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# **Randomised Controlled Clinical Trial for Assessing the Efficacy of Acupuncture on Emotion of Stress and Quality of Life**

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## Abbreviations

| Abbreviation | Explanation                                            |
|--------------|--------------------------------------------------------|
| AP           | Acupuncture Point                                      |
| AT           | Acupuncture Treatment                                  |
| CRF          | Case Report Form                                       |
| CRO          | Clinical Research Organisations                        |
| CROMS        | Clinical Research Operations and Management Support    |
| DU24         | DU 24 Shenting Acupuncture Point                       |
| ECRF         | Electronic Case Report Form                            |
| EOT          | End of Treatment                                       |
| GAD          | Generalized Anxiety Disorder                           |
| ICD11        | International Classification of Diseases 11th Revision |
| PTSD         | Post-Traumatic Stress Disorder                         |
| PSS          | Perceived Stress Scale                                 |
| HLPCQ        | Healthy Lifestyle and Personal Control Questionnaire   |
| RAS          | Reticular Activating System                            |
| SD           | Standard Deviation                                     |
| SC           | Salivary Cortisol                                      |
| SE           | Standard Error                                         |
| SEM          | Standard Error Mean                                    |
| HRV          | Heart Rate Variability                                 |
| WHO          | World Health Organisation                              |

## **Abstract**

This study is a randomized controlled clinical trial to study the effectiveness of a scalp acupuncture protocol on stress reduction and improvement on quality of life. The hypothesis was that a simple scalp acupuncture protocol could demonstrate a positive impact on stress and quality of life as compared to placebo acupuncture.

*Objectives:* To investigate the effectiveness of the intervention of a specific new scalp acupuncture protocol in stress reduction and improvement on quality of life.

*Method:* The intervention was applied at the scalp, in the area of the acupuncture point DU24 for 25 minutes at a time, 2 times per week for 10 sessions. 10 people participated in the intervention group and 10 people in the control group. Each participant answered the Perceived Stress Scale (PSS) and Healthy Lifestyle and Personal Control Questionnaire (HLPCQ) before and after intervention. Also measurements of Heart Rate Variability (HRV) and Salivary Cortisol (SC) took place before and after intervention.

*Results:* There was a statistically significant difference between the intervention group and the control group in the PSS, HLPCQ questionnaires, HRV measurements and cortisol mean levels.

*Conclusion:* The scalp acupuncture protocol with 3 subcutaneous needles, in the area of the acupuncture point DU24 for 25 minutes at a time, 2 times a week for 10 sessions is effective for improving the quality of life, reducing stress and improving HRV and cortisone levels.

**Keywords:** Acupuncture, scalp acupuncture, stress, quality of life

# INTRODUCTION

## 1.1 Introduction

According to World Health Organization (WHO), psychological stress (stress) has become a global epidemic. Stress negatively affects productivity by more than 50%, at a cost estimated at \$ 300 billion in the US<sup>1</sup>.

Stress modifies biological processes and contributes to pathogenesis, especially in diseases such as depression, cardiovascular disease, obesity and HIV<sup>234</sup>. Stress can cause negative structural changes in various parts of the brain<sup>5</sup> and its chronicity can lead to cerebral atrophy and weight loss<sup>6</sup>.

Exposure to chronic stress is likely to lead to long-term or permanent changes in the psyche affecting the likelihood of disease and the course of a disease<sup>7</sup>. For example, those who report stress are more likely to have some kind of malignancy than those who do not report it, due to the fact that stress causes a decrease in the activity of the immune system<sup>8</sup> and an increased risk of autoimmune disease<sup>9</sup>.

Stress and stress categories such as post-traumatic stress disorder (PTSD) are recommended to be treated with medications that may contain fluoxetine, paroxetine, sertraline and venlafaxine<sup>10</sup>. These medications come with their own set of risks. In particular, medication side effects that can be mild, such as interactions with other drugs, arrhythmias, and orthostatic hypotension<sup>11</sup> to severe, such as hepatotoxicity<sup>12</sup>. For the above reasons the scientific community proposes and investigates into the use of non-drug treatment.

There is growing clinical evidence to support the use of acupuncture treatment (AT) for a variety of mental disorders<sup>13</sup>. Acupuncture has been researched for its effectiveness in dealing with stress, with reports of positive findings in related reviews<sup>14</sup>. Acupuncture has recently been investigating its effectiveness of treating patients suffering from PTSD and the findings are varying. A review states that acupuncture has a significant effect on the treatment of PTSD<sup>15</sup>, another meta-analysis presents encouraging evidence for its effectiveness in the treatment of PTSD<sup>16</sup>, while in another meta-analysis on the same subject, it states that although there are positive therapeutic effects, attention should be paid to the promotion of AT as a proven treatment for PTSD<sup>17</sup>.

People with stress need ways to deal with it and that is why various interventions are recommended, including verbal and non-verbal<sup>18</sup>. The side effects of non-verbal approaches such as pharmacotherapy and the dislike by some patients of verbal mental interventions, lead people to stop these approaches or not begin with them at all. For these reasons, there should be efforts on finding new tools for dealing with stress, which depending on the case can be used alone or in combination with other interventions.

Acupuncture is supported by various studies that can help with stress and show minimal side effects. As non-verbal intervention is expected to show good compliance.

The study compares the effectiveness of a scalp AT protocol in the treatment of stress, with a corresponding placebo group.

## **1.3 Risks and benefits**

### **1.3.1 Potential hazards**

Some risks and side effects of AT includes pain due to acupuncture, local bleeding and / or bruising, fatigue, sleep disturbances and gastrointestinal upset<sup>19</sup>.

### **1.3.2 Potential benefits**

Acupuncture is considered as a minimally invasive method that acts through self-regulatory mechanisms and not with the administration of drugs, allowing self-regulation and the non-development of tolerance and dependence, in contrast to medical treatment. As non-verbal interventions they are expected to have good compliance.

## **1.4 Objectives**

The main objective of this study is to explore the effectiveness of a new scalp AT intervention in stress reduction and improvement of quality of life. Another objective is to find an effective intervention that could be used parallel to pharmacological treatments.

In addition to the aforementioned primary objectives of the study, the following secondary objectives will be considered. It is desirable to create an easy-to-use acupuncture protocol for dealing with stress and find out its effectiveness. It is also important to identify any side effects of scalp acupuncture intervention.

## **2. METHOD**

### **2.1 Study design**

This is a randomized, single-blind study of AT. There were 10 people in the intervention group and 10 people in the control group. In order to explain the study and find participants, a short audiovisual material was created which was posted on social media (<https://www.youtube.com/watch?v=Ttbpt9VGljg&t=14s>).

### **2.2 Procedure**

The study protocol received a protocol number in January 2020 from the secretariat of the Aeginite Hospital and was presented and approved by the committee of the Master's Degree Program "Promotion of Mental Health and Prevention of Psychiatric Diseases".

This study was conducted at the YinYang Clinic from September 2020 to January 2021. A total of 91 acupuncture treatments and 78 placebo acupuncture treatments were performed.

Participants were personally informed by the researcher about the aims and procedures of the study and were registered only after submitting a written consent. According to the inclusion criteria, the age of the individuals had to be aged 18-65 living in Greece and will have a positive evaluation in stress. Exclusion criteria included oral intake of cortisol and inability to read or write in Greek or English.

### **2.3 Initial and final measurements**

During the first meeting the participants filled in 2 questionnaires (PSS, HLPCQ), went through an interview to get a short medical history and the HRV was taken.

#### **2.3.1 Brief medical history**

The medical history recorded relevant information, which included questions about substance use and habits such as smoking and alcohol, sleep quality, and ensured that entry criteria were met and that there were no exclusion criteria.

### 2.3.2 PSS Questionnaire

The PSS consists of 14 elements that assess the degree of stress that a person perceives. Each item is scored on a Likert scale of 5 points (rating from 0 = never to 4 = very often). There are seven positives and seven negatives elements and the total end score is calculated by inverting the seven positives and then adding up all 14 items (maximum overall score = 56, minimum overall score = 0). Higher PSS scores show higher stress levels in the last month<sup>20</sup>.

### 2.3.3 HLPCQ Questionnaire

The HLPCQ is a good tool for evaluating the effectiveness of health-promoting interventions to improve people's lifestyles and well-being. It is a 26-item tool in which the respondent is asked to indicate the frequency of 26 lifestyle habits using a Likert scale (1 = Never or Rarely, 2 = Sometimes, 3 = Often and 4 = Always). There are 12 items related to diet, 8 items referring to daily time management, 2 items referring to organized physical exercise and 4 items referring to social support and positive thinking practices<sup>21</sup>.

### 2.3.4 HRV measurement

HRV provides an indirect understanding of the tone of the autonomic nervous system and is an indicator of cardiovascular risk<sup>22</sup>. Changes in the autonomic nervous system are often found in mood swings. Changes in the function of the autonomic nervous system are reflected in a decrease in HRV. Decreased HRV is characterized by emotional dysfunction, decreased psychological flexibility, and defective social commitment, which in turn are associated with prefrontal cortex hypomotility<sup>23</sup>. For the HRV measurements, the iPad application "Elite HRV" was used on a second generation iPad Pro device.

### 2.3.5 SC measurement

Salivary cortisol (sc) reflects the free (bioactive) fraction of serum cortisol. Cortisol production shows a daily (circadian) rhythm. Its levels peak early in the morning and fall to their lowest levels at night. The measurement of cortisol in saliva is used to investigate the disorders of the daily (circadian) secretion rate and to diagnose conditions such as adrenal stress or adrenal exhaustion. The laboratory results facilitate the diagnosis of the body's poor adaptation to stress as well as adrenal fatigue. Cortisol levels rise regardless of circadian rhythm in response to stress. Salivary cortisol levels are not affected by salivary flow rate or salivary enzymes.

Measurements of hormones in saliva are an excellent choice, because the collection of the sample is non-invasive and easy, without possible complications and inconvenience of blood sampling, while ensuring the sensitivity and accuracy of the measurements.

## 2.4 Description of intervention

Scalp AT with 3 subcutaneous needles, in the area of the acupuncture point DU24 for 25 minutes at a time, 2 times a week for 10 sessions. The patient had to remain supine for 30 minutes.

## 2.5 Description of placebo intervention

Virtual AT of the acupuncture point DU24 for 25 minutes at a time, 2 times a week for 10 sessions. The patient had to remain supine for 30 minutes. To achieve blindness the doctor was sitting behind the participant's head, so that there is no visual contact with the doctor's hands.

## 2.6 Statistical methods

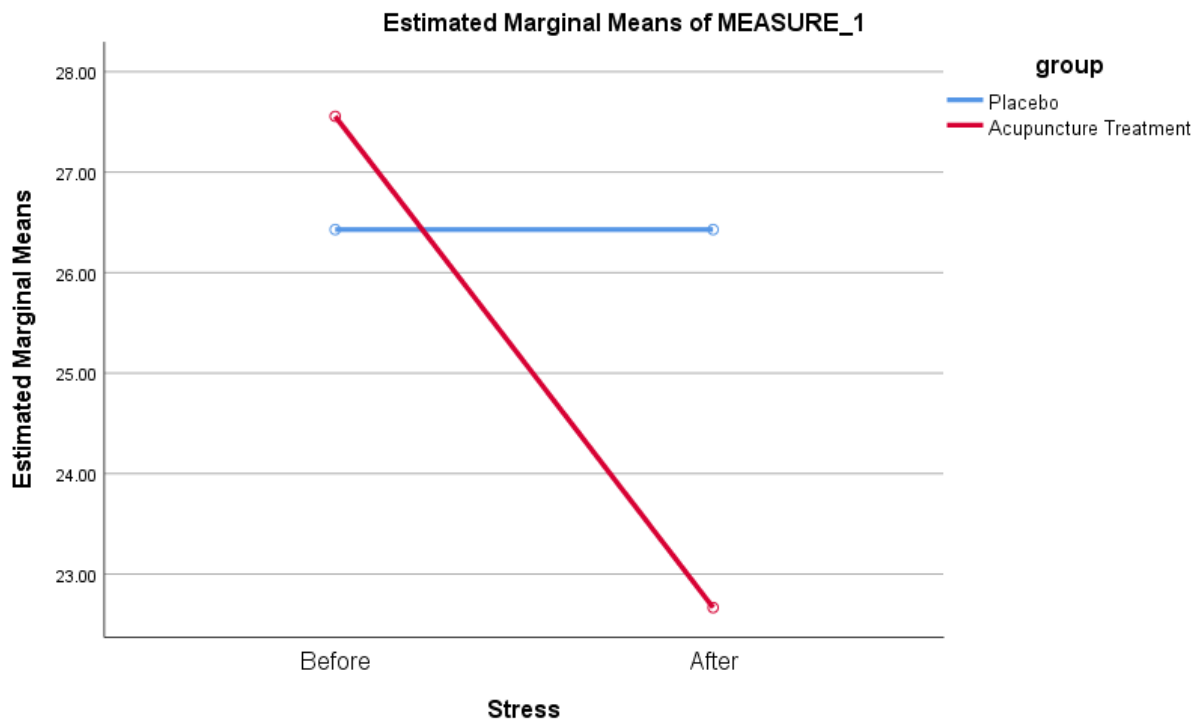
The latest version (2021) of the SPSS program for IOS (SPSS Inc., Chicago, IL, USA) was used for statistical analysis for anova. Anova was calculated before and after the intervention and the

placebo intervention, between the intervention group and the placebo intervention group. The level of statistical significance was set at 0.05.

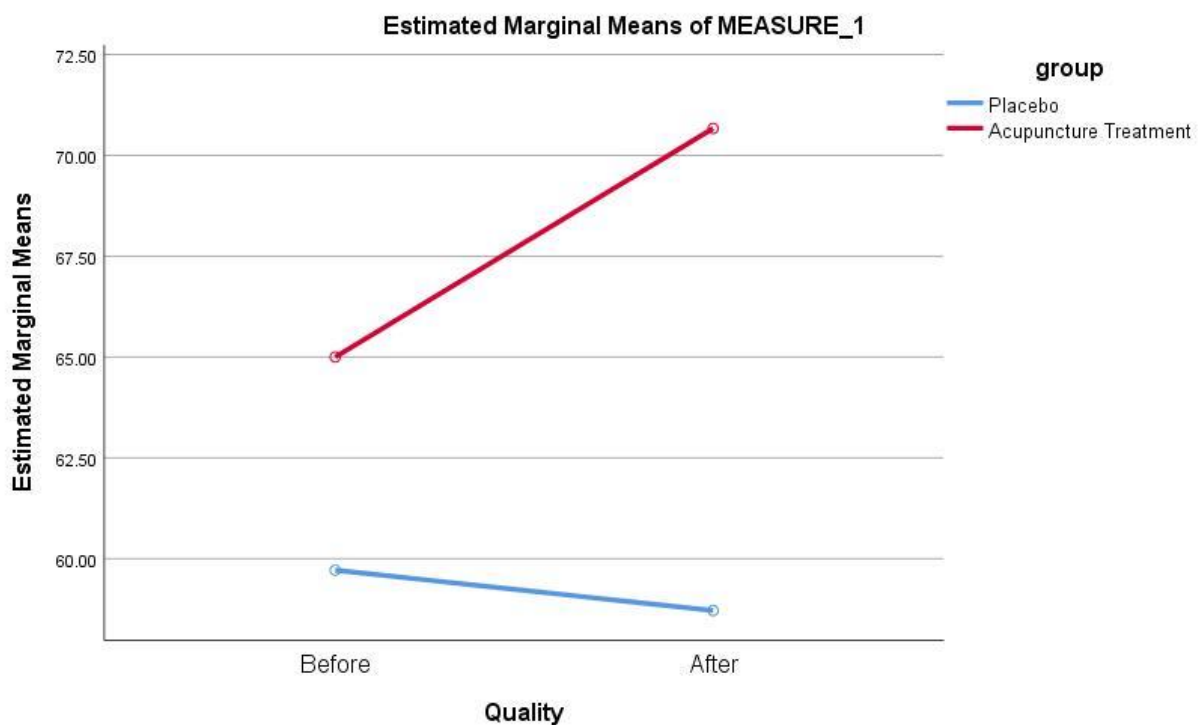
### 3. RESULTS

The total number of participants was 20, 10 for the intervention group and 10 for the placebo group. Of the 20, 7 were men and 13 were women. There was one drop out from the intervention team and 3 drop outs from the placebo team. The intervention group was 9 persons (N = 9) and the control group 7 persons (N = 7).

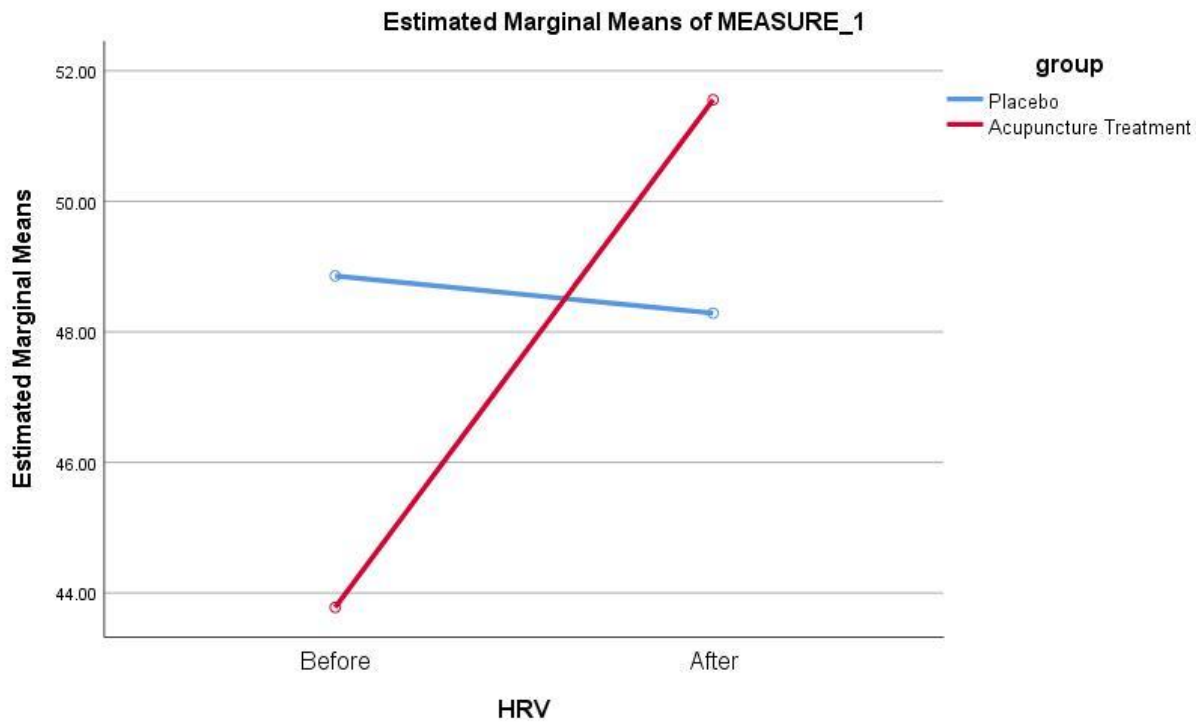
The graph below shows the results of the PSS questionnaire. The value of p is 0.002. The blue line



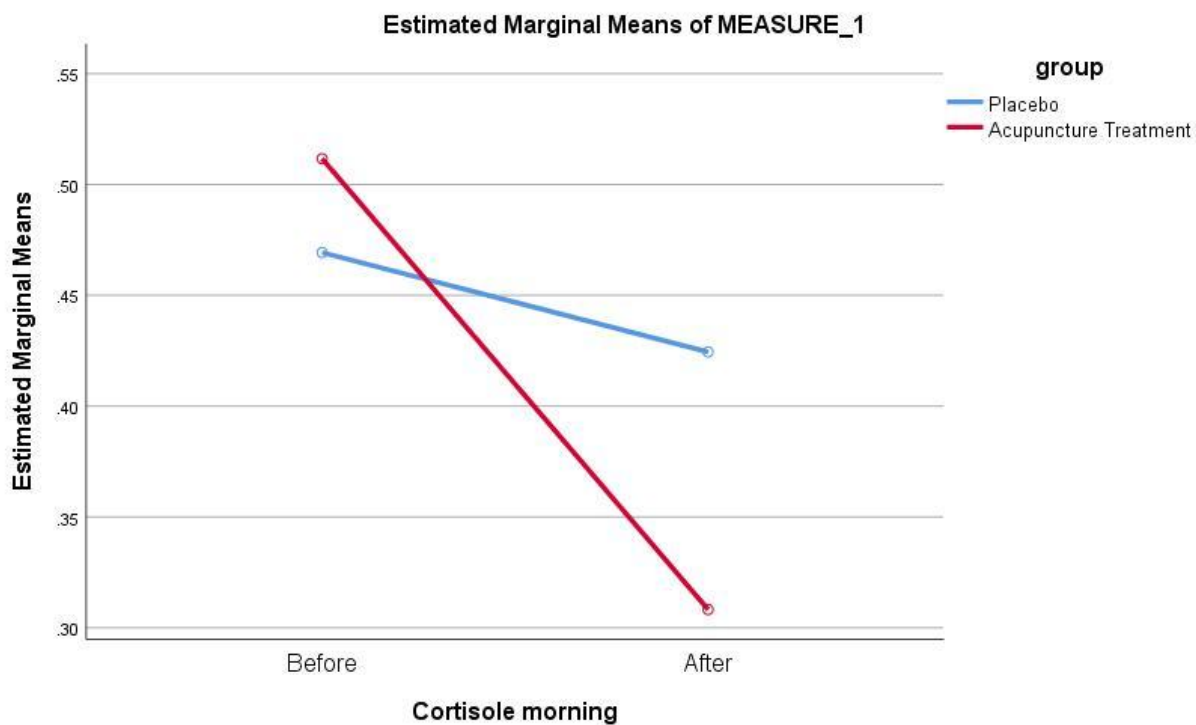
shows the results of the placebo and the red line shows the results of the intervention team.



The graphs below show the results of the HLPCQ questionnaire. The value of p is 0.008. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.

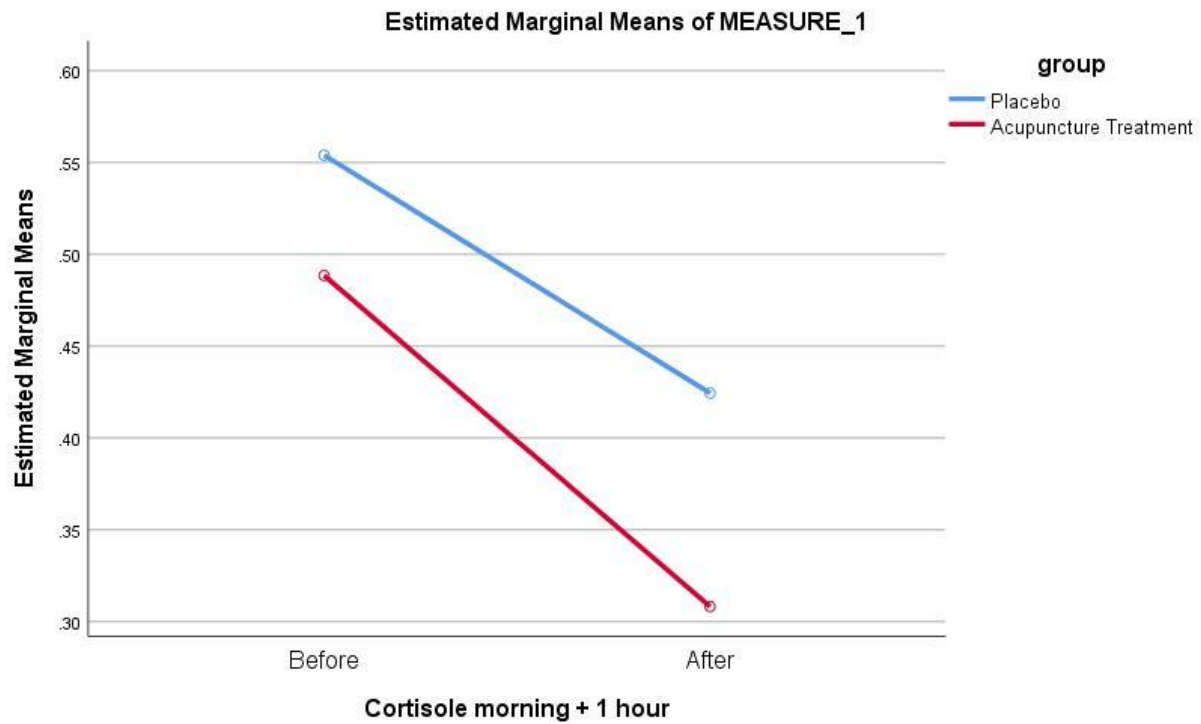


The graphs below show the results of HRV. The value of p is 0.016. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.

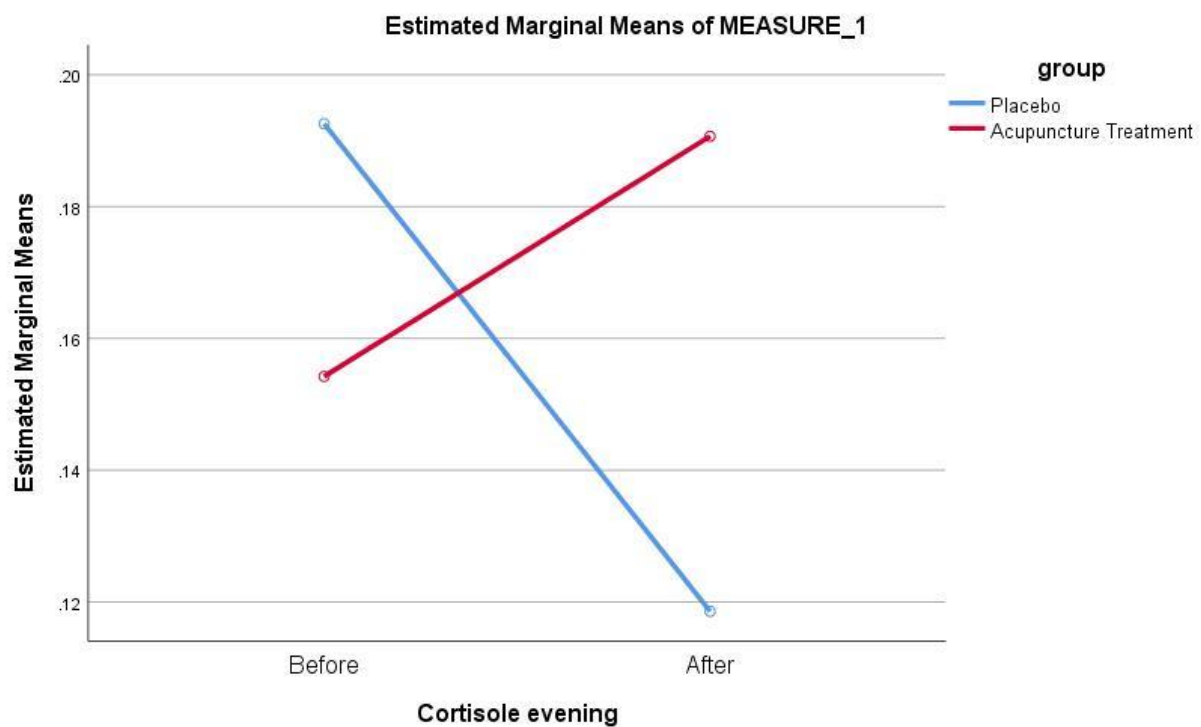




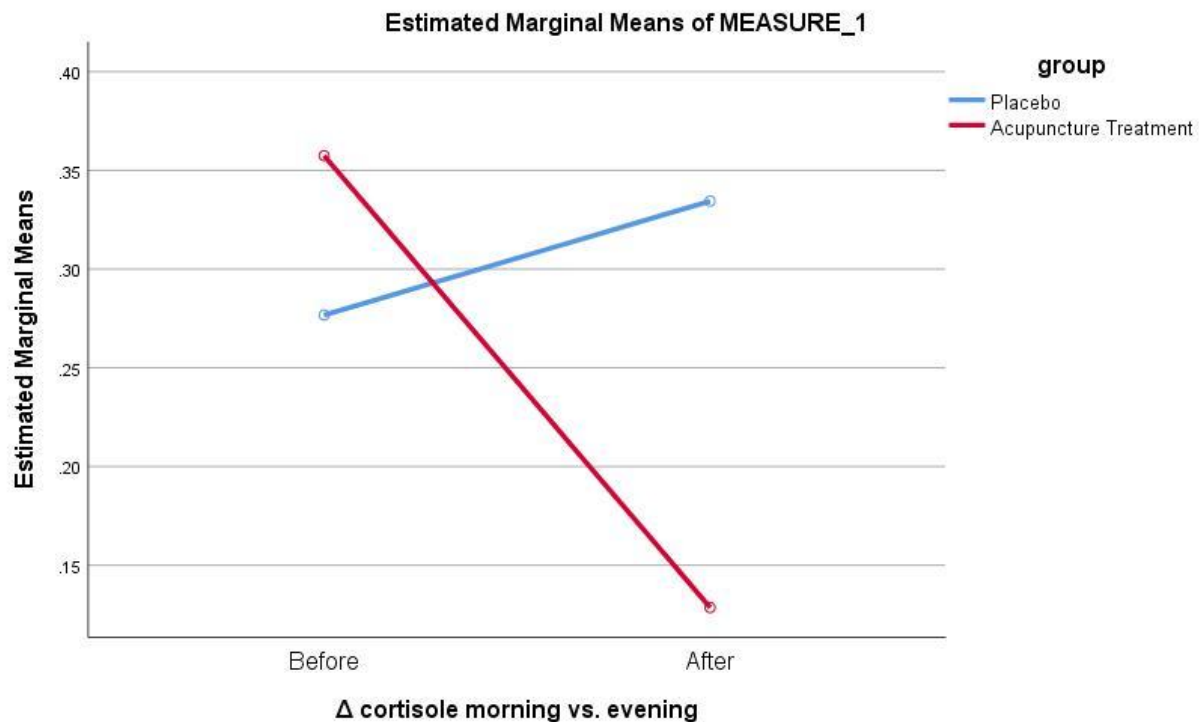
The following graphs record the results of the morning sc measurements. The value of p is 0.172. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.



The following graphs record the results of the sc measurements in the morning + 1 hour. The value of p is 0.664. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.



The following graphs record the results of the sc measurements at night. The value of p is 0.317. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.



The following graphs record the results of the average of all sc measurements. The value of p is 0.042. The blue line shows the results of the placebo group and the red line shows the results of the intervention group.

The statistical results showed that there is a statistically significant difference in the intervention group when using acupuncture. Specifically for the PSS questionnaire  $p = 0.002$ , the HLPCQ questionnaire the  $p = 0.008$  the HRV  $p = 0.016$  and the average of the sc the  $p = 0.016$ .

## 5. CONCLUSION

In conclusion, the acupuncture protocol with 3 subcutaneous needles, in the area of the acupuncture point DU24 for 25 minutes at a time, 2 times a week for 10 sessions is effective in improving the quality of life and reducing stress.

### Conflict of interests

There is no conflict of interest.

### Moral issues

In the control group, after the end of the 10 placebo acupuncture, real acupuncture was performed along with learning of stress reduction and self-improvement techniques. Individuals were admitted to the study of their own free will after written consent. That is why there are no ethical issues.

### Financing

This study received no funding and was done exclusively with the means of the lead researcher.

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