Acupuncture

The efficacy of acupuncture in migraine has been recently evaluated by the Cochrane Collaborative Group [1]. After a rigorous selection, the Cochrane Collaborative Group took into consideration 11 publications which investigated the effectiveness of acupuncture toward a sham procedure in the prophylaxis of migraine. Five studies concluded that acupuncture is significantly more effective than the sham stimulation, 4 studies showed a positive trend in favor of acupuncture, while in 2 other trials acupuncture appeared to be no more effective than placebo. In three studies, the effectiveness of acupuncture was compared with that of pharmacological preventive treatments. In all three studies the efficacy of acupuncture was underscored (equally effective to the study drug in one study and more effective than the study drugs in the other two studies), but the Cochrane reviewers expressed some methodological doubts relative to these 3 trials.

Another recent, systematic review reached conclusions similar to those of the Cochrane Collaborative Group, regarding the role of acupuncture in migraine prophylaxis [2].

Electromyographical biofeedback and relaxation training

The majority of the studies in this regard compared active treatments vs. a control group represented by patients in an out-patient setting. It is, in fact, extremely difficult to design studies with matching placebo, since double-blinding is impossible to use and a single-blinding is complicated to achieve. In the trials analyzed, the effect size in the patient groups receiving the control treatment appeared to be less than half of the minimum value of the effect size of the patient groups who received the active treatments. These data suggest that electromyographical biofeedback and relaxation training have a certain effectiveness in the prevention of adult migraine. A bias to be considered is that the majority of the patients included in these studies were recruited in specialized centers and, therefore, they were patients with severe migraine or nonresponders to pharmacological therapies.

1. Electromyographical biofeedback: prospective, controlled randomized or quasi-randomized studies in adult migraine patients

Five studies have been published on this topic between 1978 and 1986. In three of the studies it was possible to calculate an overall effect size score of 0.77 and mean headache improvement using the headache index was 51% (range, 36%–58%) [3–5]. In 2 further studies, for which it was impossible to calculate the effect size, the mean headache improvement was 23% (20%–24%) [6, 7]. Studies not included in this analysis reported lower percentages of headache improvement.

2. Relaxation training: prospective, controlled randomized or quasi-randomized studies in adult migraine patients

Techniques aimed at controlling muscle tension or inducing mental relaxation with the help of a therapist have been analyzed. These techniques include: progressive muscle relaxation, autogenic training, and relaxation through meditation or visual imagery techniques.

In 5 studies it was possible to calculate the effect size, and the mean headache improvement was 41% (range, 6.2%–78%) [3, 8–11]. In one study, progressive muscle relaxation was compared with autogenic training but no difference was found between the two treatments [12].
Thermal biofeedback and relaxation training

The use of thermal biofeedback for preventive headache treatment consists in teaching the patient to warm the hands (vasodilatation) by using rapid sensory feedback, even though the distal vasodilatation of the upper limbs does not seem to be the most relevant factor in the antimi-graine effect of this procedure. No significant difference was found on the effects of thermal biofeedback on hand warming compared with that on cooling, on thermal stabilization or on the suppression of the alpha rhythm on the EEG [13].

Indeed, both a regular participation at these sessions and the belief of the patient in obtaining good results through meaningful control over headache (vasodilatation) can significantly influence the anti-migraine effect of this technique. The studies show, in fact, that the effectiveness of thermal biofeedback is enhanced if it is also practiced at home [14], and if the degree of feedback is reinforced by positive results such as hand warming [15].

1. Thermal biofeedback

In 4 studies, the mean improvement of the headache index was 37% [16–19]. The modest value of the effect size (0.38) inferred by three studies [17–19] failed to support a significant clinical benefit. However, studies not included in the meta-analysis showed a greater improvement (50% and more).

2. Thermal biofeedback plus relaxation training

Nine studies showed a mean improvement in the headache index of 33% [3, 7–9, 20–24]. The value of the effect size (meta-analysis carried out on 8 of 9 studies) [3, 4, 8, 9, 20–23] was modest (0.40), but still statistically significant. The association of this technique with medication therapy can further improve the headache index, as seen in one study which showed a positive effect of the addition of propranolol to the treatment [24]. A comparison with drug therapy alone did not show significant differences [25].

Thermal biofeedback has often been used in combination with progressive muscle relaxation, and this combination (TBR) has given the best results. On the other hand, TBR has been associated with pharmacological therapy and this gave better results compared to the two techniques used separately. Recently, thermal biofeedback associated with relaxation techniques has been recommended as a first-choice nonpharmacological treatment for migraine, and physical therapy has been indicated as a second-choice treatment for migraineurs who do not sufficiently improve with TBR [26].

Many studies on thermal biofeedback, associated or not with relaxation techniques, involve young patients affected by migraine. A meta-analysis study based on the comparison of different types of behavioral treatment demonstrated that thermal biofeedback and TBR are much more effective than other behavioral treatments, psychological approaches, placebo and the most frequently used drugs [27]. However, this conclusion was not confirmed by another meta-analysis in the same study carried out taking into account only those studies comparing patients in therapy with control groups [27].

Thermal biofeedback alone can be effective in the prevention of migraine. TBR is also an effective treatment in the prevention of recurrent migraine attacks. TBR can be effectively associated with traditional pharmacological treatment; moreover, the association of TBR with physiotherapy (e.g. active and passive movements, correction of posture) can be considered in those patients who do not respond to TBR alone. However, it should be pointed out that thermal biofeedback is no more effective in migraine prevention than other types of biofeedback. The results obtained with electromyographic biofeedback and TBR showed that neither technique is superior.

Hyperbaric oxygen therapy

The hypothesis of a therapeutic role for oxygen in migraine dates back to the 1930s. Wolff and Lenox in fact, believed that oxygen inhalation was able to abort migraine attacks due to the vasoconstrictive activity of oxygen on intra- and extracranial vessels [28]. Some decades later, Kudrow introduced therapy with normobaric oxygen for cluster headache [29], but unlike for this form of headache, the administration of oxygen represents today a little explored technique for the treatment of migraine.

The effectiveness of hyperbaric oxygen at two atmospheres of pressure was compared to the effect of normobaric oxygen at one atmosphere of pressure in patients affected by migraine [30]. Some studies later, Kudrow introduced therapy with normobaric oxygen for cluster headache [29], but unlike for this form of headache, the administration of oxygen represents today a little explored technique for the treatment of migraine.

The effectiveness of hyperbaric oxygen at two atmospheres of pressure was compared to the effect of normobaric oxygen at one atmosphere of pressure in patients affected by migraine [30]. The study found a statistically significant difference in effectiveness in favor of hyperbaric oxygen. The principal criticism of this study is that it was an open design with a small number of patients.

Another study compared the effectiveness of hyperbaric oxygen with normobaric oxygen in patients suffering from migraine with aura [31]. The results supported the greater efficacy of hyperbaric oxygen therapy, even though this, too, was an open study with few patients.
Hypnosis has a long tradition but few controlled studies are available regarding its effectiveness in migraine treatment. Given the difficulty in identifying sham techniques, potential study strategies included comparison with pharmacological treatments or with behavioral techniques such as biofeedback, or comparison between patient status before and after hypnosis. Two studies based on this last approach suggested a high efficacy, but the results should be taken with caution [32, 33]. In the first case [32], a randomized study compared hypnotherapy (six sessions) with prochlorperazine (10 mg/day first month, then 20 mg/day for 11 months). During the first six months, patients treated with hypnotherapy showed a reduction in headache frequency compared to the group treated with prochlorperazine, and this difference reached statistical significance during months 6-12 of treatment. A possible criticism of this study is that prochlorperazine as administered in this study cannot be considered an antimigraine drug.

In the second case [33], the effectiveness of self-hypnosis was compared with thermal biofeedback plus relaxation training. Both approaches were effective in improving headache symptoms, but no significant difference was found between the two groups.

In considering the possibility of combining hypnosis with other non-pharmacological therapies, a meta-analysis of a broad number of controlled studies suggested that hypnosis can be of benefit in the treatment of headache when combined with cognitive-behavioral therapy [34].

Orthodontic and stomatognathic treatments

A single trial investigated the effectiveness of dental occlusal equilibration [35] in migraine prevention. Headache diagnosis was made according to the criteria of the Ad Hoc Committee on Classification of Headache of 1962 [36]. Of the 96 patients studied, a subgroup of 36 suffered from migraine. No significant benefit was observed in the group of migraineurs [35]. The studies of Wenneberg et al. [37] and Vallon et al. [38] are difficult to interpret since they lacked sufficient data for migraine diagnosis according to IHS criteria. Tsolka et al. [39] treated 51 patients with orthognathodontic or sham techniques. No significant differences were observed in the percentage reduction of migraine crises between the groups treated with either genuine therapy or sham treatment.

Cervical manipulation techniques

A single study from 1978 carried out by Parker et al. [40] treating migraine patients with cervical mobilization (movement of a joint within the normal range of movement) and cervical manipulation (movement of a joint beyond its normal range of oscillation) provided little advantage for the use of these techniques in patients with migraine (criteria not clearly defined). The study compared three interventions in 85 subjects: cervical manipulation performed by a physician or physiotherapist, cervical manipulation performed by a chiropractor, and cervical mobilization performed by a physician or physiotherapist (control). In all three groups, the post-treatment scores of migraine patients for frequency, severity and disability were better than pre-treatment scores. No statistically significant differences were observed between groups treated with cervical manipulation and simple cervical mobilization. The same authors [41], in a follow-up study of these patients, reported a reduction in the average number of attacks, from 29 to 19.

In 1998, Nelson et al. [42], in a prospective controlled study in parallel investigated migraine prophylaxis in 218 patients. They were subdivided into three groups: the first one received amitriptyline, the second one cervical manipulation plus amitriptyline, and the third one only cervical manipulation. Using index scores based on pre-treatment values, a statistically significant improvement was observed in 49% of patients treated with amitriptyline, in 41% of those treated with drug plus cervical manipulation, and in 40% of those treated with cervical manipulation alone. A statistically significant improvement was seen in the amitriptyline-treated group compared to the other two groups.

Behavioral therapy

Non-pharmacological treatment of headache, in general and particularly of migraine, and especially in childhood and adolescence should not be viewed as an alternative to pharmacological intervention, but rather as an integral part of the approach. This is based on the well known individual variation in response to pharmacological treatments, both in adults [43, 44], and in children and adolescents [45, 46], since the pharmacogenetic, pharmacodynamic and phar-macokinetic characteristics of the drugs vary with age. A non-pharmacological intervention is based first of all on the correct identification of the headache disturbance, as well as the possible trigger factors of the crises. Non-pharmacological intervention is crucial in childhood and adolescence, especially when the well-recognized negative role of analgesic abuse in developing a chronic headache is taken into account [47–49].

Even though non-pharmacological interventions cannot be considered tout court an alternative strategy to pharmacological interventions, some aspects support the use of...
non-pharmacological interventions as treatments “of choice” or treatments to be integrated into symptomatic and prophylactic therapy:

- Ineffectiveness or inadequate response to pharmacological treatment
- Inadequate compliance
- Resistance of parents or patients (especially if adolescents) to the use of drugs
- A previous history of frequent analgesics use
- Former preventive treatments
- Psychiatric comorbidity (e.g. anxiety disturbances, mood disturbances, social phobias, sleep disturbances)
- Environmental trigger factors temporally related to the onset of the crises
- Family problems
- Excessive involvement in school- and work-related matters

Relaxation techniques gave good results, especially when combined with biofeedback, as shown in a case-control study [50]. After 10 years, biofeedback still seems to be more effective than relaxation training alone [51, 52]. Relaxation training, nevertheless, seems no more effective than less-structured interventions, such as therapy sessions carried out “discussing” potential trigger factors of the crises, or sessions based on the recognition of underlying emotional factors [53].

In synthesis, the treatments that have received greater empirical support are those based on biofeedback (thermal/autogenic feedback and electromyographical biofeedback). Recently, promising results were obtained with biofeedback based on training of slow cortical potentials [54].

There has been a lack of controlled studies using psychodynamic models of psychotherapy (individual) or a family therapy approach, even though the efficacy of such interventions is widely supported by clinical experience.

Two relevant reviews [29, 55] further underscore the effectiveness of biofeedback, but the advantage of integrating this technique with cognitive-behavioral interventions needs to be more clearly established.

Cognitive-behavioral techniques are based on the assumption that specific learning experiences can modify maladaptive behaviors, replacing them with others more suitable to the subject and different situations. Techniques aimed at modifying stress-coping strategies and effecting a more adaptive response to stress have been successfully used in childhood and adolescence [56, 57].

Future research should consider the following issues:

- Patient groups have been selected from the clinical setting (above all patients attending specialized centers).
- The tendency to spontaneous headache remission especially in childhood and adolescence has been widely demonstrated [58] and its contribution to the results of therapeutic trials should be assessed.
- The role and the mechanisms of placebo need to be clarified, for the implications regarding both pharmacological and non-pharmacological treatments.
- Further studies are needed to identify the discriminating factors (i.e. headache diagnosis and psychological profile) which support or not the choice of various non-pharmacological interventions.
- The influence of age-related factors needs to be further investigated.
- The influence of factors such as psychiatric comorbidity and personality characteristics should be clarified.
- The interactions between pharmacological and non-pharmacological interventions need to be determined.
- The influence of different learning settings (clinical and research laboratories) and training programs (individual or group) for different interventions should be better investigated.
- Predictive variables for the clinical outcomes should be identified.

References


