

Ear acupuncture in the treatment of migraine attacks: a randomized trial on the efficacy of appropriate versus inappropriate acupoints

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Abstract Ear acupuncture can be a useful mean for controlling migraine pain. It has been shown that a technique called the Needle Contact Test (NCT) can identify the most efficacious ear acupoints for reducing current migraine pain through just a few seconds of needle contact. The majority of the points were located on the antero-internal part of the antitragus (area M) on the same side of pain. The aim of this study was to verify the therapeutic value of area M and to compare it with an area of the ear (representation of the sciatic nerve, area S) which probably does not have a therapeutic effect on migraine attacks. We studied 94 females suffering from migraine without aura, diagnosed according to the ICHD-II criteria, during the attack. They were randomly subdivided into two groups: in group A, tender points located in area M, positive to NCT were inserted; in group B, the unsuitable area (S) was treated. Changes in pain intensity were measured using a VAS scale at various times of the study. During treatment, there was a highly significant trend in the reduction of the VAS value in group A (Anova for repeated measures: $p < 0.001$), whereas no significance was observed in group B. VAS values were significantly lower in group A than in

group B at 10, 30, 60 and 120 min after needle insertion. This study suggests that the therapeutic specificity of auricular points exists and is linked to the somatotopic representation of our body on the ear.

Keywords Ear acupuncture · Migraine · Pain · Somatotopic representation

Abbreviations

ICHD International Classification of Headache Disorders
NCT Needle Contact Test
VAS Visual Analogue Scale
PPT Pain Pressure Test

Introduction

The recent reviews of the scientific literature [1] have confirmed the efficacy of somatic acupuncture in the treatment of migraine. Ear acupuncture, as well, finds application both in the treatment of migraine attack and in migraine prophylaxis and some recent reports seem to validate its efficacy [2, 3].

In a case report [3], we demonstrated that with the use of a new diagnostic technique called the Needle Contact Test (NCT) it was possible to identify, through the contact of a few seconds of a needle, the most efficacious ear acupoints for reducing current migraine pain. This reduction remained steady over time for at least 60 min.

In a pilot study [4], 15 patients with a unilateral migraine attack in progress were tested with the NCT. Migraine intensity was measured with a Visual Analogue Scale (VAS) repeated at 1, 5, 15 and 30 min after NCT. The most effective tender points in pain control were

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identified on the antero-internal part of the antitragus, the anterior part of the lobe and the upper auricular concha, on the same side of pain. The majority of these points were effective very rapidly (within 1 min), while the remaining points produced a slower antalgic response, between 2 and 5 min. The insertion of a semi-permanent needle in these zones allowed stable control of the migraine pain, which occurred within 30 min and still persisted 24 h later.

Since the most active site in controlling migraine pain was the antero-internal part of the antitragus, the aim of this study was to verify the therapeutic value of this elective area (appropriate point) and to compare it with an area of the ear (representing the sciatic nerve) which is probably inappropriate in terms of giving a therapeutic effect on migraine attacks, since it has no somatotopic correlation with head pain.

Materials and methods

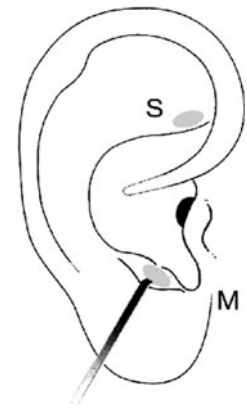
The study enrolled 94 females, diagnosed as migraine without aura following the International Classification of Headache Disorders [5], who were subsequently examined at the Women's Headache Centre, Department of Gynaecology and Obstetrics of Turin University. They were all included in the study during a migraine attack provided that it started no more than 4 h previously. According to a predetermined computer-made randomization list, the eligible patients were randomly and blindly assigned to the following two groups: group A ($n = 46$) (average age 35.93 years, range 15–60), group B ($n = 48$) (average age 33.2 years, range 16–58).

Before enrollment, each patient was asked to give an informed consent to participation in the study.

Migraine intensity was measured by means of a VAS before applying NCT (T0).

In group A, a specific algometer exerting a maximum pressure of 250 g (SEDATELEC, France) was chosen to identify the tender points with Pain–Pressure Test (PPT). Every tender point located within the identified area by the pilot study (Fig. 1, area M) was tested with NCT for 10 s starting from the auricle, that was ipsilateral, to the side of prevalent cephalic pain. If the test was positive and the reduction was at least 25% in respect to basis, a semi-permanent needle (ASP SEDATELEC, France) was inserted after 1 min. On the contrary, if pain did not lessen after 1 min, a further tender point was challenged in the same area and so on. When patients became aware of an initial decrease in the pain in all the zones of the head affected, they were invited to use a specific diary card to score the intensity of the pain with a VAS at the following intervals: after 10 min (T1), after 30 min (T2), after 60 min (T3), after 120 min (T4), and after 24 h (T5).

Fig. 1 The appropriate area (M) versus the inappropriate area (S) used in the treatment of migraine attacks



In group B, the lower branch of the anthelix was repeatedly tested with the algometer for about 30 s to ensure it was not sensitive. On both the French and Chinese auricular maps, this area corresponds to the representation of the sciatic nerve (Fig. 1, area S) and is specifically used to treat sciatic pain. Four needles were inserted in this area, two for each ear.

In all patients, the ear acupuncture was always performed by an experienced acupuncturist. The analysis of the diaries collecting VAS data was conducted by an impartial operator who did not know the group each patient was in.

The average values of VAS in group A and B were calculated at the different times of the study, and a statistical evaluation of the differences between the values obtained in T0, T1, T2, T3 and T4 in the two groups studied was performed using an analysis of variance (ANOVA) for repeated measures followed by multiple *t* test of Bonferroni to identify the source of variance.

Moreover, to evaluate the difference between group B and group A, a *t* test for unpaired data was always performed for each level of the variable “time”. In the case of proportions, a Chi square test was applied. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) software program. All values given in the following text are reported as arithmetic mean (\pm SEM).

Results

Only 89 patients out of the entire group of 94 (43 in group A, 46 in group B) completed the experiment. Four patients withdrew from the study, because they experienced an unbearable exacerbation of pain in the period preceding the last control at 24 h (two from group A and two from group B) and were excluded from the statistical analysis since they requested the removal of the needles. One patient from group A did not give her consent to the implant of the semi-permanent needles. In group A, the mean number of

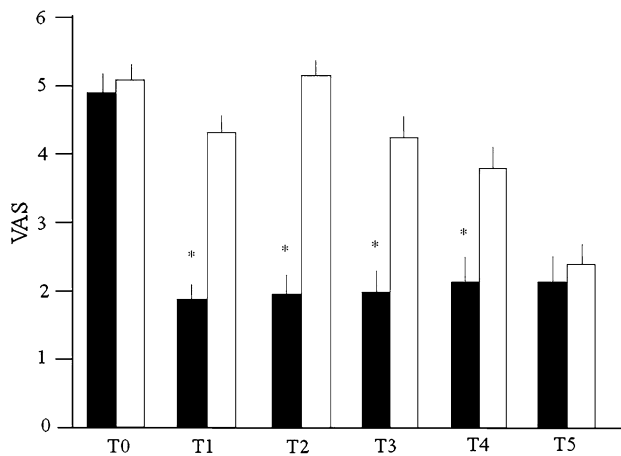


Fig. 2 VAS values before treatment (T0), after 10 min (T1), after 30 min (T2), after 60 min (T3), after 120 min (T4), and after 24 h (T5), in group A (black columns) and in group B (white columns). ANOVA for repeated measures in Group A = $p < 0.001$; ANOVA for repeated measures in Group B = n.s. (*)Unpaired t test for intergroup analysis at T1, T2, T3 and T4 = $p < 0.01$; at T0 and T5 = n.s.

inserted needles was 3.2 ± 0.23 for each patient. In group B, four needles were always inserted, two for each ear.

ANOVA for repeated measures showed a highly significant trend in the reduction of VAS value in group A ($p < 0.001$) during treatment (T1, T2, T3 and T4), whereas in group B no statistical significance was observed (Fig. 2).

The t test for unpaired data showed significantly lower values ($p < 0.001$) of VAS score in group A compared with group B at T1, T2, T3, T4.

VAS values were significantly lower in group A than in group B after 10 min (T1A 1.90 ± 0.23 vs. T1B 4.3 ± 0.22), 30 min (T2A 1.9 ± 0.3 vs. T2B 5.2 ± 0.24), 60 min (T3A 2 ± 0.33 vs. T3B 4.2 ± 0.32), and 120 min (T4A 2.1 ± 0.37 vs. T4B 3.7 ± 0.28); unpaired t test for all comparisons ($p < 0.01$). No difference between groups was found at T0 (T0A 4.9 ± 0.27 vs. T0B 5 ± 0.24 ; $p = \text{n.s.}$) and at T5 (T5A 2.1 ± 0.34 vs. T5 B 2.4 ± 0.24 ; $p = \text{n.s.}$).

We also evaluated the number of patients that obtained a reduction of $\geq 50\%$ in VAS values 120 min after needle insertion and the number of patients that resulted totally pain free at the same moment. At T4, 28/43 patients in group A and 6/46 in group B achieved at least a 50%

reduction of pain score ($\chi^2 = 25.53$; $p = 0.00001$). At the same time, 10/43 in group A and 2/46 in group B were totally pain free ($\chi^2 = 6.81$; $p = 0.009$).

Discussion

This study demonstrates once more that a therapeutic specificity of auricular points probably exists and suggests that it is intimately linked to the somatotopic representation of our body on the ear. Consequently, it is possible that appropriate points are more efficacious than inappropriate points in controlling any type of pain, including migrainous pain. In our case, the area of the antitragus, which in the recent Chinese standardized map of auricular acupoints also bears the indication “headache”, seems to be more appropriate than the representation of the sciatic nerve for reducing the intensity of migraine attacks. It is probable, however, that there are further areas to be treated with ear acupuncture to obtain a real prophylactic effect in migraine. Moreover, the consistency of the analgesic effect of semi-permanent auricular needles on migraine pain for the whole duration of the attack, and eventually, for the prophylactic treatment of migraine without aura, needs to be tested and confirmed in larger controlled studies.

Conflict of interest The authors declare that there is no actual or potential conflict of interest in relation to this article.

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