Acupuncture and percutaneous electric nerve stimulation to control chronic masticatory myalgia: preliminary study*

Uso da acupuntura e da estimulação elétrica nervosa percutânea no controle da mialgia mastigatória crônica: estudo preliminar

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ABSTRACT

BACKGROUND AND OBJECTIVES: This was a randomized clinical trial to compare the analgesic effect of acupuncture and percutaneous electric nerve stimulation for chronic masseter muscle masticatory myalgia.

METHODS: Participated in the study 23 patients with unilateral or bilateral masticatory myalgia, who were selected according to Research Diagnostic Criteria for Temporomandibular Disorders and were distributed in two groups. Acupuncture and percutaneous electric nerve stimulation groups were made up of 12 and 11 patients, respectively. In each group, patients were submitted to two weekly treatment sessions lasting 20 minutes, in a total of 9 sessions. Selected points for the acupuncture group were IG4, E36, F3, ShemMen (bilateral auricular), VG20 and Yintang. Needles were inserted and stimulated until “De Qi” was obtained, then remaining without stimulation until procedure completion. In the electric stimulation group, symptomatic points were identified by manual palpation and electric stimulation was applied. Both groups have described pain intensity by means of the visual analog scale, before the first, fifth and ninth sessions. Results were evaluated with Student t and F (ANOVA) tests.

RESULTS: There has been mean visual analog scale scores decrease in both groups at each measurement, being that in the last measurement the acupuncture group had statistically lower mean as compared to the percutaneous electric nerve stimulation group.

CONCLUSION: Acupuncture and percutaneous electric nerve stimulation are effective methods to improve masseter muscle masticatory myalgia in the short term.

Keywords: Acupuncture, Percutaneous electric nerve stimulation, Temporomandibular disorders.

INTRODUCTION

Masticatory myalgia (MM) is deep somatic pain, characterized by fatigue or pain worsened by jaw passive or functional movement, which may limit mouth opening¹. There is controversy about the most adequate therapeutic approach to control MM. Recommendations include a wide variety of procedures including rest, thermal therapy, stretching, exercises, massage, acupressure, intervention on tri-
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METHODS

The study was developed in the Orofacial Pain Control Center, School of Dentistry, University of Pernambuco, according to principles of Resolution 466/2012 of the National Health Council, Department of Health, and in compliance with the Declaration of Helsinki. Population was made up of spontaneous or referred demand, aged between 22 and 64 years, with MM. Participation was made effective by free and sovereign will through the reading and signing of the Free and Informed Consent Term (FICT).

Inclusion criteria were pain for more than three months, of dysesthesia at intervention site; totally edentulous without oral rehabilitation.

In a first screening we have selected among orofacial pain (OFP) patients those with symptoms related to temporomandibular disorders (TMD) for more than three months, with possible cumulative analgesic effect during application sessions. This study aimed at comparing the analgesic effect of PENS on MM.

For AG, intervention protocol was developed as from literature reviews and clinical experience by a dentist qualified in acupuncture by the Federal Council of Dentistry with seven years of experience. Selected points were IG4, E36, F3 and Shem Men (bilateral auricular), VG20 and Vintang, all systemic points and far from the pain site, in an attempt to avoid dry TP needling of the masseter muscle. Those points were chosen due to their action on chronic pain control and symptoms commonly associated to TMD, such as anxiety, emotional stress and depression. Application sites were previously cleaned with 70% alcohol and disposable needles (0.25x30 mm) were inserted at 10 to 20mm depth. In all patients needles were initially stimulated to reach "De Qi" and remained inserted without stimulation until the end of the session.

For PG, a different investigator has selected the areas of electric stimulation application according to painful points, identified by manual palpation with approximately 1 kmf/cm² digital pressure. Before the procedure, all patients were submitted to proproection test which, if negative, would impair the adjustment of electric stimulation intensity for PENS, in addition to masking digital pressure inspection result. The device was DIAN-E, NKI brand, gauged by the Institute São Paulo. Protocol consisted in the introduction of two acupuncture needles (0.20x13mm) perpendicular to the muscle, and a needle inserted in the painful point and the other 1cm of it, with depth of 10 to 13mm compatible with the volume of the involved muscle and with adequate stabilization of each needle. Electric stimulation parameter was pulse frequency of 100Hz, continuous pulse pattern and bidirectional symmetric rectangular pulse shape. Current intensity was tailored according to the tolerance of each patient, being increased to produce the most intense and tolerable electric sensation.

Participants of both groups would describe pain intensity by means of 10-cm VAS, without numbers and with the words no pain and worst imaginable pain on both ends, by means of the question: "What is the pain felt right now?" Answers were measured by an investigator blind to treatment sessions. Due to the possibility of symptoms due to needling interventions, it was established that measurements would be carried out before the first session and immediately before the fifth and ninth (last) interventions. So, for data collection purposes, we
have totaled evaluation and results related to eight treatment
sessions, because in the ninth application session pain inten-
sity was measured only before the procedure.

Statistical analysis
Data analysis has generated absolute distribution of mean sta-
tistical measurements and standard deviation (descriptive sta-
tistics), and the following statistical tests were used: Student t
with equal variances and F test (ANOVA) to check equality
of variances between groups, with Bonferroni correction (in-
ferential statistics) among measurements. Statistical calcula-
tions were made with the program Statistical Package for the
Social Sciences, version 15, and error margin for statistical
tests decision was 5.0%.
This study was approved by the Ethics Committee, University
of Pernambuco under n. 080/2007.

RESULTS
From 190 patients initially evaluated with OFP, 103 had
TMD and in 52 the masseter muscle was unilaterally or bi-
laterally involved. From these, 23 were randomized in two
groups, AG=12 and PG=11 (Figure 1). One GP patient and
two AG patients were lost due to abandonment and report of
VAS=10, both during the experiment. Age mean and standard
deviation for AG was 40.60 and 14.26 years, respectively, and
for PG it was 37.10 and 8.17 years. Table 1 shows socio-de-
mographic data of the studied population.
Mean VAS values used for pain measurement are shown in
table 2.
Taking as reference the first measurement, where mean values
are statistically similar by Student t test, there has been signi-
ficant mean VAS decrease in further measurements for both
groups by the F test (ANOVA). By means of Bonferroni cor-
rection, these differences were located between the first and
the second and between the first and the third measurements.

Table 1. Socio-demographic data of both groups

<table>
<thead>
<tr>
<th>Gender</th>
<th>AG</th>
<th>%</th>
<th>PG</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1</td>
<td>10.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>90.0</td>
<td>10</td>
<td>100.0</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>AG</th>
<th>%</th>
<th>PG</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>7</td>
<td>70.0</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Married</td>
<td>3</td>
<td>30.0</td>
<td>4</td>
<td>40.0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>AG</th>
<th>%</th>
<th>PG</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No education</td>
<td>1</td>
<td>10.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Incomplete basic</td>
<td>2</td>
<td>20.0</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Complete basic</td>
<td>1</td>
<td>10.0</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>High school/college</td>
<td>6</td>
<td>60.0</td>
<td>3</td>
<td>30.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family income (MW)</th>
<th>AG</th>
<th>%</th>
<th>PG</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No income</td>
<td>1</td>
<td>10.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Up to 2</td>
<td>4</td>
<td>40.0</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>&gt;2 to 5</td>
<td>2</td>
<td>20.0</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>6 or above</td>
<td>3</td>
<td>30.0</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100.0</td>
<td>10</td>
<td>100.0</td>
</tr>
</tbody>
</table>

AG = acupuncture group; PG = percutaneous electric nerve stimulation; MW = minimum wage.

Table 2. Visual analog scale mean and standard deviation by measure-
ment according to group

<table>
<thead>
<tr>
<th>Measurement</th>
<th>AG Mean±SD(1)</th>
<th>PG Mean±SD(1)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>5.60±1.65 (A)</td>
<td>6.50±1.84 (A)</td>
<td>p(2)=0.264</td>
</tr>
<tr>
<td>2nd</td>
<td>1.34±1.57(B)</td>
<td>2.74±2.06 (B)</td>
<td>p(2)=0.105</td>
</tr>
<tr>
<td>3rd</td>
<td>0.69±0.94(B)</td>
<td>1.80±1.25 (B)</td>
<td>p(2)=0.038*</td>
</tr>
</tbody>
</table>

p(3)<0.001* p (3)<0.001* |

AG = acupuncture group; PG = percutaneous electric nerve stimulation.
* Significant difference at 5.0%; (1) SD= standard deviation; (2) Student t with
equal variances; (3) F test (ANOVA) for repeated measures. Means followed by
equal letters are not significantly different at 5%.

There has been no statistically significant difference in the last
measurement in mean VAS value between AG and PG (Stu-
dent t test). There has been no relevant intervention-related
adverse effect in both groups. Two AG patients have referred
mild sedation during intervention.

DISCUSSION
Neuromodulating therapies seem to have satisfactory results
in relief musculoskeletal pain5-7,10,16,17. In our study, results
have shown decrease of symptoms intensity in groups AG and
PG, being that AG patients had mean values statistically lo-
wer than PG in the last measurement.
It has been suggested that PENS has a cumulative effect du-
ting treatment, perceived by the maintenance of the analgesic
effect at each intervention12. This fact may be considered in
the results of our study, translated into decreased VAS at each

Figure 1. Flowchart of sample distribution
RDC = Research Diagnostic Criteria; PENS = percutaneous electric nerve sti-
mulation; FAI = Fonseca’s Anamnesis Index.
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measurement in the first, third and last treatment weeks. Although PENS being considered a new therapeutic modality9, it does not seem to differ, in practice and principles, from electroacupuncture15, except with regard to application points. In our study, sites to place needles in PG were points corresponding to the source of pain reported by patients and confirmed by physical evaluation. For AG, chosen puncture points were systemic acupuncture points located distant from the pain site. It has been shown that acupuncture points often coincide with common symptomatic regions of masticatory muscles. Point E7, for example, corresponds to the location of muscles. Point E7, for example, corresponds to the location of muscles. Point E7, for example, corresponds to the location of muscles.

Both techniques were effective to control short term pain in AG and PG7,11. Acupuncture had differentiated results when compared to placebo without needle insertion, suggesting clinically significant neuromodulating mechanisms as consequence of the puncture17. This neuromodulating therapy was effective, in the short term, to decrease TMD-related pain of muscular origin16, confirming the results of this study. The difficulty to select patients exclusively with masseter muscle MM has determined a small sample. Future studies with larger samples may consistently confirm our results.

CONCLUSION

Acupuncture and PENS have decreased, in the short term, reported symptoms of chronic masticatory myalgia in the masseter muscle, being that AG had further symptoms intensity decrease as compared to the PENS group.

REFERENCES

1. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. J Craniomandib Di-