

Treatment of the Idiopathic Scoliosis with Brace and Physiotherapy

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Abstract

Introduction: Scoliosis is a three-dimensional deformation of the spine with a lateral curvature or deviation greater than 10° and associated with vertebral rotation. Many conservative treatments are available for adolescents with idiopathic scoliosis, but the evidence for their effectiveness is still questioned. The objective of this study was to define the effectiveness of braces and individual physiotherapy for the comprehensive treatment of idiopathic scoliosis in adolescents.

Method: A retrospective study of 57 children with idiopathic thoracic dextroscoliosis with the magnitude of the thoracic curve between 20°-35°, treated in Orthopedic and Physiatrist Clinic as well as National Ortho-prosthetic Center within University Clinical Center of Kosova in Prishtina, during the period of 2003-2006.

Results: Inclusion of kinesitherapy in the comprehensive management of idiopathic scoliosis varied in the improvement of the muscle strength (satisfied and moderate) in almost 80 % of the children while the correction of the curve was small in approximately 42.1% of cases.

Conclusions: For children with idiopathic scoliosis, who require braces, an exercise program helps chest mobility, muscle strength, proper breathing flexibility in the spine, correct posture and keeps muscles in tone so that the transition period after brace removal is easier.

Key Words: Idiopathic scoliosis, rehabilitation, orthosis, exercises

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Introduction

Scoliosis is a three-dimensional deformation of the spine with a lateral curvature or deviation greater than 10° and associated with vertebral rotation.

Two to three percent of adolescents are diagnosed with scoliosis, but only 0.3- 0.5% develop a curvature above 20°. Idiopathic scoliosis is twice as common in female.

Doctors' continuously refine the definition of scoliosis according to: the shape of the curve, its location, its direction, magnitude of the curve and the etiology of the scoliosis.

Recently there have been many research studies done to understand the etiology of scoliosis. Some studies have reported about lower melatonin levels. Congenital etiology of scoliosis is very frequent due to the malformations in the vertebral body. Neuromuscular disorders may lead as well to the development of the scoliotic curvature because of the muscle disequilibrium and neurological problems. The most frequent scoliosis are those without a known etiology, so called, idiopathic scoliosis¹.

Scoliosis may develop secondary to Muscle Dystrophies, Cerebral Palsy, Poliomyelitis, vertebral Injuries, Tumors of the Spine, Syringomyelia, Osteogenesis imperfecta, Turner's syndrome, Marfan's syndrome.

Progressive scoliosis may lead to respiratory, cardiac and gastro-intestinal problems².

Diagnosis: Scoliosis can be diagnosed by clinical examination, plain radiographs and CT scan.

- Clinical examination includes: Adam's test (forward bending of the trunk); measurement of the lower limbs length; neurological examination (reflexes, myotomes, dermatomes); proprioception and coordination examinations; gait analysis, muscle endurance; stability of the scoliosis in antero-posterior and lateral plane².
- Radiological examination is one of the simplest and most effective methods of diagnosis. The magnitude of the curve can be measured by Cobb's method, despite the limitations on the measurement of the three dimensional deviations.

Treatment: The magnitude of the scoliotic curve above 20° according to Cobb³, requires a very complex treatment. This treatment means either conservative or surgical treatment.

Conservative treatment is focused on wearing of the TLSO (Thoraco-Lumbo-Sacral Orthosis) and physiotherapy. The history of this combined treatment dates from Galeni (131-201).

Despite that, there still exists disagreement over choice of the most effective treatment method for the idiopathic scoliosis³.

Until date, there are no significant records to justify conservative treatment and the observed reduction in surgical indication for the treatment of the idiopathic scoliosis⁴.

The objective of this study was to measure the effectiveness, if any, of braces and individual kinesitherapy for the comprehensive treatment of idiopathic scoliosis in adolescents.

Patients and Methodology

We studied 57 adolescents with idiopathic thoracic dextroscoliosis with the magnitude of the thoracic curve between 20°-35°, ranging from age 10-15, diagnosed and treated at the University Clinic Centre of Kosova in Prishtina, over the time period 2003-2006.

Using retrospective analysis of the medical files of the patients enrolled in the study.

A specially designed questionnaire was designed to extract data from case notes viz general data, clinical examination, treatment (methodology, period) and 12 months evaluation.

The evaluation of the scoliosis magnitude was done in 4 levels, according to the registered data, as follows: high improvement (50% of the scoliotic curve according to Cobb); low improvement (10-30%); no improvement and at last the worsening of magnitude of the curve.

The evaluation of the muscle strength and endurance was measured by chronometer (seconds) and it was categorized in 5 levels: satisfactory (more than 50% of improvement, 10-15 seconds more comparing with the first examination); moderate (30-50%, 5-10 seconds more), low (10-30%, till 5 seconds more), without improvement and finally worsening (presence of pain).



Fig. 1. Exercises with TLSO

The treatment was tailored individually for each patient and based on the interdisciplinary approach: orthopedist, physiatrist, physiotherapist and orthoprothetic technician.

TLSO was prescribed for 23 hours per day. Physiotherapy were performed 3 times per day including muscle and tendon stretching exercises, back strengthening, pelvitrochanteric and lower limb muscles, corrective exercises for the convex side, proprioception and balance exercises, posture and respiratory exercises.

Results

We studied 57 adolescents with idiopathic scoliosis, with idiopathic scoliosis 20 ° -35° , from age 10-15, diagnosed and treated at the University Clinic Centre of Kosova in Prishtina.

Table 1.- Improvement of the muscle strength and endurance

Modalities	N	%
Satisfactory	33	57.9
Moderate	13	22.8
Low	9	15.8
No improvement	2	3.5
TOTAL	57	100.0

P<0.01

Table II.- Improvement of the magnitude of the scoliotic curve measured by Cobb's method

Improvement	N	%
High	5	8.8
Low	24	42.1
No improvement	25	43.9
Worsening	3	5.3
TOTAL	57	100.0

P<0.01

Table III- Improvement of the muscle strength and endurance due to the gender

	Idiopathic Scoliosis				TOTAL n (%)
	Satisfactory n (%)	Moderate n (%)	Low n (%)	No improvement n (%)	
F	27(58.69%)	11(23.91%)	7 (15.21%)	1(2.17%)	46 (80.70%)
Gender M	6(54.54%)	2(18.18%)	2(18.18%)	1(9.09%)	11(19.29%)

Table IV- Improvement of the magnitude of the scoliotic curve measured by Cobb

	Idiopathic Scoliosis				TOTAL n (%)
	Satisfactory n (%)	Moderate n (%)	No results n (%)	Worsening n (%)	
F	4(8.06%)	20(43.47%)	20(43.47%)	2(4.34%)	46 (80.70%)
Gender M	1(9.09%)	4(36.36%)	5(45.45%)	1(9.09%)	11(19.29%)

Table.- V. Presentation of life quality improvements due to the performance of the daily activities

Life quality Improvements	Satisfactory	No improvement
%	81%	19%

Application of the combined therapy resulted in significant values as far as the muscle strength and endurance concern p<0.01 (Table I).

We also noted that there was no significant improvement in the magnitude of scoliotic curve (Table II) with no significant difference in the combined treatment, brace and physiotherapy, between genders in treatment modalities of idiopathic scoliosis (Table III)

That there was no significant difference in the reduction of the scoliotic curve magnitude as a result of combined therapy and gender distribution (Table IV).

Table V This table shows that the application of combined therapy, brace and physiotherapy resulted in better quality of life and the patients transitioned much more easily through the therapeutic program until they become independent from the use of brace in the end of the treatment.

Discussion

Applying the kinezitherapy as adjuvant component of treatment for the idiopathic scoliosis, lead to better mobility of the trunk, strengthening and improvement of abdominal and paravertebral muscles as well as better

posture. The combined treatment decreased the complications of the prolonged wearing of the TLSO.

Muscle strength and endurance improved in 80% of cases. High improvement (above 50%) was recorded on 33 cases (57.9%), moderate improvement (30-50%) on 13 cases (22.8%). Two cases defaulted while deterioration was not noted in one patient.

As far the reduction of the curvature magnitude of the scoliosis, during our study we have recorded a satisfactory improvement of 5% in 8.8 cases, low improvement in 42.1% of cases, lack of improvement in 43.8% of cases and worsening of the magnitude in 5.2% cases of idiopathic scoliosis. This is similar to the study by Atthanasopulus et al. They the studied 20 cases with a magnitude of curve 20° -50° and recorded an improvement on the muscle strengthening and endurance on 48,1% of cases⁵. Also according to Birbaumer et al, 15 adolescents with idiopathic scoliosis were studied, with a magnitude of curve 15°-38°, with a reduction of the angle of scoliosis in 6.14%. Recent studies in Germany (Rehabilitation centre, Bochum) also revealed that conservative technique performed on idiopathic scoliosis with average curves of 27°⁶, showed reduction in progression of the curve after a tailored exercise program.

In similar studies that were performed in Katharina Schroth Hospital, Rehabilitation Center for Spine Deformities, in Sobemheim, Germany, 107 adolescents with idiopathic scoliosis, with a magnitude of curve in average of 43.6° were offered combined treatment, brace and kinesitherapy, the results were an improvement of 5° in 43.93% of cases, 53.3% without any improvement and 2.8% of cases had an incursion of magnitude for about 5°. According to Birbaumer et al.⁶, the study performed in 15 patients, with an average of the curvature magnitude 15°-38°, satisfactory improvement was recorded in 6,14% of cases. Another study performed by el Sayyad and Connine, in a group of scoliosis with a magnitude of curves 15°-45°⁷, low improvement of 4,05°, was recorded among 18 idiopathic scoliosis.

A study performed in California, due to the effect of the strengthening of the rotator muscles of the trunk, 16 from 20 idiopathic scoliosis patients have registered reduction of the scoliotic curve magnitude. Similar studies have been performed in California, Maryland, Missouri and Tennessee. Physiotherapeutic treatment has resulted with an improvement in quality of life and daily activities in about 81% of cases.^{9,10}

CONCLUSIONS

1. Treatment of idiopathic scoliosis with brace and kinesitherapy is an effective method of choice for conservative treatment of idiopathic scoliosis with magnitude of the curve 20°-35°.
2. Combined treatment for idiopathic scoliosis, resulted with good results on muscle strengthening and endurance.
3. Combined treatment for idiopathic scoliosis, has not reduced the magnitude of curve measured by Cobb.
4. Patients receiving treatment have better quality of life and they tolerate the transitory phase without any major complain.

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