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ASPECTS OF TREATMENT*

Superficial acupuncture in the relief of chronic low back pain

A placebo-controlled randomised trial

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Summary

A single-blind, randomised, placebo-controlled trial of superficial acupuncture in the treatment of low back pain was carried out by comparing 8 patients treated by acupuncture with 9 patients treated by placebo. In all five measures of efficacy chosen for study the acupuncture group achieved better responses than the placebo group; four of the five inter-group differences were statistically significant. In addition, an overall mean for all five measures combined showed significant superiority of acupuncture over placebo.

Introduction

Lewit*(1)* reported relief of chronic pain with acupuncture and lumbar puncture needles inserted deeply into tender regions within muscles and other myofascial structures. Relief of pain has also been achieved by stimulating the skin in a noxious manner; Melzack *et al.(2)* and Simons *(3)* have reviewed a variety of superficially applied counterirritants. Indeed, Travell and Rinzler *(4)* have described relief from chronic pain when they applied a non-noxious stimulus—in this instance ethyl chloride spray—to the skin immediately overlying abnormally tender muscle regions or 'trigger points'.

The aim of the investigation reported here was to determine whether the noxious stimuli of acupuncture needles inserted superficially into the skin and subcutaneous layers alone to an approximate depth of 4 mm for short periods of time once a week were more effective than placebo in relieving chronic low back pain in patients who had already failed to derive sufficient benefit from conventional measures. The locations of abnormally tender muscle regions or 'trigger points' were found by palpation, using methods described by Travell *(5)* and Macdonald *(6)*. The skin immediately overlying the 'trigger points' was subjected to one of the following two methods of treatment: (*a*) the insertion of acupuncture needles or (*b*) the attachment of inert surface electrodes acting as placebos. The remission rates of these two groups of patients were then compared.

Patients and methods

We studied 17 consecutive patients whose chronic low back pain had failed to derive sufficient relief from appropriate conventional methods of treatment; they were asked to continue their existing drug regimens and other forms of support as required. In order to decrease the likelihood of spontaneous remission the duration of each patient's back pain had to be at least one year; furthermore, the severity of the condition warranted referral from orthopaedic or rheumatological departments to a pain relief clinic.

RANDOM ALLOCATION

Before the patients were examined a stratified random process was used to divide the sexes as equally as possible between the two groups: acupuncture, 6 females and 2 males; placebo, 6 females and 3 males.

DATA

As patients suffering from back pain present with a variety of disabilities and aetiologies (many of which are unknown) several measures of treatment efficacy were employed:

Subjective assessments

Huskisson *(7)* described horizontal visual analogue scales for the subjective measurement of pain. On each of 7 evenings before each treatment the patient was instructed to use such a scale marked thus: 0, 'no pain'; 10, 'pain as bad as it could be'.

The same pain scoring system was used on the night before each treatment to indicate a subjective assessment of the pain produced by each of the following activities: walking on level ground; standing still; sitting on a hard chair; rising from a hard chair; getting out of a bath; turning in bed; putting on socks or stockings; lifting weights; climbing stairs; and bending to touch the knees.

A similar horizontal analogue scale was used to provide a subjective pain relief score (0, 'no improvement'; 10,

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'complete relief'); this was carried out immediately after each treatment.

Another subjective scoring system was used to assess the patient's mood (1, 'normal'; 5, 'a markedly abnormal state'); this was employed to assess the following: 'activity', 'appetite', 'sleep', and 'anxiety'. The patient completed these scores each night for a week before the first treatment only.

Clinical assessments

Patients were assessed by unbiased clinical observers at the beginning and the end of each course of treatment. This trial was single-blind as it was not possible to be sure that patients would not describe, during the second assessment, the methods of treatment that had been employed.

On each occasion records were made of the presence or absence (rather than the degree of involvement) of the following physical signs: gait impairment; spinal mobility impairment; loss of lordosis; scoliosis; left and right impaired straight-leg raising; pain on movements of either hip; crossed-leg pain from either side; left and right femoral nerve stretch test; pelvic tilt; sensory deficits; motor deficits; and reflex changes.

The observers assessed the severity of pain numerically (1, 'minimal'; 2, 'moderate'; 3, 'severe'). Also the area of pain was mapped on a dermatome chart of the body. At the end of a course of treatment the reduction or otherwise in both the severity of pain and the area it occupied on the dermatome chart were assessed separately in the following way: −1, 'worse'; 0, 'no change'; 1, 'minimal improvement' (1–24%); 2, 'moderate improvement' (25–49%); 3, 'good' (50–74%); 4, 'excellent' (75–99%); 5, 'complete resolution' (100%).

The duration, prognosis of the condition, drug regimens, other forms of support, aetiology, and previous investigations and treatments were also noted.

COMPARISON OF THE TWO GROUPS BEFORE TREATMENT

The orthopaedic and rheumatological departments reported each of the diagnoses of the 8 patients in the acupuncture group as follows: anterior spondylitis; ankylosing spondylitis; degenerative disc lesion; idiopathic (2 patients); non-articular rheumatism; osteoarthritis; and prolapsed intervertebral disc. In the placebo group the following causes of pain were diagnosed: arachnoiditis following a discogram; degenerative disc lesion (2 patients); idiopathic; osteoarthritis; sacroiliac ligamentous strain; Scheuermann's osteochondritis; and prolapsed intervertebral disc (2 patients).

The two groups were comparable in terms of age, duration of pain, mood scores, number of physical signs, and severity of pain assessed before treatment by the methods described above.

INFORMATION GIVEN TO PATIENTS

Patients were informed that the purpose of this trial was to compare the pain-relieving efficacy of acupuncture and a new form of treatment using surface electrodes.

Those who were about to receive acupuncture were told that this was a form of treatment that had to be carried out for a short period of time once a week. It was pointed out that as patients varied in their sensitivity to this treatment some required more prolonged treatment than others. If less than the required amount was given no beneficial effects would occur. Some patients who were relatively insensitive to the stimulus of acupuncture would require electrical stimulation to the needles to achieve a beneficial result. If, on the other hand, too much stimulation was given the pain would be temporarily increased; this would be an indication to reduce the amount of stimulation at the next visit.

The first treatment was expected to give only a few hours' relief, but it was hoped that successively prolonged pain relief would follow each treatment given at weekly intervals until sustained relief of pain was achieved.

The maximum number of treatments between the two assessments was arbitrarily defined as 10. The number of treatments was reduced, however, if further improvement failed to occur or indeed if the pain continued to progress.

Those who were about to receive placebo surface electrodes were given the same instructions except that they were told this was a form of electrical stimulation of such high frequency that it could not be felt.

TRIGGER POINTS

An examination was undertaken in each case to discover the locations of 'trigger points'. At each location severe pain was elicited when firm pressure was applied to an abnormally tender muscle region, particularly during any manoeuvre that increased its isometric tension *(6)*. Commonly occurring painful regions were to be found in the following muscles: erector spinae, multifidus, iliocostalis and quadratus lumborum, iliopsoas, obliquus externus and internus abdominis, and rectus abdominis. Such tenderness was also found in muscles of the hip and lower limb. The number of affected muscle regions was comparable in the two groups.

Treatment

ACUPUNCTURE GROUP

Sterile 30-gauge (0.32 mm diameter) stainless steel needles were employed to provide a noxious stimulus. To minimise the pain of insertion each needle was inserted swiftly into the skin. The needles were inserted to an approximate depth of 4 mm into the skin and subcutaneous layers immediately overlying 'trigger points'; care was taken to avoid penetrating the muscles or their fasciae. The needles were left in situ for 5 min during the first treatment.

Every time a treatment failed to produce beneficial results the length of time was doubled at the next treatment a week later until the needles were left in situ for 20 min. If this also failed, then electroacupuncture was performed at the next treatment. Here the needles were connected in parallel to the negative-going output of a Shackman Type JS 753 B stimulator designed for electroacupuncture. Impulses of 700 μs duration were obtained at a frequency of 2 Hz; the amplitude was increased approximately every 2 min to maintain the stimulation just above the pain threshold. Again if 5 min of this treatment produced no effect the duration was doubled at each treatment until 20 min was reached.

The usual findings of a satisfactory response included vasodilatation of the skin surrounding the needles accompanied by a feeling of warmth. In addition palpation revealed the absence of pain in the previously tender muscle regions; furthermore some or all of the previously positive physical signs were restored to normality.

PLACEBO GROUP

In a trial of painful electrical transcutaneous stimulation to the skin versus placebo in the relief of back pain Melzack *(8)* employed electrodes attached to the surface of the skin and connected to dummy electrical apparatus as his control. A similar method was employed here.

Standard electroencephalographic electrodes (1 cm in diameter) were attached to the skin over the tender muscle regions. The electrodes were attached by wires (not carrying any current) to an impressive apparatus standing approximately 2 m high; this was an 8-channel chart recorder (Devices 19) covered with dials and lights; its cooling system made a satisfactory 'whirring' sound.

Again every time a treatment failed to produce beneficial results the length of time was doubled; however, if the patient reported a worsening of his condition (as occurred in 3 cases) immediately following the placebo the time of the treatment was reduced.

Results

At the end of each course of treatment the percentage reduction of the following four observations was assessed:

Mean percentage reductions

Patient groups	*Pain relief (%) after each treatment*	*Pain score reduction (%)*	*Activity pain score reduction (%)*	*Physical signs reduction (%)*	*Severity and pain area reduction (%)*	*Combined average % reduction*
Acupuncture (n = 8)	77.35	57.15	52.04	96.78	73.75	71.41
Placebo (n=9)	30.14	22.74	5.83	29.17	18.89	21.35
Significance of difference*	$p<0.01$	NS	$p<0.05$	$p<0.01$	$p<0.01$	$p<0.01$

* Significance assessed by the Wilcoxon rank sum test. NS = not significant.

pain scores, activity pain scores, physical signs, severity and area of pain on the dermatome chart. So far as physical signs were concerned only complete resolution of a previously positive sign was taken into account. In addition the percentage pain relief scores indicated by the patient after each treatment were included.

In the accompanying table the means of these five measures of success in the two groups are compared and also the average reduction in all five measures combined. In every case the acupuncture group's reduction was greater than that of the placebo group and the differences between the two groups were, with one exception, statistically significant when tested by Wilcoxon rank sum tests.

Discussion

This study shows unequivocal strong support for a beneficial effect of superficial acupuncture in reducing an overall mean of five measures of chronic back pain severity. So far as we know there have been no other placebo-controlled trials of superficial acupuncture in the relief of chronic low back pain.

It may seem puzzling that noxious stimuli applied to the skin may relieve pain; yet Hippocrates *(9)* had an aphorism, 'If a patient is subjected to two pains in different parts of the body simultaneously the stronger blunts the other'. This phenomenon has been explored by Le Bars *et al. (10)*, who have proposed diffuse noxious inhibitory controls (DNIC) within the rat's nervous system. However, stimulation of skin also produces responses, possibly of a defensive nature, in muscles; for instance, Kugelberg and Hagbarth *(11)* showed that shifting a noxious stimulus from one skin site to another by only a few centimetres within the same dermatome on the trunk in man produced different reflexes within the abdominal and erector spinae muscles. These effects may also be important in modifying the activity of 'trigger points', whose role in the maintenance of chronic pain has been discussed by Travell *(5)*.

Further studies are required to determine whether stimulating the skin and subcutaneous regions immediately overlying 'trigger points' in this noxious but relatively painless manner is more effective than inserting needles elsewhere. Indeed, this method may be contrasted with the deep needling prescribed by traditional Chinese sources reported by Lu Gwei-Djen and Needham *(12)* and Hou Zonglian *(13)*. Nevertheless, the results of this investigation indicate that it is not necessary to enter the muscle itself to achieve a significant benefit ($p<0.01$) when compared with the effects of placebo.

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