Effects of Ai Chi and Yamamoto new scalp acupuncture on chronic low back pain

Efeitos do Ai Chi e da cranioacupuntura de Yamamoto na dor lombar crônica

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Abstract

Introduction: Low Back pain affects a large part of the population and represents a major socioeconomic problem. There are many resources for treatment of this symptom, among them: acupuncture and aquatic therapy. **Objective**: To compare the effects of an aquatic physical therapy program (AI CHI) and Yamamoto New Scalp Acupuncture (YNSA) in pain intensity and functionality in patients with chronic low back pain. **Material and methods**: a clinical trial with a randomized sample. Sixty six individuals with chronic low back pain, of both genders were selected, however 44 individuals completed the study. The individuals were divided into three groups AI CHI (n = 15), YNSA (n = 15) and Control (n = 14). Ten 10 interventions with a program of aquatic therapy method (Ai Chi) and Yamamoto New Scalp Acupuncture (YNSA), were made,

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twice a week. The control group received the intervention only after the end of the study. Pain intensity was assessed by a visual analogue scale (VAS) and the functional capacity by Owestry functionality Index. **Results**: There was significant reduction in pain and improvement in functional capacity (p < 0.05) in YNSA and AI CHI and when compared to the control group. **Conclusion**: It was concluded that the YNSA and AI CHI were effective in reducing pain and improving the functionality of the lumbar spine in patients with chronic low back pain.

Keywords: Acupuncture. Aquatic therapy. Physiotherapy.

Resumo

Introdução: *Lombalgias acometem grande parte da população e promovem grande impacto na sociedade. Existem diversos recursos para o tratamento deste sintoma dentre eles, a acupuntura e a fisioterapia aquática.* ***Objetivo***: *comparar os efeitos de um programa atividade física aquática (AI CHI) e cranioacupuntura de Yamamoto (YNSA) na intensidade da dor e funcionalidade em indivíduos com dor lombar crônica.* ***Material e métodos***: *estudo clínico experimental com amostra randomizada. Foram selecionados 66 indivíduos com dor lombar crônica, de ambos os gêneros, entretanto completaram o estudo 44 indivíduos. Os indivíduos foram divididos em três grupos AI CHI (n = 15), YNSA (n = 15) e Controle (n = 14). Foram realizados 10 atendimentos de um programa de fisioterapia aquática, com o método Ai Chi e de cranioacupuntura de Yamamoto, com frequência de 2 vezes por semana. O grupo controle recebeu intervenção somente após o término do estudo. A intensidade da dor foi avaliada por uma escala visual analógica (EVA) e a capacidade funcional pelo Índice de funcionalidade de Owestry.* ***Resultados***: *Observou-se redução significativa na dor e incremento na funcionalidade (p < 0,05) nos grupos Ai Chi e YNSA e em relação ao grupo controle.* ***Conclusão***: *Pode-se concluir que o Ai Chi e a YNSA foram efetivos na redução da dor e melhora na funcionalidade da coluna lombar em indivíduos com dor lombar crônica.*

Palavras-chave: *Acupuntura. Hidroterapia. Fisioterapia.*

Introduction

Low back pain is very common and affects a large part of the population (1, 2). In Brazil about 10 million people become disabled by low back pain (3). According to World Health Organization (4), more than 80% of people around the world are affected by pain in the spine at some point in their lives and the low back pain is the most common one.

The low back pain can cause a large economic impact, since most people with low back pain remain out of work or their productivity is reduced (5 - 9). Treatment costs are high and represents onus to patients and to government (5, 7, 10).

A common resource used to treat low back pain is the aquatic therapy also known as hydrotherapy, in which exercises are performed in a heated swimming pool for therapeutic purposes (11). The AI CHI is a physiotherapy method developed from the principals of Tai Chi and Qigong methods associated with the techniques of Shiatsu and Watsu methods. (12, 13). It

is a treatment performed with the water at shoulder level and the movements of the arms, legs and trunk are slow and wide, they are associated to a deep and calm breath. The benefits are associated to the stabilization of the trunk, pain control and improvement of the metabolism and blood flow (12).

Another resource that can be applied to the treatment of low back pain is the acupuncture, in which needles are inserted at specific points on the skin (acupuncture points) in order to treat and prevent diseases and reduction of the pain (14, 15, 16). The Yamamoto New Scalp Acupuncture (YNSA) is one of the acupuncture techniques that can be used in the pain treatment. This technique was developed by Yamamoto and collaborators in the 70's and consists of a microsystem, in which the stimulation or puncture of points in the scalp causes effects in another corporal region, contributing to the treatment of diseases, especially the painful and neurological ones (17).

The aquatic (18 - 22) and acupuncture therapy (23-27) have been used in treatment of low back pain.

The YNSA was effective in the treatment of acute low back pain (28), until now there is no research of the low back treatment with AI CHI technique or with the combination of these two techniques.

So, the objective of this research was to compare the effects of an aquatic physical therapy program (AI CHI) and YNSA in the intensity of pain and functionality in people with low back pain.

Materials and methods

This research was experimental, with sample randomization into 3 groups: AI CHI, YNSA and Control. The initial sample had 66 individuals, but in the AI CHI group 4 people dropped out due to difficulties to get to the study sit, 3 from respiratory pathologies and 1 because the symptoms became worse. In the YNSA 5 participants dropped out due difficulties to get to the site and one was excluded for presenting uterine bleeding that is a contra-indication of the technique. In the control group 5 participants gave up by difficulties to get to the site and 3 gave up without reason. So, the final sample had 15 participants in the AI CHI, 15 in YNSA and 14 in the Control group.

The research complied with CONEP resolution 196/96 and the project was approved by the Ethics and Research Committee of Hospital do Trabalhador, number 90.173, CAAE: 06511712.6.00005225. All the participants were informed of the procedure and signed the consent term.

The evaluations were done at the Centro de Estudos do Comportamento Motor (CECOM) at UFPR and the interventions were done at the Hydrotherapy Department at the PUCPR in Curitiba-PR.

Inclusion criteria were: both gender individuals with low back pain for at least 3 months, without evident postural alterations on the physical examination, age between 33 and 77 years, without pacemaker or metallic implant in the spine, without circulatory or sensibility alterations, without lesion on the skin, without any previous physiotherapy treatment, acupuncture or massage 15 days prior the participation in the research and cognitive capacity preserved.

Exclusion criteria were: radiation of the pain on the legs, incapacity to participate in any stages of the research, pregnancy, dizziness, labyrinthitis, epilepsy and any other form of seizure.

Temporary exclusion factors were considered, that is, if on the day of the participation the volunteers were under the following conditions: blood pressures over 150x90mmHg, and if they had alcoholic drinks 48 hours prior to participation. If the volunteers submit this conditions they would not participate in the experimental protocol and would be rescheduled and treated in another.

The evaluation instruments used were Oswestry Functional Index and Visual Analogue Scale (VAS).

It was performed ten (10) interventions twice a week. The control group participants received the interventions after 5 weeks of the evaluation date and received a similar protocol of the group that presented a better benefit.

The acupuncture was done according to Yamamoto *et al* (17). The volunteers were in a seated position and it was done a palpation of D point bilaterally. The side in which the volunteer presented more painful sensation or pressure was punctured. After that D1-D5 point was punctured, in the same side of the D point. The needles were maintained for 20 minutes.

The AI CHI protocol was performed according to Cunha *et al* (12).The interventions were made collectively in a swimming pool with temperature kept between 32 ℃ e 34℃, during 30 minutes.

The data regarding age, mass, height, BMI were assessed using descriptive statistics (mean and standard deviation). The data pattern distribution of each of these variables was analyzed using the Lilliefors test and the evaluating of the homogeneity of the variances between groups was done using the Levene test. Once the assumptions of normality and homogeneity were checked, the means of the variables were compared between groups by analysis of variance – one way factor followed by Fisher's follow up test (*Least Square Difference*).

The data regarding functionality (Oswestry) and the pain scores (VAS) were analyzed by descriptive statistics (mean and standard deviation), it was also assessed the assumptions of normality and homogeneity of the variances, as described above. Then it was applied the analysis of variance to repeated measures, and then the Fisher's follow up test (*Least Square Difference*).

Results

The final sample consisted of 44 volunteers diagnosed with chronic low back pain, that were selected from medical appointments at the Hospital do

Trabalhador and from the hydrotherapy waiting list of the Unidade de saúde Ouvidor Pardinho. Table 1 shows the physical characteristics of the participants and the p > 0.05 observed in all variables indicates that the groups are homogeneous.

The visual analogic scale assesses pain in the exact moment of the evaluation. When performing the analysis it was verified that there were significant differences between the groups over the intervention periods (p < 0.05). It was found that the groups started the study with the same pain scores (p > 0.05). However, at the revaluation, the AI CHI and YNSA groups showed reduction of the pain scores from

baseline evaluation. The control group showed no change in their pain score (p > 0.05) (Table 2).

Regarding the functionality obtained by the Oswestry Disability Index, the evaluation criteria refers to the best functionality as the scores reduces. In the present study we found that the subjects of the three groups began with functionality statistically similar (p > 0,05). However, at the revaluation moment the groups submitted to the interventions showed significant reduces in scores (p < 0.05), except the control group (p > 0.05). Thus, the subjects submitted to the interventions showed improvement in functionality after the intervention period (Table 3).

Table 1- Mean and standard deviation of the variables age, mass, height and BMI of the groups AI CHI, YNSA and CONTROL; p-value of the analysis of variance – one way factor

	AI CHI	YNSA	Control	P value
N	15	15	14	
Age (years)	61.7 ± 9.3	57.3 ± 7.2	61.2 ± 7.2	0.251
Mass (Kg)	75.2 ± 10.4	69.8 ± 11.0	73.2 ± 15.2	0.649
Height (cm)	164 ± 9.6	159 ± 10.5	159 ± 9.4	0.375
BMI (kg/m^2)	27.8 ± 3.4	27.6 ± 3.6	28.7 ± 4.3	0.868

Table 2 - Mean and standard deviation of pain intensity (VAS) for groups AI CHI, YNSA and CONTROL at evaluation and revaluation periods; p value of variance analysis for repeated measures

	AI CHI	YNSA	Control
N	15	15	14
VAS initial	6.6 ± 2.4[*]	6.9 ± 2.8[*]	7.6 ± 2.6
VAS final	2.7 ± 2.9[*#]	0.9 ± 1.9[*#]	6.3 ± 1.7[#]
P value		0.005	

Note: [*] means significant differences between evaluations (intra-groups) and [#] means significant differences between groups (inter-groups).

Table 3 - Mean and standard deviation of Oswestry Disability Index for groups AI CHI, YNSA and CONTROL at evaluation and revaluation periods; p value of variance analysis for repeated measures

	AI CHI	YNSA	Control
N	15	15	14
Oswetry initial	37.97 ± 18.32[*]	36.03 ± 13.32[*]	43,14 ± 14.04
Oswestry final	28.27 ± 19.18[*#]	17.4 ± 9.3[*#]	42,64 ± 14.58[#]
p value		0.007	

Note: [*] means significant differences between evaluations (intra-groups) and [#] means significant differences between groups (inter-groups).

Discussion

Low back pain is one of the major causes of disability, it interferes in quality of life, work productivity and it is the most common cause to medical consultation (30, 31). The clinical recommendations for low back pain treatment, done according to systematic review of literature, includes interdisciplinary rehabilitation, exercises (including aquatics), acupuncture, massage, manipulation, yoga and patient reeducation (32, 33).

The aquatic exercises have shown positive results in low back pain symptoms (34). Researches show reduction in pain (18-22) and increment in functionality (35, 36) in treatments done in aquatic environment; these findings confirm the results observed in the present study. However, it should be noted that it was not found, until now, researches that evaluate the effects of AI CHI in low back pain, so the results found in the present study may be due to the action of the physical and thermic properties of the water.

The heated water has a relaxing effect that can contribute in the reduction of the activation of paravertebral muscles (11, 21) and consequently reduce the low back pain and improved the functionality. In addition, the pain reduction can also be due to the action of the physical properties of the water. The hydrostatic pressure (Pascal's Principle), for the action of body support and movement assistance, can promoted less effort to maintain posture and, thus reducing muscular tone and muscular relaxation (21).

Furthermore, the treatments for low back pain in aquatic environment can be done with less risk of damage such as gravitational overload incident on the spine, due to the action of the thrust (Arquimedes's Principle), which promotes reduction in the apparent weight and, so can reduce the muscle spasm (37, 21, 38, 39). Camilotti *et al* (40) observed, by spinal shrinkage, that in the seated position in aquatic environment the overload in the spine is lower than in land environment. They attributed the lower overload to the physical properties of water, like thrust and hydrostatic pressure and to the relaxation promoted by the heated water. So, the reduction in the intensity of the pain and consequently improvement in the functionality of the spine could be due to the physical and thermal effects of water.

With regard to acupuncture, it was observed that the YNSA technique promoted significant reduction in pain and increment in functionality of the lower back. Similar results were observed in the treatment of acute low back pain with YNSA (28).

The reduction in pain, with the YNSA treatment, can be due to the activation of afferent fibers A delta and C, that promoted signals that are transmitted to the spine cord and leads to production of dynorphin and enkephaline. These afferent stimuli propagate to the brain setting a sequence of excitatory and inhibitory mediators on the spinal cord, resulting in release of neurotransmitters such as serotonin, dopamine and norepinephrine at spinal cord to pre and post synaptic pain inhibition. When these signals reach the hypothalamus and pituitary gland, the stimulus releases endorphin and acetylcholine promoting reduction in pain (41), and consequently the pain relief may improve the functionality.

The literature regarding the acupuncture for the treatment for low back pain is controversial, some studies (23-27) indicate that systemic acupuncture promotes remission of low back symptoms, however, in these studies the systemic acupuncture was significantly effective for reducing low back pain compared to conventional treatment (physiotherapy, exercise and medications), but there was no significant difference when comparing to sham acupuncture (superficial puncture and out of the acupuncture point or simulation of placement of needles (42)). In other studies there are ineffectiveness reports or there is little evidence that acupuncture is effective for reducing the low back pain (43-45). Cherkin *et al* (26) observed that treatments with massage promoted a reduction in back pain significantly superior to the treatment with acupuncture.

On the other hand, Manheimer and col (42), in a literature review (meta-analysis), concluded that acupuncture is effective for relieving chronic low back pain. The acupuncture treatments are significantly more effective compared to sham acupuncture or the fact that the individual does not perform any kind of treatment, however, there is evidence that acupuncture is more effective compared to other therapies, such as exercise and physiotherapy.

In addition to the divergence of results, there is no consensus among authors regarding the choice of acupuncture points and treatment methods (systemic acupuncture, auricular acupuncture, electroacupuncture, among others). With respect to systemic acupuncture, most authors use local points associated with distal points (23, 26, 43, 46, 47), but there is no consensus regarding the choice of points and some

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authors choose the points according to the patient needs (44, 48).

According to Hall (9) the acupuncture practice is not sufficient standardized which makes it difficult for a reliable evaluation. In Witt's study (24), for example, the choice of the points were taken randomly and according to the clinical experience of the person who applied the technique and the points chosen in the treatment is not mentioned in the study. Wang, Kain and White (49) report that some of the problems found in the studies are: inadequate sample, methodological limitations and the use of invalid assessment measures.

This research used a well-defined methodology, with randomized sample, but the number of participants and interventions were small. Despite these factors, the results observed in these study show that YNSA and AI CHI are effective methods to reduce chronic low back pain and can stimulate the development of new researches.

Conclusion

The results of this study show that YNSA and AI CHI, done twice a week, were effective in reducing the pain and improving the functionality of the lumbar spine. However, more studies are needed to evaluate the effects of Ai Chi and YNSA in individuals with low back pain using larger sample of participants and also with the combined techniques.

Acknowledgments

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