

Comparative analysis of Klapp and GPR methods in the treatment of idiopathic scoliosis in adults

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Abstract— *Scoliosis is a pathological deviation of the vertebral column in the frontal plane, associated or not to the rotation of the vertebrae in the axial and sagittal plane. It is measured by the Cobb angle, considered the gold standard in the diagnosis. The Global Postural Reeducation (GPR), conceived in the 80s by Philippe Souchart, consists of the muscular work in chains, thus allowing the reorganization and restoration of the muscles maintainers of posture. The klapp method was developed by Rudolf Klapp in the decade of 40, after the observation that only Bipedes had scoliosis, where they were made activities on quadruped position, attenuating the strength of gravity on the spine. Our purpose was to compare the two therapeutic methods in the treatment of idiopathic scoliosis adulthood verifying if there is effectiveness at the end of the proposed protocol. Subjects were selected 6 female, aged between 20 and 30 years, patients with idiopathic scoliosis, who met the inclusion and exclusion criteria established. These were divided into 3 equal groups: control (who did not attend any treatment), klapp and RPG. Nine sessions were carried out with 50 minutes duration for 3 weeks. At the beginning and end of the treatment, the individuals underwent postural evaluation and examination of RX. Both methods reduced the scoliosis present in subjects after the treatment period as compared to the increase seen in the control group (6.7%), with a slight advantage for the klapp method (a reduction of 21%) in relation to the RPG (a reduction of 17.5%). But the results were not significant. Although both methods have reduced the Cobb angle, showing a clinical relevance of results, this reduction was not statistically significant. The reduced sample size certainly influence here, requiring research in larger groups to obtain more reliable results.*

Keywords— *Scoliosis, Physiotherapy, Klapp Method, Global Posture Reeducation.*

I. INTRODUCTION

Scoliosis is a pathological deviation in the spine in the frontal plane with or without rotation of the vertebrae in the axial and sagittal planes. It can be classified as to its curvature: when less than 20 ° it is considered light, moderate between 20 ° and 40 ° and greater than 40 ° severe. As for the types of curvature, there is the shape of C, composed of only one curve; and in S, composed of two curves, the largest curve being considered primary^[1].

The Cobb angle is commonly used for quantitative assessment of the lateral curvature of the spine in the frontal plane in 2 dimensions. Considered the gold standard for the diagnosis and monitoring of patients with scoliosis, this method is also important in the planning of surgical procedures, monitoring and management of spinal

deformities, since it determines the severity of the curvature^[1].

Global Postural Reeducation (GPR), a method developed by the physiotherapist Philippe Souchart, was created in the 1980s. It consists of adjustments in posture to reorganize the segments of the human body, allowing the reorganization and rebalancing of the postural muscles. Identifies and stretches the muscles considered responsible for postural changes^[2].

Rudolf Klapp developed his method in 1940 after an observation about the fact that only bipeds present scoliosis, since the orthostatic position favors the appearance of the phenomenon. Working bipeds in quadruped position, the thoracic spine when horizontal would eliminate the force of gravity, the movements of the

rib cage would have greater amplitude and the spine would suffer maximum relaxation having a greater expansion and mobilization of the rib cage. Despite being a little researched technique, it is widely used in clinical practice in the treatment of scoliosis^[3].

Little is said about the effects of these methods in the treatment of scoliosis, even though they are techniques with evidence of good results when applied. Furthermore, their fundamental rehabilitation principles are consistent with the necessary intervention to reduce scoliotic curvature in patients with it. The objective of this study was to highlight the effects of the Klapp and RPG methods in the treatment of idiopathic scoliosis, comparing them with respect to post-intervention results.

II. METHODOLOGY

2.1 Sample

The sample universe was the University Center of Goiatuba - UNICERRADO, whose community, within the inclusion and exclusion criteria, was recruited. The sample was for convenience, with dissemination on institutional social networks and folders posted at strategic points on the campus, initially formed by 21 subjects and was reduced to 6, distributed equally and randomly in the Klapp, GPR and control groups, the latter only doing the initial and final evaluation.

Nine individuals were excluded from this study because they were not available to participate in the consultations, two after the radiographic examination did not find scoliosis, one in the postural evaluation because they did not present changes consistent with the pathology in question and 3 were excluded by the age criterion.

2.2 Procedures

At the beginning and at the end of the treatment, the individuals were submitted to a postural evaluation using a symmetrograph where the conducts were adopted for greater reliability of the evaluation, such as: distance of 15cm between individual and symmetrograph, the costumes should be bikinis or swimming trunks, in order to better visualize postural changes via bony prominences^[4]. All postural evaluations, at the beginning and end of the experiment, were performed by the same examiner, to avoid evaluation bias. The subjects' images were recorded using the Motorola G5s Plus® Smartphone Digital Camera, using 13 megapixel (MP) resolution.

The second evaluation was performed by radiographic examination (X-ray) of the spine with posteroanterior view to quantify the angulation of scoliosis based on the Cobb angle^[5]. The subjects underwent the X-ray in a hospital in

the municipality of Goiatuba on a previously scheduled date. After the initial evaluations, the subjects in their respective groups performed 9 sessions of 50 minutes each, distributed three times a week.

Both treatment groups received similar passive stretches, which are: paravertebral and gluteus stretches, hamstrings and sural triceps, quadriceps, biceps, brachioradialis, wrist and finger flexors, pectorals and anterior deltoid; neck region, in scalenes, trapezius, platysma and sternocleidomastoid. The stretches were performed up to the physiological limit respecting the individuality of each one and maintained at this threshold for 20 seconds.

The group that received the treatment with the GPR method performed two postures: frog on the ground and frog in the air, both with open arms. The postures were applied in 2 stages, the first being 5 minutes long and the second 10 minutes; with rest interval if necessary^[6]. In the Frog posture on the floor, the individual was instructed to lie supine on the stretcher, hip in semiflexion and rotated externally, knees in flexion, feet in dorsiflexion with heels together. The arms were placed in 90 ° abduction initially with supination of the forearm and finger extension. The Frog posture in the air was performed with the subject in supine on a GPR stretcher, hips at 90 ° of flexion with external rotation, knees semi-inflexed, feet in dorsiflexion and heels together, shoulders at 90 ° of abduction with supination of the forearm and extension of fingers^[7].

The group that received the Klapp method as treatment performed the postures: "lateral crawling" - quadruped position, with the hands directed inwardly, bringing the upper limb forward and the lower limb backwards on the side of the concavity, the head was kept turned to the convexity side; "Large arch" - quadrupedal position, extension of the upper and lower limbs on the concave side on a diagonal. The contralateral knee and elbow were kept close together; "Turning the arm" - position of cats, with upper limb on the concave side in extension and 90° abduction, performing a rotation of the trunk accompanied by the head also towards the side of the concavity; "Big curve" - extension of the upper and lower limbs on the side of the concavity. The postures were maintained for 5 minutes each^[3].

2.3 Inclusion and Exclusion Criteria

Subjects between 20 and 30 years old, of both sexes, with idiopathic scoliosis were admitted to this study. People with rheumatic, cardiac, pulmonary, neurological diseases, smokers, pregnant women, alcoholics and who do not have availability or agreement to participate in the sessions, were excluded from this study because they

presented less resistance to postures and pregnant women due to the fact that the exam is included in the evaluations. radiation that can pose risks to the fetus.

2.4 Data analysis

The parametric data were tabulated and statistically analyzed using the GraphPad Prism 7.0 software, where descriptive statistics were performed (means and standard deviation) and the results before and after the intervention were analyzed by the Anova Multivariate test with Bonferroni's post hoc test of multiple comparisons, considering the samples within the Gauss curve.

2.5 Ethical Issues

All volunteers received the appropriate guidelines for participation in the project, including the risks and benefits of the project, and agreed by signing the informed consent form established in accordance with Res. 466/12 CONEP. The research was authorized by the Human Ethics Research Committee of the Goiânia General Hospital Dr. Alberto Rassi by CAAE 93622618.0.0000.0035.

III. RESULTS AND DISCUSSION

After applying the inclusion and exclusion criteria and evaluation to confirm the presence of scoliosis, 6 subjects participated in the experiment, divided into the Control, Klapp and GPR groups.

The results of intervention are shown in table 1

Table 1: Cobb angle pre / post treatment

Groups	Pre (mean \pm SD)	Post (mean \pm SD)
Control	15 \pm 9.89	16 \pm 11.31
Klapp	19 \pm 4.24	15 \pm 7.07
GPR	26 \pm 19.79	21.5 \pm 16.26

$p > 0.05$

The results, although showing a reduction in the Cobb angle in both treated groups, showing clinical efficacy, were not statistically significant, and there was also no significant difference in the results between the groups analyzed.

The most relevant radiological images of each group were selected to visualize the scoliotic curve before and after the intervention period.

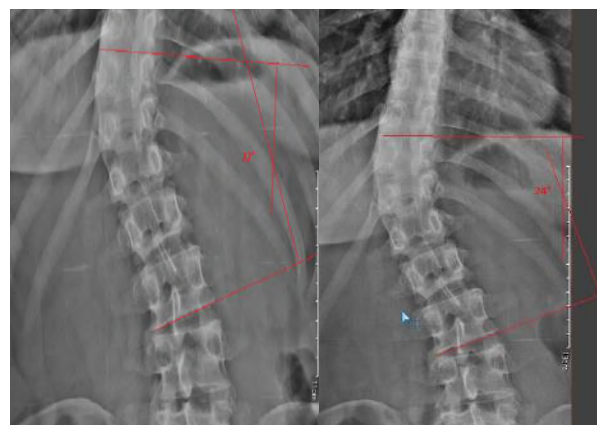


Fig. 1. Control Group A - Before B - After

Source: Authors' data.



Fig. 2. Group GPR A - Before B - After

Source: Authors' data.

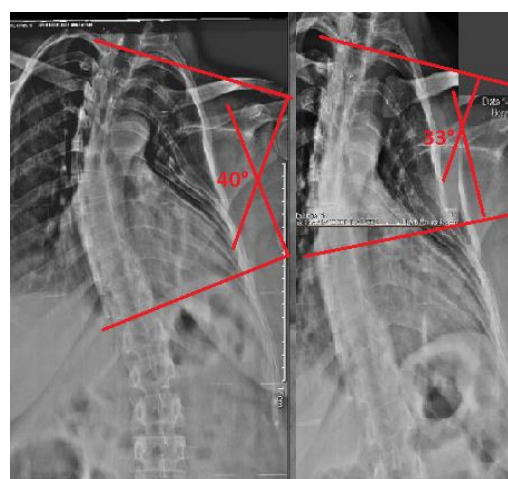


Fig. 3. Klapp Group A - Before B - After

Source: Authors' data.

At the end of vertebral growth, which occurs around 15 years of age, the spine becomes less flexible, thus making

its correction more difficult^[8]. Due to the rotation of the vertebrae, many authors believe to be irreversible and few believe in reducing scoliotic curvature^[9].

Although the Klapp method is little researched, it is present in the daily treatment of scoliosis, due to the fact that it is easy to apply, even in groups. It has as a disadvantage the difficult adherence by patients with older age, because the maintenance of postures is for long periods^[3].

The Klapp method was effective in improving the extensor muscles of the spine and prevented the progression of the angle of gibosity^[10], in addition to attenuation in body asymmetries after application of the method, but none of the authors used the angle as a parameter for scoliosis measurement. Cobb thus making the result of low reliability^[3].

In a study using stretching as a method of treating scoliosis for 40 sessions, a significant reduction in gibosity was detected. Stretching was part of both treatment programs done here, and it is believed that they participated in the subjects' scoliosis reduction process, although the authors cited did not quantify this reduction to serve as a co-collaboration parameter for the final result^[11].

In the study by Segura et al, 16 girls aged 10 to 17 years were selected, divided into 2 groups, one being treated with GPR and the other with Pilates for 20 sessions individually. At the end of treatment, a reduction of 1.87 ° in the Cobb angle of the Pilates group and 3.5 ° in the GPR^[12] group was reported. Here, even with only 9 sessions, a greater reduction in pathological curvature was achieved.

The Klapp method and the GPR are similar in terms of the development of flexibility and muscle tissue, as well as in the stimulation of motor learning in postural muscles. It is suggested to monitor the subjects treated for at least 6 months to 1 year, in order to identify the impact and maintenance of the long-term results of these effects^[11].

The Klapp method was more effective in treating trunk asymmetries when compared to those of the pelvis^[3]. There are reports that the same method was not effective in reducing body asymmetries^[11]. Both studies used computerized photogrammetry as a form of evaluation and 20 consultations were made per subject. Despite the reliability of computerized photogrammetry, studies are lacking on the measurement of the scoliotic curve. Here it was possible to notice a reduction in the curve with less than half of the sessions performed.

The GPR method was effective in reducing scoliosis after 5 sessions, although greater monitoring of patients to

verify the duration of the effects is recommended. This corroborates the result of this research, which with few sessions managed to reduce scoliosis, but it also shows the importance of medium and long-term monitoring to verify the maintenance of gains^[13].

The small sample size, as well as the few sessions made, is placed as biases for the result obtained. It is believed that in larger groups and with more sessions, the results are significantly positive regarding the scoliosis solution.

IV. CONCLUSION

According to the results obtained here, both methods were clinically effective in reducing the Cobb angle when compared to the control group. The results were not statistically significant, and it is believed that the reduced number is the main reason for the occurrence. It can be inferred that the number of sessions is also a factor of influence, although both treatments have reduced the scoliotic curve within the proposed time. There was no significant difference between the Klapp and GPR methods in the findings.

It is also important to emphasize that there is no evidence on the maintenance of post-treatment results, pointing out the importance of long-term monitoring. Further studies are needed on this topic.

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