226 - COLD AND PRESSURE PAIN THRESHOLD EVALUATION IN HEALTHY INDIVIDUALS SUBMITTED TO INTERFERENTIAL CURRENT WITH 4000 HZ

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INTRODUCTION

According Latremoliere (2009), nociceptors play an important role in protecting the individual. They help prevent injuries by generating both a withdrawal reflex to the stimulus, as an unpleasant sensation painful, resulting in complex behavioral strategies to avoid further injury.

The pain intensity can be measured using the Visual Analogue Scale of Pain (VAS). This technique has proven its effectiveness in previous studies. It consists of a horizontal bar, with its left end in zero, ie any sensation of pain, and the right end of the numerical value of ten, ie, the most severe pain possible. It is then a horizontal bar that has a slit in it, in which the individual uses to inform, in a subjective way, the intensity of their pain (ADEDOYIN; OLAOGUN; FAGBEJA, 2002; DEFRIN; ARIEL; PERETZ, 2005).

Another method of measuring pain is the pressure algometer. It is predominantly a manual process that requires a response of the perceptual evaluated. Its reliability in assessing the pain threshold is therefore dependent not only on the technical implementation of the evaluator, but also the capacity of the individual, to provide a verbal indication of its consistent pain threshold (CHESTERTON, 2007).

Since the pain remains the main motivation for patients to seek medical help, many techniques and methods have been developed to promote analgesia to these patients. The interferential current has been one of them (ADEDOYIN; OLAOGUN; FAGBEJA, 2002).

The interferential current is a device that emits electrical waves of medium frequency (2000 or 4000 hZ), with amplitude modulated from 0 to 250, or 4000 to 4250Hz. This frequency modulated has been alleged as the effective component of interferential current (SATTER, 2008; PALMER et al., 2004).

According to the theory of Melzack and Wall (1965) pain gate control, the fibers of larger diameter compete for access within the central ascending sensory tract in the dorsal horn of the spinal cord, with the smaller diameter, the nociceptors. As the largest diameter the lead stimulus more quickly, they inhibit the stimulation of hyperalgesia, causing the noxious stimulation does not reach a conscious level (ADEDOYIN; OLAOGUN; FAGBEJA, 2002; JORGE et al., 2006). Another explanation for the analgesic effects of interferential current can be explained by Wedensky inhibition, the fibers of the type C, since there are stimulation of the same in the relative refractory period, raising the threshold until exhaustion of the fibers (GOATS, 1990).

However, according to Santos et al. (2008), it appears that a placebo effect can occur with the use of such current. And Palmer et al. (2004), mentioning that distraction and other extrinsic factors, the individuals of a sample can alter the results of a study regarding the measurement of its pain threshold.

Since the interferential current therapy has been widely used as a method of analgesia, in physiotherapy, but there is controversy on its effectiveness, make it necessary studies regarding the effectiveness of the technique on different types of pain thresholds and parameters therapeutic use. So, in order to be improving, showing and working with new studies and protocols on the interferential current, the aim of this study was to evaluate the pain threshold to mechanical stimulation and cold front to interferential current therapy in healthy subjects, using a bipolar application technique on the nerve root.

MATERIALS AND METHODS

Type of Study

The present research it is a clinical, quantitative, randomized, double-blind crossover study. Participants were 20 volunteers, 9 males and 11 females, aged 19.85 ± 2.98 years (18 until 30 years). Volunteers signed a consent form, which is made available in the study without any reward and could withdraw from the study at any time for free will. The study was approved by the Ethics and Research of the State University of West Paraná 081/2009 and conducted between July and October 2009.

They were divided randomly into two groups of 10 individuals each, group 1 (G1) and group 2 (G2). The groups always performed the same activities within your group in two consecutive days in a crossover, or what G1 did on day 1, G2 was the 2nd day, and vice versa. Each day, one of the groups, given the researchers did not receive any power, only having a placebo effect.

Individuals who had performed the therapy, or experienced the interferential current, were excluded from the study. Also excluded were individuals who had any contraindication to the use of electrical stimulation, and contraindications to cold and heat.

Evaluation Protocol

The pain evaluation via stimulation of the mechanoreceptors was performed with application of pressure algometer. Prior to assessment, subjects in both groups immersed their dominant upper limb to the elbow for 5 minutes in water at 38 °C to stabilize the temperature of the member, then as a means of pain stimulation was used to algometer Kratos®, capable of producing pressures up to 50 Kgf. It was explained to individuals in both groups would be assessed pain using a technique of stimulating pressure to which they should report the exact moment they felt the first painful sensation. We evaluated the thenar and hypothenar regions of the dominant limb of each individual.

The pain evaluation via stimulation of termoceptores was performed using the cold. After applying the algometer, the subjects were instructed to immerse the same upper limb in the water at 5 ºC, until the elbow region, assessing the exact time, in seconds, that the individual reported, by using the word "pain" his "pain threshold". Without removing the limb immersion in cold water, and after 30 seconds of immersion, was rated the numerical value of the end of the painful sensation participant, the visual analog scale of pain.

Electrical Stimulation Protocol

Following the pain pressure and cold evaluation, the therapy was performed with interferential current (Ibramed®, Neurovector generation 2000, Amparo-SP), the experimental group, with the parameters pre-defined by researchers. The placebo group received no current. It was explained to the individual in the placebo group would be made current with a lower

intensity, but it was only on the machine and placed on the intensity of zero, so that the volunteers could see the light on the reader without being able to observe the level of intensity.

The parameters of stimulation were: frequency of 4000 Hz, 100 Hz AMF, ΔF 50%, slope 1 / 1, electrodes placed over the nerve roots from C3 to T1, technique bipolar electrodes and for 15 minutes. At the end of the current application, the pain was reassessed by pressure and cold on three occasions: immediately after application, 20 minutes and 1 hour after stimulation.

Statistical Analysis

Statistical analysis was by presentation of data on average and standard deviation, following the normality test of Kolmogorov-Smirnov test. Views data normality, they were analyzed with ANOVA repeated measures and post hoc Tukey test, in all cases the level of significance was 5%.

RESULTS

In this study, comparisons between pre-interferential (Av1), post-immediate (AV2), twenty minutes after interferential (AV3) and one hour after (AV4), with the algometer, showed no significant difference ($p<0.05$) concerning the increase or decrease the pain threshold of both the thenar region, the hypothenar region, regardless of the group analyzed.

Regarding the pain threshold to cold, the placebo group (Fig. 1) was not significantly different ($p <0.05$). In the group treated with interferential (Fig. 2), there is a significant decrease in pain threshold between the pre-interferential (AV1) and post (AV2), and an increase between AV2 and one hour after interferential (AV4), restoring the initial values.

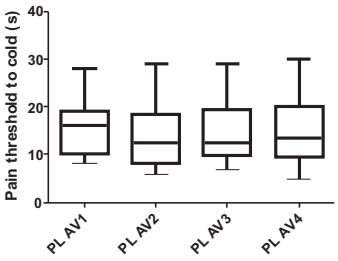

Figure – Pain threshold to cold for the Placebo group, in different moments of evaluation.

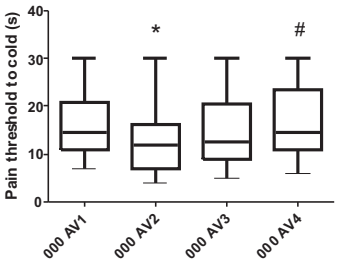

Figure – pain threshold to cold for the group 4000 Hz, at different moments of evaluation. * Statistically significant difference when comparing with the time AV1. # Statistically significant difference when comparing with the time Av2. The final sense, assessed using the VAS, was observed in the placebo group (Fig. 3) a significant increase between AV1 and AV4. In the group treated with interferential (Fig. 4), there is an increase between AV1 and AV2 but significant increase between AV1 and AV4.

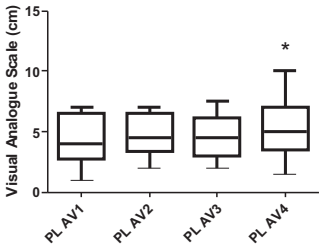

Figure – Visual Analogue Scale of pain to cold for the placebo group. * Statistically significant difference when comparing with Av1.

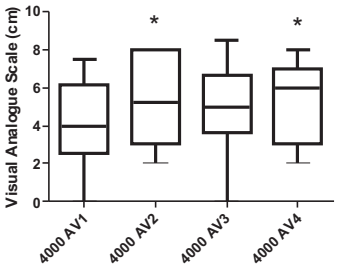

Figura – Visual Analogue Scale of pain to cold for the group treated with interferential current 4000 Hz * Statistically significant difference when comparing with Av1.

DISCUSSION

The results of this study notes that over the algometer, no significant differences on the pain threshold when comparing the ratings AV1, AV2, AV3 and AV4, which agrees with Palmer et al. (2004), reporting that there are significant changes in the threshold of A delta fibers and C both in the application of interferential current, and the placebo in healthy subjects.

Johnson e Tabasam (2003) by inducing cold pain in healthy subjects, did not observe a significant effect on pain threshold in individuals submitted to interferential. This result is contrasted to that found in this study as the threshold for cold was statistically decreased after the application of current (Av2), compared with the time AV1, but after 20 minutes of application, since there was no such difference significantly (AV3), and AV4 was significant increase in the threshold, returning to baseline. That is, stimulation with interferential produced momentary increase sensitivity to cold.

Jarit et al. (2003) reported an improvement occurs in painful episodes in the post-operative knee, and Defrin, Ariel and Peretz (2005) observed an improvement in painful episodes in patients with chronic pain. Arise, then, the hypothesis that the interferential therapy is only effective in individuals who have a painful picture and not for healthy individuals, to increase the pain threshold.

In the assessments with the VAS, there was a significant increase in the placebo group, compared to AV1 to AV4. This may have occurred by successive cold assessments have produced a change in the pain perception, so individuals were more sensitive to painful stimuli from the cold. Which was also repeated in the treated group, but, similar to that observed with the pain threshold to cold-treated group, there was also a significant increase in VAS when comparing AV1 to AV2, ie, electrical stimulation produced an immediate increase sensitivity to cold.

Studies such as Johnson and Tabasam (2003), the opposite way, did not find such feature-raising painful cold, with the current use in healthy subjects, not only changes observed pro-analgesic. And Cheing and Hui-Chan (2003) observed an increase in pain threshold with the use of interferential current, when evaluating the heat pain in healthy subjects.

It should be noted, however, that this study has limitations: only been used a form of placement of electrodes, the failure to carry out painful heat stimulus, and also the fact only be used in healthy subjects. These limitations are as suggestions for future studies.

CONCLUSION

With the methods used in this study, interferential current produced momentary and reversible increase sensitivity to cold, and did not alter the pressure sensitivity.

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COLD AND PRESSURE PAIN THRESHOLD EVALUATION IN HEALTHY INDIVIDUALS SUBMITTED TO INTERFERENTIAL CURRENT WITH 4000 HZ

ABSTRACT

The aim of this study was to evaluate the pain threshold to mechanical stimulation and cold, front to interferential current therapy in healthy subjects, using a bipolar technique applied on the nerve root. The study included 20 volunteers, divided into two groups of 10 each. What one group did the first day, the other did the second. We evaluated the pain threshold with a pressure algometer pain threshold and cold by the time the VAS to reach the pain threshold. As a form of electrical stimulation was used interferential current with the parameters predefined by the researchers and individuals were assessed on three occasions: soon after, 20 minutes and one hour after stimulation. The comparison between the assessments with the algometer, the results were not statistically significant, both in the placebo group, and in the group stimulated. Since the assessments of pain threshold to cold by the time the placebo group showed no significant difference. In the treated group, there is a significant decrease in pain threshold between the pre-and post-interferential immediately, and an increase from the immediate post-assessment and one hour after interferential, restoring the initial values. What about the comparisons between the ratings of the VAS, was observed in the placebo group a significant increase between the pre-interferential and one hour after stimulation. In the treated group there was a significant increase in the assessments pre-and post-interferential immediate, and also an increase between the pre-interferential and one hour after the current. With the methods used in this study, interferential current produced momentary increase sensitivity to cold reversible, and did not alter the pressure sensitivity.

KEYWORDS: Transcutaneous Electric Nerve Stimulation, Pain, Cold Temperature.

EVALUATION DE SEUIL DE DOULEUR DU FROID ET DE PRESSION DANS LES PARTICULIERS SAINS SOUMIS À INTERFÉRENTIELS ACTUELLE 4000 HZ

RÉSUMÉ

L'objectif de cette étude était d'évaluer le seuil de la douleur à la stimulation mécanique et du front froid pour la thérapie actuelle interférentiels chez des sujets sains en utilisant une technique bipolaire appliquée sur la racine nerveuse. L'étude a inclus 20 volontaires, répartis en deux groupes de 10 chacun. Qu'est-ce qu'un groupe fait la première journée, l'autre ne le second. Nous avons évalué le seuil de la douleur avec un seuil de douleur et algometer pression à froid par le temps, le SAV d'atteindre le seuil de douleur. Comme une forme de stimulation électrique a été utilisé individus interférentiels en cours avec des paramètres prédéfinis par les chercheurs, et ont été évalués à trois reprises: peu après, à 20 minutes et une heure après la stimulation. La comparaison entre les évaluations avec le algometer, les résultats n'étaient pas statistiquement significatives, à la fois dans le groupe placebo, et dans le groupe stimulé. Étant donné que les évaluations du seuil de la douleur au froid, au moment où le groupe placebo n'a révélé aucune différence significative. Dans le groupe traité, il ya une diminution significative du seuil de la douleur entre le pré-et post-interférentiels immédiatement, et une augmentation de l'immédiat après-évaluation et une heure après interférentiels, restaurer les valeurs initiales. Et les comparaisons entre les cotes de la SVA, a été observée dans le groupe placebo, une augmentation significative entre la pré-interférentiel et une heure après la stimulation. Dans le groupe traité, il ya eu une augmentation significative des évaluations de la pré-et post-interférentiels immédiat, et également d'une augmentation entre la pré-interférentiel et une heure après que le courant. Avec les méthodes utilisées dans cette étude, interférentiels courant produit une augmentation momentanée de sensibilité au froid réversible, et ne modifie pas la sensibilité à la pression.

MOTS-CLÉS: Transcutaneous Electrical Nerve Stimulation, Douleur, Froid.

EVALUACIÓN DEL DOLOR UMBRAL DE LA FRÍO Y PRESIÓN EN LOS INDIVIDUOS SANOS SOMETIDOS AL COM ACTUAL INTERFERENCIAL 4000 HZ

RESUMEN

El objetivo de este estudio fue evaluar el umbral de dolor a la estimulación mecánica y frente frío a la terapia actual interferencial en sujetos sanos mediante una técnica de aplicación bipolar en la raíz nerviosa. El estudio incluyó a 20 voluntarios, divididos en dos grupos de 10 cada uno. Lo que un grupo hizo el primer día, la otra no la segunda. Se evaluó el umbral del dolor con una presión algómetro umbral del dolor y frío en el momento de la EVA para alcanzar el umbral del dolor. Como una forma de estimulación eléctrica se utilizó interferencial individuos actuales con los parámetros predefinidos por los investigadores, y fueron evaluados en tres ocasiones: poco después, a 20 minutos y una hora después de la estimulación. La comparación entre las evaluaciones a los algómetro, los resultados no fueron estadísticamente significativas, tanto en el grupo placebo, y en el grupo estimulado. Dado que las evaluaciones de umbral de dolor al frío en el momento en el grupo placebo no mostraron ninguna diferencia significativa. En el grupo tratado, hay una disminución significativa en el umbral del dolor entre el pre-y post-interferencial de inmediato, y un aumento de la inmediata post-evaluación y una hora después de interferencial, la restauración de los valores iniciales. Qué pasa con las comparaciones entre las puntuaciones de la EAV, se observó en el grupo placebo, un aumento significativo entre el pre-interferencial y una hora después de la estimulación. En el grupo tratado hubo un aumento significativo en la evaluación pre-y post-interferencial inmediata, y también un aumento entre el pre-interferencial y una hora después de que el actual. Con los métodos utilizados en este estudio, interferencial corriente producida aumento momentáneo de la sensibilidad al frío reversible y no altera la sensibilidad a la presión.

PALABRAS CLAVE: Estimulación Eléctrica Transcutánea del Nervio, Dolor, Frío.

AVALIAÇÃO DO LIMIAR DA DOR AO FRIO E À PRESSÃO EM INDIVIDUOS SAUDÁVEIS SUBMETIDOS À CORRENTE INTERFERENCIAL COM 4000 HZ

RESUMO

O objetivo do estudo foi avaliar o limiar da dor ao estímulo mecânico e ao frio frente à terapia com corrente interferencial, em indivíduos saudáveis, utilizando uma técnica de aplicação bipolar sobre a raiz nervosa. Participaram do estudo 20 voluntários, divididos em dois grupos de 10 cada. O que um grupo fez no primeiro dia, o outro fez no segundo. Foi avaliado o limiar da dor por pressão com um algômetro e o limiar da dor ao frio pelo VAS pelo tempo até atingir o limiar doloroso. Como forma de eletroestimulação, foi utilizada a corrente interferencial com os parâmetros pré-definidos pelos pesquisadores, e os indivíduos foram reavaliados em três momentos: logo após, 20 minutos após e uma hora depois da eletroestimulação. Quanto à comparação entre as avaliações com o algômetro, os resultados não foram estatisticamente significativos, tanto no grupo placebo, quanto no grupo eletroestimulado. Já nas avaliações do limiar da dor ao frio pelo tempo, o grupo placebo não apresentou diferença significativa. Já no grupo tratado, verifica-se uma diminuição significativa do limiar doloroso entre a avaliação pré- interferencial e pós-imediata, e um aumento entre a avaliação pós-imediata e uma hora pós interferencial, restaurando aos valores iniciais. E quanto às comparações entre as avaliações do VAS, observou-se no grupo placebo um aumento significativo entre a avaliação pré-interferencial e uma hora após a eletroestimulação. No grupo tratado verificou-se um aumento significativo as avaliações pré-interferencial e pós-imediata, e também um aumento entre a avaliação pré-interferencial e uma hora após a corrente. Com os métodos utilizados, no presente estudo, a corrente interferencial produziu aumento momentâneo da sensibilidade ao frio de forma reversível, e não alterou a sensibilidade à pressão.

PALAVRAS-CHAVE: Estimulação Elétrica Nervosa Transcutânea, Dor, Baixa Temperatura.

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