34 - STABILIZING MUSCLES OF THE LUMBAR SPINE STRENGTHENING IN THE TREATMENT OF LOW BACK PAIN

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INTRODUCTION

Low back pain is a common disorder, debilitating and costly financeiramente1, 2. Epidemiological studies estimate that the prevalence of low back pain in the general population is between 50 and 80% 3. It is known that the etiology of localized pains column is multifactorial and may result from mechanical causes, degenerative factors or by psicossomáticas4 disorders, 5, and one of the changes associated with low back pain is muscle imbalance.

As an important risk factor for low back pain is muscle weakness of the muscles of the trunk and abdominais6-8. The strengthening of these muscles appears to be a viable alternative for the management of dor9, 10, including associated control nutricional11, the fisioterapia12, the use of ultrassom13 suíça14 and ball.

The two muscles most involved in these cases appear to be the lumbar multifidus (LM) and transverse abdominis (TA) 15. Pesquisas16-18 show that muscle dysfunction is a ML after the first episode of low back pain, the muscle mechanoreceptors deconditions and commits, they could not recover spontaneously, even with the reduction of pain. In healthy subjects the TA is contracted before the movements of the extremities to protect the column, while in individuals suffering from back pain before this contraction movements failed, triggering an inefficient muscular stabilization of the spine, thus requiring a treatment específico19, 20.

Figueiredo et al.21 cite three studies which were using needle electromyography and ultrasound real-time results show that the TA can be contracted in advance and in priority to other abdominal muscles during the depression of the abdominal wall, but despite the effectiveness of the equipment considered "gold standard", they have some limitations.

Still, according to the authors, due to the difficulty of using these laboratory devices in rehabilitation centers, it is essential to develop clinical techniques for evaluation and training of TA, one possibility being the use of Biofeedback Unit pressure (UBP), as the stabilizer. The UBP is a device developed by physiotherapists, which aims to quantify changes in pressure in an inelastic bag, sandwiched between the abdomen and the stretcher, during contraction of the TA, a correct contraction of the muscle in question resulted in a change in pressure recorded manômetro22.

The TA should be trained separately as one of the major muscles in the affected low back pain, losing its function tônica23 because its contraction through specific exercise significantly reduces the laxity of the sacroiliac joint, hence the use of such contractions may be useful for the treatment of lombalgia24.

In addition, this training provides the individual a stabilizer improves the automatic stabilizers synergism of other muscles, being rich in proprioceptive stimulation, giving it an improved performance of their atividades25.

Based on the dysfunctions of the stabilizing muscles of the spine, this research was to evaluate the effect of an exercise protocol in the treatment of low back pain, emphasizing the strengthening of the TA muscle in order to provide the patient with greater body awareness and efficiency of muscle contraction, by monitoring with the UBP.

MATERIALS AND METHODS

This research was characterized as an experimental study of randomized clinical trial. The study was conducted on the premises of the School of Physical Therapy Clinic of the Anglo-American School of Foz do Iguaçu, in the period from September to October 2009.

The sample was initially composed by 21 subjects, aged between 20 and 60 years, of both genders, with a clinical diagnosis of low back pain. However, three subjects were excluded from the sample because they had herniated discs. Thus, the remaining 18 subjects were randomly divided into two groups: treatment group (TG) and control group (CG).

The GT was subjected to an exercise protocol based on the method of segmental stabilization through proprioceptive exercises focusing on TA muscle, while the CG did not receive the intervention, was observed only with the intention of checking the natural evolution of the pathology .

Three subjects dropped out of the GT treatment for personal reasons. Thus, the GT at the end was composed of six of nine subjects and the GC.

Both groups underwent an initial assessment including: 1) identification and history, 2) completing the questionnaire McGill26 pain, which is composed of 78 descriptors that evaluate the characteristics of pain and its intensity, 3) completing the questionnaire of Roland -morris27, which consists of 24 items on the interference of back pain in activities of daily living and life skills, and 4) test transverse abdominal muscle activation, through the use of the stabilizer unit, brand Chattanooga22, inflating the manometer to 70 mmHg and requesting the contraction of the TA.

Stabilizer for the use of the patient was positioned prone, with the device in the region of the TA, held after inspiration and expiration associated with contraction of isolated muscle, a contraction of the TA correct results in reduced blood pressure greater than or equal to 4 mmHg21.

After application of the exercise protocol, both groups were reevaluated. One researcher was responsible for the history and application of questionnaires, both the beginning and end of the protocol, while another researcher performed the measurements of TA muscle activation.

Research volunteers were instructed to practice the exercises below, aimed at stabilizing muscle proprioception of the lumbar spine and postural positioning.

The protocol was applied for 25 sessions, divided into three phases: I) preparation (1 to 25 of treatment) and ii) two stages of specific training: cognitive and associative (6 th to 15 th service), and III) stage autonomous and functional training (16 º to 25 º care). The proposed therapy was applied three times a week, with an average of 40 minutes each, always observing the importance of palpation and verbal command.

The following describes each phase of the exercises:

Phase I: a) heating and mobility: the patient was asked to perform scales anterior-posterior and lateral-lateral hip on the Swiss ball, repeating 10 times every movement, and rotational motion on the Swiss ball (10 times to the right and 10 to the left) (adapted from Craig28), b) manual therapy (technical gear): patient prone, rolling apply T10 to the sacral region for 2 minutes, bilaterally to the spinous processes (adapted from Guirro and Guirro29), c) diaphragmatic breathing (Sarmento30), repeating 5 times and controlled via palpation and verbal command.

Phase II (cognitive stage): a) patient in the supine position, asked if the contraction of the rectus abdominis, TA later and eventually muscle contraction of the perineum, 5 repetitions. b) held a three-simultaneous contraction (rectum and perineum TA) contraction for 5 seconds and relax for 10 seconds, 10 repetitions.

Phase II (associative stage): three-simultaneous contraction of muscle training and relaxation for 10 seconds 5 seconds, in two different positions: sitting patient and extent of the lower limbs cinnamon 1 kg (5 repetitions for each member) and patient standing and half-squat (about 30 degrees of knee flexion and trunk leaning against the wall, 10 repetitions).

Phase III (autonomous stage and functional training): a) tri-simultaneous contraction of the muscles in training, 20 seconds of contraction and relaxation 10 b) motion to sit / stand, then full squats leaning on backrest with 5 repetitions each c) mini-circuit: walk 10 meters with obstacles, climbing ramp and fall down the stairs (stair-ramp), take 1 kg object on the floor, load it and put it back on the floor, filling the bladder (balloon) and secure it in place above the shoulders (2 repetitions).

The study was approved by the Ethics Committee of Faculty and Research Assis Gurgacz, Opinion no. 251/2009. All signed an informed consent.

The results were obtained by statistical analysis with the Student t test and Wilcoxon test, using Graphpad Instat software version 3.05. We calculated the mean values, standard deviation and values obtained with the subtraction of the values collected in the pre-and post-implementation of the McGill questionnaire, Roland-Morris and contraction of the test performed by device stabilizer.

RESULTS

Table I presents the data of the study. You can see the values obtained with medium and (difference) between the GT and GC, respectively, before the application of forms of assessment used.

Table I: Comparison of mean values and standard deviation obtained through the evaluation forms used.

	Treated group		Control group		Δ between GT and GC		
	Pre	Post	Pre	Pre	Post	Pre	P
McGill	48,7±4,9	39,2±10,4	40,3±9,4	41,4±7,9	9,5±10,9	-1,1±7,9	0,0599
Roland-Morris	13,7±4,3	5,2±3,1	8,9±5,1	9,6±5,1	8,5±3,9	-0,7±1,1	<0,001*
Stabilizaer	85,0±3,2	65,3±2,5	80,1±5,0	80,8±5,4	19,7±5,1	-0,7±1,2	<0,001*

*:Statistically significant

After statistical analysis of comparisons values (difference) between the GT and GC, referring to the McGill questionnaire data, the p value was 0.0599, considered not significant.

However, when comparing the values obtained between the GT and GC with the Roland-Morris questionnaire, and test the transversus abdominis muscle contraction, using the stabilizer, we found values of p <0.001 for both considered extremely significant.

DISCUSSION

There is evidence that activities related to motor control, implemented as treatment programs and exercícios12 including physiotherapy, manual therapy and reeducação31 or containing only manual32 therapy are more effective than drug treatment in cases of chronic low back pain.

Similar events were observed in systematic reviews of Van Tulder et al.33 and Ferreira et al.34, who found that exercise therapy is more effective than usual medical approach in treating chronic back pain, in order to improve pain, the function and quality of life, including how to prevent episodes of recurrence.

These findings with the results of this work, especially with regard to the function back, after all the Roland Morris questionnaire represents an important tool for evaluating patients with low back pain, especially in studies clínicos27.

The literature review carried out by Gouveia and Gouveia20 clarified and strengthened the role of the TA muscle as a stabilizer back, its relationship with low back pain and the importance of specific training to improve their function.

Santos and Freitas25 also include other muscles responsible for stability, diaphragm, multifidus and pelvic floor. In the work of Fozatti et al.35, the authors observed that the balance between lumbar lordosis, the TA muscle, diaphragmatic motion and the axis of rotation of the coxofemoral joints, can be considered as a basic principle of treating stress incontinence by postural reeducation. Thus, the importance of the TA muscle exercises focused not only have benefits for low back pain.

Commenting on the acceptance of treatment, Wilson et al.36 reported that despite the contraction of these muscle groups increase the stiffness of the trunk with minimal load to the lumbar spine, the technique is not always easy for all patients, a fact which was not observed in this study. The subjects had no difficulty when performing the exercises.

In the review of France et al.15 The authors report that the exercises of segmental stabilization in low back pain have an important role in preventing the recurrence of low back pain, because these exercises restore the protective function of the deep muscles, and are specific to avoid overloading damaged structures. This fact could not be observed in this study, because the monitoring of the subjects occurred only during the treatments.

Figueiredo et al.21 evaluated the intra-examiner and between the use of the stabilizer during contraction of the TA muscle and concluded that the use of this tool should be encouraged in clinical practice because of its relevance, simplicity and safety reasons. A similar conclusion also found in the study of Costa et al.37, which describe the use of tests and palpation of the stabilizer for the analysis of TA muscle activation is reliable, even emphasizing that these methods of analysis should be encouraged because of its relevance, simplicity and safety reasons.

Following the line of the studies cited during this study sought to keep all procedures in a standardized way to avoid possible errors in the tests, including the placement of volunteers, calibration of the UBP and the movements that could influence the results, as respiratory movements, for example. In addition, the examiner underwent prior training to minimize possible errors.

In assessing pain, McGill26 questionnaire is widely used, including research linking the use of exercises on the ground or to the aquatic environment in the treatment program of low back pain, such as Norris and Matthews38, Waller et al. 39

and Hough et al.40. However, despite this variable in evolution with reduction of the GT score of the questionnaire in relation to GC after applying the proposed protocol of exercises, there was no statistical significance.

CONCLUSION

The proposed protocol of exercises to strengthen the stabilizing muscles of the lumbar spine resulted in improvement of lumbar function, improved muscle activation and TA did not significantly interfere in pain.

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STABILIZING MUSCLES OF THE LUMBAR SPINE STRENGTHENING IN THE TREATMENT OF LOW BACK PAIN

ABSTRACT

Background: The high prevalence in the population and the significant negative social and economic impact generated by the cases of disability justify the importance of the study of low back pain. Objective: Evaluate the effect of an exercise protocol to strengthen the stabilizing muscles of the lumbar spine in the treatment of low back pain. Methods: The proposed protocol was applied in 15 subjects randomly assigned to two groups, treated (TG) and a control group (CG), aged between 20 and 60. Methods of assessment questionnaires were used to McGill and Roland-Morris and stabilizer pressure biofeedback unit. The TG was submitted to an exercise protocol, based on the segmental stabilization, which emphasizes the strengthening of the transversus abdominis muscle. The CG did not receive the intervention. Results and conclusion: The results were that the TG presented significant improvement of lumbar function, the transverse abdominal muscle activation (both $p < 0.0001$) and clinical improvement of pain, but not statistically significant ($p = 0.0599$).

KEYWORDS: low back pain; exercise therapy, physical therapy.

RENFORCEMENT DES MUSCLES STABILISATEURS DE LA COLONNE LOMBAIRE LOMBAIRE DANS LE TRAITEMENT DE LOMBALGIES

SOMMAIRE

Introduction: La prévalence élevée dans la population et l'impact négatif significatif socioéconomiques engendrés par les cas de handicap ne justifie l'importance de l'étude de la douleur dorsale. Objectif: évaluer l'effet d'un protocole d'exercice pour renforcer les muscles stabilisateurs de la colonne lombaire dans le traitement de la lombalgie. Méthodologie: Le projet de protocole a été appliqué dans 15 sujets répartis aléatoirement en deux groupes, l'un traité (GT) et un groupe contrôle (GC), âgés entre 20 et 60. Comme les méthodes de questionnaires d'évaluation ont été utilisés de McGill et de Roland-Morris et stabilisateur de biofeedback pression. Le GT a été soumis à un protocole d'exercice basé sur la méthode de stabilisation segmentaire, en insistant sur le renforcement musculaire abdominale transversale. Le CG n'a pas bénéficié de l'intervention. Résultats et

conclusion: Les résultats ont montré que la GT a été une amélioration statistiquement significative de la fonction de retour, l'activation du muscle transverse de l'abdomen (les deux p <0,0001) et l'amélioration clinique de la douleur, mais non statistiquement significative (p = 0,0599).

MOTS-CLÉS: douleurs lombaires, une rééducation, la physiothérapie.

FORTALECIMIENTO DE LOS MUSCULOS ESTABILIZADORES DE LA COLUMNA LUMBAR EN EL TRATAMIENTO DEL DOLOR DE ESPALDA

RESUMEN

Introducción: La alta prevalencia en la población y los importantes efectos socioeconómicos negativos generados por los casos de discapacidad justifique la importancia del estudio del dolor de espalda. Objetivo: Evaluar el efecto de un protocolo de ejercicios para fortalecer los músculos estabilizadores de la columna lumbar en el tratamiento del dolor de espalda baja.

Metodología: El proyecto de protocolo se aplicó en 15 pacientes divididos aleatoriamente en dos grupos, uno tratado (GT) y un grupo control (GC), con edades comprendidas entre 20 y 60. Como métodos de cuestionarios de evaluación se utilizaron McGill y Roland Morris y unidad de estabilización de la presión de biofeedback. El GT fue sometido a un protocolo de ejercicio basado en el método de estabilización segmentaria, haciendo hincapié en el fortalecimiento transversal de los músculos abdominales. La CG no recibió la intervención. Resultados y conclusiones: Los resultados mostraron que el GT fue una mejoría estadísticamente significativa en función de la espalda, la activación del músculo transverso del abdomen (ambos p <0,0001) y la mejoría clínica del dolor, pero no estadísticamente significativo (p = 0,0599).

PALABRAS-CLAVE: dolor de espalda, terapia de ejercicios de fisioterapia.

FORTALECIMENTO DOS MÚSCULOS ESTABILIZADORES DA COLUNA LOMBAR NO TRATAMENTO DA LOMBALGIA

RESUMO

Introdução: A alta prevalência na população e o expressivo impacto socioeconômico negativo gerado pelos casos de incapacidade justificam a importância do estudo das dores lombares. Objetivo: Avaliar o efeito de um protocolo de exercícios de fortalecimento dos músculos estabilizadores da coluna lombar no tratamento da lombalgia. Metodologia: O protocolo proposto foi aplicado em 15 sujeitos divididos aleatoriamente em dois grupos, um tratado (GT) e um controle (GC), com faixa etária entre 20 e 60 anos. Como métodos de avaliação foram utilizados os questionários de McGill e Roland-Morris e a unidade de biofeedback pressórico stabilizer. O GT foi submetido a um protocolo de exercícios, baseados no método de estabilização segmentar, enfatizando o fortalecimento do músculo transverso abdominal. O GC não recebeu a intervenção. Resultados e conclusão: Os resultados obtidos foram que o GT apresentou melhora estatisticamente significativa da função lombar, da ativação do músculo transverso abdominal (ambos com p<0,0001) e melhora clínica da dor, porém não estatisticamente significativa (p=0,0599).

PALAVRAS-CHAVE: dor lombar; terapia por exercício, fisioterapia.