

GLOBAL POSTURAL REEDUCATION IN THE TREATMENT OF POSTURAL IMPAIRMENTS

(Original scientific paper)

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Abstract

Global Postural Re-Education (RPG) is an innovative method of posture correction developed by the French physiotherapist Philippe E. Souchart. A RPG session 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. This final position depends on each person's condition, and which motor coordination chain is affected. The RPG method has been widely used in clinical practice, with reported benefits for prevention and rehabilitation of musculoskeletal dysfunctions. Although the method is widely used clinically, the literature is still scarce and provide controversial results. The current study aims to evaluate the efficacy of RPG method in the treatment of postural impairments. Forty six volunteers university students (aged 17 to 25 years old), with postural impairments, were randomly divided into two treatment groups. The RPG group (n=22) performed muscle chain stretching, while the control group (n=24) performed conventional physiotherapy program, including symmetrical exercises for the trunk muscles. After intervention, the RPG group showed a statistically significant correction of postural impairments, correction of compensations, pain and symptoms relief in a long-term, increasing in muscle strength, endurance and balance, which was maintained at a 9-month follow-up. The control group showed no significant change in part of these parameters after intervention or at follow-up. A RPG treatment approach appears more effective than conventionally used physiotherapy program in the treatment of postural impairments.

Keywords: *physiotherapy, musculoskeletal dysfunctions, muscle chain stretching, conventional physiotherapy program, control group, experimental group, muscle strength, t-test, correlation coefficient.*

INTRODUCTION

In the early 50's, the French physical therapist Françoise Mézières (1978, 1984) developed through careful observation, an proposal that revolutionized the way to exercise the body: the anti gymnastique. The innovation proposed by Mézières was based on the following observation: each time and individual tried to decrease the curvature of a spinal segment, the curve moved to another segment. Thus, it was necessary to consider the body as a whole and approach it as such. In this theory, all deformations are caused by a shortening of the posterior muscles as an inevitable consequence of daily movements. Philippe-Emmanuel Souchart (1987) taught the Mézières Method for 10 years at the Mézières Center, in southern France. He substantiated the GPR method on his deep knowledge of anatomy, biomechanics, kinesiology and osteopathy. Fields that allowed him to

base the method now known as the Global Posture Re-education (GPR). Conventional physical therapy often uses static stretching, which consists of stretching a single muscle or muscles group until a tolerable point and sustained it for approximately 30 seconds. The GPR method is based on the global stretching of anti gravitational muscles and the stretching of muscles that are organized on muscle kinetic chains for approximately 15 to 20 minutes. In both cases, compensations are not allowed (Teodori, Negri, Cruz & Marques, 2011). The RPG method has been widely used in clinical practice, with reported benefits for prevention and rehabilitation of musculoskeletal dysfunctions. Although the method is widely used clinically, the literature is still scarce and provide controversial results.

The current study aims to evaluate the efficacy of RPG method in the treatment of postural impairments.

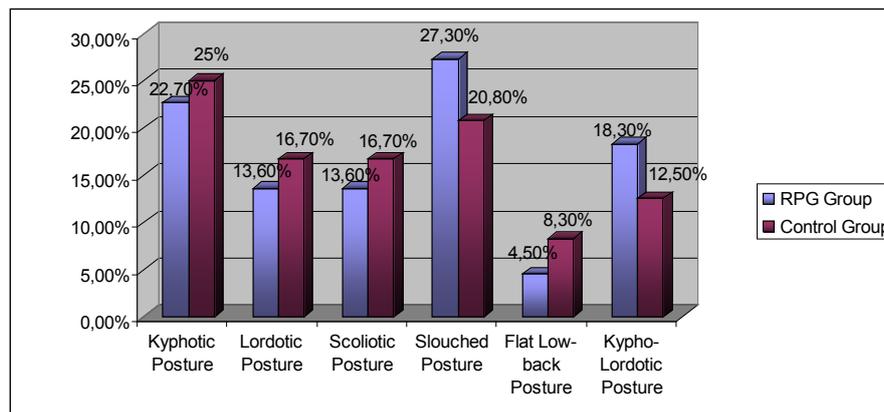


Fig. 1. Distribution of the patients according to the postural impairments

METHODS

Forty six volunteers university students (aged 17 to 25 years old), in University of Architecture, Construction and Geodesy, Department of Sport, Sofia, Bulgaria, with postural impairments, were randomly divided into two treatment groups. The RPG group (n=22) performed muscle chain stretching (Souchar, 1987), while the control group (n=24) performed conventional physiotherapy program, including symmetrical exercises for the trunk muscles.

The major aim of physiotherapy was to prevent progression of postural impairments.

The RPG method aims at “stretching” shortened muscular chains. On the contrary, the goal of our physiotherapy program was to “normalize” the tone in the muscular chains. It is a true neuromuscular re-education that does not involve only stretching but acts directly upon the electrical activity of the muscles.

A physiotherapy session 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. This final position depends on each person’s condition, and which motor coordination chain is affected. With the applied exercises in RPG group we stress on the stretching of dorsal and anterior myofascial chains.

The dorsal myofascial chain consists of plantar fascia, gastrocnemius, hamstrings, lig. sacrotuberale, lumbosacral fascia, erector spinae, lig. nuchae and cranial fascia (Myers, 1997). The standing and bending forward position, utilized to act on the posterior muscle chains and to evidence the possible compensations, has a double function. Indeed it is useful in the neuromotory reprogramming of the anterior flexion, but it also strengthens the dynamic muscle groups of the spine, since it adopts an exercise with an eccentric contraction, which is physiologic for the spine and produces the highest increase in the maximal force (Silvano & Carla, 1997). We applied the exercise from a 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 postural impairment), spine and head. The patient made eccentric stretching of the hamstrings and respectively of the dorsal myofascial chain, by extension of the knee joints and active axial elongation of the spine. The exercise was performed slowly. The end range of motion was hold 5-15 minutes. Initially the stretching of the dorsal myofascial chain was done from supine position, which allowed unloading of the spine. We worked consequently with one and the other lower limb and after that with both of them. The exercise proposed was specific for a particular muscle group, required the minimal energy consumption, and was proposed for the time necessary for its integration.

In order to stretch the anterior muscle chain (diaphragm, pectoralis minor, scalene, sternocleidomastoid, inter-costalis, iliopsoas, arm, forearm, and hand flexors), 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°. The end range of motion was hold 5-15 minutes.

A physiotherapy session in RPG group was:

- long: approximately one hour; any less than this would have made impossible any lasting improvements, durable improvements;
- individual: the session involved postures held during free, deep, rhythmic exhalations with the mouth open wide
- twice a week.

Each posture was constructed and elaborated by the physiotherapist according to the patient’s deformation and defense mechanisms. No two patients had identical sessions, and no two sessions were identical for any one patient.

The physiotherapy program applied to the control group (CG) includes symmetrical exercises for the trunk muscles, lower and upper limbs. A physiotherapy session in CG was long approximately one hour, twice a week (Димитрова, 2006; Liebenson, 2006).

RESULTS

An analysis of variance of data was made. The average follow-up period was 9.1 months (range 4 to 12 months).

Positive outcomes were observed from the very beginning of the treatment. The main outcomes in both groups were: pain and symptoms relief, correction of compensations, and correction of postural ailments. End results of muscle strength testing, muscle balance and body equilibrium test were better in RPG patients.

Results of test for shortness of the erector spinae and associated postural muscles (dorsal muscular chain) were positive in 33/46 (71.7%) of cases at the beginning. After the treatment course we determined normal muscle elasticity in 19/22 (86.4%) cases of RPG group and only in 16/24 (66.8%) cases of CG ($p < 0.001$).

Results indicate a close correlation between the hypertonicity in dorsal muscular chain and the abdominal muscles endurance. With a hypertonic dorsal muscular chain the abdominal muscles endurance generate was reduced to average 28.31 sec in RPG group (Table 1) and 27.12 sec in CG ($p \geq 0.05$). Immediately after reducing the tonus of the dorsal muscular chain by global active stretching, the abdominal muscles endurance generated was normalized in most of the subjects of RPG group (average 86.49 sec), and in lower number of the subjects of CG (average 52.79 sec, $p < 0.001$).

There was a significant difference between the CG and RPG group regarding the back extensor muscle strength. End results of back extension in prone position test were as follows: RPG group – 110,6 sec and CG – 65.39 sec (Table 2).

Numbers and percentage values of postural impairments improvement, stabilization and progression

In RPG group 15/22 (68.2%) of the patients improved, 6/22 (27.3%) stabilized postural impairments and 1/22 (4.5%) experienced progression of the impairments. The results were statistically significant $p < 0.0001$.

In CG 9/24 (37.5%) of the patients improved, 13/24 (54.2%) stabilized postural impairments and 2/24 (8.3%) experienced progression of the impairments. The results obtained in this group were not statistically significant ($p = 0, 67$). Progression in postural impairments was greater in control group (8.3%) than in RPG group (4.5%).

Statistically significant differences in the clinical study were obtained in RPG group to reduce the following parameters: the distance from the vertical occiput line to the gluteal sulcus, scapular asymmetry and vertical deviation of the apex for scoliotic posture ($p < 0.01$). Significance tested with Wilcoxon matched pairs test. In CG these results have not improved significantly.

These results are significantly better than the results reported by other authors and better than natural history of idiopathic scoliosis. Klisic & Nikolic (1982) investigated 150 patients with idiopathic scoliosis; 100 patients received specific physiotherapeutic methods and 50 patients, the control group, did not receive any treatment at all. The average curvature was 15° Cobb angle in the exercise group and 13° Cobb angle in the control group. During a three-year mean follow-up period, 58% of the exercise group improved but only 28% of the patients in the control group. Conversely, 37% of the patients in the exercise group against 64% of the patients in the control group were found to have deteriorated. Molon & Rodot (1986) investigated 210 cases. Of these, 160 received physiotherapy and 50 had no treatment at all. The average Cobb angle was 17° in the exercise group and 13° in the control group. The average follow-up period was 4.5 years. In the exercise group 62.5% stabilized or improved, whereas only 20% showed an improvement in the control group.

DISCUSSION AND CONCLUSION

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. Stabilization is a result of the

Table 1. Results of the test for abdominal muscles endurance (sec)

	Groups	N	X	S	Min.	Max.	R	t	p
Before PT	RPG	22	28.31	6.16	10.0	86.00	76.00	1.296	0.243
	CG	24	27.13	8.43	9.00	88.00	81.00		
After PT	RPG	22	86.49	15.93	31.00	97.00	66.00	9.219	0.001
	CG	24	52.79	14.52	21.00	91.00	70.00		

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

	Groups	N	X	S	Min.	Max.	R	t	p
Before PT	RPG	22	36.34	7.26	25.0	120.0	95.00	1.063	0.182
	CG	24	35.32	7.47	32.00	99.00	67.00		
After PT	RPG	22	110.6	16.03	50.00	250.0	200.0	8.763	0.001
	CG	24	65.39	16.59	45.00	220.0	85.00		

interaction of three subsystems: the CNS for control; the passive osteoligamentous structures for passive restraint and sensory feedback; and the active muscle system for production and control of movement.

To promote or restore spinal joint stability, rehabilitation of the muscular system is necessary. This requires a holistic approach emphasizing the functional role of muscles in maintaining dynamic joint stability while producing the movements, which are required by our activities of daily living. This 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.

This study has found evidence that physiotherapy as a sole form of treatment reduces the progression of postural impairments.

Applied physiotherapy 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.

The RPG method balanced and regulated muscle tone throughout the whole body. It prevented the worsening of postural impairments and reduced pain.

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