



## SEGMENTAL STABILIZATION AND AUSSIE CURRENT IN WOMEN WITH NONSPECIFIC CHRONIC LOWER BACK PAIN

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### ARTICLE INFO

#### Article History:

Received 02<sup>nd</sup> September, 2018  
Received in revised form  
14<sup>th</sup> October, 2018  
Accepted 06<sup>th</sup> November, 2018  
Published online 31<sup>st</sup> December, 2018

#### Key Words:

Segmental Stabilization,  
Electrotherapy,  
Nonspecific Lower back pain.

### ABSTRACT

**Introduction:** Lower back pain impacts almost 80% of the population. A lower back's is taken as non-specific when there is not a closed clinical diagnosis. This paper compared the outcomes with the segmental stabilization and the Aussie current's usage in an isolated and joint form for the treatment of lower back pain. **Materials and Methods:** This is an analytical clinical trial, with a control group which was a subproject of the research named "Physiotherapeutic performance in orthopedic and sports dysfunctions" endorsed by the opinion of number 2,418,872. The sample was comprised by 24 assessed subjects, before and after interventions, through the Visual Analogue Scale and the Start Back and Rolland Morris questionnaire. Afterwards, they were shared among the treatments's protocol with (1) isolated segmental stabilization, (2) Aussie isolated current, (3) segmental stabilization + Aussie current, and (4) control group. The data analysis was done by the Statistical Package for the Social Sciences program 22.0 version with the paired t-Student test, Wilcoxon and Kruskal Wallis. The level of confidence was 95% ( $p < 0,05$ ). **Results:** It was noticed that the Aussie current, in an isolated way ( $p = 0,027$ ) and / or incorporated with the segmental stabilization ( $p = 0,047$ ) led to greater outcomes. **Conclusion:** It was settled that the Aussie current was seen as the a better option to decrease pain.

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Citation: João Cambuí Silva Neto, Leonardo Silva Lima, Lucas Freitas Santos et al., 2018. "The effect of dm control behavior on patient blood sugar levels in anutapura general hospitalpalu", *International Journal of Development Research*, 8, (11), 24787-24791.

### INTRODUCTION

Lower back pain is one of the main causes of disability being encountered in approximately 80% of the population (FURTADO *et al.*, 2014). In line with to Benvenuti (2016) who point that the female population is inclined to the develop nonspecific lower back pain. Such fact is clarified because women are submitted to a gradual process of loss of muscle mass during their life, being predisposed to painful symptoms in the lower back region. In spite of these numbers, a specific diagnosis regarding the possible causes of lower back pain is not decisive between 90-95% of the cases, once this pain displays a multifactorial character (O'SULLIVAN, 2010). A lower back pain complain is taken as nonspecific when there is not a closed clinical diagnosis, it may be categorized because of the discomfort and muscle fatigue framework from the last costal ribs to the gluteal fold (KNOX, 2018).

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The health professionals looks for detecting the several etiological factors that provide the emergence of the symptoms of the nonspecific lower back pain that can be identified in numerous manners like muscular, bone, joint and neural pain. The symptoms labelling helps to select the best treatment option. Among the therapeutic proposals displayed in the literature, we particularly emphasize the segmental stabilizations and electrotherapy (GHORBANPOUR *et al.*, 2018; JUNIOR, 2005). Among some techniques applied to decrease the pain of the lower back segment, the segmental stabilization exercises promote the activation of the intrinsic lower back multifidus, Transverse Abdomen, and pelvic floor muscles through isometric contraction. The isometric exercises are valuable because they act as a reeducation in the deep muscles (YUNG, 2018). Another technique frequently used as a feature to decrease lower back pain is electrotherapy, which the usage of electric currents such as Aussie favors the pains' decrease. The current Aussie or Australian current is a physiotherapy technique inside the package of various currents

that the electrotherapy offers to deliver the sensory and motor stimulation. This current is able to conduct a stimulus with minimal discomfort because it is a medium frequency current (4000Hz or 4kHz) and because it uses the Burst modulation in a short period, becoming this way even more comfortable (4ms) (CAMARGO, 2011). In light of the foregoing and noticing the negative repercussion for pain and functionality in women with nonspecific lower back pain, it is of central importance to know the most successful methods for subjects' recovery. This way, this research seeks to compare the outcomes gotten from the segmental stabilization and the use of the Aussie current in isolation and a combined usage of these techniques.

## MATERIALS AND METHODS

The current study addresses a controlled and randomized clinical trial, which is a subproject of the study named "Physiotherapeutic performance in orthopedic and sports dysfunctions", presented and endorsed by FAINOR Research Ethics Committee (CEP / FAINOR) through the approval number: 2,418,872. The study was held in the Human Performance Laboratory of a private college in the city of Vitória da Conquista-BA, situated in the southwest region of Bahia. The subjects who comprised the sample were recruited through spontaneous demand, and had to adopt the respective inclusion criteria: Women aged 18 to 30 years who reported having nonspecific lower back pain which persisted for a period of three months in a back region between the lower ribs and the gluteal fold (KOVACS *et al.*, 2003). There were removed participants who accomplished other analgesia activities and the ones who were in the gestational term, in extended drugs usage and with a history of lower spine fracture. After the criteria's adoption, the final sample was composed by 24 women, who replied a structured questionnaire and scientifically validated forms, which were respectively the Start Back Screening Tool (SBST) (PILZ, 2014) to examine the patients' prognosis and the Roland Morris Disability Questionnaire (RMDQ) and to measure functional incapacity (MONTEIRO, 2010), besides answering the Visual Analogue Scale (VAS) that in a subjective way allows us to check the pains' intensity (MARTINEZ *et al.*, 2011). The VAS encompasses scores from zero (0) to ten (10), in which are determined the cutoff point in the subsequent sequence: it is rated from zero (0) to two (2) as mild pain; between three (3) and seven (7) as moderate pain; and between eight (8) and ten (10) as severe pain. The RMDQ is fast and easy to be applied, with the average answering time of five minutes. The score is got by the items total sum, which vary from zero (no inability) to 24 (severe inability). Values above 14 points to physical disability. The SBST questionnaire is comprised by nine items, four concern referred pain, dysfunction, and five items constitutes the psychosocial subscale (items 5 to 9) regarding discomfort, catastrophization, fear, anxiety and depression. For the questionnaires' raking and classification, the patient had as options "I agree" and "I Disagree" in the first eight items, with the first option graded with one point, and the second option graded zero. The ninth item presented five options: "Nothing, Little, Moderate, A lot, Extremely", with the first three options being graded with zero, and the last two with one point each. If the total score is between 0-3 points, the patient is categorized with lower risk. For higher values above 3 in the total score we consider then the psychosocial subscale rates comprised by questions 5-9. If the scoring of this subscale is  $\leq 3$  points, the patient is

categorized with medium risk and, if it is  $> 3$  points, they fit in the high-risk group. After it, the volunteers were split randomly in four (4) intervention groups with six (6) participants in each group, them being: one (1), Aussie current (AC), two (2), segmental stabilization (SS), three (3) segmental stabilization + Aussie current (SS + AC), and four (4), control group (CG). The SS group volunteers carried only the isometric strengthening exercises protocol combined with diaphragmatic breathing, while the AC participants just had the pain control therapy by the Aussie current, on the other hand the SS + AC volunteers performed both SS and AC. The CG were the subjects that did not go through any treatment. The SS volunteers' group treatment was implemented with two session per week with duration of 40 minutes each session in a four week period, being conducted with group of six patients with the therapist giving auditory and tactile stimuli for the appropriate execution of the exercises, the second group with six AC volunteers, the third group with six volunteers with SS + AC, and the fourth group with six volunteers as the CG.

The SS Group one (1), was enlisted at the start of the pre-established protocol. In the first week, there was the first contact with the volunteers that was done during the first session, primarily the body awareness-raising, formed by three phases: one (1), diaphragmatic respiration, in which the subject was firstly instructed to inhale through the nose and exhale through the mouth, just with abdominal movement during the respiratory cycles; two (2), expiration with the transverse muscle abdomen contraction; and three (3), diaphragmatic respiration with the transverse abdomen contraction as well as the pelvic floor. In the second session, after the corporal awareness raising on the first session we directed to the first protocol's exercise that being the bridge exercise, with the subject in supine position with flexed knees and elevation of the pelvis, this was done in eight times of 40 seconds. After this, the second exercise started that was the bridge with leg elevation it was completed alternately, the participant positioned in supine position in the stretcher, with knees flexed, elevation of the pelvis and elevation of one leg at a time, this was done four times of 40 seconds in each member. In the second week, occurred the fourth and fifth sessions where the volunteers with good body awareness and execution got during the first week carried the bridge exercise, with the volunteer in bench press with her knees flexed and elevation of the pelvis during eight times of 40 seconds. The second exercise was the lateral bridge done on both sides, with supine position on a stretcher with the flexed elbow at 90 degrees and elevation of the pelvis, being executed four times of 40 seconds on each side.

In the third week, the fifth and sixth sessions happened with the advance of exercise execution and body awareness in the first and second weeks. The pre-established protocol was followed with the bridge exercise the subject in supine position, with the knees flexed and the pelvis elevated, during eight times of 40 seconds. After it, the second exercise was the Swiss ball bridge conducted with the subject in supine position on a stretcher, with knees extended, feet supported on Swiss ball and pelvis elevated, it was done eight times with 40 seconds. In the fourth week, the seventh and eighth sessions happened after gradual upgrading of the previous three weeks, at the last week the bridge exercise was done with the individual on supine position with knees flexed and pelvic elevation, for eight times of 40 seconds. As a result, the second exercise that was the Swiss ball bridge started with leg

elevation and Swiss ball slip this exercise was carried bilaterally, the subjects positioned on the stretcher, with the knees bent, with the feet supported by the Swiss ball, with pelvis and one leg elevated and with the contralateral leg descending the ball in a cranial direction, and keeping for 40 seconds four times in each limb.

Group 2 (2) of AC was recruited to begin the pre-established protocol. The volunteers were guided on the goal of the electric current, which feeling would be experienced according to the rise in intensity. The Aussie current was applied with analgesic purpose and there were used the respective parameters: Carrier frequency: 4 KHz; Burst duration: 4 ms; modulated frequency: 50 us; stimulation mode: continuous; Treatment time: 30 min \* and intensity related to the patient's perception of gradual growth (CAMARGO, 2011). After the parameters setting, two channels with four electrodes that were positioned in a crosswise way in the low back region, with first circuit being filled with an electrode of five centimeters next to the transverse process of the first right vertebra and another electrode of five centimeters placed to the left of the gluteal fold, conversely the second circuit was completed with an electrode of five centimeters on the side of transverse process of the first left vertebra and another electrode five centimeters on the right of the gluteal fold. It was highlighted that before the electrodes positioning the patient's cutaneous sensitivity was assessed with using the Esthesiometer that is Semis-Weinsten instrument ®.

Group three (3) of SS + AC was enrolled to begin the pre-established protocol. That comprised combined therapy of SS associated to AC respectively, obeying the time and form of application of the group one and two techniques in group.

Group four (4), constituting the CG group, the volunteers were assisted for the same period of the groups before mentioned, nevertheless these participants were the ones who did pass through any treatment. The interventions happened with all groups twice a week for four weeks, resulting in eight sessions. At the end of the final intervention, the individual were requested to return after two days so that the assessments instruments of pain and functionality, originally used were reapplied and the reassessment performed with the participants. For the data analysis, we employed descriptive statistics with absolute, mean and standard deviation distributions and in the Statistical Package for the Social Sciences software 22.0 version. For the effects comparison before and after intervention, it was performed the paired t-Student test, the Wilcoxon test and the Kruskal Wallis test to detect the risk categories and the best evolutions in line with the technique. For all assessments, the reliability level was 95% ( $p < 0.05$ ).

## RESULTS

Table 1 shows the outcomes of the mean regarding the pain score level which was assessed by the VAS, and the functional incapacity, assessed by the Rolland Moris questionnaire, before and after intervention. Concerning the pains' level, it is possible to check that both variables had a decrease in the scores in all groups, nevertheless it is perceived that these reductions were significant just for the groups that used the Aussie current, ( $p = 0.027$ ) and / or he integrated with the segmental stabilization ( $p = 0.047$ ). When examining the functional incapacity, similar discoveries were observed

regarding the pain's level, with reduction for all groups, but with significance only for the groups that used the Aussie current in isolation or combined with segmental stabilization ( $p = 0.049$  and  $0.042$ , respectively). It is noted that when checking the techniques' efficiency in the study's variables, the group of segmental stabilization protocol combined to the Aussie current displayed a higher evolution percentage. The variations for both VAS and physical incapacity are different for the groups ( $p = 0.017$  and  $p = 0.048$ , respectively). When assessing the STarT Back, it was found a risk improvement regarding the poor prognosis, of which cases of medium risk for SS and AC were abolished and the ones of high risk for SS + AC group. There was not displayed any alteration in the control group. The categorical variance was not shown in a considerable way, as displayed in Table 3.

**Table 1. Samples' Assesment and reassessment. Vitória da Conquista - BA, 2018**

Variables	Pre mean ± Standard Deviation (n = 6)	Post mean ± Standard Deviation (n = 6)	p*
<b>Pain levels, VAS<sup>o</sup></b>			
SS <sup>1</sup>	6,5 ± 2,07	5,0 ± 2,28	0,191
AC <sup>2</sup>	5,50 ± 2,07	3,33 ± 2,42	0,027
SS + AC <sup>3x</sup>	7,2 ± 1,30	3,20 ± 2,58	0,047
CG□	4,0 ± 0,89	3,5 ± 0,83	0,203
<b>Physical disability, RM<sup>**</sup></b>			
SS <sup>1</sup>	5,0 ± 4,0	3,16 ± 3,06	0,058
AC <sup>2</sup>	7,16 ± 2,63	3,0 ± 2,75	0,049
SS + AC <sup>3x</sup>	9,0 ± 4,18	3,5 ± 4,41	0,042
CG□	3,83 ± 2,13	2,93 ± 1,63	0,06

\*paired t-Student Test; <sup>o</sup> Visual Analogue Scale ; \*\* Rollande Morris; <sup>1</sup> Segmental Stabilization ; <sup>2</sup> Aussie current; <sup>3</sup> Segmental Stabilization + Aussie Current; □ Control; x n = 5; Source: Research data.

**Table 2. Evolution of the pain's level and physical incapacity of the sample. Vitória da Conquista - BA, 2018**

Variables	Average difference	% in gains
<b>Pain levels<sup>o</sup>, VAS<sup>o</sup></b>		
SS <sup>1</sup>	1,5	23
AC <sup>2</sup>	2,17	39,4
SS + AC <sup>3x</sup>	4	55,5
CG□	0,5	12,5
<b>Physical Incapacity, RM<sup>**</sup></b>		
SS <sup>1</sup>	1,84	36,8
AC <sup>2</sup>	4,16	58,1
SS + AS <sup>3x</sup>	5,5	61,1
CG□	0,9	23,4

\*Kruskal Wallis non parametric test; <sup>o</sup> Visual Analogue Scale; \*\* Rollande Morris; <sup>1</sup> Segmental Stabilization; <sup>2</sup> Aussie Current; <sup>3</sup> Segmental Stabilization + Aussie Current; □ Control; x n = 5; Source: Research data.

**Table 3. Evolution of the risk of poor prognosis. Vitória da Conquista - BA, 2018**

SBST <sup>**</sup>	Assessment (n = 6)	Reassessment (n = 6)	p*
<b>SS<sup>1</sup></b>			
Low	5 (83,3)	6 (100,0)	0,317
Average	1 (16,7)	-	
<b>AC<sup>2</sup></b>			
Low	5 (83,3)	6 (100,0)	0,317
High	1 (16,7)	-	
<b>SS + AC<sup>3x</sup></b>			
Low	2 (40,0)	4 (80,0)	0,18
Average	2 (40,0)	1 (20,0)	
High	1 (20,0)	-	
<b>CG□</b>			
Low	6 (100,0)	6 (100,0)	1

\* Wilcoxon non parametric test; \*\* STarT Back Screening Tool; <sup>1</sup> Segmental Stabilization; <sup>2</sup> Aussie current; <sup>3</sup> Segmental Stabilization + Aussie Current; □ Control; x n = 5; Source: Research data.

## DISCUSSION

The present paper compared the outcomes of lower back segment stabilization and Aussie current exercises in decreasing the pain's framework and functional inability in women with chronic nonspecific lower back pain. It was noticed that the segmental stabilization linked to the AC displayed better outcomes to analgesia and functional incapacity than the isolated application of the Aussie. That way, the study bears the idea that segmental stabilization was a way of maximizing the effects of AC once segmental stabilization in an isolated way did not show benefits. Chronic pain control by means of the Aussie current happens by the release of endogenous opioids through the activation of the ABeta nerve fibers and the ADelta and C fibers, just as the discharge of neurotransmitters in the central nervous system in a longer way (MELZACK, WALL and PANTALEÃO *et al.*, 2011). It is reinforced that few studies show the physiological processes produced during the decreasing effects of the pain framework that AC promotes, nevertheless it is supposed that just as the transcutaneous electrical stimulation (TES), this process happens by adjustment that strengthens the analgesic effect. The author used the pains barriers by pain's pressure and temporal sum, showing that the AC applied with a 4KHz frequency has a straight impact on the pain's mechanism, an outcome that substantiates other studies (WARD *et al.*, 2002; WARD; OLIVER, 2007; WARD *et al.*, 2009). Agripino (2017) emphasizes that there is a lack of randomized studies to evidence such effect, because in his study the author noticed from the outcomes of the temporal sum that these hypoalgesia mechanisms come from the central sensitization and the central nervous system excitability (CNS) answering to the stimulus, this way the AC may display analgesic properties regarding the possible inhibitory action of nociception in the CNS. In accordance to Corrêa et al. (2016), in controlled study within a period of four weeks had as goal to check the impacts of an isolated medium-frequency current for analgesic ends using two different guidelines, presented beneficial effects in the pain's treatment, which settles the outcomes encountered in the current study, supporting the idea and substantiating the results that the electroanalgesia of medium frequency exhibit important results in hyalalgesia. It was detected in the current paper that the physical incapacity measured by Rolland Morris, had better outcomes for the segmental stabilization group combined to the Aussie current.

The SS entails the contraction of the deep upper body muscle, transverse abdomen, multifidus, pelvic floor linked to abdominal breathing like an essential therapeutic agent to decrease pain and physical incapacity (LEITE *et al.*, 2008; FERREIRA, PEREIRA, 2010). In Perreira et al. research (2010), which was conducted with 12 women with nonspecific lower back pain, with the mean age of 20.66 + 3.74 years, it was done 12 sessions of a protocol using SS twice a week, in which was assessed the the functional capacity using the Rolland Morris questionnaire before and after the intervention it was seen improvement of women's functional capacity ( $p < 0.0001$ ) after the intervention period. These evidences lead to the comprehension that SS is an efficient therapeutic mechanism for the functional incapacity, although the majority of the investigations display SS in an isolated way (Bottamedi *et al.*, 2011; Souza *et al.*, 2010). Nevertheless, in the current paper the SS group was not likely to reveal the physical incapacity enhancement, therefore being able to predict that the decrease of the physical incapacity arose from the pains'

reduction provided by AC. This understanding carries an idea of SS chronicity effects of which the current study with four weeks a protocol using the same technique did not demonstrate success and that earlier way the SS just amplified the analgesic effects of the Aussie current. At the Start Back Screening Tool assessment, it was displayed that the participants' prognosis is good. This outcome was already hoped in face of pain's reduction and enhancement of the participants functional capacity as stated previously. The SS is described by different studies as useful for pain and functional incapacity in studies with longer protocols (CARVALHO *et al.*, 2011; SOUZA *et al.*, 2010). Nevertheless, with the outcome here obtained with a shorter protocol which was different from the other studies, because SS was the factor that stayed in the second plan powering this way the AC impacts for the pain's early treatment. The current paper reported some shortcomings such as withdrawals or deletion of some participants since they did not comply properly with the scheduled procedures, but it did not negatively affects the outcomes. In spite of the important indications found here to pains' reduction through AC, more studies are required to comprehend its mechanism, once in the current study the purpose was not to assess the possible activated analgesic route, so it was not possible to assert which would be the mechanism for that effect. Further scientific studies with the same methodology and bigger samples are needed to expand the subjects' understanding and to get the possible mean that resulted in better outcomes of the AC against SS in the pain's treatment.

## Conclusion

The present paper is of innovative nature for linking SS with AC that is not explored enough by the researchers and it comes to extend to the scientific community just as to bring additional proposals for the clinical practice. It may be settled that SS combined with AC was taken as the main method for the treatment of nonspecific chronic lower back pain, accompanied by the isolated AC, so it is suggested the usage of the AC combined with SS in the clinical practice for physiotherapists who are treating nonspecific chronic lower back pain. However, it is imperative to highlight that there was a struggle to encounter studies in the scientific literature to supplement the discussion on account of the innovative study's nature aside from promoting new studies development.

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