

## GLOBAL POSTURAL REEDUCATION IN THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS

EVGENIYA DIMITROVA

NSA

Department of Physiotherapy, Sofia  
Bulgaria**ABSTRACT**

The conservative treatment with physiotherapy of adolescent scoliosis, has not proven to be effective in terms of lasting correction of curves. Global Postural Re-Education (RPG) is an innovative method of posture correction developed by Ph. Souchard. Although the method is widely used clinically for prevention and rehabilitation of musculoskeletal dysfunctions, the literature is still scarce and provide controversial results. The current study aims to evaluate the efficacy of RPG method in the treatment of adolescent idiopathic scoliosis. Forty nine children (aged 10 to 16 years old), with adolescent idiopathic scoliosis (Cobb angle between 10° and 25°), were treated in the Department of Physiotherapy and private practice for the period of 10 years. They were randomly divided into two treatment groups. The RPG group (n=26) performed muscle chain stretching, while the control group (n=23) performed conventional physiotherapy program, including symmetrical exercises for the trunk muscles, lower and upper limbs. Statistically significant differences in the clinical study were obtained in RPG group to reduce the following parameters: the Cobb angle, the distance from the vertical occiput line to the gluteal sulcus, scapular asymmetry and vertical deviation of the apex for scoliosis ( $p < 0.01$ ). In control group these results have not improved significantly.

A RPG treatment approach appears more effective than conventionally used physiotherapy program in the treatment of adolescent idiopathic scoliosis.

**Key words:** adolescent idiopathic scoliosis, physiotherapy

**INTRODUCTION**

The physiotherapy (PT) of adolescent scoliosis, has not proven to be effective in terms of lasting correction of curves. Several studies can show positive results in preventing progression of curves (Negrini, et al., 2008; Fusco, et al., 2011). Global Postural Re-Education (RPG) is an innovative method of posture correction developed by Ph. Souchard (1987) on his deep knowledge of Mézières method (1984), anatomy, biomechanics, kinesiology and osteopathy. Although the method is widely used clinically (Teodori et al, 2011), the literature is still scarce and provide controversial results. The current study aims to evaluate the efficacy of RPG method in the treatment of adolescent idiopathic scoliosis (AIS).

**METHODS**

Forty nine children (aged 10 to 16 years old), with adolescent idiopathic scoliosis (Cobb angle between 10° and 25°), were treated in the Department of Physiotherapy and private practice for the period of 10 years. They were randomly divided into two treatment groups (Fig. 1). The RPG group (n=26) performed muscle chain stretching (Souchard, 1987), while the control group (n=23) performed scoliosis-specific exercises.

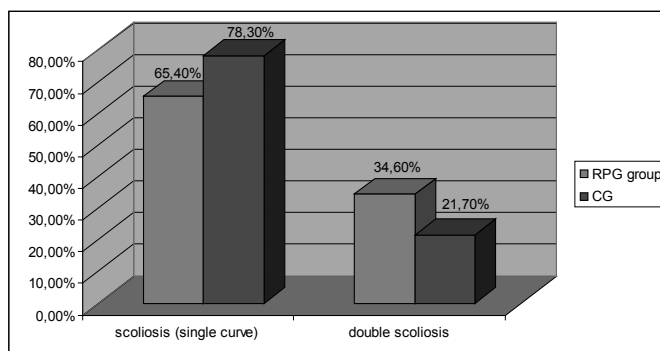


Fig. 1

Distribution of the patients according to the kind of scoliosis

Distribution of the patients according to the kind of AIS and initial characteristics of the patients are given in Fig. 1 and Table 1.

Table 1 Initial characteristics of the patient

Group	Subgroup	Sex F/M	Mean age (years)	Mean Cobb angle (degrees)
RPG (n=26)	RPG1 (single curve; n=17)	16/1	11.2	17.2
	RPG2 (double scoliosis; n=9)	8/1	11.1	Th – 16.8° Th/L – 16.2°
CG (n=23)	CG1 (single curve; n=18)	17/1	11.3	17.5°
	CG2 (double scoliosis; n=5)	5/0	11.4	Th – 16.2° Th/L – 15.6°

PT in both groups had two main treatment objectives: active self-correction as well as the improvement of spinal stability. PT had two different types of **goals**: general (what means decreasing or stabilization of scoliosis angle) and specific (correction of shoulders, scapulas and head position, pelvis derotation, facilitation of three-plane corrective breathing and posture pattern, improvement of lumbo-pelvic stabilization). Main principles of the PT were: to make the child aware of existing deformation; to release myofascial structures which limit three-plane corrective movement; to improve stability in the lower trunk; to facilitate of three-plane corrective breathing in functional positions; to indicate correct patterns of scoliosis correction in sitting, in gait and ADL.

A PT session in RPG group comprises of a series of specific muscle chain stretching positions, which evolves gradually from an initial position with minimum tension, and then applying progressive stretching until a final tension is reached through the end position, which was hold 5-15 minutes. This final position depends on each person's condition, and which muscle chain (Myers, 1997) is affected: SBL (superficial back line); DFL (deep front line); LL (lateral line); SL (spiral line); SFL (superficial front line).

The standing and bending forward position, utilized to act on the SBL and to evidence the possible compensations. Indeed it is useful in the neuromotory reprogramming of the anterior flexion, but it also strengthens the dynamic muscle groups of the spine. We applied the exercise from a supine, standing and bending forward position, with light flexion of the knee. The physiotherapist corrected the position of each element of the chain – feet, knees, lower limbs, thorax (manual passive correction of the scoliosis), spine and head. The patient made eccentric stretching of the hamstrings and respectively of the SBL, by extension of the knee joints and active axial elongation of the spine.

In order to stretch the DFL the patient lay in the supine position with the upper limbs abducted at 30° and the forearms supine. The pelvis was kept in retroversion, while the lumbar spine remained stabilized. Hips were flexed, abducted, and laterally rotated, with the soles of the feet touching each other. Gradually, respecting the patient's limits, the lower limbs were extended as much as possible while maintaining the tibiotarsal angle at 90°.

In terms of overall stretches of the LL, the patient did the half-moon stretch, a simple lean to one side with the arms overhead. The currently popular 'crunch' with a twist, where one elbow heads for the opposite knee, engaged the upper part of the SL. We were looking for balanced tone between the tissues of the SFL and SBL. Each posture was constructed and elaborated by the physiotherapist according to the patient's deformation and defense mechanisms.

The PT program applied to the control group (CG) included scoliosis-specific exercises; relaxation of structures restricting correction by using techniques like: contract-relax technique, passive and active myofascial release, trigger points, joint mobilization, neuromobilisation and postural training. The choice of each element of every corrective exercise depends on Cobb angle, size and direction of trunk rotation, position of the spine in sagittal plane and location of functional compensation (Димитрова, 2006).

A PT session in both groups was: long approximately one hour; individual; twice a week. Between the individual therapy meetings, at home, once a day (45 min), the children performed adequately selected set of exercises.

**RESULTS**

An analysis of variance of data was made. The average follow-up period was 2.5 years. Results of test for shortness of SBL were positive in 35/49 (71.4%) of cases at the beginning. After the treatment course we determined normal muscle elasticity in 21/26 (80.8%) cases of RPG group and only in 14/23 (60.9%) cases of CG (p<0.001). Results indicate a close correlation between the hypertonicity in SBL and the abdominal muscles endurance. With a hypertonic SBL the abdominal muscles endurance generate was reduced in both groups (Table 2, Fig. 2).

Table 2 Results of the test for abdominal muscles endurance (sec)

	Groups	N	$\bar{X}$	S	Min.	Max.	R	t	p
Before PT	RPG	26	26.21	5.26	11.00	88.00	77.00	1.223	0.213
	CG	23	25.23	6.33	10.00	84.00	74.00		
After PT	RPG	26	87.53	13.23	33.00	98.00	65.00	8.226	0.001
	CG	23	53.97	11.92	20.00	93.00	73.00		

Immediately after reducing the tonus of the SBL by global active stretching, the abdominal muscles endurance generated was normalized in most of the subjects of RPG group, and in lower number of the subjects of CG (p<0.001).

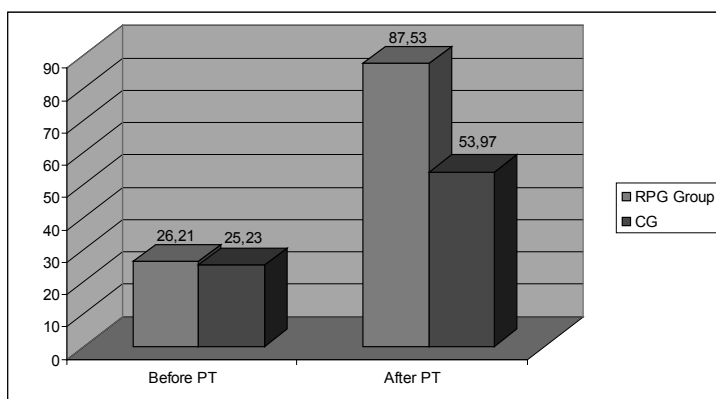


Fig.2 Results of the test for abdominal muscles endurance (sec)

There was a significant difference between the CG and RPG group (p<0.001) regarding the back extensor muscle strength (Table 3, Fig. 3).

Table 3 Results of the test for back muscles endurance (sec)

	Groups	N	$\bar{X}$	S	Min.	Max.	R	t	p
Before PT	RPG	26	35.24	6.16	27.0	110.0	83.00	1.12	0.109
	CG	23	36.31	6.27	31.0	100.0	69.00		
After PT	RPG	26	111.5	14.2	52.00	253.0	201.0	7.715	0.001
	CG	23	66.33	16.3	46.00	226.0	80.00		

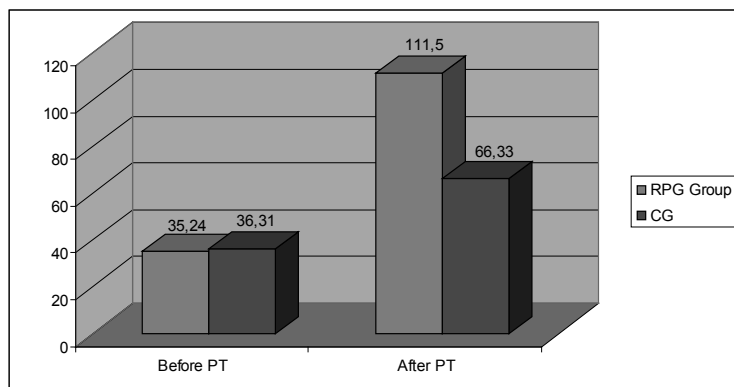


Fig. 3  
Results of the test for back muscles endurance (sec)

The main outcomes in both groups were: improvement of breathing function, pain and symptoms relief, correction of compensations, and correction of postural ailments. Improvement of more than 5 degrees or stabilization of  $\pm 5$  degrees of the scoliosis curvature was defined as a positive outcome. An aggravation of the spinal curvature of more than 5 degrees was defined as negative outcome (Fig. 4).

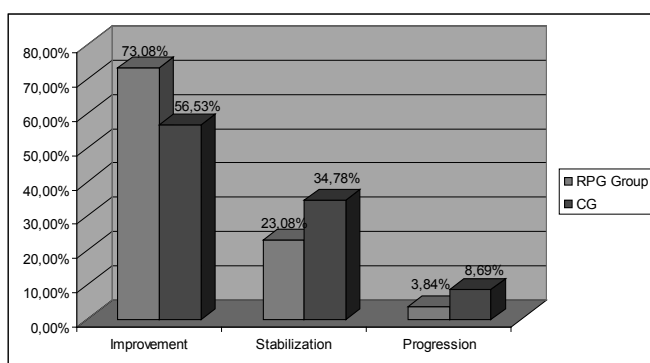


Fig.4  
Percentage values of scoliosis improvement, stabilization and progression

Percentage values of scoliosis improvement, stabilization and progression are given in Fig 4. Statistically significant differences in the clinical study were obtained in RPG group to reduce the progression of scoliosis and the following parameters: the distance from the vertical occiput line to the gluteal sulcus, scapular asymmetry and vertical deviation of the apex for scoliosis ( $p < 0.01$ ). In CG these results have not improved significantly. Correction of two or three structural curves was harder and less effective than only one structural curve. Scoliosis of small Cobb's angle range were more possible to correct. Our results were similar to the results reported by other authors and better than natural history of idiopathic scoliosis (Bialek&M'hango, 2008; Negrini et al, 2008; Fusco et al, 2011).

## DISCUSSION

Once a diagnosis of scoliosis has been made, the primary concerns are whether there is an underlying cause and if the curve will progress. Whether or not spinal deformity occurs depends of course on external factors, but it also depends on the ability of the body to resist and control external forces so as to maintain stability (Fusco et al. 2011). Stabilization is a result of the interaction of three subsystems: the CNS; the passive osteoligamentous structures; and the active muscle system. To promote or restore spinal joint stability, rehabilitation of the three systems is necessary. The functional role views muscles as working together in chains to perform functional activities, rather than as individual muscles having the classical roles expressed as their actions. It is not enough simply to identify a muscle imbalance and treat those muscles. The chain that is dysfunctional must be identified, and treatment of a key link given (Souhard, 1987). Applied PT in RPG group worked to recover good functioning through a return to normal postural tone. This entailed first and foremost normalisation of the morphology. All the structures depend on function, and thus were influenced by the therapeutic approach.

## CONCLUSION

This study has found evidence that PT as a sole form of treatment reduces the progression of scoliosis. The RPG method balanced and regulated muscle tone throughout the whole body, and prevented the worsening of scoliosis.

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