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ORIGINAL ARTICLE

The Effects of Taping and Corrective Exercise Program on Spine and Pelvic Balance in University Students

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ABSTRACT

Background. The increase in sedentary life and the decrease in physical activity lead to decreased flexibility, musculoskeletal pain, and motor dysfunction. **Objectives.** This study aimed to measure the alignment level, bone density, and body composition of the human body using DEXA and formetric 4D before and after applying the taping treatment and corrective exercise program for 8 weeks and analyze the difference. **Methods.** This study was conducted in three different groups: those who applied exercise and taping (TCEG), those who only applied exercise (CEG), and the control group, who applied neither (CG). The corrective exercise program of this study was constructed by referring to corrective exercise for dysfunction of the lumbo-pelvic-hip complex. After conducting overhead squat motion evaluation for the study participants, two upper and lower body programs were created and applied alternately, considering the compensation action. **Results.** As for the post-mortem results of TCEG, the change in the trunk inclination and the average value was the highest (MD:1.00±2.17), and the degree of trunk imbalance was significant (F=3.882, p=.035). As a result of measuring pelvic tilt(post:0.66±3.70) and torsion(post:0.27±2.84), the most corrected average value in TCEG was confirmed. **Conclusion.** We think it is necessary to correct the body shape through corrective exercise. Although various studies on corrective exercise have been conducted, they do not provide a clear standard, and body imbalance is related to several factors, so it is necessary to conduct research at a more systemic level. As in this study, it is considered that various factors need to be considered, such as attempts to correct the alignment of the spine and pelvis, as well as the differences in body composition. In the future, a complex and diverse follow-up study of corrective exercise programs and body imbalance will be needed.

KEYWORDS: ***Taping Treatment, Corrective Exercise, Lumbo-Pelvic-Hip Complex, Dysfunction.***

INTRODUCTION

Incorrect posture and daily life habits might be caused by reduced flexibility, musculoskeletal pain, or motor dysfunction. The development of industrial society today tends to increase sedentary life and decrease physical activity, which factors cause deformation and pain of the spine and pelvis and cause musculoskeletal disorders. The alignment of the vertebrae and the pelvis is important because the alignment of the vertebrae and the pelvis makes the skeletal system and body function economically (1). In the field of the human spine, many scientists or surgical doctor are interested in adult spinal deformity (ASD). ASD causes structural spine deformation due to various causes, and changes in the balance mechanism to take the standing posture in the most economical manner follow. As the imbalance of the spine alignment increases, the muscles are compensated to maintain the standing posture. More activity is required, and more energy is consumed, causing fatigue, pain, and disability (2, 3). Also, unlike adolescent spinal deformity, the main symptom of deformity, the adult spinal deformity may accompany low back pain and lower extremity radiating pain due to degenerative

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changes (4). Therefore, many treatment methods, such as surgery, orthosis, manual therapy, and exercise therapy, are applied to ASD to treat pain caused by deformation. In addition to these treatments, taping is often used in non-pharmacological treatments. Taping is widely used for musculoskeletal disorders or pain control. The use of taping therapy has the advantage of being painless, less discomfort after adhesion, relatively economical, and treatment lasting more than 24 hours (5-9). In the field, more and more attempts are made to exercise prescription using taping. However, questions such as what kind of program should be applied and how to apply the existing exercise program level according to the risk level, such as mild or severe or various types of body imbalance, have too diverse opinions among experts. As such, the use of exercise and taping therapy in the therapeutic treatment dimension is more atrophy due to the setting that does not meet the reliability and validity recognized (10). The purpose of this study was to divide into three groups: a control group that did nothing for general college students, a control group that only performed corrective exercises, and an experimental group that performed both corrective and taping treatment. After applying the taping treatment and corrective exercise program for 8 weeks, It is to verify the effectiveness of taping therapy and corrective exercise program in the method of correcting body imbalance by measuring the alignment level, bone density, and body composition of the spinal column and pelvis using Formetric ш 4D (DIERS Medical Systems, Chicago, IL) and DEXA (Hologic ZDR 4500, USA), and analyzing the left and right differences between body alignment and body composition.

MATERIALS AND METHODS

Participants. This study was conducted in three different groups: those who applied exercise and taping (TCEG, n=9), those who only applied exercise (CEG, n=8), and the control group, who applied neither (CG, n=9) Table 1. The recruited subjects were selected as those who had no orthopedic or neurological abnormalities, no problems with the balance due to impaired vestibular system or vision, and who did not require attention from a physician in physical activity. Before application of the exercise program, the stature and weight, spine and pelvic alignment, bone density, and body composition of the subjects were premeasured. After taping and corrective exercise program twice a week for 8 weeks, each was remeasured similarly. Shows the procedure of this study Figure 1.

Exercise Programs. The taping therapy. Taping was applied to the erector spine, quadratus lumborum, and iliopsoas muscles. The taping method for the erector spine muscle was attached from the 1st coccygeal bone to the inferior angle of the scapula. The quadrates lumborum was attached from the superior part of the iliac crest to the 12th rib. The taping of the quadrates lumborum was applied from the midpoint of the xiphoid process and navel to the medial part of the thigh Figure 2.

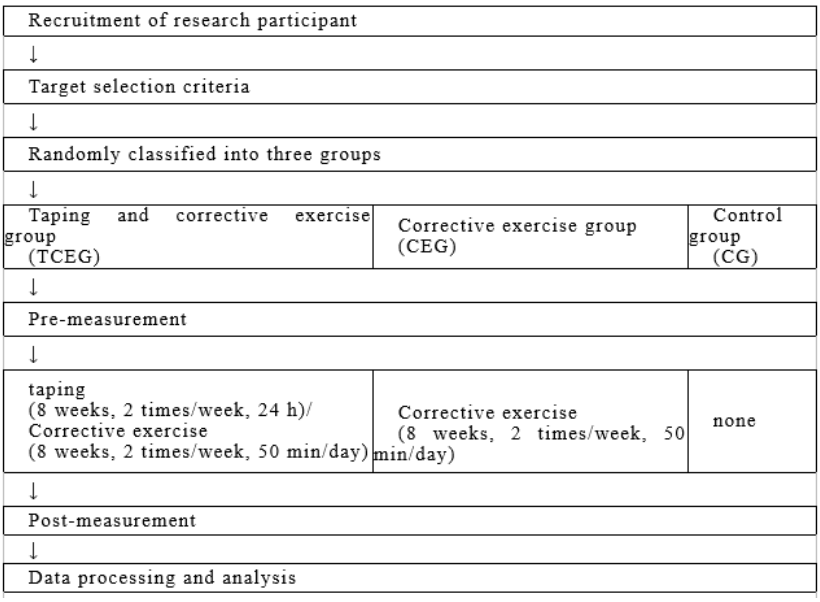
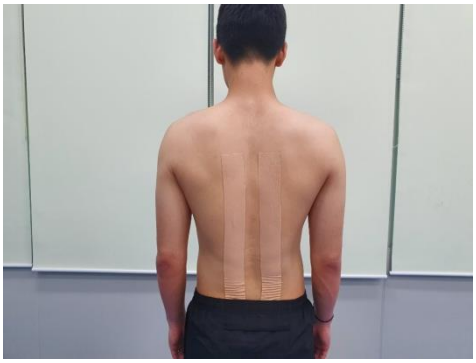
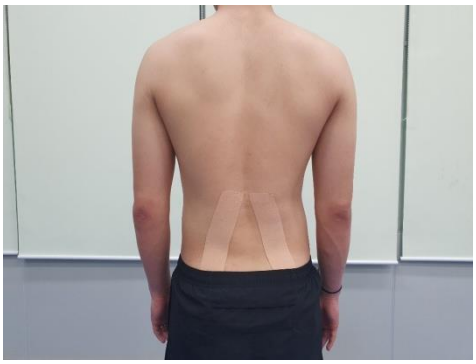


Figure 1. Experimental Procedure.



(a) Taping of the Erector spinae



(b) Taping of the Quadratus lumborum

(c) Taping of the Iliopsoas

Figure 2. Taping Method.

The Corrective Exercise Program. The Corrective Exercise Specialist (CES) course, made by the National Academy of Sports Medicine (NASM), is a professional course that can professionally design an exercise and conditioning program that helps posture correction and quick recovery after sports activities to prevent sports damage and injuries. It is based on exercise and posture evaluation. The correct exercise program for this study was constructed by referring to corrective exercise for dysfunction of the lumbopelvic-hip complex in NASM-CES. After conducting the overhead squat motion evaluation for the study participants, two upper and lower body programs were created and applied alternately, considering the compensatory action. Tables 3-5 and Figures 3 and 4 explain the corrective exercise program.

Variable and Tools. About DEXA and Formetric ш 4D. The bone mineral density (BMD) was measured using DEXA. The other 6 variables were measured using Formetric ш 4D. Table 2; explains these variables about DEXA and Formetric ш 4D.

Statistical Analysis. The SPSS 21.0 (SPSS Science, Chicago, USA) statistical program was used to identify differences in this study. Statistical methods included ANOVA and post hoc Bonferroni correction. The significance level was set at a P value of 0.05.

RESULTS

Trunk Inclination. As a result of analyzing the effects of the treatment by group and between group and time, no statistically significant difference was shown (P>0.05). However, at the upper limit, the change of the taping with the corrective exercise group was the largest, and the average value also showed the greatest decrease Table 6.

Trunk imbalance. As a result of analyzing the effects of the treatment by group and between group and time, no statistically significant difference was shown (P>0.05). However, the interaction between the group and the period showed a statistically significant difference between the left-side and right-side results (P>0.05) Table 7.

Pelvic Tilt. As the result of analyzing the effects of the treatment by group and between group and time, no statistically significant differences were shown (P>0.05). However, compared with the average values, the taping with the corrective exercise group showed a great decrease Table 8.

Pelvic Torsion. As the result of analyzing the effects of the treatment by group and between group and time, no statistically significant differences were shown (P>0.05). However, compared to the average values, the taping results for the corrective exercise group showed the largest value in Table 9.

Kyphotic Angle. As a result of analyzing the difference between the pre-and post-treatment group, a statistically significant difference in the CEG was shown (P<0.01). There was no statistically significant difference in the kyphotic

angle according to the interaction between the group and the period (P<0.05). The usual range of the kyphotic angle presented by Formetric 4D is (42-45°), and the median value is 48.5°. Seven out of nine subjects in the TCEG showed a change closer to this median value. Five out of eight subjects in the CEG showed a change closer to this median value Table 10.

Lordotic Angle. As the result of analyzing the effects of the treatment by group and between group and time, no statistically significant differences were shown (P>0.05). There were significant differences in some parts (P<0.01). The normal range of the kyphotic angle presented by Formetric 4D is (33-47°), and the median value is 40.0°. Seven participants in the TCEG, 4 in the CEG, and 2 in the CG showed close results to the median value Table 11.

Bone Mineral Density. In the TCEG, the left upper extremity showed a difference between the pre-and post-treatment values (P<0.05). The TCEG showed a significant increase in BMD (Table 14). As a result of the analysis of the right upper extremity, there was a statistical difference between the TCEG and CG. The BMD increased in both groups post- compared with pre-treatment measurement (P<0.05) (Table 12). As a result of analyzing the left and right differences in the BMD of the upper extremity, no statistically significant difference between the group before and after was shown (P>0.05). In contrast to the right lower extremity, the left side showed statistically significant differences in the TCEG and CG (P<0.05) Table 13.

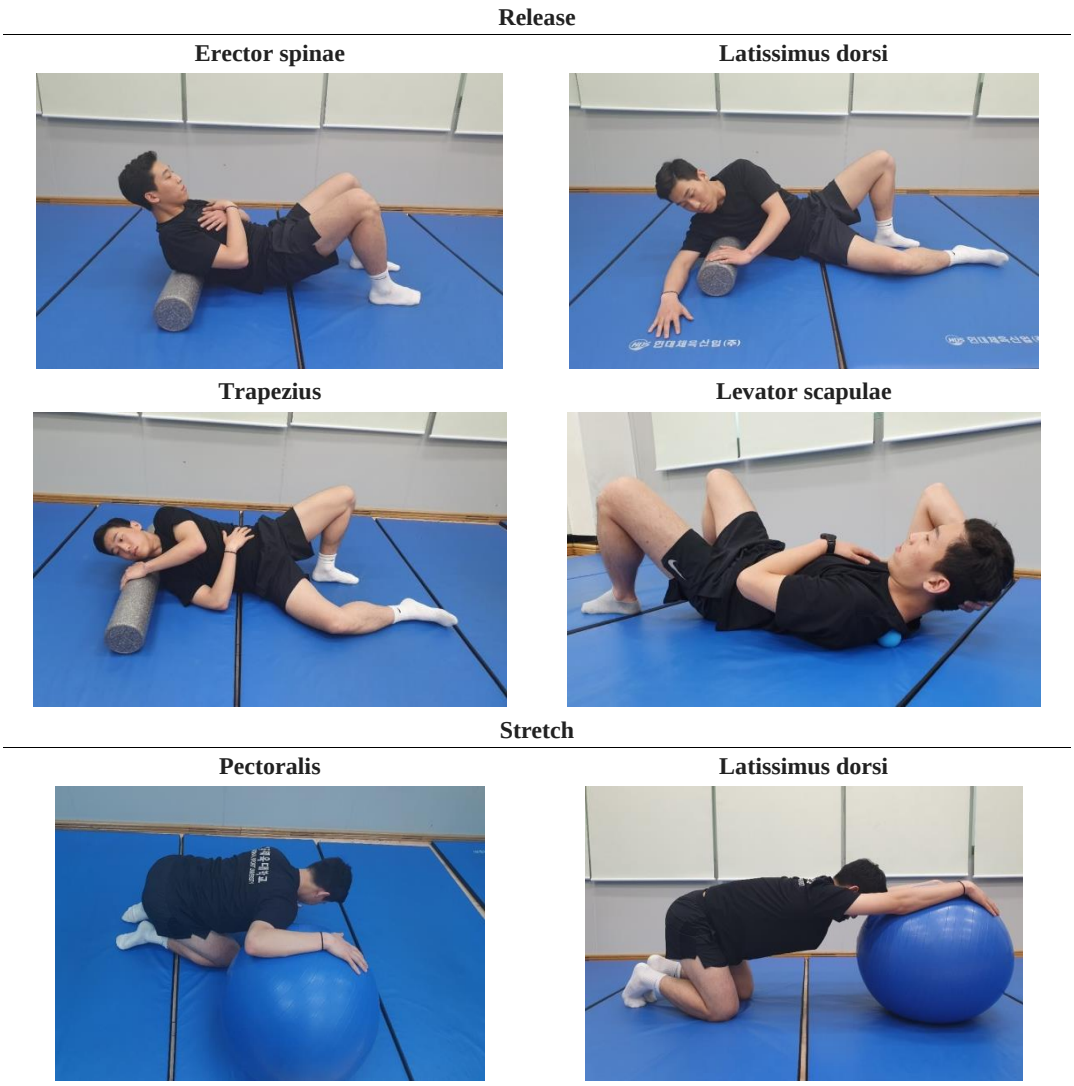


Figure 3. Corrective Exercise Program for the Upper Body.

Table 1. Characteristics of Subjects

Group	Age	Height	Weight
TCEG	19.56 ± 1.45	166.66 ± 6.83	60.66 ± 8.74
CEG	20.83 ± 1.78	161.75 ± 8.61	58.37 ± 10.54
CG	20.57 ± 2.05	178.00 ± 7.31	77.77 ± 9.35

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group.

Table 2. Measured variables of Formetric III 4D

	Variables
Trunk Imbalance [°]	The angle between the line connecting VP – DM and a plumb line through VP
Trunk Inclination [°]	The angle from the line connected VP with DM to the gravity centerline
Pelvic Tilt [mm]	The difference in height between DL and DR
Pelvic Torsion [°]	The torsion of the surface normals of DL and DR
Kyphotic angle [°]	The angle between the surface tangents from the ICT and ITL
Lordotic angle [°]	The angle between the surface tangents from the ITL and ILS

Abbreviations: VP, vertebral prominence; DL, sacral dimple left; DM, dimple middle; ICT, the inflection point of cervicothoracic spine; ITL, the inflection point of the thoracolumbar spine; ILS, lumbosacral transition point.

Table 3. Summary of Compensation of Lumbo-Pelvic-Hip Complex in Overhead Squat.

Compensation /Potential Overactive Muscles	Potential Underactive Muscles
Excessive forward lean	
Soleus	Tibialis anterior
Gastrocnemius	Gluteus maximus
Hip flexor muscles	Erector Spinae
Abdominis	Core muscles.
Low back arches	
Hip flexor muscles	Gluteus maximus
Erector spinae	Hamstring muscles
Latissimus dorsi	Core muscles.
Low back round	
Hamstring muscles	Gluteus maximus
Adductor Magnus	Erector spinae
Rectus abdominis	Core muscles.
External oblique abdominis	Hip flexor muscles/ Latissimus dorsi
Asymmetrical weight shift	
Adductor muscles	Gluteus medius (Same side of shift)
Tensor fasciae latae	Tibialis anterior (Opposite side of shift)
Soleus/Gastrocnemius, Piriformis, Biceps femoris, Gluteus medius (Opposite side of shift)	Adductor muscles (Opposite side of shift)

Table 4. Corrective Exercise Program for the Upper Body

Upper Body /Workout	Time/Rep (second)	Sets
Release		
Erector spinae	20	2
Latissimus dorsi	20	2
Trapezius	20	2
Levator scapulae	20	2
Stretch		
Pectoralis	20	2
Latissimus dorsi	20	2
Trapezius	20	2
Levator scapulae	20	2
Activation		
Push up (Plus)	10	3
Black Burn	20	3
Row	20	3
Lat Pull Down	20	3
Integrated Dynamic Movement		
Dead Lift	10-20	3-5

Rep, Repetition.

Table 5. Corrective Exercise Program for the Lower Body.

Lower Body / Workout	Time/Rep	Sets
Release		
Adductor complex	20	2
TFL / IT band	20	2
Soleus / Gastrocnemius	20	2
Iliopsoas	20	2
Stretch		
Piriformis	20	2
Biceps femoris	20	2
Abdominal muscle	20	2
Iliopsoas	20	2
Activation		
Side Hip Kick	20-30 / rep	3
Adductor Leg Raise	20-30 / rep	3
Hip Bridge	20 rep	3
Crunch	20 rep	3
Integrated Dynamic Movement		
Squat	15-20 / rep	3-5

Rep, Repetition.

Trapezius **Levator scapulae**

Activation

Push up (Plus) **Black Burn**

Row **Lat Pull Down**

Figure 4. Corrective Exercise Program for the Upper Body (cont.)

Integrated Dynamic Movement
Dead Lift

Figure 5. Corrective Exercise Program for the Lower Body.

Table 6. Results of Analysis for the Trunk Inclination [°].

Group	Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
			MD	T	P	Sig.	
TCEG	-2.42 ± 2.69	-1.41 ± 2.65	1.00 ± 2.17	1.387	0.203	Group	F=0.353 p=.707
CEG	-2.71 ± 2.02	-2.14 ± 2.68	0.57 ± 1.79	0.899	0.399	Time	F=2.035 p=.167
CG	-1.56 ± 3.00	-1.44 ± 1.60	0.12 ± 2.05	0.182	0.860	Group×Time	F=0.426 p=.658

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 7. Results of Analysis for the Trunk Imbalance [°]

Group mm.	Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
			MD	T	P	Sig.	
TCEG	-3.43 ±10.47	2.53 ±11.38	5.97 ±9.89	-1.810	0.108	Group	F=0.465 P=0.634
CEG	2.25 ±7.39	0.93 ±3.75	-1.31 ±6.63	0.560	0.593	Time	F=0.011 P=0.917
CG	5.83 ±10.77	1.66 ±12.91	-4.16 ±6.69	1.866	0.099	Group×Time	F=3.882 P=0.035*

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 8. Results of Analysis for the Pelvic Tilt [mm]

Group	Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
			MD	T	P	Sig.	
TCEG	-1.00 ±6.70	0.66 ±5.95	1.66 ±3.70	-1.348	0.214	Group	F=0.234 P=0.793
CEG	1.50 ±3.58	0.75 ±3.10	-0.75 ±4.16	0.509	0.626	Time	F=0.353 P=0.558
CG	1.00 ±4.74	1.33 ±4.52	0.33 ±2.78	-0.359	0.729	Group×Time	F=0.978 P=0.391

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 9. Results of Analysis for the Pelvic Torsion [°]

Group	Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
			MD	T	P	Sig.	
TCEG	1.31 ±2.05	0.27 ±2.84	-1.04 ±2.56	1.221	0.257		F=1.481 P=0.248
CEG	0.07 ±2.93	-0.56 ±3.04	-0.64 ±3.04	0.601	0.567		F=3.049 P=0.094
CG	2.02 ±2.35	1.30 ±2.11	-0.72 ±1.09	1.996	0.081		F=0.070 P=0.933

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 10. Results of Analysis for the Kyphotic Angle [°]

Group	Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
			MD	T	P	Sig.	
TCEG	54.5 ±13.99	46.7 ±9.86	-7.83 ±12.76	1.841	0.103	Group	F=1.699 P=0.205
CEG	54.4 ±8.18	44.0 ±7.94	-10.42 ±8.33	3.540	0.009**	Time	F=7.698 P=0.011*
CG	55.8 ±9.14	56.8 ±9.33	1.01 ±9.81	-0.310	0.764	Group×Time	F=2.808 P=0.081

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 11. Results of Analysis for the Lordotic Angle [°]

Group	Pre	Post	Paired t-test			Two-way repeated ANOVA	
			MD	T	P	Sig.	
TCEG	35.24 ±6.22	35.76 ±6.15	0.52 ±4.46	-0.350	0.735	Group	F=8.270 P=0.002**
CEG	44.81 ±4.65	45.37 ±5.35	0.55 ±2.47	-0.638	0.544	Time	F=1.205 P=0.284
CG	35.78 ±5.99	37.13 ±5.03	1.35 ±3.93	-1.034	0.331	Group×Time	F=0.139 P=0.871

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 12. Results of Analysis for the BMD of Arm [g/cm^2]

Group		Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
				MD	T	P	Sig.	
Left								
	TCEG	0.83 ±0.06	0.85 ±0.07	0.013 ±0.012	-3.072	0.015*	Group	F=2.469 P=.107
	CEG	0.86 ±0.08	0.86 ±0.09	0.003 ±0.019	-0.490	0.639	Time	F=1.683 P=.207
	CG	0.92 ±0.09	0.92±0.08	-0.003 ±0.019	0.523	0.615	Group×Time	F=2.071 P=.149
Right								
	TCEG	0.86 ±0.06	0.86 ±0.06	0.007 ±0.018	-1.213	0.260	Group	F=4.216 P=.028*
	CEG	0.86 ±0.08	0.87 ±0.08	0.014 ±0.015	-2.575	0.037*	Time	F=4.719 P=.040*
	CG	0.96 ±0.10	0.96 ±0.10	-0.000 ±0.014	0.157	0.879	Group×Time	F=1.787 P=.190
right and left Difference								
	TCEG	0.03 ±0.03	0.02 ±0.02	-0.009 ±0.016	1.622	0.143	Group	F=3.922 P=.034*
	CEG	0.02 ±0.02	0.03 ±0.02	0.007 ±0.029	-0.746	0.480	Time	F=.004 P=.949
	CG	0.05 ±0.03	0.05 ±0.03	0.000 ±0.022	-0.044	0.966	Group×Time	F=1.118 P=.344

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<0.01; ***, P<0.001.

Table 13. Results of Analysis for the BMD of Leg [g/cm^2]

Group		Pre	Post	Paired T-Test			Two-Way Repeated ANOVA	
				MD	T	P	Sig.	
Left								
	TCEG	1.34 ±0.13	1.33 ±0.12	-0.028 ±0.229	0.377	0.716	Group	F=4.184 P=.028*
	CEG	1.31 ±0.15	1.31 ±0.15	0.001 ±0.015	-0.250	0.810	Time	F=0.163 P=.690
	CG	1.49 ±0.15	1.49 ±0.14	-0.005 ±0.041	0.393	0.704	Group×Time	F=0.116 P=.891
Right								
	TCEG	1.34 ±0.13	1.33 ±0.13	-0.007 ±0.020	1.109	0.300	Group	F=3.250 P=.057
	CEG	1.31 ±0.14	1.31 ±0.15	0.000 ±0.005	-0.111	0.915	Time	F=0.790 P=.383
	CG	1.47 ±0.14	1.46 ±0.14	-0.005 ±0.030	0.515	0.620	Group×Time	F=0.277 P=.761
Difference right and left								
	TCEG	0.02 ±0.01	0.02 ±0.01	-0.002 ±0.016	-0.399	0.700	Group	F=1.600 P=.224
	CEG	0.01 ±0.01	0.02 ±0.01	0.005 ±0.012	-1.351	0.219	Time	F=1.116 P=.302
	CG	0.03 ±0.02	0.03 ±0.01	-0.002±0.021	-0.272	0.793	Group×Time	F=0.924 P=.411

TCEG: Taping and Corrective Exercise Group. CEG: Corrective Exercise Group. CG: Control Group. Pre: Pre-measurement. Post: Post-measurement. Values: Mean ± Standard Deviation. MD: Mean Difference. 95 % CI: 95 % Confidence Interval. *, P<0.05; **, P<.01; ***, P<0.001.

DISCUSSION

In particular, the change in the TCEG was remarkable. At the spinal column level and pelvic alignment level, torso tilt and imbalance decreased with time from the average value. The angle tends to decrease at the mean values of pelvic tilt and pelvic torsion, especially in the taping correction exercise group. In the case of kyphosis, there was no statistically significant difference in the interaction between group and period, but it was confirmed that the posterior angle decreased compared to the previous period during the main effect period. The above results were the same for pelvic tilt and pelvic torsion. In the case of the kyphotic angle, it was confirmed from the TCEG that the angle was changed to the standard angle. This study achieved the same result as a previous report, in which, after performing a corrective exercise program for teenage participants, there were no significant differences in the left and right pelvic changes (11). However, a significant value was obtained in the effect of scoliosis for other research, which was conducted for 8 weeks, twice a week, and 50 minutes per session, differed from the previous study in terms of the total amount of exercise and duration, which the previous study was conducted for 12 weeks, 3 times a week, and 90 minutes per session (12).

Considering the above studies, we think it is better to apply a 12 weeks corrective exercise program than 8 weeks. Although there may be differences depending on the state of the imbalance of the body, in our opinion, it is good to apply the exercise program for as long as possible. BMD also did not show a statistically significant difference in this study, but in other studies, it was thought that the exercise program should last longer than 10 weeks, and the results showed that when the period was more than 10 weeks, the BMD increased (13). According to Ghaeri, deformation of the pelvis promotes imbalanced development of the surrounding muscles and causes pain by causing abnormal movement (14). Also, to restore the deformed body shape to its original state, it was necessary to flexibly stretch unbalanced muscles biased to one side and develop muscle strength (15). So, we think correcting the body shape through corrective exercise is necessary. Although various studies on corrective exercise have been conducted, they do not provide a clear standard, and body imbalance is related to several factors, so it is necessary to conduct research at a more systemic level. As in this study, it is considered that various factors need to be considered, such as attempts to correct the alignment of the spine and pelvis, as well as the differences in body composition. A complex and diverse follow-up study of corrective exercise programs and body imbalance will be needed in the future. Although there was no significant difference between TCEG and CEG, TCEG showed a more positive change than CEG in all factors, except Kyphotic angle in the mean value. Hopefully, this study will be a useful resource for follow-up studies that suggest effective methods for developing corrective exercise programs and resolving body imbalances from various perspectives.

CONCLUSION

The level of the spinal column and pelvic alignment did not show any difference in all factors, but all showed a tendency to change positively in the mean value. In the mean values of the taping corrective exercise group and the corrective exercise group, the group with taping showed more positive changes than the group who performed only corrective exercise in all factors except for the spine back angle and spinal segment rotation angle. As a result of comparing the taping correction exercise group and the correction exercise group to verify the effect of taping, the average value of the taping correction exercise group changed significantly. Although there was no significant difference in bone density and body composition, it is expected that more positive results will be achieved if the amount of exercise is increased and the duration of exercise is increased. The limitation of this study was short experimental periods, so a positive change in the mean value was shown, but it was not statistically significant. Studying a longer period with more subjects is needed in the future.

APPLICABLE REMARKS

- The difference between the left and right sides of BMD was not improved, but showed the potential to increase BMD through corrective exercise.
- Although not statistically significant, there was a positive change in the mean value when applying taping treatment and corrective exercise together.

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AUTHORS' CONTRIBUTIONS

Study concept and design: Lee Je-Hun. Acquisition of data: Shin Hyo-Hun, Yoon Na-Young. Analysis and interpretation of data: Shin Hyo-Hun, Yoon Na-Young. Drafting the manuscript: Shin Hyo-Hun. Critical revision of the manuscript for important intellectual content: Lee Je-Hun. Statistical analysis: Shin Hyo-Hun. Administrative, technical, and material support: Lee Je-Hun. Study supervision: Lee Je-Hun.

CONFLICT OF INTEREST

The authors mention that there is no "Conflict of Interest" in this study.

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