

The Effects of an Exercise Program Consisting of Taekwondo Basic Movements on Posture Correction

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Abstract. [Purpose] The purpose of this study was to verify the effect of posture correctional programs using basic TaeKwonDo movements. [Subjects] The subjects were TaeKwonDo trainees attending an elementary school in B city. They were separated into experimental and control groups according to posture problems found during posture analysis. [Methods] The subjects of the training exercise program performed basic TaeKwonDo movements for 8 weeks, 3 times per week. The TaeKwonDo exercise program consisted of basic TaeKwonDo movements including Hwangso Makki, Meongye Chigi, Olgul Makki, Olgul Yop Makki, Batangson Arae Makki, Momtong An Makki and Apkubi. [Results] Hwangso Makki and Meongye Chigi movements had a significant positive effect on the correction of neck inclination. Olgul Makki, Olgul Yop Makki, Batangson Arae Makki and Momtong An Makki movements had beneficial effects on the correction of shoulder inclination. Apkubi movement had a significant beneficial effect on the correction of pelvis inclination. [Conclusion] This study demonstrated that an exercise program consisting of basic TaeKwonDo movements is an effective means of posture correction.

Key words: TaeKwonDo basic movements, Posture correction, Posture inclination

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INTRODUCTION

A person's posture is created by the specific muscle and skeletal structure of the individual in a specific environment that affects the human body alignment or human body position¹⁾. A posture can be described as good or bad depending on the status of the body alignment. Good posture improves the growth and development of the body, and it helps to promote a healthier life both psychologically and socially²⁾. On the other hand, bad posture that deviates from proper body alignment will overload a specific muscle or joint, which in turn can cause deformation in the human body structure. The resulting deformation in human body structure may also cause malfunctioning of the musculoskeletal, respiratory, nervous, or internal organ systems^{3, 4)}.

In recent years, it has become manifest that many people have deformation of their bodies due to imbalance of the musculoskeletal system caused by bad posture, in particu-

lar, inappropriate working postures. Manual therapy and exercise are recommended to treat the deformation of the body that is caused by poor posture. There are studies in progress to examine the effects of manual therapy and exercise treatments.

Manual therapy promotes the mobility of motion to eliminate pain. Such treatments must be done by trained therapists in order to mitigate the causes of the problem. The advantage of manual therapy is that it can help to reduce the problem of malfunction immediately⁵⁾. In agreement with this, Park⁶⁾ said that manual therapy is effective for body correction. Byun⁷⁾ also stated that chiropractic is effective in the treatment of scoliosis. However, the disadvantage of manual therapy is that it must be performed by expert therapists, and even when it is done by an expert therapist, if the techniques are not performed properly, it can cause severe injury to tissue and other structures⁵⁾.

Posture correction by exercise requires more time but is safer and can be done by the patients themselves at home. Hence, much research has been done regarding posture correction through exercise. Many studies have been performed concerning the effects of stretching as a means of posture correction⁸⁾, the effects of yoga on deformed pelvis correction⁹⁾, the effects of pilates on posture correction¹⁰⁾, and the effects of ballet on posture correction¹¹⁾. These studies have demonstrated that exercise does have positive

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effects on posture correction. Most of these studies were based on treatment principles related to the relaxation of contracted muscles.

However, posture correction can also be done by stretching contracted muscles, and through exercise that strengthens the weaker muscles¹²). Nevertheless, existing research on the effects of muscle strengthening exercises on posture is insufficient.

Hence, the purpose of this study was to examine the effects of an exercise program consisting of some basic TaeKwonDo movements to strengthen muscles for posture correction. TaeKwonDo is a popular sport in Korea for promoting a healthier body. Although the Seogi, Makki, Chigi, and Jireugi postures in TaeKwonDo are muscle strengthening exercises, there is no exercise program which specifically addresses posture correction. Therefore, this study also examined the efficacy of an exercise program utilizing basic TaeKwonDo movements on posture correction to provide basic information on rehabilitation programs employing basic TaeKwonDo movements in order to improve health.

SUBJECTS AND METHODS

The subjects of this study were students attending a TaeKwonDo learning center in Busan. They were grade students attending an elementary school who had attained TaeKwonDo level 2 or higher, who had a differences in shoulder height or leg length. They were informed of the purpose of this study and joined voluntarily. This study complied with the ethical standards of the Declaration of Helsinki, and written informed consent was received from each participant. There were 24 subjects altogether, and they were randomly divided into an experimental group of 17 students, and a control group of 7 students. The average age of the experimental group was 13.1 years, their average height was 147.6 cm, and their average weight was 44.4 kg. The average age of the control group was 13.1 years, their average height was 150.0 cm, and their average weight was 42.1 kg.

A physical examination of each student was performed before the intervention. The experimental group performed an exercise program consisting of basic TaeKwonDo movements for 8 weeks. The control group performed general TaeKwonDo exercises. After 8 weeks, the physical examination was repeated to observe the effects of the exercise program utilizing basic TaeKwonDo movements. The examination focused on the inclination of the neck, shoulders and pelvis.

A digital camera (DHC-H50, Sony, Japan) was used to examine and record the posture of the subjects. The camera was set about 2 m from the subjects at a position where the subjects' images filled about 80–90% of the camera screen. The height of the camera was level with the chest, and a tripod stand was used to keep the camera horizontal. The pictures were taken from the front and the right side where the shoulder was visible. The neck, shoulder, and pelvis inclinations were examined using Posture pro 7 (PP7, Ventura Designs, USA).

For the exercise program, eight basic TaeKwonDo movements considered effective for posture correction were selected. The exercise program employing basic TaeKwonDo posture-correction movements included Olgul Makki (outer wrist face lift-up Makki), Batangson Arae Makki (palm hand underneath pressing Makki), Olgul Yop Makki (inner wrist face assisting side Makki), Momtong An Makki (outer wrist trunk inner Makki), Hwangso Makki (bull Makki), Meongye Chigi (yoke chigi), Juchumseogi (riding stance), and Apkubi (forward inflection stance).

Each first level movement was performed for 10 seconds, and each second level movement was performed for 20 seconds. After 10 seconds of exercise, 10 seconds of rest were taken, and after 20 seconds of exercise, 20 seconds of rest were taken. A warm up exercise was performed for 10 minutes, the main exercise for 30 minutes, and cool down exercise for 10 minutes, making a total of 50 minutes for the exercise program.

Because the experiment involved 24 subjects, the Shapiro-Wilk test was conducted to verify the normality of the data. A nonparametric method was used because the data were not normally distributed. The Mann-Whitney test was used to compare the differences in the inclinations of the neck, shoulders and pelvis of both groups. The Wilcoxon Signed Rank test was used to determine the effects of the exercise program consisting of basic TaeKwonDo movements on the inclination of the neck, shoulders and pelvis. For the analysis, we used SPSS for Windows (Ver. 21.0) statistical software, with a significance level of 0.05.

RESULTS

The results for the differences in the neck, shoulders and pelvis inclination between the experimental and control groups are shown in Table 1.

The front and back neck inclination of the experimental group was 10.2°, and that of the control group, 9.9°, with no significant difference. The left and right neck inclination of the experimental group was 2.9°, and that of the control group was 3.4°, with no significant difference. Therefore, no significant difference was evident between the two groups. The shoulder inclination of the experimental group was 1.4° and that of the control group was 1.4°, with no significant difference. The pelvis inclination of the experimental group was 1.6° and that of the control group was 1.4°, with no significant difference. Table 2 shows the results of the effects of the exercise program consisting of basic TaeKwonDo movements. The front and back neck inclination of the experimental group was 10.2° before the exercise, but it reduced significantly to 5.8° after the exercise ($p < 0.05$). In contrast, that of the control group increased slightly from 9.9° to 10.6°, with no significant difference. The right and left neck inclination of the experimental group was 2.9° before the exercise, but it reduced significantly to 0.8° after the exercise ($p < 0.05$); and that of the control group reduced from 3.4° to 1.7°, with no significant difference. The shoulder inclination of the experimental group was 1.4° before the exercise, but it reduced significantly to 0.6° ($p < 0.05$), whereas that of the control group reduced from 1.4° to 1.3°,

Table 1. Comparison of neck, shoulder and pelvis inclination between the experimental and control groups (Unit: °)

Variables	Experimental	Control	Mean rank	Sum of rank	
	Mean±SD	Mean±SD			
Neck	Anterior-Posterior inclination	10.2±4.4	9.9±4.6	12.62	214.50
	Right-Left inclination	2.9±3.4	3.4±3.2	12.21	85.50
Shoulder inclination				11.97	203.50
				13.79	96.50
Pelvis inclination				12.15	206.50
				13.36	93.50
				12.94	220.00
				11.43	80.00

Table 2. Changes in neck, shoulder and pelvis inclination after the intervention (Unit: °)

Variables	Group	Pre-exercise	Post-exercise	Mean rank	Sum of rank	
		Mean±SD	Mean±SD			
Neck	Anterior-Posterior inclination	Experimental *	10.2±4.4	5.8±2.8	8.90	133.50
		Control	9.9±4.6	10.6±4.5	2.50	2.50
	Right-Left inclination	Experimental *	2.9±3.4	0.8±1.1	2.50	10.00
		Control	3.4±3.2	1.7±2.4	5.50	11.00
Shoulder inclination	Experimental *		1.4±1.0	0.6±0.7	5.50	44.00
		Control	1.4±0.8	1.3±1.0	1.00	1.00
	Pelvis inclination	Experimental *	1.6±0.1	0.5±0.8	3.00	9.00
		Control	1.4±1.1	0.6±0.5	1.00	1.00

*: p<0.05

but with no significant difference. The pelvis inclination of the experimental group reduced significantly from 1.6° to 0.5° (p<0.05), whereas the pelvis inclination of the control group reduced from 1.4° to 0.6°, with no significant difference.

DISCUSSION

TaeKwonDo is a sport that can be performed by anyone; boys and girls, young and old. It practices self-defense and attack using the hands and feet. The ultimate goal of TaeKwonDo is to train the mind and body to live healthily¹³. TaeKwonDo is a self-disciplining sport that involves skillful use of the bare hands, and it gathers energy to concentrate the mind, so it can strengthen both the mind and the body. TaeKwonDo is a traditional martial art of Korea and its techniques include Poomsae, Kyorugi (sparring), Breaking, and so on¹⁴.

It is possible to develop a posture-correcting exercise

program using moderate practice of basic TaeKwonDo movements to strengthen the weaker muscles. This study examined the effects of an exercise program employing basic TaeKwonDo movements. Six upper extremity movements and two lower extremity movements that are effective for posture correction were selected for use in the exercise program. The upper extremity movements, Olgul Makki and Olgul Yop Makki, strengthen the upper trapezius muscles, lower trapezius muscles and serratus anterior. Batangson Arae Makki and Momtong An Makki strengthen the pectoralis minor muscles and lower trapezius muscles. When performing Hwangso Makki movement, the chin is slightly pulled toward the neck to lengthen the back muscles of the cervical vertebrae, and then the sternocleidomastoid muscles are also stretched. Meongye Chigi is a movement that strengthens the middle trapezius muscles. The lower extremity movement, Juchumseogi, elicits eccentric contraction of the gluteus maximus, semimembranosus, semitendinosus, and adductor magnus muscles. It also elicits

concentric contraction of the quadratus lumborum, pectineus, tensor fasciae latae, adductor brevis, adductor longus, adductor magnus, rectus femoris, and sartorius muscles. In the Apkubi posture, the front leg movements elicit contraction of the semimembranosus and semitendinosus muscles, causing posterior inclination of the pelvis. The back leg movement elicits eccentric contraction of the quadratus lumborum, iliopsoas pectineus, tensor fasciae latae, adductor brevis, adductor longus, adductor magnus, rectus femoris, sartorius, gastrocnemius, and soleus muscles. It also induces concentric contraction of the tibialis anterior muscles facilitating anterior inclination of the pelvis.

Myers¹⁵⁾ reported that when the sternocleidomastoid muscles, and the muscles originating in the scapula and inserted cervical vertebrae cause imbalance, abnormal alignment is induced in the neck. Park and Jung¹⁶⁾ stated that in cases of round shoulders, the upper and middle trapezius muscles are weakened. Golding and Golding¹⁷⁾, and Jung¹⁸⁾ noted that when the sternocleidomastoid, splenius capitis, anterior scalene, and semispinalis capitis muscles contract on only one side, there is lateral flexion and rotation toward the opposite side. Kendall¹⁹⁾ reported that contraction of the lower part of serratus anterior muscles causes scapular depression. Park and Jung¹⁶⁾ said that contraction of the lower trapezius muscles causes different heights of the right and left shoulders, and when the pectoralis minor muscles are shortening, they elicit the coracoid process: and the scapula moves medially and inferiorly, causing drooping of the shoulder. Park²⁰⁾ stated that when there is a shortening of the semitendinosus and semimembranosus, the ischium is pulled inferiorly and anteriorly, leading to pelvic imbalance. Myers¹⁵⁾ mentioned that in the relation between the foot arch and the pelvic inclination, the tibialis anterior muscles are functionally connected to the rectus femoris and satorius muscles, and the iliotibial tract and tensor fasciae latae muscles. So, contraction of the tibialis anterior muscles can cause pelvic imbalance.

Taken together, it can be said that abnormal alignment of the cervical vertebrae, shoulder, or pelvis are a closely related to imbalance of related muscles. TaeKwonDo movements include motions that can strengthen the muscles that are related to abnormal alignments of the body. Therefore, considering the fact that TaeKwonDo movements are helpful for muscle strengthening, we concluded that if we could design an exercise program utilizing TaeKwonDo movements that strengthened the muscles of the upper and lower extremities, it would be effective for posture correction.

Accordingly, this study was conducted to examine the effects of an exercise program consisting of basic TaeKwonDo movements on posture correction. The results demonstrate that in the subjects who performed the exercise program employing basic TaeKwonDo movements, anterior and posterior neck inclination significantly reduced from

10.2° to 5.8°, and right and left neck inclination reduced from 2.9° to 0.8° after the intervention; shoulder inclination was 1.4° before the intervention and reduced to 0.6° after the intervention; and pelvic inclination also reduced significantly from 1.6° to 0.5°. These results show that if the cause of abnormal body alignment is imbalance of the muscles, it can be resolved by performing an exercise program utilizing basic TaeKwonDo movements.

This study presents a new concept in TaeKwonDo. The exercise program consisting of basic TaeKwonDo movements is not just beneficial for maintaining health, or for recreation, it can also be used for rehabilitation purposes. We hope that this kind of exercise program will contribute greatly to the health promotion of the populace.

REFERENCES

- 1) Solberg G: Plastic changes in spinal function of pre-pubescent scoliotic children engaged in an exercise therapy programme. *S Afr J Physiotherapy*, 1996, 52: 19–24.
- 2) Lee JR: A study on the spinal deviations of college females. *Korean J Phys Educ*, 1996, 35: 4311–4317.
- 3) Kim CK: Upright posture is a restorative. Hainaim Publication, 2000.
- 4) Kim JT: Spinal correction and posture correction method. Kunkang Digest, 2002.
- 5) Mulligan BR: *Manual Therapy: Nags, Snags, Mwms, Etc*, 5th ed. Plane View Services, 2010.
- 6) Park SB: Effect of massage, special exercise program and chiropractic to chronic low back pain patients as three things are practiced simultaneously. Keimyung University, Master's thesis, 2000.
- 7) Byeon SH: An effect of chiropractic and massage on scoliotic's Cobb's Angle and sense of equilibrium. Busan University of Foreign Studies, Master's thesis, 2008.
- 8) Lee KY: A study on the development of the children through the stretching of the flexibility and the power. Kongju National University, Master's thesis, 2000.
- 9) Choi EA: The effect of Hatha yoga practice to displaced pelvis correction of middle aged women. Changwon University, Master's thesis, 2008.
- 10) Yoon SH: A study of Pilates exercise program for body posture and balance. Myongji University, Dissertation of doctorate degree, 2008.
- 11) Park HL: The Difference between the Effects of Closed Kinetic Chain and Open Kinetic Chain Integrated Functional Physical Fitness Exercises on Muscle strength, Balance, Alignment, and Brain Functioning for Children in Ballet Training. Ewha Womans University, Dissertation of doctorate degree, 2011.
- 12) Jang JH, Koh EK, Han DW: The effectiveness of passive knee extension exercise in the sitting position on stretching of the hamstring muscles of patients with lower back pain. *J Phys Ther Sci*, 2013, 25: 501–504. [Cross-Ref]
- 13) Korea taekwondo association: <http://www.koreataekwondo.org>
- 14) Kukkiwon: *Kukki-taekwondo Manual*. Osung Publishing House, 2006.
- 15) Myers TW: *Anatomy Trains Posters: Myofascial Meridians for Manual and Movement Therapists*. Elsevier Science Health Science Division, 2009.
- 16) Park HS, Jung HW: *Muscle Clinic*. Iljungs Publishing, 1999.
- 17) Golding LA, Golding SM: *Fitness Professionals' Guide to Musculoskeletal Anatomy and Human Movement*. Healthy Learning, 2003.
- 18) Jung JW: *Seeing with Drawing Musculoskeletal Anatomy*. Daihak Publishing, 2011.
- 19) Kendall FP: *Muscles: Testing and Function with Posture and Pain*. Lippincott Williams & Wilkins, 2005.
- 20) Park CW: *Chiropractic Clinical Technique*. Daekyungbooks Publishing, 2006.