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Is Acupuncture an Effective Adjunctive Treatment for Chronic Asthma in Adults?

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Is Acupuncture An Effective Adjunctive Treatment For Chronic Asthma In Adults?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

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In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

May 5, 2011
ABSTRACT

OBJECTIVE: The objective of this systematic review is to determine whether acupuncture is an effective adjunctive treatment for chronic asthma in adults.

STUDY DESIGN: Review of all English language primary randomized controlled trials from 2003-2009

DATA SOURCES: Three randomized controlled trials were found using OVID, Medline, Pubmed, and Cochrane databases

OUTCOMES MEASURED: The three trials measured various outcomes: FEV1, 6-Minute Walking Distance; the Dyspnea Visual Analogue Scale; St. George’s Respiratory Questionnaire, Bronchitis Emphysema Symptom Checklist, Asthma Quality of Life, Beck Anxiety Index (BAI), and medication use.

RESULTS: Chu et al. found statistically significant improvement in FEV1 after acupuncture. In the study by Mehl-Madrona et al., improvement in both Asthma Quality of Life scores and medication use were found with the use of asthma or craniosacral therapy. Maa et al. showed that both acupuncture and acupressure significantly improved St. George’s Respiratory Questionnaire in asthmatic patients.

CONCLUSIONS: Acupuncture, as an adjunct to standard asthma care, is an effective treatment for chronic asthma.

KEY WORDS: Asthma; Acupuncture
INTRODUCTION

Asthma is a reversible chronic airway disorder characterized by respiratory hypersensitivity, bronchoconstriction, airway obstruction and inflammation. Treatment for asthma is focused on exacerbation prevention, control of asthma symptoms, and the maintenance of normal activity levels. This paper evaluates three randomized controlled trials that compare acupuncture to standard treatment or sham acupuncture for the treatment of chronic asthma.

Asthma affects 22 million people in the U.S. and is the most common childhood chronic disease, affecting 6 million children. It affects 300 million people worldwide and trends suggest an increase in asthma-related morbidity and mortality. The estimated cost of asthma alone is $18 billion. Asthma accounts for 2 million emergency department visits, 500,000 hospitalizations, and 10 million outpatient visits yearly.

Because the goal of chronic asthma treatment relies largely on control and prevention of symptoms, individual treatments may vary. Some of the usual methods used to treat asthma include short-acting beta agonists, long acting beta agonists, inhaled corticosteroids, combination beta agonist/corticosteroids, leukotriene receptor agonists, mast cell stabilizers, and other bronchodilators (such as Theophylline and Ipratropium Bromide).

Acupuncture is a form of traditional Chinese medicine that involves placing solid, thin-gauged needles into specific acupuncture points in the body. It is widely used in China for therapeutic pain relief and other conditions, including chronic pulmonary disorders. However, acupuncture has not been widely utilized in Western medicine. The pathophysiology behind acupuncture is still not well understood. It is believed
stimulating acupuncture points with the needles may send nerve signals that in turn cause
the release of endorphins, norepinephrine, and serotonin—resulting in pain relief and
potential antidepressive properties. Furthermore, ACTH release may be stimulated
which causes the adrenal gland to release cortisol and produce anti-inflammatory effects.

**OBJECTIVE**

The objective of this systematic review is to determine whether acupuncture is an
effective adjunctive treatment for chronic asthma in adults.

**METHODS**

Selected articles included men and women over the age of 18 suffering from
chronic asthma, and included acupuncture as an intervention. Comparisons to
acupuncture in the selected studies varied. Chu et al. (2007) compared acupuncture
against sham acupuncture. Maa et al. (2003) chose to compare three groups:
acupuncture, acupressure, and a final control group in which neither acupuncture nor
acupressure was used. Mehl-Madrona et al. (2007) compared acupuncture, craniosacral
therapy, and combined acupuncture and cranial sacral therapy.

Three randomized controlled trials were chosen for this systematic review. The
author performed searches of the OVID-Medline, PubMed, and Cochrane databases,
using the keywords “asthma” and “acupuncture,” and setting the language as English.
All articles were published in peer-reviewed journals, and were selected based on
relevance and the importance of outcome to patient. Inclusion criteria were as follows:
randomized, controlled trials based on patient-oriented outcomes. Articles were excluded
from this review if they included patients under the age of 18, or the studies were
conducted prior to 2003. Statistics used varied amongst each study. Chu et al. used
change in the mean from baseline and p-values. Similarly, Mehl-Madrona et al. used change in the mean from baseline and p-values, with the addition of t-test and the 95% confidence interval. Maa et al. chose to present data using adjusted odds ratios, 95% confidence intervals, and p-values. In all studies, p ≤ 0.05 was considered statistically significant.

OUTCOMES MEASURED

Chu et al. measured outcome as FEV1 before and after real acupuncture and sham acupuncture, as an indicator of bronchodilation and asthma relief. Maa et al. used several patient-oriented outcome measures in the study, including scores for 6-Minute Walking Distance (6-MWD); the Dyspnea Visual Analogue Scale (DVAS); four variables from St. George’s Respiratory Questionnaire (SGRQ)—symptoms, activity, impacts, total score; and eleven variables from the Bronchitis Emphysema Symptom Checklist (BESC)—dyspnea, fatigue, congestion, peripheral sensory complaints, irritability, anxiety, decathexis, helplessness, sleeping difficulties, poor memory, and alienation. Mehl-Madrona et al. used several patient oriented outcomes as well, such as Asthma Quality of Life (AQOL) scores, the Beck Anxiety Index (BAI), and medication use.

RESULTS

The demographics of the studies included in this review are outlined in Table 1. All studies included patients with chronic asthma and received acupuncture as an adjunctive therapy. None of the subjects were asked to withhold medication use due to the study.

The study conducted by Chu et al. compared FEV1 as a measure of asthma relief and bronchodilation in both “real acupuncture” and “sham acupuncture” groups.
### Table 1: Table of demographics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>#Pts</th>
<th>Age</th>
<th>Inclusion Criteria</th>
<th>Excl. Criteria</th>
<th>W/D</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chu et al. (2007)</td>
<td>Prospective, crossover RCT</td>
<td>18</td>
<td>49-75</td>
<td>&gt;35 years of age with FEV1 between 45-80%, FEV1/FVC &lt; 70%, patients interested in receiving acupuncture, 20% improvement in FEV1 after inhalation of B2 agonist medication 7 days before acupuncture in any physiology laboratory.</td>
<td>Acute asthma attack, respiratory infection, or systemic corticosteroid use 1 month before study; asthma hosp within 3 mo. before study; regular beta agonist use; medication change due to worsened sx w/in 1 mo of study.</td>
<td>2</td>
<td>Acupuncture – performed by experienced doctor, each needle kept in place for 15 minutes then removed. Sterile, single-use needles were used and were manipulated twice during sessions.</td>
</tr>
<tr>
<td>Maa et al. (2003)</td>
<td>RCT</td>
<td>70</td>
<td>Mean age of 64</td>
<td>Age 40+, hx of asthma &gt; 3 years, methacholine PC20 &lt; 5.0 mg/mL, FEV1/FVC &lt; 75% or increased RV/TLC, regular inhaled steroid, theophylline, or beta-agonist treatment for &gt; 6 months, rescue bronchodilators &gt; 2x weekly</td>
<td>Hx of bronchiectasis, pulmonary tuberculosis /pleurisy, cardiac dysfx, other systemic diseases, occupational asthma, disability, confounding environmental factors.</td>
<td>29</td>
<td>Acupuncture – using sterile 34-gauge needles inserted 0.5-2cm into 8 points; Acupressure – a technique taught to patients and self-administered at least once a day.</td>
</tr>
<tr>
<td>Mehl-Madrona et al. (2007)</td>
<td>RCT</td>
<td>89</td>
<td>20-80</td>
<td>Class II-IV chronic asthma sufferers</td>
<td>Age &lt;18, patients receiving acupuncture or craniosacral therapy within 6 months, pregnant, other steroid use, involvement in other research studies.</td>
<td>21</td>
<td>(1) Acupuncture, (2) craniosacral therapy, (3) combination of acupuncture and craniosacral therapy</td>
</tr>
</tbody>
</table>
Participants were randomly assigned to real or sham acupuncture, in double-blinded manner, received a washout period of 2-3 days, and were crossed over into the other group. Two participants of the original 18 were dropped from the study because they failed to attend the second session of either real or sham acupuncture. Twelve of the participants noted that they had previously utilized acupuncture as alternative therapy for asthma. Table 2 summarizes the results of the study by Chu et al. FEV1 before and after real acupuncture showed a statistically significant increase (p=0.002) while FEV1 before and after sham acupuncture did not (p=0.838). Ultimately, the percentage change in FEV1 in the group receiving real acupuncture was significantly greater than in the group receiving sham acupuncture (RA=11.57±8.11, SA=0.32±7.76, p=0.0001). Note that data was continuous and could not be converted to dichotomous data; thus, analysis of risk reduction, benefit increase, and numbers needed to harm or treat could not be performed.

Table 2: Summary of FEV1, FEV1 change, and percentage change in FEV1 before and after acupuncture

<table>
<thead>
<tr>
<th></th>
<th>RA</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 before acupuncture (L)</td>
<td>1.52 ± 0.45</td>
<td>1.49 ± 0.40</td>
</tr>
<tr>
<td>FEV1 after acupuncture (L)</td>
<td>1.67 ± 0.40</td>
<td>1.49 ± 0.41</td>
</tr>
<tr>
<td>ΔFEV1 (L)</td>
<td>0.15 ± 0.11</td>
<td>0.00 ± 0.12</td>
</tr>
<tr>
<td>ΔFEV1 (%)</td>
<td>11.57 ± 8.11</td>
<td>0.32 ± 7.76</td>
</tr>
</tbody>
</table>

*Data is presented as mean ± standard deviation. FEV1 = forced expiratory volume in one second. RA = real acupuncture. SA = sham acupuncture.

Mehl-Madrona et al. initially intended to compare patient outcomes (Asthma Quality of Life, medication use, and the Beck Anxiety Inventory) among 5 comparison groups: acupuncture, craniosacral therapy, combination acupuncture and craniosacral
therapy, an attention control group, and a standard of care group. However, only 68 of the original 89 completed the study, most commonly citing schedule conflict as the reason. As such, the authors compounded the original groups into only two: a treatment group (those who received acupuncture, craniosacral therapy, or both), and a control group (attention control and standard of care). Table 3 outlines the difference scores of the Asthma Quality of Life questionnaire from baseline, comparing control and treatment groups. Immediately post-treatment, the AQOL difference scores favored the treatment group (p = 0.004, 95% CI: -6.02 to -1.20). Even 3 months post-treatment difference scores showed statistically significant score improvement of the treatment group over control (p = 0.039, 95% CI: -4.80 to -0.12). The difference scores between control and treatment groups at 6 months post-treatment were not statistically different.

<table>
<thead>
<tr>
<th>Group</th>
<th>Difference Score Pretreatment and Posttreatment</th>
<th>Difference Score Pretreatment to 3 Mo. Posttreatment</th>
<th>Difference Score Pretreatment to 6 Mo. Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Mean 0.86</td>
<td>-0.36</td>
<td>-0.86</td>
</tr>
<tr>
<td></td>
<td>SD ± 4.95</td>
<td>± 3.44</td>
<td>± 3.54</td>
</tr>
<tr>
<td>Active Treatment</td>
<td>Mean -2.75</td>
<td>-2.83</td>
<td>-2.85</td>
</tr>
<tr>
<td></td>
<td>SD ± 4.52</td>
<td>± 4.94</td>
<td>± 1.98</td>
</tr>
<tr>
<td></td>
<td>95% CI -6.02 to -1.20</td>
<td>-4.80 to -0.12</td>
<td>-4.32 to 0.35</td>
</tr>
<tr>
<td></td>
<td>p-value p = 0.004</td>
<td>p = 0.039</td>
<td>p = 0.095</td>
</tr>
</tbody>
</table>

*SD = standard deviation. CI = confidence interval.

Mehl-Madrona et al. also compared medication use between control and active treatment groups. The most commonly used drugs were inhaled beta-agonists, inhaled corticosteroids, and leukotriene receptor agonists. The authors created a scale for medication use where the highest recorded dose was scored as 1, to which all other doses
were considered proportionate. **Table 4** describes Mehl-Madrona’s findings. Medication usage was significantly decreased both immediately post-treatment ($p < 0.001$, 95% CI: -0.931 to 0.771) and at 6 months post-treatment ($p = 0.043$, 95% CI: 0.012 to 0.697) in the active treatment group, connoting that subjects in the treatment group did not need as much medication to maintain the same comfort level. No significant reduction in medication usage was present at 3 months post-treatment. In addition, while Mehl-Madrona et al. measured Beck Anxiety Index as an outcome, there was no significant change in the anxiety scores from pre- to post-treatment.

**Table 4**: Comparisons of medication change between active treatment and control groups

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Mean 0.74</td>
<td>0.19</td>
<td>0.01</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>SD ± 0.75</td>
<td>± 0.71</td>
<td>± 0.81</td>
<td>± 0.66</td>
</tr>
<tr>
<td>Active Treatment</td>
<td>Mean 1.17</td>
<td>-0.31</td>
<td>-0.29</td>
<td>-0.3</td>
</tr>
<tr>
<td></td>
<td>SD ± 1.06</td>
<td>± 4.52</td>
<td>± 0.62</td>
<td>± 0.67</td>
</tr>
<tr>
<td>95%CI</td>
<td>-0.931 to 0.771</td>
<td>0.247 to 0.751</td>
<td>-0.051 to 0.663</td>
<td>-0.012 to 0.697</td>
</tr>
<tr>
<td>p-value</td>
<td>p = 0.091</td>
<td>p &lt; 0.001</td>
<td>p = 0.092</td>
<td>p = 0.043</td>
</tr>
</tbody>
</table>

*SD = standard deviation. CI = confidence interval.

Maa et al. compared groups receiving adjunctive acupuncture, groups receiving adjunctive acupressure, and groups receiving standard care only (control group). They looked at several patient oriented outcomes, including 6-MWD, DVAS, the Modified Borg Scale, BESC (and its 11 domains), and SGRQ (split into four domains). Scores were converted into dichotomous data by determining if the change in score exceeded the median of the difference between post-test and baseline scores. If a score met this criterion, it would be considered “improved” and assigned a value of 1. If it did not, it
Table 5: Summary of statistically significant outcomes of Maa et al. study as compared between control, acupuncture, and acupressure groups

<table>
<thead>
<tr>
<th>Group</th>
<th>SGRQ Score (Total)</th>
<th>% Improved</th>
<th>RBI*</th>
<th>ABI*</th>
<th>NNT*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupuncture</td>
<td></td>
<td>91</td>
<td>1.39</td>
<td>0.53</td>
<td>2</td>
</tr>
<tr>
<td>Acupressure</td>
<td></td>
<td>76</td>
<td>1.00</td>
<td>0.38</td>
<td>3</td>
</tr>
</tbody>
</table>

RBI = relative benefit increase, ABI = absolute benefit increase, NNT = numbers needed to treat

would receive a value of 0. Despite the number of outcomes measured in this particular study, few achieved statistical significance. The acupuncture group showed significant SGRQ score improvement, increasing 18.5-fold over the control (p = 0.02, 95% CI: 1.54 to 211.48, OR = 18.5). In addition, the acupressure group showed a significant 6.57-fold improvement in SGRQ compared to the control (p = 0.05, 95% CI 0.98 to 44.0, OR = 6.57). All other outcome measures showed no significant change in score compared to the control group. Since Maa et al. were able to convert the data into dichotomous form, RBI, ABI, and NNT could be calculated. See Table 5 for a summary of the outcomes achieving statistical significance. The relative benefit increase of acupuncture over the control group was 1.39, and the numbers needed to treat was 2. Furthermore, acupressure showed a 1.00 relative benefit increase, with a NNT of 3.

In the study by Maa et al., 29 of the original 70 subjects withdrew, the majority due to personal reasons—mostly citing the study as “too time consuming,” and many withdrawing voluntarily. Only one reported withdrawing due to an asthma attack. In all of the studies in this review, there was no mention of adverse reaction or negative events due to any of the interventions.
DISCUSSION

Limitations to the studies were numerous. In the study conducted by Chu et al., 12 of the 16 patients who completed the study already had previous experience with acupuncture. It is possible that having such experience may predispose them to better response and bronchodilation than those new to acupuncture therapy, which may have greatly affected the results. In addition, in two of the studies included in this review, blinding of subjects and/or practitioners with regards to acupuncture was not accomplished. The nature of acupunctural therapy makes blinding difficult, but still poses a significant limitation.

Sample size posed some difficulty for Mehl-Madrona et al. Their initial study protocol called for 26 subjects per cell, but due to withdrawals this could not be achieved. Resultantly, the authors were forced to consolidate the three proposed experimental groups into a single group called “active treatment” and combine two control groups into a single group. As such, the study did not regard acupuncture as an individual intervention, but instead in conjunction with craniosacral therapy. This limits the conclusions that can be drawn from this study regarding acupuncture’s influence on asthma.

In addition, the lack of a “standard of care” for acupuncture regarding chronic respiratory disease may be an issue, since the method acupuncture was performed in each article varied. The studies included in this review also looked at acupuncture’s effects at multiple points in time—at the extremes, Chu et al. measured FEV1 immediately post-treatment, while Mehl-Madrona et al. continued to measure AQOL and other outcome scores even 6 weeks post-treatment.
Finally, the intervention of asthma and other alternative medical treatments raises the question of viability. While the availability and acceptance of complementary and alternative medicine is increasing within the U.S., most medical insurance does not cover the cost of acupuncture. However, some worker’s compensation programs have began reimbursing for acupuncture, showing its increasing popularity and perhaps illustrating the recognition of its beneficial effects.

CONCLUSIONS

Acupuncture, used as an adjunctive treatment to standard asthma treatments, is shown to be an effective technique in the treatment of chronic asthma. The studies reviewed in this article provide evidence supporting that adjunctive acupuncture has bronchodilating effects. In addition, the use of acupuncture or craniosacral therapy has been shown to significantly improve AQOL scores, even several weeks post-treatment, as well as improve medication use. Furthermore, the use of acupuncture was shown to increase SGRQ scores—indicating a positive change in the quality of life of asthma patients.

While evidence provided by these studies supports the use of acupuncture for the treatment of asthma, the limitations posed by these studies warrant further investigation. Withdrawals from the included studies were numerous and larger sample sizes are necessary. Also, various techniques of acupuncture were used, and it further study is warranted to determine which techniques are more effective at improving quality of life in asthmatics. Finally, because the studies observed outcomes at various points in time, it poses the question of whether there is a temporal effect of acupuncture—in other words, at what point in treatment does its effect on asthma begin, and how long does it last?
Despite these questions and limitations, the results conveyed by the studies in this review support the use of acupuncture as an adjunctive treatment for chronic asthma in adults.
REFERENCES


