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**| RESEARCH ARTICLE**

# Meta-analysis of the Effectiveness of Acupuncture Treatment in Shoulder Pain

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**| ABSTRACT**

In this meta analysis, it was aimed to evaluate effectiveness of acupuncture treatment in shoulder pain. Nine articles with 10 samples were chosen for the study out of the 668 acupuncture research studies that were evaluated on scholarly databases (15–23). The ages, female to male ratios, and initial and final Visual Analog Scale (VAS) pain levels of research participants were recorded. A total of 365 shoulder pain patients including 238 (65.20%) females and 127 (34.80%) males were subjected to acupuncture treatment. VAS difference mean was -2.66 with 0.87-4.80 range. Age means of shoulder pain patients ranged from 30.8 to 56.81 with 47.66 mean. In all study samples, VAS differences between control group and acupuncture group were significant ($p<0.05$). Spearman's rho correlation analysis results showed that only female frequency was significantly correlated with VAS difference ($r=-0.760$; $p<0.05$). Correlation between male frequency and age were insignificant ($p>0.05$). Generalized Linear model (Logit) results showed that effects of gender frequency and age were statistically insignificant ($p>0.05$). Acupuncture treatment is effective in shoulder pain for individuals of all ages and genders, but this level of effectiveness is higher in men. However, more samples, clinical studies and meaningful regression analysis results are needed to make this generalization.

**| KEYWORDS**

Shoulder pain, acupuncture, effectiveness

**| ARTICLE INFORMATION**

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## 1. Introduction

In recent years, due to sedentary life, working at a computer or desk, many work environments and daily life changing due to technological conveniences, there has been a serious increase in cases of shoulder pain (1-4). While shoulder pain is most generally defined as the pain experienced by individuals in the shoulder muscles, it can be addressed in different ways according to its causes or the duration and form of the pain. The most common classification among these is acute-chronic and specific-nonspecific (6-8). In all these distinctions, the basic common point is that shoulder pain seriously restricts the lives of individuals and therefore, it must be treated. Although the treatment process in specific shoulder pain focuses on eliminating the factor that will cause shoulder pain, in nonspecific shoulder pain, since the cause is not fully known, treatment is generally limited to pain management, focusing on reducing pain (9-11).

In nonspecific and chronic pain, continuous use of medication and the intensity of painkillers negatively affect both the physical and functional health of individuals, and many negative situations such as the general mental health of individuals, drug costs, and side effects of painkillers can occur (11-14). Instead, methods such as physical therapy and acupuncture are important in terms of obtaining more effective results with less drug use. Acupuncture is based on the stimulation of muscle and nerve structures in certain parts of the body with needles, and is widely used especially in pains such as waist, back, areas with muscle density, and shoulder pain (11-14).

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Despite the widespread use of acupuncture in shoulder pain, the number of clinical studies in this area is quite limited. The majority of the studies in the literature are conceptual or systematic reviews (15-23). However, there are no sufficient studies examining the effects of gender and age on the decrease in pain levels in shoulder pain. Therefore, the aim of this study was to analyze the role of acupuncture in the treatment of shoulder pain in terms of gender and age.

## 2. Methods

### 2.1. Model of the Research

Research on acupuncture for shoulder pain was first presented, and subsequently more meta-analysis approaches were used. Meta-analysis and descriptive scanning methods were examined.

### 2.2. Data Set

Relevant keywords were searched in academic databases such as Web of Science, Scopus, and Pubmed in order to obtain research data from secondary data sources. Due to the wide range of acupuncture uses, all studies on acupuncture treatment for shoulder discomfort were evaluated.

Nine papers with ten samples were chosen for the study out of the 668 acupuncture research studies that were evaluated on scholarly databases (15–23). The ages, female to male ratios, and initial and final Visual Analog Scale (VAS) pain levels of research participants were recorded.

### 2.3. Statistical Analysis

The research data were described using means and frequencies, and Spearman's rho correlation analysis was utilized to look at the relationship between VAS differences and gender-age factors. The Generalized Linear Model (Logit) was used to examine the effects of age and gender on variations in VAS pain scores because of linearization errors (24,25). SPSS 25.0 for Windows was used to do the analysis, using a 95% CI and a significance level of 0.05.

## 3. Results

A total of 365 shoulder pain patients including 238 (65.20%) females and 127 (34.80%) males were subjected to acupuncture treatment. VAS difference mean was -2.66 with 0.87-4.80 range. Age means of shoulder pain patients ranged from 30.8 to 56.81 with 47.66 mean. In all study samples, VAS differences between control group and acupuncture group were significant ($p<0.05$) (Table 1).

**Table 1.** Baseline characteristics of shoulder pain patients and VAS scores with research outcomes

| Article | Females | Males | Age | VAS initial | VAS final | VAS difference | Comparison | Results |
|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 15 | 49.3 | 6.4 | 3.4 | -3 | Control | 1 |
| 16a | 6 | 6 | 53.33 | 6.79 | 4.75 | -2.04 | Control | 1 |
| 16b | 4 | 4 | 54.13 | 6.06 | 5.19 | -0.87 | Control | 1 |
| 17 | 9 | 0 | 42 | 5.42 | 3.75 | -1.67 | Control | 1 |
| 18 | 104 | 60 | 53.9 | 7.12 | 3.33 | -3.79 | Control | 1 |
| 19 | 30 | 0 | 42.33 | 6.07 | 1.73 | -4.34 | Control | 1 |
| 20 | 39 | 21 | 39 | 7.03 | 2.23 | -4.8 | Control | 1 |
| 21 | 7 | 1 | 55 | 6.7 | 5.7 | -1 | Control | 1 |
| 22 | 12 | 5 | 30.8 | 5.42 | 4.44 | -0.98 | Control | 1 |
| 23 | 12 | 15 | 56.81 | 7.15 | 3 | -4.15 | Control | 1 |
| Total | 238 | 127 | Mean: 47.66 | Mean: 6.42 | Mean: 3.75 | Mean: -2.66 | | |

VAS: Visual Analog Scale.

Spearman's rho correlation analysis results showed that only female frequency was significantly correlated with VAS difference (r=-0.760; p<0.05). Correlation between male frequency and age were insignificant (p>0.05) (Table 2).

**Table 2.** Spearman's rho correlation between VAS differences and gender with ages

| | **r** | **p** |
|---|---|---|
| Females | -0.760* | 0.011 |
| Males | -0.427 | 0.219 |
| Age | 0.103 | 0.777 |
| VAS initial | -0.626 | 0.053 |

*p<0.05, VAS: Visual Analog Scale.

Generalized Linear model (Logit) results showed that effects of gender frequency and age were statistically insignificant (p>0.05) (Table 3).

**Table 3.** Generalized Linear model (Logit) for effects of gender, age and VAS initial on VAS difference

| Parameter | **OR** | **Std. Error** | **95% Wald Confidence Interval** | | **Hypothesis Test** | | |
|---|---|---|---|---|---|---|---|
| | | | **Lower** | **Upper** | **Wald $X^2$** | **df** | **p** |
| (Intercept) | 7.330 | 3.715 | 0.049 | 14.611 | 3.894 | 1 | 0.048 |
| Females | -0.038 | 0.028 | -0.094 | 0.017 | 1.826 | 1 | 0.177 |
| Males | 0.054 | 0.051 | -0.046 | 0.155 | 1.129 | 1 | 0.288 |
| Age | 0.081 | 0.047 | -0.012 | 0.174 | 2.933 | 1 | 0.087 |
| VAS initial | -2.127 | 0.716 | -3.530 | -0.724 | 8.831 | 1 | 0.003 |
| (Scale) | 0.806 | 0.360 | 0.335 | 1.936 | | | |

VAS: Visual Analog Scale.

Initial VAS score or level of pain was a significant factor for VAS difference. In other words, acupuncture on shoulder pain was more effective in patients having less initial pain (Figure 1).

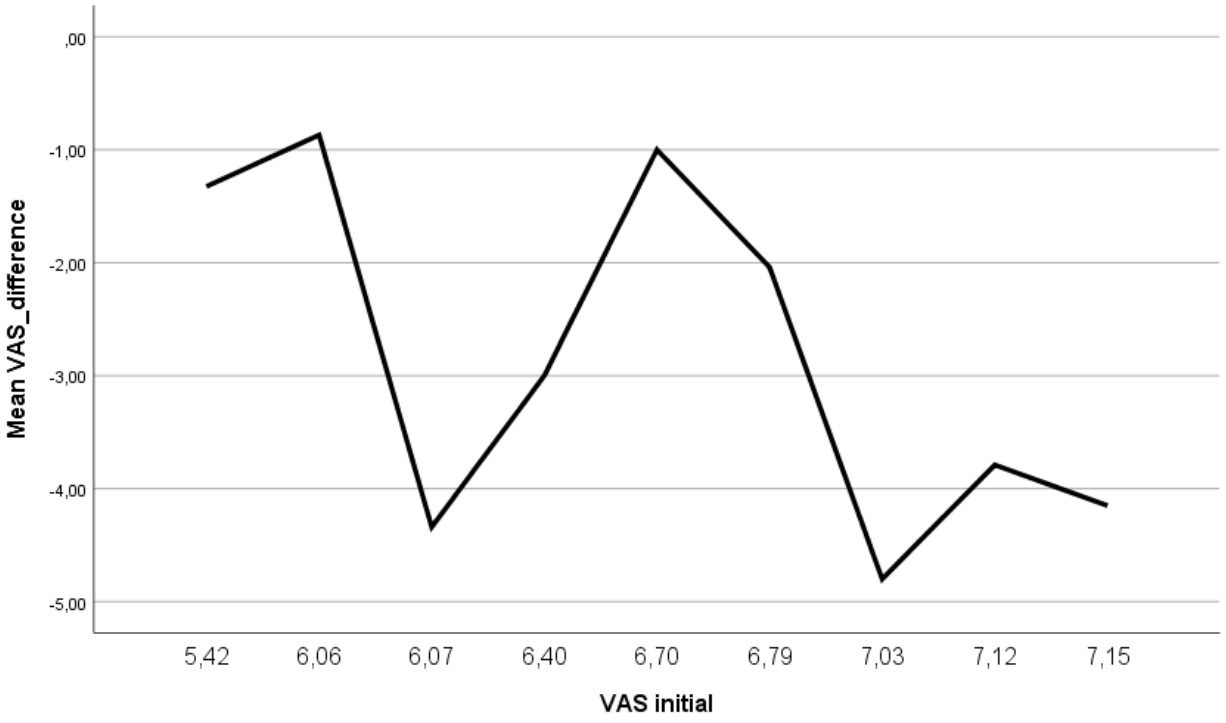


**Figure 1.** Change of VAS difference with initial VAS score of shoulder pain patients

## 4. Discussion

This study analyzed the effects of gender and age on pain change in the treatment of chronic shoulder pain with acupuncture. In this context, 10 samples from 9 studies were taken and the effects of age and gender were examined through clinical studies. The results obtained showed that as the number of women in the sample increased, pain change decreased. In other words, shoulder pain treatment with acupuncture was more effective in men compared to women.

Shoulder pain is one of the important muscle pains with unknown cause that limits the individual's standard of living (1-4). In shoulder pain with known cause, eliminating the cause is sufficient for treatment, while in chronic shoulder pain with unknown cause, instead of the treatment process, the pain is mostly suppressed (5-7). This situation leads to individuals being exposed to continuous medication use. On the other hand, acupuncture aims for these individuals to achieve more recovery and have less shoulder pain by using less medication.

The correlation analysis results that emerged in the study showed that there was a statistically significant and negative relationship between the frequency of women and the change in VAS or pain level. However, this relationship was not at the effect level according to the regression analysis results. In other words, although the pain threshold was higher in women, acupuncture was more effective in reducing shoulder pain in men. Many reasons can be shown for this difference, such as the fact that men have different muscle structure than women, that men generally prefer acupuncture less than women, and that those who prefer it may be more selective for this reason. In addition, the physical strength differences between women and men, the physical activities in their working lives, and the hormonal balances may also have an effect on the research results.

### *Limitations of the study*

Since the majority of acupuncture research focuses on conceptual studies or literature reviews, the study's main weakness is that there aren't many studies to compare, which further contributes to the study's reputation.

Conclusions about the benefits of different types of acupuncture are unachievable due to the wide range of variations in acupuncture-related practices. This is just another serious flaw in the research. Additionally, because every clinical practice used a different method for collecting clinical and demographic data, demographic data was limited to age and gender.

### *Contribution to literature and clinical applications*

The study's most important contribution to the literature is that, unlike research on shoulder pain, it demonstrates how demographic factors impact a large sample. In this sense, the results of the study demonstrate that acupuncture is effective for people of all ages and genders.

Given that acupuncture treatment is less successful for female patients than for male patients, the study's contribution to clinical practice is that additional support sessions or supplements can be beneficial.

## 5. Conclusion

According to the results obtained in the study, acupuncture treatment provides effective results in shoulder pain for individuals of all ages and genders, but this level of effect is higher in men. However, in order to make this generalization, more samples, clinical studies and regression analysis results are needed to be meaningful.

Since these results were made in a very specific sample variety, further studies are needed with larger samples and multi-center studies in which the effects of age and gender will be revealed more effectively.

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