

# Acupuncture

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The research evidence on the effectiveness of acupuncture for the treatment of pain presented in a recent issue of *Effective Health Care* is reviewed.

This paper summarises the research evidence presented in a recent issue of *Effective Health Care* on the effectiveness of acupuncture.<sup>1</sup>

## BACKGROUND

In the UK, acupuncture is widely used in both private and NHS practice. In surveys of the use of complementary medicine, acupuncture is consistently cited among the most commonly used.<sup>2</sup> Approximately 7% of the adult population in England have received acupuncture.<sup>3</sup> Most acupuncture sessions are provided by specialist practitioners without other medical qualifications, of whom there are over 2200 in the UK.<sup>4</sup> In addition, the British Medical Acupuncture Society has among its members over 2000 doctors who use acupuncture in hospital or general practice,<sup>5</sup> and there are over 1200 physiotherapists who are members of the Acupuncture Association of Chartered Physiotherapists.<sup>6</sup> In 1995, the last year for which there are data, approximately 10% of GPs in England either referred patients for acupuncture or administered it themselves.<sup>7</sup> A more recent survey estimated that, in 1998, the NHS provided one million acupuncture treatments in England. The current estimated total cost to the NHS of nearly £26 million is equivalent to all other complementary therapies combined.<sup>3</sup> In the private sector it is estimated that patients receive around two million acupuncture treatments a year.<sup>8</sup>

## WHAT IS ACUPUNCTURE?

Acupuncture involves the stimulation of specific points on the skin, usually by the insertion of needles. In its original form acupuncture was based on the principles of traditional Chinese medicine. Traditional acupuncturists understand health in terms of a vital force or energy called "Qi" (pronounced "chee") which circulates between the organs along channels called meridians. Qi energy must flow in the correct strength and quality through each of these meridians and organs for health to be maintained. The acupuncture points are located along the meridians and provide one means of altering the flow of Qi. Traditional acupuncturists use an Oriental medicine framework for referring to disturbances thought to cause symptoms, such as "kidney yang vacuity, water overflowing" or "damp heat in the bladder".

Many conventional healthcare professionals who practise acupuncture have dispensed with such concepts. Acupuncture points are thought to correspond to physiological and anatomical features such as peripheral nerve junctions, and diagnosis is made in purely conventional terms. One concept thought important by some practitioners is that of "trigger points" which they believe often correspond to acupuncture points.<sup>9</sup> This is an area of increased sensitivity within a muscle which is said to cause a characteristic pattern of referred pain in a related segment of the body. An example might be tender areas in the muscles of the neck and shoulder that relate to various patterns of headache.<sup>9</sup>

It is often implied that a clear distinction exists between traditional and western acupuncture, but the two approaches overlap considerably.<sup>10</sup> Moreover, traditional acupuncture is not a single historically stable therapy<sup>11</sup> and there is considerable variation between different "schools" of acupuncture practice.<sup>10</sup> Two acupuncturists treating the same patient may vary in the particular points chosen, the depth and duration of needling, the method and intensity of needle stimulation, and the use of adjunctive techniques such as massage or herbal medicines.

## NATURE OF THE CLINICAL EVIDENCE

Most of the conditions that acupuncturists treat are either self-limiting (such as low back pain and morning sickness) or have a relapsing and remitting course (such as migraine and asthma) and, almost without exception, the presenting complaint is a subjective symptom such as pain, fatigue, or breathlessness. Accordingly, it is hard to justify types of evidence other than randomised controlled trials (RCTs) in the evaluation of the effectiveness of acupuncture.

This paper is based predominantly on a review of systematic reviews conducted by the Complementary and Alternative Medicine Field of the Cochrane Collaboration.<sup>12</sup> Individual RCTs published subsequent to the reviews are also included.

## EFFECTIVENESS

### Acute pain

Pain after dental surgery provides a good model of acupuncture analgesia due to its limited and predictable course. In a typical RCT, patients undergoing third molar extraction were randomised to receive acupuncture or placebo on a double blind basis. The mean duration of the pain-free interval following surgery was 181 minutes in acupuncture patients and 71 minutes in controls, a statistically significant difference.<sup>13</sup> A systematic review of 16 such studies concluded that acupuncture was probably effective for pain after

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dental surgery and that future research should concentrate on defining “the optimal acupuncture technique”.<sup>14</sup> While this research does seem to demonstrate an effect of acupuncture not attributable to placebo, its clinical importance is not fully clear. Two additional RCTs found similar results.<sup>15 16</sup>

Studies investigating acupuncture for other forms of postoperative pain used widely diverse treatment techniques, studied small samples of patients, and have had inconsistent findings.<sup>17–25</sup>

### Chronic pain

Several systematic reviews have evaluated the effectiveness of acupuncture for the treatment of chronic pain (table 1).<sup>26–44</sup> Some systematic reviews have examined particular diagnoses, such as headache or back pain, whereas others have included studies across a range of chronic pain conditions. Although reviews vary in their conclusions, acupuncture was found to be superior to no treatment or waiting list control in most studies. RCTs comparing acupuncture to a sham technique were more evenly balanced between those that did and those that did not find statistically significant differences between groups. Meta-analysis was not generally attempted. Quality was related to study outcome with lower quality studies being more likely to favour acupuncture.

A number of additional RCTs have been published subsequently and have yet to be reviewed systematically.<sup>45–69</sup> These RCTs are of variable quality and also provide conflicting evidence for the effectiveness of acupuncture across a range of chronic pain conditions. Tables providing more detail on each of these trials are available via the Centres for Reviews and Dissemination (CRD) website ([www.york.ac.uk/inst/crd/ehcb.htm](http://www.york.ac.uk/inst/crd/ehcb.htm)).

Advocates of acupuncture have pointed to the findings of several high quality studies that have shown statistically and clinically significant differences between acupuncture and sham.<sup>53 70 71</sup> However, each of these findings should not be viewed in isolation from the more extensive body of evidence on chronic pain.

### Addiction

Acupuncture is widely promoted as an aid to smoking cessation. A systematic review of 21 trials suggested that, at best, acupuncture may have a small benefit over a sham acupuncture procedure for short term abstinence rates.<sup>72</sup> Acupuncture is not more effective than placebo techniques for long term abstinence.<sup>72</sup> Quit rates for acupuncture appear slightly lower than those for nicotine replacement.<sup>73</sup>

Acupuncture has been used to treat cocaine addiction in several hundred drug treatment programmes in the United States.<sup>74</sup> Several RCTs have been conducted<sup>75–79</sup> but these have not been subjected to systematic review. Acupuncture is favoured in some analyses, but some RCTs were complicated by multiple statistical comparisons: this increases the likelihood of a false positive result. The most rigorous RCT reported that patients assigned to acupuncture were significantly more likely to provide cocaine negative urine samples, the prespecified primary outcome measure, than those in both the control and sham acupuncture groups.<sup>79</sup>

No systematic reviews evaluating the use of acupuncture to treat alcoholism or opiate addiction were identified. The number, size, quality, and strength of findings of RCTs studying acupuncture for alcoholism and opiate addiction is insufficient to guide clinical decisions.<sup>80–86</sup>

### Asthma

Systematic reviews of acupuncture for asthma have concluded that there is little evidence on which to base clinical decisions.<sup>87 88</sup> A number of the included RCTs have examined acupuncture for asthma and chronic obstructive pulmonary disease. The RCTs are heterogeneous with respect to patients,

acupuncture techniques, outcome measures, and controls. They have also been small with a median sample size of 25; the largest RCT accrued only 39 patients. Some RCTs have used models of induced asthma to allow good experimental control.<sup>89 90</sup> While appearing to show a physiological benefit of acupuncture on lung function, these studies have not been replicated and provide limited insight into the clinical usefulness of acupuncture for asthma. Two small RCTs have recently been published which also provide limited insight into the clinical effectiveness of acupuncture for asthma.<sup>91 92</sup>

### Nausea and vomiting

Two systematic reviews have examined acupuncture for nausea and vomiting.<sup>93 94</sup> The first included RCTs on nausea related to surgery, pregnancy, and chemotherapy.<sup>93</sup> Although acupuncture was not an effective technique when administered under anaesthetic, it was superior to a sham technique in 11 of the 12 studies rated as high quality. The reviewed RCTs showed consistent results across different investigators, different groups of patients, and different forms of acupuncture point stimulation. Allocation concealment was not included in the quality assessment and two studies with unconcealed allocation were included in the principal analysis. The second review, which concentrated on postoperative emesis, improved on the original review by excluding studies with unconcealed allocation and reported a meta-analysis.<sup>94</sup> Data from 19 studies including 1679 patients were analysed. Acupuncture reduced both nausea (relative risk compared with placebo control 0.4; 95% CI 0.2 to 0.7; five RCTs) and vomiting (relative risk compared with placebo control 0.5; 95% CI 0.35 to 0.65; eight RCTs) in adults in the immediate postoperative period. These findings were reasonably robust to sensitivity analyses of study size and quality. Of four additional RCTs on postoperative emesis, two reported less nausea and vomiting<sup>95 96</sup> and two reported no differences between acupuncture, acupressure, and sham treatment.<sup>97 98</sup>

In the case of nausea related to chemotherapy, one of the findings of the early review was that the data were weaker for this indication than for postoperative vomiting.<sup>93</sup> A subsequent high quality RCT (n=104) which included concealed allocation, sham control, and careful blinding found clinically and statistically significant differences in vomiting between acupuncture and control.<sup>99</sup> An additional small trial of 17 women undergoing chemotherapy for breast cancer found significantly less nausea in the group receiving acupressure.<sup>100</sup>

In pregnancy related nausea the early review indicated that acupuncture might have a prophylactic effect but there were no data on acupuncture for the treatment of severe vomiting.<sup>93</sup> More recently a randomised, blinded, crossover trial of 33 pregnant women with hyperemesis reported large clinical improvements from acupuncture and statistically significant differences between acupuncture and sham.<sup>101</sup> One other RCT (n=55) found no effect of acupuncture on pregnancy related nausea.<sup>102</sup>

A small number of paediatric studies reported in the later review did not find differences between acupuncture and control.<sup>94</sup> Two subsequent double blind, sham controlled RCTs used acupuncture points specially chosen for the paediatric population.<sup>103 104</sup> The two RCTs included a combined total of 115 children and had similar results; rates of vomiting in the first 24 hours after surgery were approximately 20% in the acupuncture treated patients compared with about 60% in controls. Three additional RCTs (including a combined total of 224 children) involved stimulation of the acupuncture point P6. Two of the three trials found no effect for acupuncture on postoperative vomiting.<sup>105 106</sup> The third trial found significantly less vomiting in the children receiving laser acupuncture.<sup>107</sup>

### Obesity

A systematic review of four RCTs of acupuncture for weight loss concluded that there was no clear evidence for its

**Table 1** Systematic reviews of clinical RCTs of acupuncture for chronic pain

Reference	Indication	Comparisons	Studies	Features	Results	Conclusion
<b>Chronic pain</b>						
Ezzo 2000 <sup>26</sup>	Chronic pain	Sham, placebo, no treatment, standard	51 RCT	y / y / y / y / n	Positive results in 21 RCTs, negative in 3, and neutral in 27. Better studies more often negative or neutral	Limited evidence that acupuncture is more effective than no treatment, inconclusive evidence regarding placebo, sham and standard care
Patel 1989 <sup>27</sup>	Chronic pain	Sham, no treatment, standard	14 RCT	n / y / n / y / y	Overall patients receiving acupuncture were 18% (p<0.01) more likely to experience improvement	Available evidence positive but definitive conclusions difficult due to various potential sources of bias
ter Riet 1990 <sup>28</sup>	Chronic pain	Sham, no treatment, standard, other acupuncture	51 CCT	y / y / y / y / n	RCTs small and of low quality. 24 with positive and 27 with negative results. Better studies more often negative	The efficacy of acupuncture in the treatment of chronic pain remains doubtful
<b>Back &amp; neck pain</b>						
van Tulder 2001 <sup>29</sup>	Low back pain	Sham, other, no treatment	11 RCT	y / y / y / y / n	Conflicting evidence for acupuncture v. no treatment. Acupuncture not more effective than trigger point injection or transcutaneous electrical nerve stimulation. Acupuncture not more effective than placebo or sham acupuncture in most trials. Methodological quality judged as low	Acupuncture not recommended as regular treatment for low back pain. High quality trials needed
Smith 2000 <sup>30</sup>	Back & neck pain	Inactive (sham, other, no treatment)	13 RCT	y / y / y / y / n	5 studies positive, 8 studies negative; better studies reported more often negative results	No convincing evidence for the analgesic efficacy of acupuncture for back and neck pain
White 1999 <sup>31</sup>	Neck pain	Sham, other, no treatment	14 RCT	y / y / y / y / n	7 studies positive, 7 negative. Of the 8 better studies 5 negative, 3 positive	No convincing evidence for the effectiveness of acupuncture for neck pain
van Tulder 1999 <sup>32</sup>	Low back pain	Sham, other, no treatment	11 RCT	y / y / y / y / n	Conclusions of primary authors positive in 8 studies, by reviewers for 2 studies. Methodological quality judged as low	Acupuncture not recommended as regular treatment for low back pain. High quality RCTs needed
Ernst 1998 <sup>33</sup>	Back pain	Sham, other, no treatment	12 RCT	y / y / y / y / y	OR for improvement compared with all control interventions 2.30 (95%CI 1.28-4.13), with sham 1.37 (0.84-2.25). Majority of studies good quality	Acupuncture superior to various control interventions although insufficient evidence whether superior to sham
Longworth 1997 <sup>34</sup>	Sciatica	Unclear	1 RCT, 6 CCT, 31 UCS	n / p / n / y / n	Most studies of poor quality; a large number of patients seem to have benefited	There may be a role for acupuncture treatment of lumbar disk protrusions and sciatica
ter Riet 1989 <sup>35</sup>	Neck and back pain	Unclear	16 RCT, 6 CCT	y / p / y / n / n	Study design was generally poor. Results only discussed for a few better quality studies	Due to the low methodological quality no definitive conclusions can be drawn
<b>Headache</b>						
Linde 2001 <sup>36</sup>	Idiopathic headaches	Sham, other, no treatment	26 RCT	y / y / y / y / n	Majority of 16 sham controlled trials with at least a trend in favour of acupuncture. Trials vs. other treatments contradictory	Existing evidence suggests the value of acupuncture for the treatment of headache. However, quality and amount of evidence not fully convincing
Melchart 1999 <sup>37</sup>	Recurrent headaches	Sham, other, no treatment	22 RCT	y / y / y / y / y	Majority of 14 sham controlled RCTs with at least a trend in favour of acupuncture. RCTs vs. other treatments contradictory	Existing evidence suggests that acupuncture has a role in headache treatment. However, quality and amount of evidence not fully convincing
ter Riet 1989 <sup>39</sup>	Tension type headache	Sham, other treatment	7 RCT, 1 CCT	y / p / y / n / n	Small study size and methodological problems make the available RCTs uninterpretable	No definitive conclusions on the effectiveness of acupuncture for headache can be drawn
ter Riet 1989 <sup>38</sup>	Facial pain	Sham	2 RCT	y / p / y / y / n	Methodological quality poor	No definitive conclusions possible
<b>Rheumatic diseases</b>						
Ezzo 2001 <sup>40</sup>	Knee osteoarthritis	Sham, other, no treatment	7 RTC	y / y / y / n / n	Strong evidence that acupuncture is more effective than sham acupuncture for pain. Limited evidence that acupuncture better than usual treatment; insufficient evidence v. other treatments.	Evidence suggests that acupuncture may play a role in the treatment of knee osteoarthritis, particularly for the treatment of pain.
Berman 1999 <sup>41</sup>	Fibromyalgia	Sham, other treatments	3 RCT, 4 CS	y / y / y / y / n	Acupuncture more effective than sham for symptoms and global ratings	Limited amount of evidence positive. Further research needed
Ernst 1997 <sup>42</sup>	Osteoarthritis	Sham, other, no treatment	7 RCT, 4 RCT / CCT, 2 RCT	y / p / n / y / n	Both sham and true acupuncture improve symptoms but better RCTs suggest no difference between the two	The notion that acupuncture is superior to sham-needling is not supported by data from controlled clinical RCTs
Lautenschläger 1997 <sup>43</sup>	Inflammatory rheumatoid disease	Sham, no treatment, different acupuncture	2 RCT, 7 CCT, 9 CS	n / p / n / y / n	RCTs contradictory, quality often low	Acupuncture cannot be recommended for rheumatoid arthritis, spondarthopathy, lupus eryth., scleroderma
ter Riet 1989 <sup>44</sup>	Rheumatoid arthritis	Sham	1 RCT, 2 CCT	y / p / y / n / n	Only 1 RCT summarised; this found positive effects on pain but not on inflammation	No definitive conclusions possible

Key: Features (reading left to right): 1 = comprehensive search, 2 = explicit inclusion criteria, 3 = formal quality assessment, 4 = summary of each single studies result, 5 = meta-analysis; y = yes, p = partly, n = no. RCT = randomised controlled trials, CCT = non-randomised controlled trials, CS = cohort studies, UCS = uncontrolled studies; OR = odds ratio, RR = rate ratio.

effectiveness.<sup>108</sup> Two RCTs have been published subsequently: one reported that active acupuncture suppressed appetite and led to greater weight loss than a placebo device<sup>109</sup>; the second reported no effect on weight loss.<sup>110</sup>

### Stroke rehabilitation

One poorly reported systematic review of acupuncture for stroke rehabilitation has been conducted.<sup>111</sup> Four RCTs have been published subsequent to the review.<sup>112–115</sup> Of these, the two more recent studies both with good methodology failed to find effectiveness of acupuncture.<sup>114 115</sup> There is currently insufficient evidence of good quality for the use of acupuncture in stroke rehabilitation.

### Tinnitus

Two systematic reviews have included RCTs of acupuncture for tinnitus.<sup>116 117</sup> With one possible exception of an RCT that found a significant but short term benefit,<sup>118</sup> results have been broadly negative. Although it is possible that the RCTs have been underpowered and/or the acupuncture administered inadequately, current evidence suggests that the effectiveness of acupuncture in tinnitus is doubtful.

### Other conditions

RCTs of acupuncture and related techniques have been conducted in a wide variety of other conditions including depression,<sup>119</sup> urinary incontinence,<sup>120</sup> induction of uterine contractions,<sup>121</sup> breech presentation,<sup>122</sup> hot flushes,<sup>123</sup> xerostomia,<sup>124</sup> irritable bowel syndrome,<sup>125</sup> hyperactivity,<sup>126</sup> male subfertility,<sup>127</sup> urinary tract infection,<sup>128</sup> and hay fever.<sup>129</sup> Although generally tending to support the effectiveness of acupuncture or the related technique for the condition concerned, such RCTs have rarely been reproduced and therefore do not constitute a sufficient basis for clinical recommendations.

### SAFETY OF ACUPUNCTURE

Serious adverse effects including pneumothorax, spinal lesions, and hepatitis B transmission have been reported in the literature, but these are rare and are generally associated with poorly trained unlicensed acupuncturists.<sup>130</sup> A systematic review of prospective studies of acupuncture safety found only two cases of pneumothorax and two cases of broken needles in a quarter of a million treatments.<sup>131</sup> A prospective survey of Japanese acupuncture practitioners recorded only 94 minor adverse events, the most common being forgotten needles and faintness, but no serious adverse events across 65 000 treatments.<sup>132</sup> A study of Swedish physiotherapists practising acupuncture prospectively recorded side effects during more than 9000 episodes of care. Although minor bleeding or haematoma were reported following nearly one in five treatments, other minor adverse effects such as fatigue or sweating were rare. There were no serious complications.<sup>133</sup> More recently, a UK study involving 574 acupuncturists has reported adverse events and treatment reactions associated with 34 407 treatments. No serious adverse events were reported although there were 43 minor adverse events, about a quarter of which were for severe nausea and fainting.<sup>8</sup> In addition, a recent prospective UK survey of 31 822 consultations with 78 doctors and physiotherapists who performed acupuncture reported a rate of 14 minor but significant adverse events (such as headache or fainting) per 10 000 acupuncture consultations.<sup>134</sup>

### IMPLICATIONS

Acupuncture appears to be effective for postoperative nausea and vomiting, chemotherapy related nausea and vomiting, and for postoperative dental pain. Current evidence suggests that acupuncture is unlikely to be of benefit for obesity, smoking cessation, and tinnitus. For most other areas the available

evidence is clearly insufficient to guide clinical decisions. The most problematic area is chronic pain, where there is a large body of data open to conflicting interpretations.

Where evidence is not compelling and is open to differing interpretations, it can be instructive to link levels of evidence to practical decisions. For example, stronger levels of evidence are needed for interventions that involve considerable cost or risk of harm than for less expensive and safer treatments. Similarly, it could be argued that more evidence is required to recommend an intervention as a regular first line treatment than as adjunctive treatment for refractory patients.

Acupuncture is most often used in the NHS as a second or third line treatment for chronic pain. A typical patient has arthritis, back pain, or headache and is not responding to conventional management, is not tolerating medication, or is experiencing recurrent pain. Current levels of evidence from RCTs of acupuncture for chronic pain are probably sufficient to justify this practice. However, there is insufficient evidence to warrant first line treatment of chronic pain; similarly, there is enough evidence to suggest that attempts to curtail acupuncture would be unjustified.

The evidence cited in this bulletin provides an overview of the methodological limitations of previous research conducted in this area. Any future research evaluating acupuncture should be carried out with appropriate methodology in order to improve the quality of the existing evidence base.

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