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The Efficacy of Massage therapy and corrective exercises on indicators of postural scoliosis of girls 8-14 years

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ABSTRACT: This study aims to study the efficacy of corrective exercises and a combination of corrective exercises and massage therapy on measures of postural scoliosis of girls. The study population includes postural scoliosis of girls 8 to 14 years with a mean age (11/64±1/67 years) in Tehran. Of those, 45 were selected voluntary and purposeful to participate in this study. Subjects were divided in the control group (n = 15) and two experimental groups consist of a group of corrective exercises and massage therapy (15 subjects) and a group that only underwent corrective exercises (n = 15). Two experimental groups performed the selective exercises exercise (a corrective exercise with massage therapy and a group of corrective exercise only) for 6 weeks (three sessions per week). Before and after training, the dependent variables, including flexibility, lateral flexion, height, shock angle along the spinal vertebrae, difference between the shoulders, the level of PSIS, angles different of the lower shoulder and the distance of little finger to the ground in the measured curve . The data were analyzed using analysis of variance (ANOVA) and Tukey test. The statistical results showed that both training methods have a significant effect on all the variables. There were significant difference between lateral flexion, difference between the shoulders, the PSIS level and the shock angle along the spinal vertebrae in the two groups that the effect of combination exercise was a more than corrective exercises.

Keywords: Corrective exercises, Massage therapy, Scoliosis.

INTRODUCTION

Scoliosis is one of the most common forms of spinal deformations in adolescents and adults that in three dimensions continue to expand, leading to curves in the frontal plane and vertebral rotation in horizontal plane. Scoliosis is the lateral deviation of the spine in simple definition that is often associated with rotation. It is generally agreed that it refers the curves less than 25° Cobb of mild curvature, 25 to 45 degrees of mean curvature and higher than 45° Cobb of sever curvature. Scoliosis Can be functional or structural, about 70% to 80% of scoliosis is asymptomatic (Negrini *et al.*, 2006, Soderberg, 1997, Otman and Kose 2005, Hawes, 2003, Hamm, 2006, Werner, 2002, Hertling, 2006).

Scoliosis can cause problems such as disability, functional limitations, pain, progression of curvature and physical deformities, mental ill-effects; the decline in the quality of life and in severe cases the respiratory problems (Weinstein, 2003). It is believed that the strong correlation between the prevalence of scoliosis and gender. The incidence and progression of scoliosis in girls is higher than boys. For people with scoliosis, the corrective purposes are to prevent the development of curvature includes reducing the curvature, pain and functional deficits of life (Negrini, 2003). At present, several methods and techniques can be used to improve posture problems such as postural re-education techniques and exercise therapy noted (Weiss, 2006). Several treatments have been proposed, including scoliosis surgery, electrical stimulation, and exercise is under the supervision of a person. The use of exercise in the treatment of idiopathic scoliosis is controversial, so that several health centers used these techniques, but not used much in some centers (Siqueira, 2010, Vera, 2009).

However, these methods of exercise therapy or the use of corrective exercises are the most common methods of correcting the scoliosis deformity.

Exercise by changing the muscle structure and other related soft tissues of the spine apply its mechanical effect. Also, it is believed that exercise can influence the neurological changes that interact together, and can manipulate motor control of the spine. The overall goal of exercise for scoliosis is to slowing down the progression of scoliosis, and delays or even avoids the brace is prescribed. To exercise the stability of the spine, pelvis and chest is in all three dimensions (Kotwicki, 2007). Otman *et al* (2005) have studied the effects of corrective exercises on idiopathic scoliosis and came to the conclusion that corrective actions are effective in increasing muscle strength in patients. Fusco et al concluded in a review in 2011 that all studies of the effects of exercise in reducing the rate of progress (especially adolescents) or improvement of typical Cobb angles confirmed.

They also stated that exercise reduces the brace is prescribed (Fusco *et al.,* 2011). In addition, another method is used in the treatment of spinal cord deformities such as scoliosis using the release of Myofascial and massage therapy. The therapist provides mobility message and relaxation of liberation for each patient using the release of Myofascial, classic massage techniques, pressure from the Ischemia (Fusco *et al.,* 2011).

Massage therapy is a form of scoliosis can help at any stage of treatment. This type of treatment is usually used when the risk of developing these disorders exist. Whether Cobb angle or if pain is present during each stage of observation, when the brace or the surgery is applied this treatment can be used (Courtois, 2009). When the body is massaged, muscles are relaxed, their tension decreases, blood flows to various sectors. In combination with physical therapy focuses on stretching, massage can provide an additional tension, the release of tissues; increase the longitudinal and transverse flexibility of muscles in particular. Morningstar *et al* (2004) used therapy with hands or rehabilitation to treat scoliosis and stated a combination of this treatment to decrease Cobb angel. Hamm *et al* (2006) also studied the effect of massage therapy in the treatment of scoliosis which considers it as a good way to treat scoliosis.

According to the information provided, it seems that the sports, corrective exercises and massage therapy can be improved scoliosis deformity. Since any research about the comparison of the effect of corrective exercise and combination of massage therapy and corrective exercise on the improvement of scoliosis, this study seems as a necessity. In this study, researcher seeks to find whether the combination of the two corrective exercises and massage therapy in scoliosis affects girls 8 to 14 years?

METHODOLOGY

Due to the interventional variable (corrective exercises and massage therapy), this is a quasi-experimental study. The study population included girls 8 to 14 years with postural scoliosis in Alborz Province. Samples were selected based on research domain and input or output criteria as purposely among population, then 30 of them were selected as voluntary and purposed to incorporate in this study. Subjects were divided in the control group (n = 15) and two experimental groups consist of a group of corrective exercises and massage therapy (15 subjects) and a group that only underwent corrective exercises (n = 15). After receiving the written form of research and inform the subjects about research method and also the informed consent to participate in this study, the data collection form including information of age , gender, position, medical history and impairment were completed by the examiner and variables of height and weight were measured by tape and scale . General characteristics of subjects are presented in Table 1.

Table 1 : Data of age, height and weight of subjects.

Group	Age (year)	Height (cm)	Weight (kg)
Corrective exercise	11/64 1/65	145/70 2/36	39/06 3/28
Combined exercise	11/03 1/76	143/48 3/19	39/19 2/64
Control	11/52 1/49	144/77 2/46	38/61 3/2

Next, all subjects participated in the trial, including measurements of dependent variables (flexibility, lateral flexion, height, shock angle along the spinal vertebrae, difference between the shoulders, the level of PSIS, angles different of the lower shoulder and the distance of little finger to the ground in the measured curve), respectively. Thus, at the beginning, the spinous process of the vertebra C7 and T12 was found to calculate the degree of spinal curvature.

To specify the spinous process of vertebra C7, testers were behind the subject and his hand on the knob at the end of the neck when the neck is flexed so that two bumps (C6 and C7) were clear in subjects. To detect C7 vertebrae from the neck, the subjects were asked to open the neck, in which case the vertebrae C7 had disappeared and C6 remained. To determine vertebra T12, the subjects were asked to flex forward and by touching rib 12 by fingers and movement the thumb toward back, where thumbs come together, the rib is disappeared and T12 is clear.

The markers were placed on the two processes. By using oscholiometer and identification of the middle of the curve, two lines of the middle of curvature drawn toward two processes of C7 and T12 and the angle of curvature is determined. Also the inclinometer was measured the difference between the scapula, PSIS and the distance between the fingers to the ground by with tape. At this stage, only a group was performed a corrective exercises with massage therapy for 6 weeks. The control group did their daily lives.

The duration of each session was 40 minutes. At the beginning and end of each session, a 5 minute warm-up and cool-down of 5 minutes was performed .the exercises of corrective groups were included the return of the muscle balance and flexibility, shortened muscles and improve the balance in the concavity and convexity on the side of the elongated muscles.

For this purpose, stretching, strength, flexibility, balance, strength and endurance were used. The combination group of subjects also took place the massage therapy in addition to the corrective exercises. Stroking & Friction was to include techniques. The massage technique was used for lengthening the shortened muscles. That subject is lying on the abdomen then the side of the concavity was undergoing massage therapy. This was done at first when the sustainable gentle pressure was applied for at least 120 to 90 seconds. Then when they start to release their tissues, the researchers kept the same pressure. At the end of six weeks, the post test was done including the above.

Kolmogorov-Smirnov tests for data normalization and comparison groups to study the effects of exercise and the difference between the pre-test and post-test of each variable in each group were considered. The one-way ANOVA test (ANOVA) and Tukey test were used to determine the difference. The hypothesis testing was done at significantly 0.05. Data analysis was performed using SPSS version 20.

FINDINGS

In Table 2, using one-way analysis of variance, the comparison of difference between the average (pre- and post-test) dependent variables among three groups has been reported.

Table 2: Comparison of variables in the three groups before and after 6 weeks of training.

Variable	Difference between pre-test and post-test			Significant Level
	corrective	Combined	control	
Flexibility	4/78	4/62	-0/21	0/019*
Lateral flexion	2/29	3/75	0/02	0/021*
Height	0/47	0/69	-0/01	0/004*
The shock angle of the spinal vertebrae	-0/45	-1/05	0/01	0/006*
Between the shoulders	-0/04	-0/08	0/00	0/011*
Difference of PSIS level	-0/02	-0/04	0/00	0/008*
Different angles of the lower shoulder	-0/62	-0/89	-0/03	0/011*
Difference of little finger to ground	1/07	1/89	0/55	0/028*

* The difference is significant.

According to the table above, with an emphasis on the significant values obtained, it is concluded that no significant difference in the 05/0 = α between all variables are associated with particular emphasis on research groups (05 / 0P <). Thus, Tukey test used to determine the difference.

Tukey test results in a significant level of 05/0 α = showed that in all variables between the combined groups with control, there is a significant difference (p< 0.05). Referring to the difference between the pre-test and post-test training variables between the two groups, it becomes clear that:

Corrective exercises influence significantly on the flexibility (P = 0.002), lateral flexion (P = 0.001), height (P = 0.041), the shock angle of the spinal vertebrae (P = 0.001), difference between the shoulders (P=0.004), the PSIS level (= 0.003 P), the difference between the lower shoulder angles (P = 0.001), and from the little finger to the ground in the curve (P = 0.005) of girls with sclerosis. The results showed a significant and positive effect of corrective exercises on these variables.

The combined exercises influence significantly on flexibility (P = 0.001), lateral flexion (= 0.002 P), height (P= 0.021), the shock angle of the spinal vertebrae (P = 0.001), between the shoulders (P=0.001), the PSIS level (P = 0.001), the difference between the lower shoulder angles (P = 0.001), and from the little finger to the ground in the curve (P = 0.003 of girls with sclerosis .The results suggest a positive and significant influence of combined exercises on these variables.

In the other study, variables were compared between the two groups of corrective and the combined exercises by Tukey test and showed that there is significant difference between the effect of corrective training alone and a combination of corrective exercises and massage therapy on flexion, difference between the shoulders, the PSIS level and the shock angle of spinal cords of girls with scoliosis at 8 to 14 years (P <0.05). The impact of compound exercises was greater than the effect of corrective exercises on these variables. While the flexibility, height, angle between the lower shoulder and the little finger to the ground in the curved position was no significant difference (p<0.05) between the two groups (corrective group and combined group). And this means that the impact of the above mentioned variables were similar in both types of exercise.

DISCUSSION

The health of each individual person is the most important concern. So information about individual physical condition is essential. The consequences of physical abnormalities such as muscle fatigue, joint deformation, a biomechanical imbalance, nerve and muscle pains and eventually psychosocial problems caused due to lack of fitness for people (Sokhanguei, 2009).

Studies shown physical activity influences on treatment and control of sclerosis in adolescence and youth. Increasing age lead to progressive Rheumatoid arthritis in accompany with decreasing the movement range of spinal code, so the corrective and treatment processes will be more difficult. Also increasing age will increases osteoporosis risk which is the cause of spinal deformities such as scoliosis (Birdwell and Lawrence 2005).

The purpose of this study is to investigate the effects of massage therapy and corrective exercises on girls with scoliosis of 8 to 14 years in Tehran. Scoliosis variables in this study were: flexibility, lateral flexion, height, shock angle along the spinal vertebrae, difference between the shoulders, the PSIS level, different angles of curvature on the lower shoulder and the little finger to the ground. Since there were significant meaningful responses for all variables after imposing independent variable on the subjects of two empirical groups, so their discussion and conclusion was discussed in same pattern of general content of researchers views.

In this study the impact of corrective exercises on flexibility was significant subjects and the results show the positive impact of the training on flexibility. The results of this study was in line with Araujo *et al* (2012) and some other researchers not adapted to which may be due to the different use of corrective exercises with this study. The possible reasons for the improved flexibility in this study are to stretch the shortened muscles and strengthen weakened muscles.

In this study the effect of corrective exercises on lateral flexion was significant and the results show the positive impact of this exercise on the other side flexion. The result of the research is consistent to Hem study (Courtois, 2009). Converse research in this field was not found.

Corrective exercises had a significant impact to increase height of subjects. A possible reason is the correction of the scoliosis, which has led to an increase in height. The results of the research are consistent to Golpayegani and Ahanjan 2007) and are converse to the results Tahmasebi *et al* Converse reason is probably because of less research period of Tahmasebi.

In another part of the study, results showed that corrective exercises have significant impact on the different angles of the lower left shoulder. One of the organs in patients with scoliosis and the curvature complications is the shoulder. The position of the scapula in fitness and good posture and prevention of injuries is important. Placement of this bone in abnormal situations lead to a disorder including the winged scapula, shoulder drop and rounded shoulder. Turning down a shoulder, the shoulder has been reduce the gap of khrevmy to the arm of same shoulder and followed with uneven shoulders. Uneven shoulders are very common complication in girls. In girls due to less use of the upper extremities in physical and sports activities than boys, as well as enthusiasm for fine hand work (painting, sewing, etc.) that need to grow the fine muscles, they leave to grow large muscles of the upper limbs and the left upper limb deformities are more likely made (Daneshmandi *et al.,* 2006, Parent *et al.,* 2005, Wong and Tan 2010).

. Possible reasons of scoliosis corrective exercises to improve and increase muscle strength could improve different aspects of the lower shoulder. The results are consistent to Hem and Golpayegani which is probably due to the less use of corrective exercises for shoulder and age of subjects in his study. Aging will decrease the responsiveness of muscle to exercise and the consistency and stability of the bones has lost its original. Muscle weakness in the shoulder girdle is seen more that this weakness may lead to joint damage due to the lack of sufficient support of joint. Since there are common connections between shoulder muscles and scapula, so every disorder in scapula lead to the anomalies of shoulder which can attribute most abnormal biomechanics and chronic damages of shoulder due to the function changes of related scapula (Contreras, 2012).

The results of this study demonstrate a significant effect of corrective exercises on the differences of the shoulders level. Some researchers believe the relation between physical activity and preserving the balance of shoulders and consider the physical activity either exercise or job activities as effective element to balance the shoulders. Based on the relationship theory, the loss of difference the shoulder level to the physical exercises is one basic reason to the weakness and shortening of some muscles of trunk and scapula, so that the muscle weakness and shortness will increase the same difference. Because of weakness and a short series of muscles that control the muscles of the shoulder disappears and caused to rotate the shoulder and the shoulder rotating to the front and sides. Therefore, for the prevention and treatment of rotating or sagging shoulders above the muscles through exercise and reform should be strengthened. Scoliosis surgery has little effect to relapse it. Accordingly, one of the possible reasons for the reduction of scoliosis in this study is to strength the related muscles. The results of this research are consistent to Fahim (2011), Contreras (2012) and Stephen (2003).

In another part of the study, results showed that corrective exercise had a significant effect on the PSIS level. Improving the scoliosis, improve flexibility and muscle strength are among possible reasons to improve PSIS. Corrective exercises are introduced as known attempt to solve those abnormal conditions such as scoliosis, through the coordinating agonist and antagonist muscles, and by strength and stretching exercises to some extent. Corrective exercises include stretching, strength exercises and also the neuromuscular facilitator exercises (Rahnama *et al.,* 2010).

Subsequent changes such as increased of proteins in skeletal muscle myosin contractile fibers, particularly in the increase in the amount of connective tissue strength, tendon and ligaments, increases capillary density in the muscle fiber, increasing the number of fibers division longitudinal muscle fibers are occurred following the corrective exercises and caused to increase the muscle strength and endurance and it seems to affect the muscle tendon length. Various skeletal parts move and stabilize the ligaments. On the other hand stretching exercises act as coordinator of agonist and antagonist muscles. So these exercises increase muscle length during the shortened side which causes to decline the malformation rate.

Carter (2002) studied the impact of corrective exercises on women anomalies and was obtained significant results. This study showed that doing corrective exercises will increase distance between the little finger to the ground in the curvature, and this increase was statistically significant. Converse research in this field was not found. Another possible reason could be stretch the shortened muscles and improve spinal mobility with improved muscle strength .strengthen movement in weak muscles, flexible movement of shortened muscles, dynamic movements in joints with moving limitation and also training advices about correct position of walking, using good cloths and tools and to engage in sports that have a therapeutic aspect and the aspect of vitality, can be considered to be the most important factors [27].

According to the findings of the study it can be concluded that corrective exercises could be inexpensive solution and without side effects to treat musculoskeletal disorders.

The only study to compare was Hem *et al* (2006) study which investigated the effect of massage therapy on patients with scoliosis deformity. The researchers concluded that massage therapy is a good treatment for symptoms of scoliosis, thoracic outlet syndrome and Thoracic outlet syndrome, or TOS disorder. Finally, the researchers stated that further research should examine massage therapy. Massage improves blood circulation and lymphatic flow and also more oxygen and food will reach to these tissues and also the toxic materials out. It also causes the secretion of Andronin (or soothing pain) and increased secretion of serotonin (mood deflator), and has been proven that massage cause to release the stress hormone (cortisol) and will thus reduce stress. When muscle cramps when the muscles are too active, caused to pain and muscle cramps. When the blood flow increases, the waste is excreted from the body and reduces pain. In general, the reasons contributing massage method can include:

1. Massage leads to better flexibility of shortened muscles.
2. Massage impose the cross stretching in addition to longitudinal stretching
3. Massage has provided a background for better performance of strengthen exercises.
4. Massage improves blood circulation and waste disposal, so it reduces pain during the muscle traction.

Given this it is clear that if the massage with corrective actions used, will influence beneficial than corrective exercises alone in people with sclerosis. The study hypothesis of lateral flexion, difference between the shoulders, PSIS level and the shock angle of vertebra indicated the impact of the combined practice (massage with corrective exercises) to improve these variables has been more effective than corrective exercises (alone). The results of the research is consistent to Golpaygani (2007) and not coordinate to Tahmasebi *et al* (2012) which is probably due to the use of basic massage techniques in his research. The degree of scoliosis of Tahmasebi research was more than the present study.

REFERENCES

Araújo ME. (2012). The effectiveness of the Pilates method: Reducing the degree of non-structural scoliosis, and improving flexibility and pain in female college students. *Journal of Bodywork and Movement Therapies*. **16**(2): 191-198.

Birdwell K, Lawrence GL. (2005). Determine the optimal time dependent sagittal spinal balance following adult lumbar deformity instrumentation and fusion from the distal thoracic spine to L5-S1. **35**(2): 275-325.

Contreras J. (2012). Shoulder Pain in Swimmers. Chapter. 6: 119-146.

Courtois I. (2009). Rééducation des scolioses: Physical therapy of scoliosis, in La scoliose idiopathique de l'enfant et de l'adulte, P. Mary, R. Vialle, and P. Guigui, Editors. 2009, Elsevier Masson: Paris. 103-114.

Daneshmandi H, Alizade MH, Shadman B. 2006.Effects of an exercise program on placement position of scapula. *Journal for Research in Sport Sciences.* **4**(11): 93-107.

Fahimi F, Hrgovic I, El-Safadi S, Münstedt K. (2011). Complementary and alternative medicine in obstetrics: a survey from Iran. *Archives of Gynecology and Obstetrics.* **284**(2): 361-4. [In persian].

Fusco, C., et al., (2011). Physical exercises in the treatment of adolescent idiopathic scoliosis: an updated systematic review. *Physiotherapy theory and practice.* **27**(1): 80-114.

Golpayegani M, Ahanjan S. (2007). The effect of one period correctivei therapeutic movement on the flexibility of hamstring muscles and lower back pain. Sports *Science Research.* **14**: 23-31.

Hawes MC. (2003). The use of exercises in the treatment of scoliosis: an evidence-based critical review of the literature. Developmental Neurorehabilitation. 6(3-4): 171-182.

Hamm M. (2006). Impact of massage therapy in the treatment of linked pathologies: Scoliosis, costovertebral dysfunction, and thoracic outlet syndrome. *Journal of Bodywork and Movement Therapies.* **10**(1): 12-20.

Hertling D. (2006). Management of common musculoskeletal disorders: physical therapy principles and methods.: Lippincott Williams & Wilkins.

Kotwicki T. (2007). Estimation of the stress related to conservative scoliosis therapy: an analysis based on BSSQ questionnaires. *Scoliosis.* **2**(1): 1.

Negrini S. (2003). Physical exercises as a treatment for adolescent idiopathic scoliosis. A systematic review. *Developmental Neurorehabilitation.* **6**(3-4): 227-235.

Negrini S, Negrini A, Romano M, Verzini N, Negrini A, Parzini S. (2006). A controlled prospective study on the efficacy of SEAS.02 exercises in preventing progression and bracing in mild idiopathic scoliosis. *Stud Health Technol Inform*. **123**: 523-526.

Otman S, Kose Y. (2005). The efficacy of Schroth's 3-dimensional exercise therapy in the treatment of adolescent idiopathic scoliosis in Turkey. *Saudi medical journal*. **26**(9): 1429.

Parent S, Newton PO, Wenger DR. (2005). Adolescent idiopathic scoliosis: etiology, anatomy, natural history, and bracing. *Instr Course Lect.* **54**: 529-36.

Rahnama N, Bambaeichi E, Taghian F, Nazarian AB, Abdollahi M. (2010). Effect of 8 Weeks Regular Corrective Exercise on Spinal Columns Deformities in Girl Students. *Journal of Isfahan Medical School*. **26**(101): 677-687.

Siqueira RBG. (2010). Pilates method in personal autonomy, static balance and quality of life of elderly females. *Journal of Bodywork and Movement Therapies*. **14**(2): 195-202.

Soderberg GL. (1997). Application to Pathological Motion, second ed. Williams & Wilkins, Baltimore. 370-377.

Sokhanguei Y. (2009). Effect of corrective exercises on chest expansion in kyphotic girls, aged 11-15, *Rehabilitation researching journal.* **9**(1): 33-36. (in Persian).

Stephen S, Burkhart MD, Craig D, Morgan MD, Kibler MD. (2003). The Disabled Throwing Shoulder: Spectrum of Pathology Part III: The SICK Scapula, Scapular Dyskinesis, the Kinetic Chain, and Rehabilitation. *The Journal of Arthroscopic and Related Surgery*. **19**: 641-661.

Tahmasebi A. (2012). The effect of exercise in the treatment of idiopathic scoliosis: a review. *Journal of Rehabilitation Research.* **8**(8): 133-38.

Vera A. (2009). Initial Results of SpineCor Treatment of Adolescent Id iopathic Scoliosis in Seville, Spain. *Scoliosis.* **4**(2): 51.

Werner RA. (2002). A massage therapist's guide to pathology: Lippincott Williams & Wilkins.

Weinstein SL. (2003). Health and function of patients with untreated idiopathic scoliosis. *JAMA: The Journal of the American Medical Association.* **289**(5): 559-567.

Weiss HR. (2006). Physical exercises in the treatment of idiopathic scoliosis at risk of brace treatment-SOSORT consensus paper 2005. *Scoliosis.* **1**(6): 1-7.

Wong HK, Tan KJ. (2010). The natural history of adolescent idiopathic scoliosis. *Indian J Orthop*. **44**(1): 9-13.