakened muscle have been disclosed as the causes of chronic cervical pain (Cailliet, 1991).

Currently, 8 out of 10 Korean company workers have such occupational disorders, and the most frequent occupational disorder is the turtle neck syndrome.

Recently, disorders like the turtle neck syndrome which was mainly found in company workers, are also displayed in children in their teens as tablet PCs and smartphones became popularized. In particular, this turtle neck syndrome tends to be gradually increasing for the case of employees who need to maintain of static posture and excessive tension during work.

Meanwhile, studies conducted on Cervical hypolordosis so far has been mostly about reduction of the anterior cervical vertebrae through various mediation such as osteopathy, manipulation therapy, exercise therapy, etc., by only focusing on the physical changes such as recovery of reduced cervical lordosis, gravitational line change of the cervical spine and improvement of cervical

vertebral movement. However, studies on correlations among pain and quality of life by taking emotional and psychological approach were not conducted. Due to lack of domestic and foreign studies on cervical hypolordosis, and in order to take an integrated approach not only for simple pain changes, but also including personal life changes and psychological factors, the researcher of this study analyzed the effects of chiropractic treatment on the improvement of curvatures, pain and quality of life for a group of 20 patients with cervical hypolordosis.

In this study, Cobb's angle, which is the most frequently used for cervical vertebral evaluation, was applied and set to less than 30 ° in order to limit its influence on experimental results.

A statistically significant difference was observed with cervical vertebral anterior angle change of 10.46 ± 3.73 degrees at an average of 26.95 ± 3.02 before the Cobb's angle experiment and 37.42 ± 1.93 after the experiment ($p < 0.001$). It can be concluded that chiropractic treatment influences the anterior angle change of the cervical vertebrae.

However, there is still controversy over the effect of such a reduction in the cervical vertebrae on the actual clinical symptoms of normal cervical spine angle recovery through various treatments such as chiropractic and kinesitherapy. Helliwell et al. (1994) conducted a study on patients with acute, chronic cervical pain and asymptomatic group, and results reported that 19% of patients with acute neck pain, 26% of chronic, 42% of asymptomatic group showed reduction of cervical lordosis. Whereas, Matsumoto et al. (1998), who studied differences in cervical vertebrae between patients with cervical spinal injury and asymptomatic control group, reported that no statistically significant difference was examined between the experimental group and the control group. Recent studies also reported that there are no correlation among curvature level of the cervical vertebrae and recovery of cervical spine curvature to factors such as period, intensity and frequency of cervical pain (Grob et al., 2007).

On the contrary, Harrison et al., (2000) reported that recovery of cervical

vertebrae was significantly different from reduction of pain as a result of a study conducted on patients who suffered from neck pain. Furthermore, According to a recent study in South Korea, patients who were diagnosed with cervical hypolordosis in radiation examination displayed a significant difference in the anterior angle of the cervical spine which changed from an average of 30.92 before performing the chiropractic treatment for 4 months and to an average of 35.63 after the treatment (Kimjungsuk, 2007). From various domestic and overseas studies, it seems that the application of manipulation treatment influences the change of cervical spine angle, and also with this study showing similar results, it was confirmed that manipulation treatment is a method that positively influences the recovery of cervical spine angle of cervical hypolordosis patients (Harrison et al, 2003;). Meanwhile, a girl before puberty showed a remarkable recovery angle of the cervical hypolordosis angle during the course of this study, and this phenomenon is related to proliferation of various cells such as chondrocytes and muscle cells due to the secretion of growth hormone, and it seems to be involved in the direct influence on the improvement of bone and cartilage growth, bone metabolism, flexibility, etc. (Kwakheon, 2011). Therefore, it implied that the progression of the treatment related to cervical hypolordosis and the bones before the adolescent period where growth hormone secretion is prosperous is able to obtain greater effect. Moreover, when comparing pre and post treatment, unless the bending of the neck at the time of simple X-ray photography and the posture of the extension are the same, errors in measurement of the cervical vertebra may exist.

In other words, slight symptoms of cervical hypolordosis may be displayed when cervical flexion posture is formed by the patient by artificially pulling the jaw at the time of simple X - ray photography.

On the contrary, if the neck has reached cervical extension, the Cobb's angle will increase and it is possible to misdiagnose the patient to have a normal cervical angle (Kapandji et al., 2001). In such a case, it is considered possible to reduce the error which may occur in the artificial posture of the patient by comparing and

measuring the position of the mandibula with a simple x-ray photography. On the other hand, pain is one of the main factors that has a negative influence on daily life at the same time being an indispensable important defense mechanism of the human body. Pain is a very important precursor symptom that is displayed in most diseases, and it is used as a warning signal to inform the abnormality of a living body or tissue of the body, as the tissue of the body is damaged. However, if such pain persists for more than a certain period of time, the pain itself becomes a disorder (Minbyongil, 1999).

As a result of osteopathy treatment, the pressure pain threshold value of right levator scapulae muscle displayed a significant increase of 3.06±0.26lb/㎠ from 7.07±1.07lb/㎠ before adjustment to 10.13±0.95lb/㎠ after adjustment, and the pressure pain threshold at the right upper trapezius muscle displayed a significant increase of 3.77±0.50lb/㎠ from 7.30±1.12lb/㎠ before adjustment to 11.07±1.12lb/㎠ after adjustment ($p = .001$). While the changes in pressure pain threshold at the left levator scapulae muscle displayed a significant increase of 3.09±0.33lb/㎠ from 6.20±1.28lb/㎠ before adjustment to 9.29±1.20lb/㎠ after adjustment, the changes in pressure pain threshold at the left trapezius muscle displayed a significant increase of 3.62±0.46lb/㎠ from 7.51±1.32lb/㎠ before adjustment to 11.23±1.52lb/㎠ after adjustment ($p = .001$). Furthermore, the changes in pressure pain threshold at the suboccpital muscle displayed a significant increase of 3.98±0.55lb/㎠ from 3.18±1.03lb/㎠ before adjustment to 7.16±0.96lb/㎠ after adjustment ($p = .001$).

This is thought to be brought about by reactivating the suppressed bones and muscle due to pain via adjustment treatment and manual therapy, and by stabilizing sensation and body related to posture control. Since chiropractic treatment and manual therapy is a form of communication that conveys sympathy of practitioners as a technique directly delivered through contact with the body, it is conceived to function to support mutual trust and interpersonal relationships (Simpson, 1991), and a positive effect of reducing pain by performing individual access therapy can be anticipated.

Meanwhile, the average quality of life examined before treatment was 81.25 ± 8.95, which increased to 85.95 ± 8.70 when examined after treatment, with a change of 4.61 ± 4.61, displaying a statistically significant difference (P <0.001). According to a study conducted by Yujaehee et al.,(2004) on the quality of life related to chronic diseases and health of Koreans, near-skeletal disorders such as fibromyalgia, back pain, neck pain, etc have been reported to seriously affect the quality of life. Furthermore, recent studies have also shown that the better the health condition is, the higher the quality of health-related life is, and in order to improve the quality of life, it is essential to improve chronic pain.

Ⅵ. Results and Conclusion

In this study, the researcher performed a total of 36 treatments over a three-month period, twelve weeks for 20 patients with cervical hypolordosis and conduced comparative analysis via X-ray, effects on pain and the quality of life.

Firstly, there was a cervical lordosis Cobb's angle change of 10.46 ± 3.73 from the average of 26.95 ± 3.02 examined before the treatment and 37.42 ± 1.93 examined after the treatment, and a statistically significant difference of $p < 0.001$ was examined.

Secondly, as a result of examining the before and after effects of osteopathy treatment, the pressure pain threshold value of right levator scapulae muscle displayed a significant increase of 3.06±0.26lb/㎠ from 7.07±1.07lb/㎠ before adjustment to 10.13±0.95lb/㎠ after adjustment, and the pressure pain threshold at the right upper trapezius muscle displayed a significant increase of 3.77±0.50lb/㎠ from 7.30±1.12lb/㎠ before adjustment to 11.07±1.12lb/㎠ after adjustment ($p = .001$). While the changes in pressure pain threshold at the left levator scapulae muscle displayed a significant increase of 3.09±0.33lb/㎠ from 6.20±1.28lb/㎠ before adjustment to 9.29±1.20lb/㎠ after adjustment, the changes in pressure pain threshold at the left trapezius muscle displayed a significant increase of 3.62±0.46lb/㎠ from 7.61±1.32lb/㎠ before adjustment to 11.23±1.52lb/㎠ after adjustment ($p = .001$). Furthermore, the changes in pressure pain threshold at the suboccpital muscle displayed a significant increase of 3.98±0.55lb/㎠ from 3.18±1.03lb/㎠ before adjustment to 7.16±0.96lb/㎠ after adjustment ($p = .001$).

Thirdly, the average quality of life examined before treatment was 81.15 ± 8.95, which increased to 85.95 ± 8.70 when examined after treatment, with a change of 4.61 ± 4.61, and a statistically significant difference ($P < 0.001$) was examined.

Osteopathy treatment is confirmed via the above results as a method to improve cervical hypolordosis disorder and resolve pathological disorders, and it can be anticipated as an alternative medicine for patients with Cervical hypolordosis. And this study will be utilized as a basic material to constitute a further developed treatment protocol through Cervical hypolordosis angle improvement and psychological approach including pain and quality of life.

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