Acupuncture for acute stroke (Review)

Zhang SH, Liu M, Asplund K, Li L

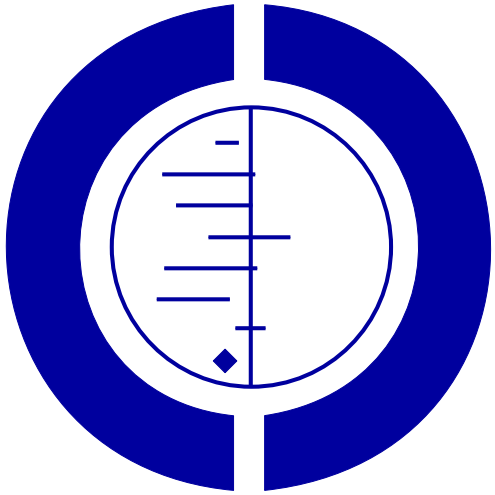

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TABLE OF CONTENTS

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ABSTRACT

Background
Acupuncture-like sensory stimulation activates multiple efferent (nerve) pathways leading to altered activity in numerous neural systems. Acupuncture is widely accepted by Chinese people and it is increasingly requested by patients and their relatives in Western countries.

Objectives
To assess the effectiveness and safety of acupuncture in patients with acute stroke.

Search strategy
We searched the Cochrane Stroke Group trials register (last searched August 2003), the Chinese Stroke Trials Register (August 2003) and the Chinese Acupuncture Trials Register (August 2003). Electronic searches were performed in the Cochrane Controlled Trials Register (*The Cochrane Library, Issue 3, 2003*), MEDLINE (1966 to 2003), EMBASE (1980 to 2003), Alternative Medicine Database (1985 to 2003), CINAHL (1982 to 2003) and the Chinese Biological Medicine Database (1981 to 2003). Reference lists of systematic reviews and identified trials were handsearched.

Selection criteria
Randomised and quasi-randomised trials of acupuncture started within 30 days of stroke onset, compared with placebo/sham acupuncture or open control in patients with acute ischaemic and/or haemorrhagic stroke. Needling into skin was required for acupuncture.

Data collection and analysis
Two reviewers selected trials for inclusion, assessed trial quality, and extracted the data independently. Authors of trials were contacted for missing data.

Main results
Fourteen trials involving 1208 patients were included. Ten trials included patients with only ischaemic stroke. When acupuncture was compared with sham acupuncture or open control, there was a borderline significant trend towards fewer patients being dead or dependent (Odds ratio (OR) 0.66, 95% confidence interval (CI) 0.43 to 0.99), and significantly fewer being dead or needing institutional care (OR 0.58, 95% CI 0.35 to 0.96) in the acupuncture group after three months or more. There was also a significant difference favouring acupuncture in the mean change of global neurological deficit score during the treatment period (standardized mean difference (SMD) 1.17, 95% CI 0.30 to 2.04). Comparison of acupuncture with sham acupuncture only showed a statistically significant difference on death or requiring institutional care (OR 0.49, 95% CI 0.25 to 0.96), but not on death or dependency (OR 0.67, 95% CI 0.40 to 1.12), or change of global neurological deficit score (SMD 0.01, 95% CI -0.55 to 0.57). Severe adverse events with acupuncture (dizziness, intolerable pain and infection of acupoints) were rare (6/386, 1.55%).

Authors' conclusions
Acupuncture appeared to be safe but without clear evidence of benefit. The number of patients is too small to be certain whether acupuncture is effective for treatment of acute ischaemic or haemorrhagic stroke. Larger, methodologically-sound trials are required.

SYNOPSIS

No clear evidence of benefit from acupuncture in acute stroke

In China, acupuncture is used to treat many acute and chronic conditions, including stroke. We reviewed evidence from randomised controlled trials investigating acupuncture in patients with acute stroke, to determine whether acupuncture was safe, and whether it could reduce the number of patients who died, or were left needing help with everyday activities. The review showed no clear effect of acupuncture on either outcome. Serious adverse effects were uncommon, and occurred in about one in every hundred patients treated. Results from much larger randomised trials are needed to assess accurately the benefits and harms of acupuncture in acute stroke.

BACKGROUND

Stroke is the second leading cause of death in the world. In China, stroke is the second most common cause of death in cities, and the third most common cause of death in rural areas (MOH, PRC 2000). Fifty per cent of survivors experience significant disability and 10% require long-term institutional care (DPH 1994), which is a major burden for both family and society. Despite significant research efforts on pharmaceutical therapies for stroke, only aspirin and t-PA (used within three hours) show moderate benefit in acute ischaemic stroke (caused by a sudden blockage of an artery carrying blood to the brain); no specific therapies have been demonstrated to be effective in haemorrhagic stroke (caused by the bursting of a blood vessel in, or on, the brain). Therefore it is necessary to test other promising interventions including complementary medicines such as acupuncture, and Chinese herbal medicine.

Experimental data indicate that acupuncture-like sensory stimulation activates multiple efferent pathways (nerves carrying signals from the brain to muscles) that can lead to altered activity in numerous neural systems (Han 1982). Whether spontaneous functional recovery after stroke can be enhanced by acupuncture has yet to be established.

Acupuncture has been used for hundreds of years in the treatment of acute stroke (Hu 1993). It has been used by Chinese doctors to improve motor, speech and other function after stroke. In a recent survey, 66% of Chinese doctors used acupuncture for stroke routinely and 63% believed acupuncture to be effective. However about 36% thought the effectiveness of acupuncture was uncertain (Chen 1997a). In China, acupuncture is a relatively simple and inexpensive treatment compared with many other commonly used interventions.

Acupuncture is well accepted by Chinese people and it is increasingly requested by patients and their relatives in some Western countries e.g. Sweden (Johansson 1993). However, before acupuncture can be recommended for routine use in patients with stroke, rigorous randomised evidence should be provided to show its effectiveness. To date, randomised controlled trials of acupuncture in stroke have been reported both in, and outside, China. Two recent articles systematically reviewed trials on acupuncture for stroke (Park 2001; Sze 2002a), one of them performed a meta-analysis (Sze 2002a). Both reviews included patients in the acute and chronic stages of stroke and did not show definite benefits of acupuncture. Whether or not acupuncture is effective for acute stroke alone is still unknown.

The aim of this review was to analyse systematically all the randomised controlled trials of acupuncture for acute stroke to provide the best available evidence for clinical practice and further research planning on stroke treatment.

OBJECTIVES

(1) To determine whether, in patients with acute ischaemic stroke or cerebral haemorrhage, acupuncture, compared with control, can increase the proportion of patients alive and not needing help in everyday activities without causing undue harm.
(2) To assess, in patients with acute ischaemic stroke or cerebral haemorrhage, the effects of acupuncture compared with control on impairment, quality of life and death from all causes.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

Truly or quasi-randomised unconfounded controlled clinical trials comparing acupuncture with placebo, sham treatment or open control (no placebo) in patients with acute stroke were eligible for inclusion. Quasi-randomisation refers to allocation using alternate case record numbers, dates of birth or day of the week. Confounded trials in which the treatment or control group received another active therapy (e.g. acupuncture versus other intervention or acupuncture plus other intervention versus control) were excluded.

Types of participants

Trials which included patients of any age or sex with any type of acute stroke (within 30 days) were eligible. The diagnosis of stroke used should preferably be consistent with the WHO definition (a focal neurological impairment of sudden onset, and lasting more

than 24 hours (or leading to death) and of presumed vascular origin) (Hatano 1976). However, studies in which the diagnosis was based on purely clinical features or purely on brain imaging (computed tomography (CT) or magnetic resonance (MR) imaging) were also included. Trials restricted to patients with subarachnoid haemorrhage or subdural haematoma were excluded.

Types of intervention

Trials evaluating acupuncture treatment which involved needling and started within 30 days after stroke onset were included regardless of times of treatment and length of treatment period. Either traditional acupuncture, in which the needles are inserted in classical meridian points, or contemporary acupuncture, in which the needles are inserted in non-meridian or trigger points, were included regardless of the source of stimulation (e.g. hand or electrical stimulation). The control interventions could be placebo acupuncture, sham treatment or no treatment. When the addition of acupuncture to another treatment was compared to the other treatment alone and the trial was therefore assessing acupuncture, the trial was included. Placebo acupuncture refers to a needle attached to skin surface (van Tulder 2000). Sham treatment refers to:
(1) needling prick on the skin surface (needles are placed in an area close to but not in acupuncture points) (van Tulder 2000); and
(2) subliminal skin electrostimulation via electrodes attached to skin (Johansson 2001).

Types of outcome measures

Primary outcome measures included:
(1) death or dependency at the end of follow up. In a subgroup analysis, the analyses were restricted to trials reporting on death or dependency at follow up at least three months after stroke. Dependency was defined as dependent on others in activities of daily living e.g. Barthel Index (BI) scored less than or equal to 60, modified Rankin Scale (MRS) grade 3 - 6 (Sulter 1999), or trialists' own definition;
(2) death or requiring institutional care (or requiring extensive family support) at the end of follow up (family care being the main form of care for severely dependent patients in developing countries). In a subgroup analysis, the analyses were restricted to trials reporting on institutional care/extensive family care at follow up at least three months after stroke;
(3) adverse events: dizziness, difficulty in tolerating electrostimulation or pain, infection, puncture of a lung, heart tamponades (can precede heart failure), spinal cord injury, disrupted pacemaker function, and those effects presumed to have been caused by acupuncture and electrostimulation. The number of patients developing at least one of the severe adverse event listed above was evaluated.

Secondary outcome measures included:
(1) changes in neurological deficit score after acupuncture treatment and at the end of follow up (at three months or longer after stroke onset). The measures could focus on specific impairment (e.g. Motricity Index, or Motor Assessment Scale which assess only motor function) or global neurological deficit (e.g. the National Institute of Health Stroke Scale (NIHSS), Canadian Neurological Scale (CNS), European Stroke Scale (ESS) or the Scandinavian Stroke Scale (SSS) which involve motor, sensory and other impaired neurological function);
(2) death from all causes within the first two weeks of treatment and during the whole follow-up period;
(3) quality of life (QOL) if assessed by included trials.

SEARCH STRATEGY FOR IDENTIFICATION OF STUDIES

See: Stroke Group search strategy

Relevant trials were identified in the Cochrane Stroke Group's trials register which was last searched by the Review Group Co-ordinator in August 2003. We also searched The Chinese Stroke Trials Register (August 2003) and the Chinese Acupuncture Trials Register (August 2003).

The following electronic bibliographic databases were also searched: Cochrane Controlled Trials Register (*The Cochrane Library Issue 3, 2003*), MEDLINE (1966 to August 2003), EMBASE (1980 to August 2003), AMED (1985 to August 2003), CINAHL (1982 to August 2003) and the Chinese Biological Medicine Database (1981 to August 2003).

The following search strategies using a combination of controlled vocabulary and free text terms were used and were modified for the other databases:

MEDLINE (Ovid), CINAHL (Ovid), Cochrane Controlled Trials Register.
1 exp cerebrovascular disorders/
2 (stroke$ or poststroke$ or cva$).tw.
3 (cerebrovascular$ or cerebral vascular).tw.
4 (cerebral or cerebellar or brainstem or vertebrobasilar).tw.
5 (infarct$ or isch?emi$ or thrombo$ or apoplexy or emboli$).tw.
6 4 and 5
7 (cerebral or intracerebral or intracranial or parenchymal).tw.
8 (brain or intraventricular or brainstem or cerebellar).tw.
9 (infratentorial or supratentorial or subarachnoid).tw.
10 7 or 8 or 9
11 (haemorrhage or haemorrhage or hematoma or hematoma).tw.
12 (bleeding or aneurysm).tw.
13 11 or 12
14 10 and 13
15 thrombo$.tw.
16 (intracranial or sinus or (venous adj5 sinus$) or (sagittal adj5 venous) or (sagittal adj5 vein)).tw.
17 15 and 16

18 1 or 2 or 3 or 6 or 14 or 17
19 acupuncture/
20 exp acupuncture therapy/
21 electroacupuncture/
22 meridians/
23 acupuncture points/
24 acupuncture$.tw.
25 (electroacupuncture or electro-acupuncture).tw.
26 acupoints.tw.
27 ((meridian or non-meridian or trigger) adj10 point$).tw.
28 or/19-27
29 18 and 28

AMED (SilverPlatter)
1 explode 'CEREBROVASCULAR-DISORDERS' in SH
2 stroke* or poststroke* or cva*
3 cerebrovascular or cerebral vascular
4 cerebral or cerebellar or brainstem or vertebrobasilar
5 infarct* or isch?emi* or thrombo* or apoplexy or emboli*
6 #4 and #5
7 cerebral or intracerebral or intracranial or parenchymal or brain or intraventricular or brainstem or cerebellar or infratentorial or supratentorial
8 haemorrhage or haemorrhage or hematoma or hematoma
9 #7 and #8
10 #1 or #2 or #3 or #6 or #9
11 explode 'ACUPUNCTURE-' in SH
12 acupunctur* or electro-acupuncture or electroacupuncture or meridians or acupoint* or needling or trigger point*
13 #11 or #12
14 #10 and #13

EMBASE (Ovid)
1 exp cerebrovascular disease/
2 (stroke$ or poststroke$ or cva$).tw.
3 (cerebrovascular or cerebral vascular).tw.
4 (cerebral or cerebellar or brainstem or vertebrobasilar).tw.
5 (infarct$ or isch?emi$ or thrombo$ or apoplexy or emboli$).tw.
6 4 and 5
7 (cerebral or intracerebral or intracranial or parenchymal).tw.
8 (brain or intraventricular or brainstem or cerebellar).tw.
9 (infratentorial or supratentorial).tw.
10 7 or 8 or 9
11 (haemorrhage or haemorrhage or hematoma or hematoma).tw.
12 10 and 11
13 1 or 2 or 3 or 6 or 12
14 exp acupuncture/
15 acupunctur$.tw.
16 (electroacupuncture or electro-acupuncture).tw.
17 acupoint$.tw.
18 ((meridian or non-meridian or trigger) adj10 point$).tw.
19 or/14-18
20 13 and 19

In addition, the reference lists of two recent systematic reviews (Park 2001; Sze 2002a) and all identified trials were searched for relevant articles.

METHODS OF THE REVIEW

Two authors (Zhang, Li) selected trials for inclusion in the review based on selection criteria outlined previously. Disagreement was resolved by discussion with a third party if necessary. Two authors (Zhang, Li) extracted data from each included trial for the methodological quality and outcome assessments. All the extracted data were cross-checked and differences were agreed by conferring with a third party if necessary. The authors of trials were contacted to provide missing data where possible.

Quality assessment

Quality assessment was made by establishing whether each included trial met the following internal validity criteria:
(1) method of randomisation (truly or quasi-randomised);
(2) adequate allocation concealment;
(3) blinding (both of participants and outcome assessors);
(4) intention to treat (ITT) analysis;
(5) number lost to follow up.

Quality assessment was performed by two independent reviewers (Zhang, Li) and disagreements reported to, and resolved by, a third party. These criteria did not form exclusion criteria and are described in the 'Characteristics of included studies' table. We planned to perform sensitivity analysis to assess the effect of including or excluding quasi-randomised trials, and the effect of including or excluding trials where placebo or sham treatment was not used for patients in the control group.

Data extraction

Data were extracted by the same two reviewers and all disagreements resolved by consensus or a third party when necessary. For dichotomous outcomes (death, death or dependency at the end of three months, continuing to require a high level of care, numbers experiencing adverse events) the number of participants experiencing the event and the total number of participants in each arm of the trial were recorded.

For continuous or long ordinal outcomes (impairment scales such as Motricity Index, MAS, and QOL measures) mean change and standard deviation of the change were extracted for each group along with the number in each group.

Data regarding the number of applications and the length of treatment period of acupuncture in each trial were extracted and reported in the 'Characteristics of included studies' table. If interventions showed significant heterogeneity, trials were analysed separately.

Data synthesis

Overall comparison was made between acupuncture and control (placebo/sham acupuncture and open control). Comparisons were also made between acupuncture and sham acupuncture, acupuncture and open control separately. In subgroup analysis we planned to compare:
(1) effects in patients with ischaemic stroke and cerebral haemorrhage;
(2) effects in patients with different time to start treatment (within 10 days and after 10 days from stroke onset); and
(3) effects in patients with different stroke severity at baseline, stroke severity was determined by CNS, NIHSS, SSS, ESS or, where no common standard was available, by trialists' own definition.

Both relative and absolute risk reductions were calculated for each dichotomous outcome. Heterogeneity between trial results was tested using a standard chi squared test. The results were reported as odds ratios (OR) with corresponding 95% confidence intervals (CI) for dichotomous data using the Peto fixed-effect method (APT 1994). For continuous data, weighted mean difference (WMD) was computed for outcomes measured on the same scale, and standardized mean difference (SMD) was calculated when the same outcome was measured on different scales (for example QOL).

DESCRIPTION OF STUDIES

Forty-five potentially eligible trials were identified. Fourteen trials, including a total of 1208 patients, met our inclusion criteria. Twenty nine trials were excluded because:
(1) no usable data were available for analysis (18 trials: Jiang 1998; Li 1999; Li 2000a; Li 2000b; Li 2001; Liu 2001; Liu 2002a; Liu 2002b; Lv 2003; Tang 1996; Wang 2001; Xu 1997; Xu 2001; Yang 2001; Zhang 1996; Zhao 2000; Zhou 2000; Zhou 2002);
(2) of confounding with drug therapy or rehabilitation treatment (four trials: Ma 1999; Pei 2001; Yun 2000; Zheng 1996);
(3) questionable randomisation (two trials: Cai 2002a; Zhang 1999);
(4) comparing two different methods of acupuncture (Li 1989);
(5) questionable data (two trials: Fu 2001; Yu 2003)
(6) unclear point from stroke onset that acupuncture began (Liu 2003)
(7) acupuncture using adhesive surface electrodes (Wong 1999)

One ongoing trial in China (AAIST 2001) aims to recruit 800 patients with acute ischaemic stroke (between 2 and 10 days after stroke onset). This trial compares acupuncture plus routine treatment with routine treatment alone and should be completed in December 2003. One trial is awaiting assessment but at present the published protocol only is available, via the Internet (Lewith 2003).

Missing data were collected through contact with all authors of included trial reports. Seven authors provided further information about their trials (Chen 1997; Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001; Si 1998; Yu 1993). For details of each trial please see the 'Characteristics of included studies' table.

Of the 14 included trials, 10 were conducted in China (including Hong Kong and Taiwan), 3 in Sweden and 1 in the UK. Mean age of participants ranged from 58.6 to 77 years. More men than women were included in most trials (between 51-93% men in 12 trials, and 49-50% men in 2 trials). Two trials (Sze 2002; Wu 2002) included patients with ischaemic stroke and patients with haemorrhagic stroke (11% and 36% respectively). All other trials included patients with ischaemic stroke, but in two of them (Hopwood 2003; Johansson 1993) patients with haemorrhage cannot be completely ruled out as CT/MRI scan was performed in only 65.4% and 50% of patients, respectively.

Ten of the 14 trials included patients with moderate or severe stroke, in which the following inclusion criteria were used:
(1) modified Edinburgh-Scandinavian Stroke Scale (MESSS, a commonly used Chinese scoring system including eight items (level of consciousness, gaze, facial paresis, language, walking ability, motor function of arms, legs and hands)) score greater than 18 (Jin 1999);
(2) MESSS score greater than 6 (Wu 2002);
(3) limb paralysis (Duan 1997; Hu 1993)
(4) limb paralysis with muscle strength grading less than or equal to 3 (Si 1998);
(5) unable to walk or eat or dress without assistance (Gosman-Hedstrom 1998; Johansson 1993);
(6) modified Barthel Index (BI) score (total of 100 points) less than or equal to 70 and unable to perform the Nine Peg test within 60 seconds or walk 10 meters without support (Johansson 2001); and
(7) standard BI score (total of 20 points) ranging from 0 to 15 (Hopwood 2003), from 3 to 14 (Sze 2002).

All trials, with the exception of three (Cai 2002; Duan 1997; Jin 1999), definitely excluded patients with coma or patients who were unable to cooperate during treatment and evaluation because of unconsciousness or severe aphasia or other disorders. Three trials excluded patients who were dependent before stroke onset (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993).

Three trials compared real acupuncture plus standard stroke rehabilitation with sham acupuncture plus standard stroke rehabilitation (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001). The sham treatment included subliminal transcutaneous nerve stimulation (TENS) (Hopwood 2003; Johansson 2001) or needling just under the skin of acupoints but without stimulation (Gosman-Hedstrom 1998). Four trials compared acupuncture plus standard stroke rehabilitation with standard stroke rehabilitation alone (Gosman-Hedstrom 1998; Hu 1993; Johansson 1993; Sze 2002). All other trials compared acupuncture plus routine drug therapy with routine drug therapy alone.

Acupuncture was started within 10 days after stroke onset in 10 trials (Cai 2002; Chen 1997; Gosman-Hedstrom 1998; Hopwood 2003; Hu 1993; Huang 2002; Johansson 1993; Johansson 2001; Si 1998; Wu 2002), 15 days in two trials (Sze 2002; Yu 1993), four to seven days in one trial (Gosman-Hedstrom 1998), 30 days in one trial (Jin 1999). One trial reported that it included patients with acute stroke but the exact time of randomisation or start of acupuncture was not reported (Duan 1997). This trial has been included in the review - and similar trials identified in the future will also be included to avoid excluding some otherwise informative trials - a sensitivity analysis excluding them can be performed if necessary. All trials selected traditional Chinese acupoints, three trials used scalp acupuncture (Cai 2002; Duan 1997; Yu 1993) while two trials used body acupuncture (Chen 1997; Sze 2002), and nine trials used both. There was variation in the number and sites of acupoints but DU20, GU20, GB7, LI11, SJ5 and ST36 were selected frequently. Pure manual stimulation was performed in six trials (Cai 2002; Chen 1997; Duan 1997; Huang 2002; Wu 2002; Yu 1993), additional electrical stimulation was performed in the remaining trials. Stimulation resulting in Teh Chi or muscle contraction was stated in nine trials (Chen 1997; Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001; Si 1998; Sze 2002; Wu 2002; Yu 1993). The duration of acupuncture treatment ranged from seven days (Huang 2002) to 10 weeks (Gosman-Hedstrom 1998; Johansson 1993; Johansson 2001; Sze 2002). The number of applications of acupuncture ranged from seven sessions (Huang 2002) to 30 sessions (Duan 1997), and length of each session ranged from 10 minutes (Chen 1997) to between 30-60 minutes (Hu 1993).

Seven trials evaluated the effect of acupuncture on activities of daily living (ADL) at the end of follow up, in which changes of BI score were evaluated at the end of the treatment period in two trials (Sze 2002; Wu 2002), 90 days in one trial (Hu 1993), and one year in four trials (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001). Death was recorded in ten trials (Chen 1997; Gosman-Hedstrom 1998; Hopwood 2003; Hu 1993; Jin 1999; Johansson 1993; Johansson 2001; Si 1998; Sze 2002; Yu 1993). Three trials described the distribution of stroke survivors in different living settings (home, rehabilitation unit, nursing or old people home, acute hospital) at 10 weeks, 3 and 12 months (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993). Adverse events related to acupuncture were recorded in nine trials (Chen 1997; Gosman-Hedstrom 1998; Hopwood 2003; Hu 1993; Johansson 1993; Johansson 2001; Si 1998; Sze 2002; Yu 1993).

All trials measured the neurological deficits score at the end of the acupuncture treatment period, and four trials followed up this outcome further: at 90 days (Hu 1993), and at one year (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001). The measures employed included the Scandinavian Stroke Scale (Gosman-Hedstrom 1998; Hu 1993); the Mobility Index (Hopwood 2003; Yu 1993); the Rivermead Mobility Index, ability to walk 10 metres, and walking speed (Johansson 2001); mobility score including walking, balance, and motor function (Johansson 1993); Fugl-Meyer Assessment of Physical Performance (FMA) (Sze 2002); and MESSS (other seven trials). Four trials (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001) measured QOL score with the Nottingham Health Profile (NHP) at 12 months.

METHODOLOGICAL QUALITY

Most of the included trials were of poor quality. Three trials used computer-generated random numbers to allocate treatment (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001); two trials used a random number table (Chen 1997; Yu 1993); two trials used stratified random envelopes (Johansson 1993; Sze 2002). One was a quasi-randomised trial which allocated patients alternately (Si 1998). Six trials did not describe their methods of randomisation. Adequate concealment of the randomisation sequence from doctors entering the patients was reported in only five trials, three of which used sealed, opaque and sequentially numbered envelops (Hopwood 2003; Johansson 2001; Sze 2002); one used central telephone randomisation (Gosman-Hedstrom 1998); and one trial used a random number list read by a doctor who was not entering patients (Chen 1997). Three trials blinded patients by using sham acupuncture (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001), and six trials blinded the outcome assessor (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001; Si 1998; Sze 2002; Wu 2002). Nine trials did not follow up patients after the treatment period, which ranged from 1 to 10 weeks. Duration of follow up in the other five trials ranged from 90 days (Hu 1993) to 1 year (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001). The number of patients lost to follow up on primary outcomes (BI) were reported in three trials, and the numbers were 1.9% (Gosman-Hedstrom 1998), 27% (Hopwood 2003), and 12% (Johansson 2001), respectively. Only four trials stated that they had performed an intention to treat (ITT) analysis on primary outcome measures (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001; Sze 2002).

RESULTS

Death or dependency at the end of follow-up

Data for this outcome were available for four trials with a total of 373 patients (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993; Johansson 2001). All trials followed patients for one year. Dependency was defined as BI less than or equal to 60 (out of a potential total of 100) (Gosman-Hedstrom 1998; Johansson 1993; Johansson 2001) and BI less than or equal to 12 (out of a potential total of 20) (Hopwood 2003). There was no significant heterogeneity among them (P = 0.46). There was a borderline significant trend for fewer patients being dead or dependent in the

acupuncture group than in the control group (OR 0.66, 95% CI 0.43 to 0.99). This would be clinically important if confirmed as it is equivalent to 100 fewer dead or dependent patients per 1000 treated with acupuncture. When acupuncture was compared with placebo and open control separately, there was still a trend for fewer patients being dead or dependent in the acupuncture group, but the difference was non-significant (OR 0.67, 95% CI 0.40 to 1.12; OR 0.63, 95%CI 0.31 to 1.29 respectively).

Death or institutional care at the end of follow-up

Three trials (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 1993) described survival in different settings at the end of follow up (12 months). The numbers of patients living at home and needing extensive family support were not available. The numbers of patients living in rehabilitation units, nursing homes/old people's homes and acute hospitals were included in the analysis as numbers requiring institutional care. There was no significant heterogeneity among the three trials. Overall, there was a significant reduction in patients who were dead or needed institutional care in the acupuncture group than in the control group (OR 0.58, 95% CI 0.35 to 0.96). When acupuncture was compared with sham acupuncture the difference was still significant (OR 0.49, 95% CI 0.25 to 0.96). When acupuncture was compared with open control, the difference was not significant (OR 0.73, 95% CI 0.34 to 1.55).

Number with adverse events related to acupuncture treatment

Nine trials recorded adverse events which were possibly related to acupuncture. Among the 386 patients who received acupuncture, only six reported moderate or severe adverse events (Gosman-Hedstrom 1998; Hopwood 2003 ; Hu 1993; Sze 2002) and three of them stopped acupuncture treatment (Gosman-Hedstrom 1998). In the control group, one patient was reported as having difficulty in tolerating sham acupuncture due to anxiety (Gosman-Hedstrom 1998). Therefore, the risk of severe adverse events with acupuncture was possibly less than 1.55%. The possible adverse events with acupuncture included difficulty in tolerating the stimulation due to uncomfortable pain and anxiety (Gosman-Hedstrom 1998), infection of arm (Gosman-Hedstrom 1998), dizziness (Hu 1993), and severe bruising of acupoints (two patients who received heparin or warfarin treatment) (Hopwood 2003; Sze 2002).

Changes of global neurological deficit score at the end of treatment period and at the end of follow-up (more than three months)

Ten trials measured this outcome at the end of the treatment period, however, mean and standard deviation of changes of global neurological score could be extracted in only six trials with total of 453 patients (Cai 2002; Duan 1997; Gosman-Hedstrom 1998; Huang 2002; Si 1998; Wu 2002). There was significant heterogeneity among the six trials (P < 0.00001), which was possibly due to differences in measuring scales, times of evaluation from stroke onset, and control groups used. Overall, patients in the acupuncture groups recovered more quickly from neurological deficits than patients in the control groups - the difference reached statistical significance (SMD 1.17, 95% CI 0.30 to 2.04). However, when acupuncture was compared with sham acupuncture, the difference was not significant (SMD 0.01, 95% CI -0.55 to 0.57).

One trial (Gosman-Hedstrom 1998) measured this outcome at the end of follow up (more than three months) when there was no significant difference between the groups (WMD 0.29, 95% CI -3.36 to 3.94).

Changes of motor function score at the end of treatment period and at the end of follow up (more than three months)

Four trials measured change of motor function score rather than global neurological deficits in stroke survivors (Hopwood 2003; Johansson 1993; Johansson 2001; Yu 1993). There was significant heterogeneity among the four trials (p < 0.00001), which was also possibly due to different measures, different time of evaluation from stroke onset and different control group used. Overall, there was a non-significant trend in favour of acupuncture with more improvement of motor function (SMD 0.76, 95% CI -0.25 to 1.77). The difference reached statistical significance when acupuncture was compared with open control but did not when compared with sham acupuncture (SMD 1.67, 95% CI 0.76 to 2.58; SMD -0.12, 95% CI -0.41 to 0.17 respectively).

At the end of follow-up (more than 3 months), two trials (Hopwood 2003; Johansson 2001) provided data on motor function score, and there was no significant difference between the acupuncture and sham acupuncture groups (WMD -0.02, 95% CI -0.35 to 0.31).

Death within first two weeks and during whole follow-up period

Ten trials provided data on death within the first two weeks, and no significant heterogeneity was found among them. There were fewer deaths in the acupuncture groups than in the control groups, but the difference was not significant and the confidence interval was wide due to the small number of events (OR 0.60, 95% CI 0.18 to 2.01). When acupuncture was compared with sham acupuncture and open control separately, no statistically significant difference was detected (OR 0.62, 95% CI 0.06 to 6.10; OR 0.60, 95% CI 0.14 to 2.47 respectively).

Data on death during whole follow-up period were also available for the same ten trials, and there was no significant heterogeneity among them. There was no difference in likelihood of death between the acupuncture group and the control group (OR 0.92, 95% CI 0.56 to 1.53). When acupuncture was compared with sham acupuncture and open control separately, no statistically significant difference was detected (OR 0.87, 95% CI 0.44 to 1.71; OR 1.00, 95% CI 0.47 to 2.14 respectively).

Quality of life (QOL) at the end of follow-up

Four trials evaluated QOL at the end of follow up (12 month). Since for most trials standard deviations of the Nottingham Health

Profile (NHP) scores were not available, it was impossible to perform a meta-analysis. All trials showed non-significant differences in three dimensions of NHP (energy, pain and sleep) between the acupuncture groups and the sham acupuncture or no acupuncture groups. In another three dimensions of NHP (mobility, social isolation and emotion), one trial reported a significant difference in favour of acupuncture for improving mobility and emotion (Johansson 1993), and another trial reported a significant difference in favour of acupuncture for improving social isolation. However, compared with two negative trials (Gosman-Hedstrom 1998; Johansson 2001), these two positive trials had smaller samples. Thus there is no definitive evidence from the current trials that acupuncture can improve long term QOL.

Subgroup analysis

As the number of trials and total number of patients included in the analysis for each outcome were small, we did not perform predetermined subgroup analysis based on types of stroke (ischaemic or haemorrhagic stroke), time of starting acupuncture and stroke severity.

Sensitivity analysis

(1) Excluding trials without placebo or sham treatment used in the control group

Three trials were included in the analysis (Gosman-Hedstrom 1998; Hopwood 2003; Johansson 2001). No significant effects of acupuncture were detected for all outcomes. However, there was still a trend towards fewer patients dying or being dependent (OR 0.75, 95% CI 0.47 to 1.21) and fewer patients dying or needing institutional care (OR 0.58, 95% CI 0.32 to 1.07) in the acupuncture groups than in the control groups at the end of follow up.

(2) Excluding quasi randomised trials

In the previous analysis, only one quasi-randomised trial (Si 1998) provided usable data for analysis (changes of global neurological deficit score at the end of treatment period). Excluding the data from this trial did not alter the result (SMD 1.21, 95% CI 0.20 to 2.22).

(3) Excluding trials in which exact time of starting acupuncture treatment was unclear

In the previous analysis, there was only one trial in which the exact time of starting acupuncture treatment was unclear (Duan 1997). Excluding the data from this trial (changes of global neurological deficit score at the end of treatment period) did not alter the result (SMD 1.00, 95% CI 0.05 to 1.95).

DISCUSSION

Fourteen trials with total of 1208 patients were included in this review. Compared with two previous systematic reviews on acupuncture for stroke (Park 2001; Sze 2002a), the present review included only patients in the acute stage of stroke, and five new trials were identified and included (Cai 2002; Hopwood 2003; Huang 2002; Wu 2002; Yu 1993). However, there was still no clear evidence of benefit of acupuncture for stroke.

There was a borderline significant trend favouring acupuncture with fewer patients being dead or dependent at the end of long-term follow up. It should be noted that the result was based on data from four trials with a limited number of patients (total of 373 patients). Further, of the four trials, only three were of high quality with regard to allocation concealment, blinding of assessment, and intention to treat (ITT) analysis. There is now empirical evidence of bias in studies with inadequately or unclearly concealed treatment allocation. Schulz et al (Schulz 1995) found that odds reductions were exaggerated by up to 30% for trials that did not have clear concealment, and by 41% for inadequately concealed trials. ITT analysis has been considered as an important strategy in pragmatic randomised controlled trials for assuring two main purposes: (1) maintains treatment groups that are similar; and (2) it allows for non-compliance and deviations from policy by clinicians (Hollis 1999). An analysis including only the three trials assessed as being of high quality did not show a significant effect of acupuncture. Thus, the apparent benefit of acupuncture may be merely due to the play of chance, imbalance of stroke severity at baseline or other methodological weaknesses. However, if the effect is real, the lack of statistical significance is almost certainly due to the small number of patients included - much larger samples would be needed to detect moderate effects of this size with any reliability.

For reasons similar to those above, the apparent effects of acupuncture in reducing death or institutional care and improving global neurological deficits were also unreliable and need to be verified in future trials.

It is desirable to perform both blinding of patients and blinding of outcome assessors in acupuncture trials since a large number of therapeutic sessions in the acute or subacute phase of stroke may have unspecific beneficial effects on recovery and quality of life. For cultural reasons, it was possible to use sham acupuncture in the two Sweden trials (Gosman-Hedstrom 1998; Johansson 2001) but it may be more difficult to perform it in other countries where patients are well acquainted with acupuncture and recognise the special sensation of 'Teh Chi' (e.g. in China). A recent systematic review suggested that placebos had no significant effects on objective or binary outcomes in clinical trials (Hrobjartsson 2001). In this review, when acupuncture was compared with sham acupuncture and open control separately, it seems that there was a placebo effect of acupuncture on the global neurological deficits score, but not on death or dependency, or death or institutional care. Therefore, in future trials, objective or binary outcomes and blinding of outcome assessors should be used where possible. Placebo treatments may not be universally acceptable, but, in settings where they are acceptable, they should be used.

Although fourteen trials were included in this review, and half of them measured ADL using BI, none used death or dependency as a primary outcome. In future acupuncture trials, widely-applied, reliable and valid outcome measures should be used in order to facilitate a meta-analysis. It has been recommended that measures of the level of activity (disability or dependence) should be the most important primary outcome assessed in stroke trials, and that outcome assessment should be undertaken at six months or longer from the start of treatment (Duncan 2000).

Acupuncture appears to be a safe treatment when used in the acute phase of stroke, with severe adverse events occurring only very rarely (possibly less than 1.5%). However, it should be remembered that this result is not based on all included patients. Five of the included trials did not report adverse events. It was possible that authors only reported positive effects without reporting adverse events as well.

None of the included trials specifically assessed the effects of acupuncture on patients with haemorrhagic stroke. Two trials (Sze 2002; Wu 2002) included a few patients with haemorrhagic stroke (11%, and 36% respectively). As these two trials contributed little usable data to the analysis, the present review actually assessed the effects and adverse events of acupuncture on ischaemic stroke. Therefore, more trials of acupuncture for haemorrhagic stroke are required in future.

The ongoing trial (AAIST 2001), using disability and long-term institutionalisation as primary outcomes, will provide further data on the effectiveness of acupuncture for acute ischaemic stroke.

AUTHORS' CONCLUSIONS

Implications for practice

The current evidence presented in this review does not support the routine use of acupuncture for patients with acute stroke.

Implications for research

As there appears to be an indication that acupuncture is potentially effective and safe in the treatment of acute ischaemic stroke, further well-designed trials are required to confirm or refute this. The trial that is currently ongoing should proceed as rapidly as possible and publish its findings as soon as possible. There is also a need to conduct more randomised controlled trials of acupuncture in haemorrhagic stroke. Future trials should overcome the limitations of many of the trials presented in this review. In particular, they should ensure adequate concealment of allocation and blinding of outcome assessors, use an objective dichotomous functional outcome as a primary outcome, have long-term follow-up, and publish the results in a usable form to facilitate a meta-analysis.

POTENTIAL CONFLICT OF INTEREST

None known.

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REFERENCES

References to studies included in this review

Cai 2002 *{published data only}*

* Cai JY, Pan JY. Scalp acupuncture and early blood vessel reopening. *Shanghai Journal of Aupuncture and Moxibustion* 2002;**21**(4):9–10.

Chen 1997 *{published and unpublished data}*

* Chen SQ, Wang YP, Li YX. Effects of acupuncture on neck in the treatment of 95 cases of acute cerebral infarction. *Chinese Journal of Rehabilitation Therapy and Practice* 1997;**3**(4):161–2.

Duan 1997 *{published data only}*

* Duan GJ, Tang Q, Zhang CY, Yang Y, Zhang B. Comparison of effects of acupuncture on cerebral infarction in different parts. *Chinese Acupuncture and Moxibustion* 1997;**10**:591–3.

Gosman-Hedstrom 1998 *{published and unpublished data}*

* Gosman-Hedstrom G, Claessson L, Klingenstierna U, Carlsson J, Olausson B, Frizell M, et al. Effects of acupuncture treatment on daily life activities and quality of life. *Stroke* 1998;**29**:2100–8.

Hopwood 2003 *{unpublished data only}*

* Hopwood V. The effect of acupuncture on stroke recovery. Personal communication 2003.

Hu 1993 *{published data only}*

* Hu H-H, Chung C, Liu TJ, Chen RC, Chen CH, Chou P, et al. A randomized controlled trial on the treatment for acute partial ischemic stroke with acupuncture. *Neuroepidemiology* 1993;**12**:106–13.

Huang 2002 *{published data only}*

* Huang JP, Zeng HK, Zhen XF, Sun C, Li H. Short-term effect of first-aid acupoint pricking blood therapy on cerebral infarction. *Shanghai Journal of Acupuncture and Moxibustion* 2002;**21**(4):7–8.

Jin 1999 *{published data only}*

* Jin ZQ, Gu FL, Chen RX, Cheng JS. Clinical investigation of acupuncture effect on acute cerebral infarction. *Acupuncture Research* 1999;**1**:5–7.

Johansson 1993 *{published data only}*

* Johansson K, Lindgren I, Winder H, Wiklund I, Johansson BB. Can sensory stimulation improve the functional outcome in stroke patients?. *Neurology* 1993;**43**:2189–92.

Johansson 2001 *{published and unpublished data}*

* Johansson BB, Haker E, von Arbin M, Britton M, Langstrom G, Terent A, et al. Acupuncture and transcutaneous nerve stimulation in stroke rehabilitation: a randomized, controlled trial. *Stroke* 2001; **32**:707–13.

Si 1998 *{published and unpublished data}*

* Si QM, Wu GC, Cao XL. Effects of electroacupuncture on acute cerebral infarction. *Chinese Acupuncture and Moxibustion* 1999;**3**: 137–9.

Sze 2002 *{published data only}*

* Sze FK, Wong E, Yi X, Woo J. Does acupuncture have additional value to standard poststroke motor rehabilitation?. *Stroke* 2002;**33**: 186–94.

Wu 2002 *{published data only}*

* Wu XL, Zou Q, Cai DJ, Tang Y, Zhao ZY, Zeng XR. Clinical observation on rehabilitation of nervous functions in the patient of stroke at acute stage treated with acupuncture. *Chinese Acupuncture and Moxibustion* 2002;**22**(11):726–8.

Yu 1993 *{published data only}*

* Yu ZS, Sai XB, Tang Q, Tong X, Yu H, Xu Q, et al. Effects of scalp acupuncture on acute cerebral infarction. *Shanghai Journal of Acupuncture and Moxibustion* 1993;**12**(2):52–3.

References to studies excluded from this review

Cai 2002a

* Cai LH. The effect of scalp acupuncture in the treatment of 170 cases of acute cerebral infarction. *Beijing Journal of Traditional Chinese Medicine* 2002;**21**(4):239–40.

Fu 2001

* Fu WB, Fan L, Li WX. Treatment of acute cerebral infarction by eye acupuncture. *Shanghai Journal of Acupuncture and Moxibustion* 2001;**20**(3):14–5.

Jiang 1998

* Jiang SH, Meng QG, Tang Q, Kong QA. Effect of scalp acupuncture combinated with urokinase on acute cerebral infarction. *Acta Chinese Medicine and Pharmacology* 1998;**3**:51–2.

Li 1989

* Li DM, Li WD, Wei LH, Zhao YL, Lu HZ. Clinical observation on acupuncture therapy for cerebral hemorrhage. *Journal of Traditional Chinese Medicine* 1989;**9**(1):9–13.

Li 1999

* Li Q, Xiao JH, Dong GY. Clinical study of the effects of scalp acupuncture on acute cerebral hemorrhage. *Chinese Journal of Integrated Traditional and Western Medicine* 1999;**19**(4):203–5.

Li 2000a

* Li CP, Yang HS, Zhang YL, Kan JF. Effects of acupuncture on plasm endothelin in patients with acute ischemic stroke. *Acupuncture Research* 2000;**25**(3):214–5.

Li 2000b

* Li CY. Clinical study of effects of acupuncture for acute ischemic study. *Clinical Journal of Acupuncture and Moxibustion* 2000;**16**(9): 7–10.

Li 2001

* Li AH, Liu YS, Shang CS, Yan XM. Clinical study on acupuncture based on principle of Xing Nao Kai Qiao in early stage of ischemic stroke. *Clinical Journal of Acupuncture and Moxibustion* 2001;**17**(11): 39–40.

Liu 2001

* Liu QX, Zhang ZC, Zhang HL. Clinical study on treatment of 160 cases of acute ischemic apoplexy mainly with acupuncture. *Chinese Acupuncture and Moxibustion* 2001;**21**(10):583–5.

Liu 2002a

* Liu HY, Zhu LF, Xie DL, Li Y. Effects of rehabilitation combined with acupuncture on acute ischemic stroke. *Chinese Journal of Clinical Rehabilitation* 2002;**6**(17):2610–1.

Liu 2002b

* Liu Y, Ling FM, Zhang XP, Long MH. Early rehabilitation of acute stroke with acupuncture. *Chinese Journal of Rehabilitation Theory and Practice* 2002;**8**(11):689–90.

Liu 2003

* Liu CR, Qiu ZF. Effects of different treatment methods in stroke rehabilitation. *Journal of Clinical Acupuncture and Moxibustion* 2003; **19**(2):25–6.

Lv 2003

* Lv LJ, Fan GQ, Zhu LP, Wu X. Clinical study on the treatment of acupuncture on cerebral infarction with upper extremity motor disfunction. *Zhejiang Journal of Integrated Traditional Chinese and Western Medicine* 2003;**13**(1):14–5.

Ma 1999

* Ma SH, Dun XR, Yu FH, et al. Clinical study on acute ischemic stroke. *Beijing Chinese Medicine* 1999;**5**:18–9.

Pei 2001

* Pei J, Sun L, Zhu T, Qian Y, Yuan D. The effect of eletro-acupuncture on motor function recovery in patients with acute cerebral infarction: a randomly controlled trial. *Journal of Traditional Chinese Medicine* 2001;**21**(4):270–2.

Tang 1996

* Tang QS, Shun ST. Clinical and experimental study on scalp acupuncture in the treatment of acute cerebral infarction. *Journal of Beijing University of Traditional Chinese Medicine* 1996;**19**(4):37–9.

Wang 2001

* Wang CY, Wang WY. Effects of electroacupuncture on apoprotin in patients with acute cerebral infarction. *Journal of Traditional Chinese Medicine* 2001;**42**(7):409–10.

Wong 1999

* Wong AMK, Su TY, Tang FT, Cheng PT, Liaw MY. Clinical trial of electrical acpuncture on hemiplegic stroke patients. *American Journal of Physical Medicine and Rehabilitation* 1999;**78**(2):117–22.

Xu 1997

* Xu YL. Effects of batroxobin combinated with acupuncture in the treatment of 60 cases of acute cerebral infarction. *Forum on Traditional Chinese Medicine* 1997;**12**(4):35.

Xu 2001

* Xu ZF, Guo ZJ, Guo YL, Shi BX. Effects of early rehabilitation and acupuncture intervention on motor function recovery of acute stroke patients. *Chinese Journal of Physical Medicine and Rehabilitation* 2001; **23**(4):226–8.

Yang 2001

* Yang HB. Effects of acupuncture in early stage of ischemic stroke. *Journal of Hubei College of Traditional Chinese Medicine* 2001;**3**(3): 38–9.

Yu 2003

* Yu CD, Wu BH, Hong AH, Bai JY, Yu Z. Effects of scalp acupuncture combined with drugs at early stage of cerebral infarction. *Chinese Acupuncture and Moxibustion* 2003;**23**(2):67–9.

Yun 2000

* Yun Y, Zhang J, Zhao R. The early effect of fire acupuncture on acute cerebral infarction. *Chinese Acupuncture and Moxibustion* 2000; **3**:151–2.

Zhang 1996

* Zhang XS, Yuan YM. The changes of vasoactive intestinal peptide somatostatin and pancreatic polypeptide in blood and CSF of acute cerebral infarction patients and the effect of acupuncture. *Acupuncture Research* 1996;**21**(4):10–6.

Zhang 1999

* Zhang QC, Luo LB, Yu L, Zhang LD, Zhang YM. Effect of needling on the 6 treating-paralysis acupoints on acute stroke. *Clinical Journal of Acupuncture and Moxibustion* 1999;**15**(3):46–8.

Zhao 2000

* Zhao J, Meng LY, Zhang J. Clinical observation of effect of acupuncture on acute ischemic stroke. *Acta Chinese Medicine and Pharmacology* 2000;**4**:54.

Zheng 1996

* Zheng JG, Zhou JZ. Effects of acupuncture with manipulation of "arouse brain and orifice opening" on acute cerebral hemorrhage. *Journal of Tianjing College of Traditional Chinese Medicine* 1996;**4**: 21–3.

Zhou 2000

* Zhou DM, Yang J, Shen TL, Yu ZG. Effects of acupuncture in the treatment of 32 cases of cerebral infarction with hemorrhagic transformation. *Clinical Journal of Acupuncture and Moxibustion* 2000;**16** (2):6–7.

Zhou 2002

* Zhou W, Wang LP, Liu H, Bian G. Influence of scalp acupuncture on serum tumor necrosis factor in patients with acute cerebral infarction. *Shanghai Journal of Acupuncture and Moxibustion* 2002;**21**(1): 11–2.

References to studies awaiting assessment

Lewith 2003

* Lewith G. Evaluating the effectiveness of acupuncture in defined aspects of stroke. Current Controlled Trials (http://www.controlled-trials.com/) 2003.

References to ongoing studies

AAIST 2001

Acupuncture for Acute Ischemic Stroke Trial. Ongoing study April 2001.

Liu M. Acupuncture for Acute Ischaemic Stroke Study (AAIST): Preliminary results. Abstract Book of China - Japan Medical Conference 2002. 2002:140.

Additional references

APT 1994

Antiplatelet Trialists' Collaboration. Collaborative overview of randomised trials of antiplatelet therapy -1: prevention of death, myocardial infarction, and stroke by prolonged antiplatelet therapy in various categories of patients. *British Medical Journal* 1994;**308**:81–106.

Chen 1997a

Chen ZM, Sandcock P, Xie JX, Collins R, Liu LS. Hospital management of acute ischemic stroke in China. *Journal of Stroke and Cerebrovascular Diseases* 1997;**6**:361–7.

DPH 1994

Director of Public Health. Annual report. Southampton and South West Hampshire Health Commission 1994.

Duncan 2000

Duncan P, Jorgenson HS, Wade DT. Outcome measures in acute stroke trials - A systematic review and some recommendations to improve practice. *Stroke* 2000;**31**:1429–38.

Han 1982

Han JS, Terenius L. Neurochemical basis of acupuncture analgesia. *Annual Review of Pharmacology and Toxicology* 1982;**22**:193–220.

Hatano 1976

Hatano S. Experience from a multicenter stroke register: a preliminary report. *Bulletin of the World Health Organization* 1976;**54**:541–53.

Hollis 1999

Hollis S, Campbell F. What is mean by intention to treat analysis? Survey of published randomised controlled trials. *British Medical Journal* 1999;**319**:670–4.

Hrobjartsson 2001

Hrobjartsson A, Gotzsche PC. Is the placebo powerless? - An analysis of clinical trials comparing placebo with no treatment. *New England Journal of Medicine* 2001;**344**(21):1594–1602.

MOH, PRC 2000

. Chinese health statistical digest. Ministry of Health, People's Republic of China 2000: 200, 260.

Park 2001
Park J, Hopwood V, White AR, Ernst E. Effectiveness of acupuncture for stroke: A systematic review. *Journal of Neurology* 2001;**248**(7): 558–63.

Schulz 1995
Schulz KF, Chalmers I, Hayes RJ, Altman DG. Empirical evidence of bias: Dimensions of methodological quality associated with estimates of treatment effects in controlled trials. *JAMA* 1995;**273**(5):408–12.

Sulter 1999
Sulter G, Steen C, Keyser JD. Use of the Bathel Index and Modified Rankin Scale in acute stroke trials. *Stroke* 1999;**30**:1538–41.

Sze 2002a
Sze FK, Wong E, Or KK, Lau J, Woo J. Does acupuncture improve motor recovery after stroke? A meta-analysis of randomized controlled trials. *Stroke* 2002;**33**(11):2604–19.

van Tulder 2000
Tulder MW van, Cherkin DC, Berman B, Lao L, Koes BW. Acupuncture for low back pain. In: *The Cochrane Library*, 4, 2000. Oxford: Update Software.

* *Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	**Cai 2002**
Methods	RCT, method of randomisation not stated. C: unclear. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 76 patients (35/41). Acute ischaemic stroke. <= 4 hours from stroke onset. 100% CT scan before entry. Comparability: unclear.
Interventions	Rx group: 2 scalp acupoints, manual twirling stimulation, 40 minutes/session, total number of session not stated. Control group: no acup. Both groups: drug therapy including Vitamin C, Citicoline and Gegengsu.
Outcomes	Change of MESSS score at 14 days.
Notes	FU: 14 days.
Allocation concealment	B

Study	**Chen 1997**
Methods	RCT using random number table.

Characteristics of included studies (*Continued*)

	C: random number list read by doctor not entering patients into trial. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 167 patients (95/72). Acute ischaemic stroke. 2-72 hours from stroke onset. 100% CT scan before entry. Comparability: age similar, more patients with multiple cerebral infarction and more female in acup group.
Interventions	Rx group: 2 acupoints (ST9), manual twirling stimulation, 10 minutes/session, once a day for 20 days. Control group: no acup. Both groups: routine drug therapy.
Outcomes	Number of patients with improvement (MESSS score decrease >18%) at 20 days.
Notes	FU: 20 days.
Allocation concealment	A

Study	**Duan 1997**
Methods	RCT, method of randomisation not stated. C: unclear. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 92 patients (47/45). Acute ischaemic stroke. 100% CT scan before entry. Comparability: MESSS score and sites of infarction similar.
Interventions	Rx group: 2 acupoints (DU20, GB7), manual twirling stimulation, 24 minutes / session, once per day for 30 days. Control group: no acup. Both group: routine drug therapy
Outcomes	Change of MESSS score at 30 days. Number of patients with improvement (MESSS score decrease >18%) at 30 days.
Notes	FU: 30 days.
Allocation concealment	B

Study	**Gosman-Hedstrom 1998**
Methods	RCT, computer-generated random number list stratified according to side of cerebral lesion, diabetes, and hospital. C: central randomisation by telephone. Blinding: patients and outcome assessor. ITT analysis: yes. Losses to FU: for BI 1 in deep acup group, 1 in superficial acup group.
Participants	Country: Sweden. 104 patients (37/34/33). Acute ischaemic stroke.

Characteristics of included studies (*Continued*)

	<7 days from stroke onset. 100% CT scan before entry. Comparability: no significant difference in age, neurol score, ADL score and past history.
Interventions	Rx group: 10 acupoints (DU20, LI11, ST38, EX mob, SJ5), manual or electrical stimulation, 30 minutes/session, twice per week for 10 weeks. Control group 1: 4 short needles placed superficially just under the skin (1 in each extremity), no manual or electrical stimulation. Control group 2: no acup. Three groups: conventional stroke rehabilitation.
Outcomes	Change of SSS score at 3, 12 months. Change of BI at 3 ,12 months. QOL score (NHP) at 3, 12 months. Number requiring institutional care at 3 , 12 months. Adverse events
Notes	FU: 1 year.
Allocation concealment	A

Study	**Hopwood 2003**
Methods	RCT, computer-generated random number list stratified with BI. C: sequentially numbered, sealed, opaque envelopes. Blinding: outcomes assessors. ITT analysis: yes. Losses to FU: 13 in acup group and 12 in control group.
Participants	Country: Britain. 92 patients (47/45). Acute ischaemic stroke. <10 days from stroke onset. 50% CT scan before entry. Comparability: age, SSS score and BI similar.
Interventions	Rx group: 10 acupoints on the paralysed side, manual (GB20, LI11, GB31, LI14, ST34, GB39, GB43) or electrical stimulation (LI10, SJ5, GB34), 30 minutes/session, 3 times per week for 4 weeks. control group: placebo acup (deactivated TENS).
Outcomes	BI, Motricity Index, NHP at 3, 6, 12, 24 and 52 weeks. Place of residence at 24 and 52 weeks.
Notes	FU: 1 year.
Allocation concealment	A

Study	**Hu 1993**
Methods	RCT, methods of randomisation not stated. C: unclear. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China (Taiwan). 30 patients (15/15) . Acute ischaemic stroke. <36 hours from stroke onset. 100% CT before entry.

	Comparability: age, sex, risk factors and location of stroke similar, more hemispheric stroke and less lacunar stroke in acup group.
Interventions	Rx group: more than 24 acupoints (Scalp motor area, GB21, LI11, GB34, EX-UE7, BL60 and LR3 selected routinely), electrical stimulation (9.4 Hz), 30 to 60 minutes/session, every other day for 4 weeks. Control group: no acup. Both groups: supportive treatment, prevention of complications and a standard rehabilitation programme.
Outcomes	Change of SSS score at 28, 90 days. Change of BI at 28, 90 days.
Notes	FU: 90 days.
Allocation concealment	B

Study	**Huang 2002**
Methods	RCT, method of randomisation not stated. C: unclear. Blinding: none. ITT analysis not stated. Losses to FU: unclear.
Participants	Country: China 35 patients (20/15). Acute ischaemic stroke. <= 48 hours from stroke onset. 100% CT scan. Comparability: no significant difference in MESSS score.
Interventions	Rx group: 4-6 acupoints, pricking blood therapy, once a day for 7 days. Control group: no acup. Both groups: drug therapy including Ligustrazine and Dextran.
Outcomes	Change of MESSS score at 7 days.
Notes	FU: 7 days.
Allocation concealment	B

Study	**Jin 1999**
Methods	RCT, method of randomisation not stated. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 120 patients (60/60). Acute ischaemic stroke. < 1 month from stroke onset. 100% CT scan before entry. Comparability: sex, age, past history, co-morbidity and stroke severity similar.
Interventions	Rx group: more than 14 acupoints (DU20, DU23 and DU26 selected routinely), manual twirling or electrical stimulation, 60 minutes/session, 5 times a week for 40 days. Control group: no acup. Both groups: routine drug therapy.
Outcomes	Number of patients with improvement (MESSS score decrease >8) at 40 days.
Notes	FU: 40 days.

Characteristics of included studies (*Continued*)

Allocation concealment	B

Study	**Johansson 1993**
Methods	RCT, stratified randomisation with envelopes. C: sealed envelopes but not sequentially numbered or opaque. Blinding: none. ITT analysis not stated. Losses to FU: none
Participants	Country: Sweden. 78 patients (38/40). Acute stroke. < 10 days from stroke onset. 63% CT scan before entry. Comparibility: age, sex, side of infarction and neurol score similar.
Interventions	Rx group: 10 acupoints (DU20, ST40, ST36, GB34, LI4, LI11, SJ5, etc), manual and electrical stimulation, 30 minutes/session, twice a week for 10 weeks. Control group: no acup. Both groups: standard stroke rehabilitation
Outcomes	Mobility score at 1, 3 months. Number requiring institutional care at 3, 12 months. Change of BI at 3, 12 months. QOL score (NHP) at 3, 12 months.
Notes	FU:1 year.
Allocation concealment	C

Study	**Johansson 2001**
Methods	RCT, computer-generated randomisation. C: sequentially numbered, sealed, opaque envelopes. Blinding: patients and outcome assessor. ITT analysis: yes. Losses to FU: for BI 6 in acupuncture group, 6 in Sub-TENS group.
Participants	Country: Sweden. 99 patients (48/51). Acute ischaemic stroke. 5-10 days from stroke onset. 98.5% CT scan before entry. Comparability: age, sex, medical history, CT scan finding, motor function score and ability to walk 10 meters similar.
Interventions	Rx group: 9-10 acupoints (LI4, ST36, DU20, LI11, ST40, EX28:21, EX36:1, GB34), manual and/or electrical stimulation, 30 minutes/session, twice a week for 10 weeks. Control group: acupoints as above, subliminal TENS (no skin sensation and no visible muscle contraction). Both group: conventional therapy, occupational therapy, speech therapy and drug therapy if needed.
Outcomes	Motor function (RMI, walk speed, ability to walk 10 meters) at 3, 12 months. Change of BI at 3, 12 months. QOL score (NHP) at 3, 12 months. Adverse events.
Notes	FU: 1 year.
Allocation concealment	A

Characteristics of included studies (*Continued*)

Study	**Si 1998**
Methods	RCT, alternative allocation. C: inadequate. Blinding: outcome assessor. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 42 patients (20/22). Acute ischaemic stroke. <7 days from stroke onset. 100% CT or MRI scan before entry. Comparability: sex, age, number and site of infarction and stroke severity similar.
Interventions	Rx group: 8 acupoints (DU20, DU24, LI4, LI11, ST36, PC6, LR3, SP6), manual twirling and electrical stimulation, 20 minutes/session, once a day for 5 days then rest 2 days repeated until discharge. Control group: no acup. Both groups: routine drug therapy.
Outcomes	Change of MESSS score at discharge from hospital.
Notes	FU: mean 37 days.
Allocation concealment	C

Study	**Sze 2002**
Methods	RCT, stratified randomisation with random permuted blocks of 4. C: sequentially numbered sealed envelopes. Blinding: outcome assessor. ITT analysis: yes. Number of dropout: 14 patients.
Participants	Country: China (Hong Kong). 106 patients (53/53). Acute ischaemic stroke and hemorrhagic stroke. <15 days from stroke onset. 100% CT scan before entry. Comparability: sex, age, comorbidity, sites of lesion, and stroke severity similar between two groups.
Interventions	Rx group: 10 main acupoints and 6 auxiliary acupoints on the paretic side, manual twirling stimulation and/or electric stimulation, 30 minutes/session, 3 times a week for 8 weeks then 2 times a week for 2 weeks. Control group: no acup. Both groups: standard physiotherapy and occupational therapy in addition to routine treatment.
Outcomes	FMA at 10 weeks. BI at 10 weeks.
Notes	FU: 10 weeks.
Allocation concealment	A

Study	**Wu 2002**
Methods	RCT, method of randomisation not stated. C: unclear. Blinding of assessor. ITT analysis not stated. Losses to FU: 2 patients in acup group.
Participants	Country: China.

Characteristics of included studies (*Continued*)

	104 patients (52/52). Acute ischaemic stroke and hemorrhagic stroke. Within 5 days from stroke onset. 100% CT/MRI scan before entry. Comparability: age, sex, and stroke severity similar.
Interventions	Rx group: 6 main acupoints and more than 6 auxiliary acupoints, manual twirling stimulation, 30 minutes/session, 5 times a week until discharge from hospital Control group: no acup. Both groups: routine drug therapy.
Outcomes	Change of MESSS and BI at the end of FU.
Notes	FU: mean 24-25 days.
Allocation concealment	B

Study	**Yu 1993**
Methods	RCT with random number table. C: random number list read by doctor entering patients into trial. Blinding: none. ITT analysis not stated. Losses to FU: none.
Participants	Country: China. 63 patients (33/30). Acute ischaemic stroke. 6 hours-15 days from stroke onset. 100% CT/MRI scan before entry. Comparability: age, sex, course and stroke severity similar.
Interventions	Rx group: 2 acupoints (DU20, GB7), manual twirling stimulation, 16-19 minutes/session, once a day for 15 days. Control group: no acup. Both groups: rutine drug therapy.
Outcomes	Change of mobility index at 15 days.
Notes	FU: 15 days.
Allocation concealment	C

acup: acupuncture
ADL: activity of daily living
BI: Barthel index
C: concealment of allocation
FMA: Fugl-Meyer Assessment of Physical Performance
FU: follow-up
ITT: intention to treat
MESSS: modified Edinburgh-Scandinavian Stroke Scale
neurol: neurological
NHP: Nottingham Health Profile
QOL: quality of life
RCT: randomised controlled trial
RMI: Rivermead mobility index
Rx group: acupuncture group
SSS: Scandinavian Stroke Scale

Characteristics of included studies (*Continued*)

TENS: transcutaneous nerve stimulation

Characteristics of excluded studies

Cai 2002a	Questionable randomisation (patients in five hospitals were included, but patients in one hospital only were allocated into the control group).
Fu 2001	Data from this trial were questionable (data were inconsistent in full text of published paper)
Jiang 1998	It was not possible to include data from this trial in the analysis. MESSS was assessed before and after treatment period, but mean change of MESSS score was not available.
Li 1989	The trial aimed to assess effects of two kinds of acupuncture on acute stroke (acupuncture involving Du15 and Du16 in addition to other acupoints versus acupuncture involving other acupoints alone).
Li 1999	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Li 2000a	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Li 2000b	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Li 2001	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Liu 2001	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Liu 2002a	It was not possible to include data from this trial in the analysis. Motor function and BI were assessed before and after treatment period, but mean change of motor function score and number of patients being independent after treatment period were not available.
Liu 2002b	It was not possible to include data from this trial in the analysis. MESSS scores, motor function and BI were assessed before and after treatment period, but mean change of neurological score and number of patients being independent after treatment period were not available.
Liu 2003	It was unclear when acupuncture treatment was started after stroke onset.
Lv 2003	It was not possible to include data from this trial in the analysis. Motor function was assessed before and after treatment period, but mean change of motor function score after treatment period was not available.
Ma 1999	Confounded (acupuncture versus nimodipine), questionable randomisation (68 cases in acupuncture group and 30 cases in control group).
Pei 2001	Confounded (clinical treatment plus electro-acupuncture versus clinical treatment plus active and/or passive functional exercise).
Tang 1996	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Wang 2001	It was not possible to include data from this trial in the analysis. Neurological score was assessed using a scoring system based on principles of traditional Chinese medicine, but mean change of score after treatment period was not available.
Wong 1999	Acupuncture points were stimulated by using adhesive surface electrode.
Xu 1997	It was not possible to include data from this trial in the analysis. BI was assessed before and after treatment period, but number of patients being independent at the end of treatment period was not available.
Xu 2001	It was not possible to include data from this trial in the analysis. MESSS scores, motor function and BI were assessed before and after treatment period, but mean change of neurological score and numbere of patients being independent after treatment period were not available.
Yang 2001	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Yu 2003	Data f rom this trial were questionable. Patients with acute ischemic stroke and BI < 70 were included and randomised in outpatients' department. It was difficult to perform this trial in China.
Yun 2000	Confounded (acupuncture plus defibrase (5 U) versus defibrase (10 U)).
Zhang 1996	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).

Characteristics of excluded studies (*Continued*)

Zhang 1999	Questionable randomisation (145 cases in acupuncture group and 96 cases in control group) and no useful data available for analysis.
Zhao 2000	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Zheng 1996	Confounded (acupuncture versus routine drug treatment); questionable quasi-randomisation using alternate allocation (40/30).
Zhou 2000	It was not possible to include data from this trial in the analysis (see reason for exclusion of Jiang 1998).
Zhou 2002	It was not possible to include data from this trial in the analysis. Motor function of limbs was assessed by using Yishangtian Scale, but mean changes of score in each group were not available.

BI: Barthel Index
MESSS: modified Edinburgh-Scandinavian Stroke Scale

Characteristics of ongoing studies

Study	**AAIST 2001**
Trial name or title	Acupuncture for Acute Ischemic Stroke Trial
Participants	Country: China 800 patients with acute ischemic stroke (2-10 days after stroke onset).
Interventions	Acupuncture plus routine treatment versus routine treatment. Acupuncture: more than 12 acupoints including PC6, DU26, SP6, ST36, ST40, LR3, DU20, etc, manual stimulation, 30 minutes/session, 5 times a week for 4 weeks .
Outcomes	Primary outcomes: disability or death and institutional care or death at 6 months, adverse events of acupuncture. Secondary outcomes: change of SSS score at the end of acupuncture treatment period.
Starting date	April 2001
Contact information	Prof. Ming Liu, Department of Neurology, West China Hospital, Sichuan University, P.R.China
Notes	

SSS: Scandinavian Stroke Scale

GRAPHS

Comparison 01. Acupuncture versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Death or dependency at the end of follow up	5	373	Peto Odds Ratio 95% CI	0.66 [0.43, 0.99]
02 Death or institutional care at the end of follow up	4	274	Peto Odds Ratio 95% CI	0.58 [0.35, 0.96]
03 Changes of global neurological deficit score at the end of treatment period	7	451	Standardised Mean Difference (Random) 95% CI	1.17 [0.30, 2.04]
04 Motor function at the end of acupuncture treatment period	4	317	Standardised Mean Difference (Random) 95% CI	0.76 [-0.25, 1.77]
05 Motor function at the end of follow up (> 3 months)	2	144	Standardised Mean Difference (Random) 95% CI	-0.02 [-0.35, 0.31]
06 Death within first two weeks	11	947	Peto Odds Ratio 95% CI	0.60 [0.18, 2.01]
07 Death during whole follow-up period	11	947	Peto Odds Ratio 95% CI	0.92 [0.56, 1.53]

INDEX TERMS

Medical Subject Headings (MeSH)

Acupuncture Therapy; Acute Disease; Cerebrovascular Accident [therapy]; Randomized Controlled Trials

Medical MeSH check words

Humans

COVER SHEET

Title	Acupuncture for acute stroke
Authors	Zhang SH, Liu M, Asplund K, Li L
Contribution of author(s)	Shihong Zhang designed the review, performed searches, appraised and selected trials, extracted data, contacted authors for additional data, carried out analysis and interpretation of the data, and drafted this report. Ming Liu initiated and co-ordinated the review project, designed the review, directed trial searches and selection, analyses, interpretation and preparation of this report. Kjell Asplund commented on the review protocol and this report, assisted in designing of the review, collected additional data in Sweden. Lin Li performed Chinese literature searches, appraised and selected trials, extracted data, assisted interpretation of the data.
Issue protocol first published	2001/4
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Date of most recent amendment	03 February 2005
Date of most recent SUBSTANTIVE amendment	01 December 2004
What's New	Information not supplied by author
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	13 June 2004
Date authors' conclusions section amended	Information not supplied by author
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GRAPHS AND OTHER TABLES

Fig. 1. Comparison 01. Acupuncture versus control

01.01 Death or dependency at the end of follow up

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 01 Death or dependency at the end of follow up

Study	Acupuncture n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
01 Acupuncture versus sham acupuncture					
Gosman-Hedstrom 1998	8/19	19/34		14.0	0.58 [0.19, 1.77]
Hopwood 2003	14/47	20/45		24.4	0.54 [0.23, 1.25]
Johansson 2001	20/48	23/51		27.6	0.87 [0.39, 1.92]
Subtotal (95% CI)	114	130		65.9	0.67 [0.40, 1.12]
Total events: 42 (Acupuncture), 62 (Control)					
Test for heterogeneity chi-square=0.75 df=2 p=0.69 I^2 =0.0%					
Test for overall effect z=1.54 p=0.1					
02 Acupuncture versus open control					
Gosman-Hedstrom 1998	7/18	10/33		11.9	1.46 [0.44, 4.88]
Johansson 1993	15/38	25/40		22.2	0.40 [0.17, 0.97]
Subtotal (95% CI)	56	73		34.1	0.63 [0.31, 1.29]
Total events: 22 (Acupuncture), 35 (Control)					
Test for heterogeneity chi-square=2.86 df=1 p=0.09 I^2 =65.0%					
Test for overall effect z=1.27 p=0.2					
Total (95% CI)	170	203		100.0	0.66 [0.43, 0.99]
Total events: 64 (Acupuncture), 97 (Control)					
Test for heterogeneity chi-square=3.62 df=4 p=0.46 I^2 =0.0%					
Test for overall effect z=1.99 p=0.05					

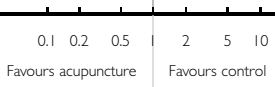

Fig. 2. Comparison 01. Acupuncture versus control

01.02 Death or institutional care at the end of follow up

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 02 Death or institutional care at the end of follow up

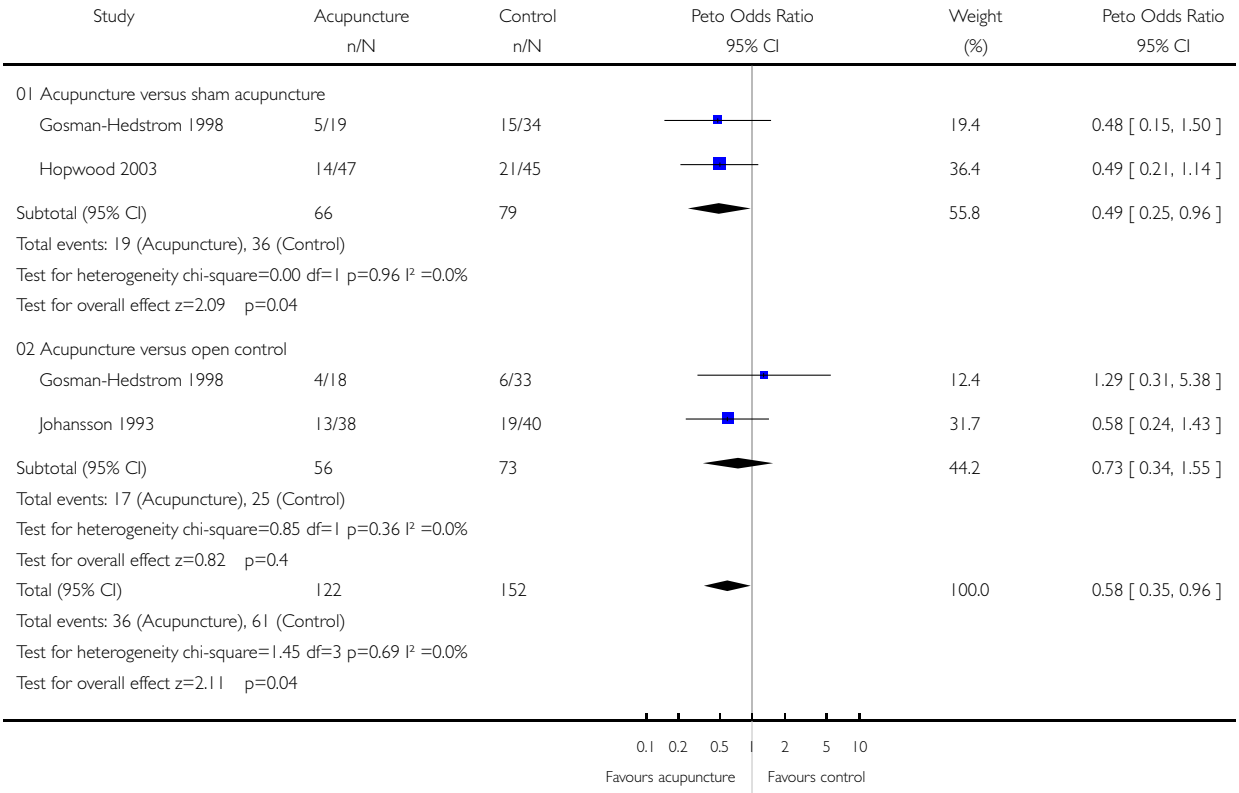

Fig. 3. Comparison 01. Acupuncture versus control

01.03 Changes of global neurological deficit score at the end of treatment period

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 03 Changes of global neurological deficit score at the end of treatment period

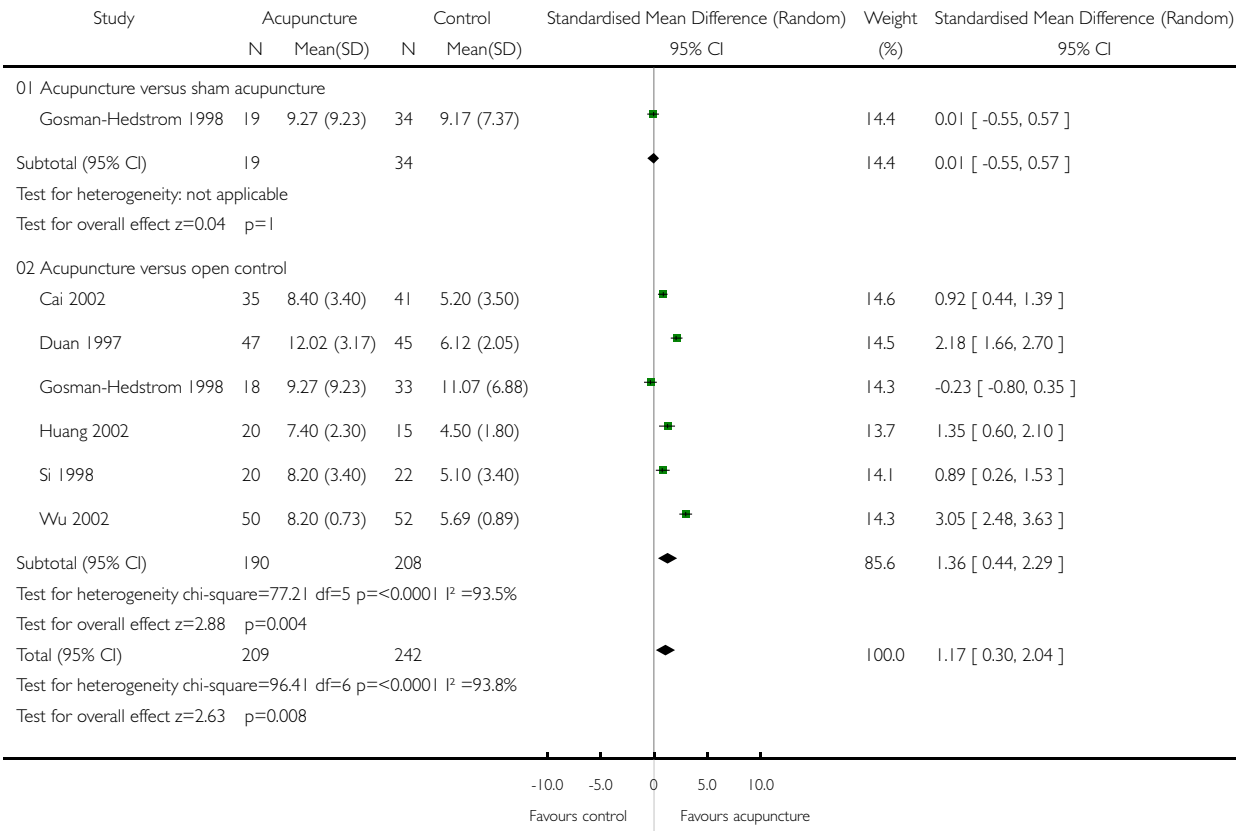

Fig. 4. Comparison 01. Acupuncture versus control

01.04 Motor function at the end of acupuncture treatment period

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 04 Motor function at the end of acupuncture treatment period

Study	Acupuncture N	Acupuncture Mean(SD)	Control N	Control Mean(SD)	Standardised Mean Difference (Random) 95% CI	Weight (%)	Standardised Mean Difference (Random) 95% CI
01 Acupuncture versus sham acupuncture							
Hopwood 2003	47	44.76 (22.78)	45	47.74 (26.44)		25.5	-0.12 [-0.53, 0.29]
Johansson 2001	44	4.68 (3.02)	48	5.00 (2.34)		25.5	-0.12 [-0.53, 0.29]
Subtotal (95% CI)	91		93			51.0	-0.12 [-0.41, 0.17]
Test for heterogeneity chi-square=0.00 df=1 p=1.00 I² =0.0%							
Test for overall effect z=0.81 p=0.4							
02 Acupuncture versus open control							
Johansson 1993	33	73.80 (4.90)	37	62.10 (5.80)		24.3	2.14 [1.55, 2.74]
Yu 1993	33	25.06 (15.57)	30	6.48 (14.63)		24.7	1.21 [0.67, 1.75]
Subtotal (95% CI)	66		67			49.0	1.67 [0.76, 2.58]
Test for heterogeneity chi-square=5.16 df=1 p=0.02 I² =80.6%							
Test for overall effect z=3.59 p=0.0003							
Total (95% CI)	157		160			100.0	0.76 [-0.25, 1.77]
Test for heterogeneity chi-square=53.59 df=3 p=<0.0001 I² =94.4%							
Test for overall effect z=1.48 p=0.1							

Fig. 5. Comparison 01. Acupuncture versus control

01.05 Motor function at the end of follow up (> 3 months)

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 05 Motor function at the end of follow up (> 3 months)

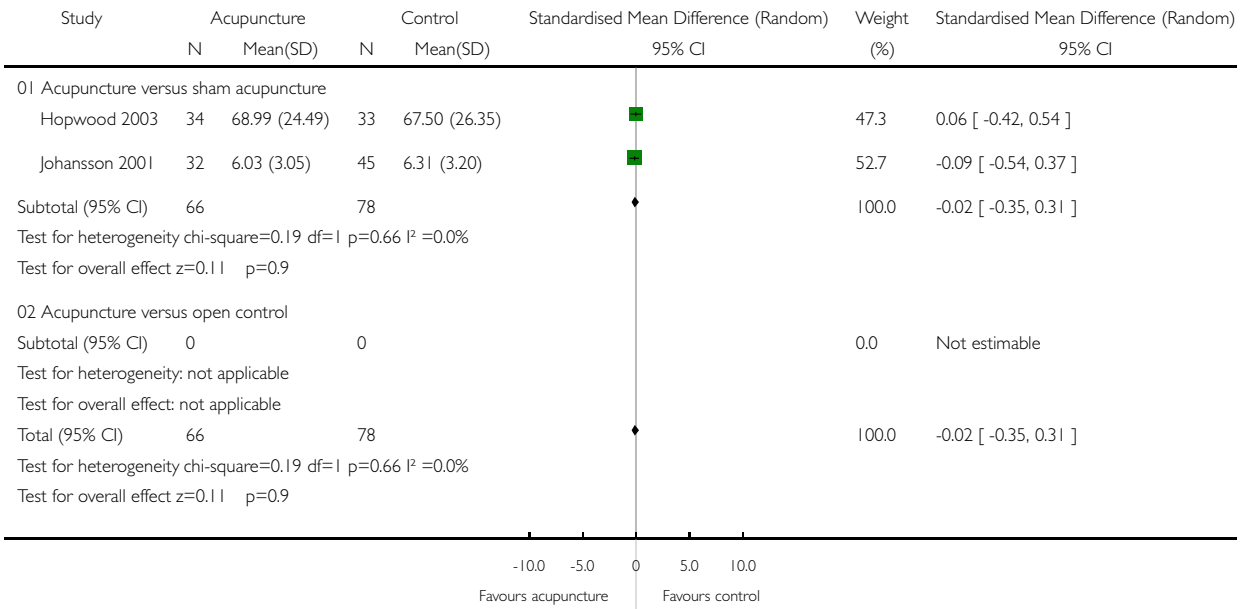

Fig. 6. Comparison 01. Acupuncture versus control

01.06 Death within first two weeks

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 06 Death within first two weeks

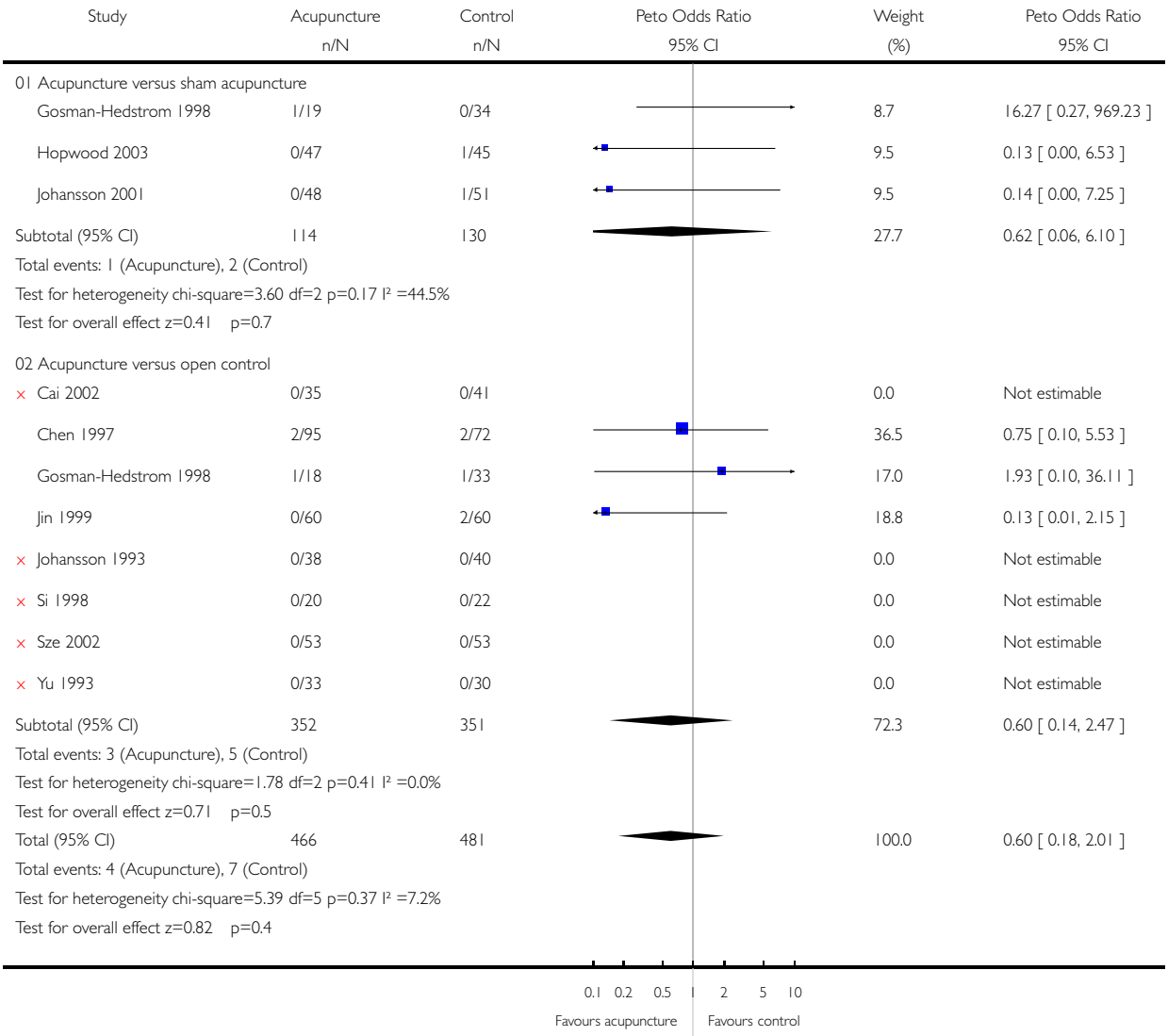

Fig. 7. Comparison 01. Acupuncture versus control

01.07 Death during whole follow-up period

Review: Acupuncture for acute stroke

Comparison: 01 Acupuncture versus control

Outcome: 07 Death during whole follow-up period