



Short Communication

Study on the Regulating Effect of Acupoint Electroacupuncture on the Depression Level of Drug Addicts



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Abstract

In order to study the regulating effect of electroacupuncture at specific acupoints on the depression level of drug addicts, we randomly selected 42 drug addicts from Sichuan drug rehabilitation center of women and divided them into treatment group (13), comfort group (10) and control group (19) from April to August 2019. Venous blood was taken before and after treatment, and the serum samples such as Noradrenalin (NA) and brain-derived neurotrophic factor (BDNF) were systematically detected. At the same time, Beck Depression Scale was used to detect the level of depression before and after treatment. Results showed that the level of depression in the real acupuncture group decreased significantly after treatment ($p < 0.05$). The contents of NA and BDNF in the serum of the real acupuncture group increased after treatment, but did not reach a significant level. In a word, the combination therapy of electroacupuncture can improve the levels of BDNF and NA in drug addicts and adjust their depression level, which is worthy of clinical promotion.

Introduction

Traditional Chinese medicine regards emotional bias as an important pathogenic factor, which has been highly valued by doctors of all dynasties. The pathogenic process of bad emotions is called “internal injury of seven emotions”. Emotional illness is usually the interweaving of a variety of abnormal emotional activities, and its complex and diverse emotional changes can be reflected in dysfunction, physical and mental changes, or physical and mental injuries.¹ Emotional pathogenesis plays a very important role in traditional Chinese medicine. Doctors of all dynasties have attached great importance to the role of emotion in the occurrence, development, and health rehabilitation of diseases. The theory of emotional pathogenesis is known as “the soul of traditional Chinese medicine”.²

The painful experience of withdrawal symptoms and strong desire for drugs produced by drug addicts in the process of withdrawal have produced a large number of negative emotions, and

symptoms such as irritability, depression, nervousness, insomnia occur repeatedly. Emotional activities depend on the viscera and essence, and emotional disorders of drug addicts lead to the imbalance of spleen and stomach qi, and the damage of heart qi. Physical discomfort and bad mood, cycle by cycle, aggravate the condition, making it difficult to completely quit drug addiction.

Drug treatment (such as methadone) can have a good effect on the treatment of drug addicts, but drug treatment will cause varying degrees of damage to the mental health of drug addicts, causing patients to have depression, anxiety, and even relapse in the process of treatment.³ Although non-drug therapy for drug addiction has been paid more and more attention in recent years, there is still a lack of efficient and targeted treatment methods. Acupuncture is one of the Chinese traditional medicine, which has been used in China for thousands of years. At present, Chinese acupuncture therapy has had a significant impact on the world. Traditional Chinese medicine adheres to the concept of the unity of heaven and man. In the face of various diseases and addictions, it advocates the coexistence of diseases and the body, using the natural qi and the healthy qi of the human body to turn evil into positive. Its green concept is in line with the bio-psycho-social model advocated by modern medicine.

Methods

Participants

42 female drug addicts were recruited from a female drug reha-

Keywords: Electroacupuncture; Drug addiction; Depression; Traditional Chinese medicine.

Abbreviations: BDI, Beck Depression Inventory; BDNF, brain-derived neurotrophic factor; BMI, Body Mass Index; NA, Noradrenalin; SD, Standard Deviation.

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bilitation center in Sichuan Province from April to August 2019. The mean Standard Deviation (SD) age of the patients was 44.38 (1.10) years old; The mean (SD) Body Mass Index (BMI) was 22.48 (0.44) kg/m². In this study, 42 patients were randomly divided into real acupuncture group (13), sham acupuncture group (10) and waiting for treatment group (19). These participants whom we recruited met the following criteria: (1) meet criteria of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition; (2) the urine morphine test was negative; (3) continuous drug abuse time >12 months; (4) did not participate in other clinical trials within 3 months. If any of the participants meet the following conditions, they should be excluded: (1) pregnant and lactating female patients; (2) patients with trauma or infection in the acupuncture area; (3) drug rehabilitation treatment in recent three months; (4) those who do not tolerate acupuncture treatment or are allergic to acupuncture needles.

Operation method of each group

Real acupuncture treatment

In this study, 13 drug addicts in the real acupuncture group were treated with electroacupuncture according to the acupoint prescriptions obtained from previous data mining: bilateral Shenmen, Neiguan, Zusanli, Sanyinjiao. All acupuncture operation is completed by acupuncturists who have obtained the qualification certificate of traditional Chinese medicine practitioners.

Operation method: patients were placed in supine position with 0.25 × 40 mm filiform needle vertically used for Needling Neiguan, Zusanli and Sanyin, with a depth of 20–30 mm. The needle is evenly lifted, inserted, and twisted to obtain Qi. Shenmen acupoint is 0.25 × 25 mm filiform needle was used for vertical needling, and the penetration was 15–25 mm. Shenmen point and Neiguan point are connected to the electroacupuncture instrument, the frequency is 2/100 hz, and the current is about 10–15 mA, which is based on the patient's tolerance.

Sham acupuncture treatment

For 10 drug addicts in the sham acupuncture group, this study selected four non-meridian and non-acupoint points corresponding to the four acupoints treated by real acupuncture. These non-meridian and non-acupoint points commonly used in the clinic were selected according to previous literature research: non-acupoint point 1: in the arm area, it is located at the medial edge of the elbow and the midpoint of the connecting line between the elbow tip and the armpit. Non-acupoint point 2: at the midpoint of the connecting line between the medial epicondyle of the humerus and the ulnar margin of the ulnar wrist of the forearm. Non-acupoint point 3: open 1–2 cm to the outside of the leg, the lateral edge of the tibia, and the outer side of Zusanli. Non-acupoint point 4: on the inside of the calf, 2 inches above the Sanyinjiao, between the tibia and fibula.

Operation method: patients took the supine position, using the finger cutting needle method to enter the needle for 10–12 mm. The needle did not twist with lifting and inserting and did not give any galvanic stimulation.

Waiting for treatment

The 19 drug addicts in the waiting group will not be treated until the follow-up period of the other two groups ends.

Treatment course

The study period was 9 weeks, including 1 week of baseline, 4

weeks of clinical treatment and 4 weeks of follow-up. Acupoints in the real acupuncture group and non-acupoint points in the sham acupuncture group were taken from both sides, once a day, 30 min each time, 5 times a week, and a total of 20 times

Ethics statement

All experimental processes involving human participants were reviewed and approved by the review committee of Sichuan Drug Rehabilitation Administration. This study was approved by the ethics committee of Chengdu University of Traditional Chinese Medicine (Ethical approval document No: 2019KL-053) and passed the registration application of China clinical trial registration center (Clinical trial registration No: ChiCTR1900027543). The experimental procedure was in accordance with the ethical principles of the 1964 Declaration of Helsinki. All participants provided informed consent before participation.

Detection of neurotransmitters

Before and after treatment, 3 ml of fasting venous blood was taken from 42 participants, and then the upper serum was taken and stored at a low temperature. The contents of Noradrenalin (NA) and brain-derived neurotrophic factor (BDNF) in the serum were detected. The ELISA kit used related products provided by Cell Signaling Technology company.

Depressive symptoms

The 42 participants were scored on the Beck Depression Inventory (BDI) before and after treatment, including 21 items. Each item was rated with Richter's 4-point scale (4-point system, 0–3 points). The cumulative score of 21 items is the total score of depression (0–63 points). The higher the score, the more serious the depression is. The scoring criteria of the scale are as follows: health: depression score <10, Mild depression: 10 points = < depression score < =15 points, Moderate depression: depression score >15, Severe depression: depression score > =25 points, and the Cronbach's alpha coefficient of BDI in this study is 0.67.

Data analysis

All data were analyzed by spss23.0, demographic variables were analyzed by descriptive statistics (ANOVA for continuous variables and χ^2 -tests for categorical variables), continuous variables are expressed as mean (SD), and categorical variables are expressed as percentage (n). In addition, paired t-test was used to compare the observed indexes before and after treatment. A 2-sided $p < 0.05$ was considered statistically significant.

Results and discussion

Sample description

Table 1 shows the demographic characteristics of participants with drug addicts. The mean (SD) age of real acupuncture was 45.16 (7.47), that of sham acupuncture was 43.30 (9.01), and that of waiting for treatment was 44.21 (6.07). The mean age of drug addicts in the three groups was not statistically different. Then, there were no significant differences in BMI, education and drug use types among the three groups. Among the 43 drug addicts, most take the traditional drugs (33 participants in total). In addition, the marital status of drug addicts in the three groups was statistically different, especially in the groups of real acupuncture and waiting for treatment, the number of divorces was the largest, 7 and 12 respectively.

Table 1. Demographic characteristic of participants with drug addictions undergoing real or sham acupuncture and waiting for treatment.

Characteristic	Real Acupuncture (n = 13)	Sham Acupuncture (n = 10)	Waiting for Treatment (n = 19)	F/ χ^2 (P)
Age (M $\pm$ SD)	45.46 $\pm$ 7.47	43.30 $\pm$ 9.01	44.21 $\pm$ 6.07	F = 0.259 (0.773)
BMI (M $\pm$ SD)	23.09 $\pm$ 2.65	21.03 $\pm$ 2.58	22.82 $\pm$ 2.94	F = 1.816 (0.176)
Education % (n)				χ^2 = 8.094 (0.178)
Elementary School and Below	53.8 (7)	20.0 (2)	21.1 (4)	
Junior Middle School	30.8 (4)	20.0 (2)	42.1 (8)	
Senior Middle School	15.4 (2)	60.0 (6)	31.6 (6)	
College and Above	0.0 (0)	0.0 (0)	5.3 (1)	
Marital Status % (n)				χ^2 = 12.084 (0.030)
Unmarried	23.1 (3)	10.0 (1)	15.8 (3)	
Married	15.4 (2)	70.0 (7)	15.8 (3)	
Divorce	53.8 (7)	10.0 (1)	63.2 (12)	
Widowhood	7.7 (1)	10.0 (1)	5.3 (1)	
Drug Type % (n)				χ^2 = 6.912 (0.080)
New Drugs	15.4 (2)	10.0 (1)	0.0 (0)	
Traditional Drugs	84.6 (11)	60.0 (6)	84.2 (16)	
Mixed Drug	0.0 (0)	30.0 (3)	15.8 (3)	

BMI, Body Mass Index; SD, Standard Deviation.

Comparison of observation indexes of drug addicts before and after treatment

NA is a strong α Receptor agonists, which can cause vasoconstriction and increase heart rate. NA is the main index to evaluate the severity of patients with depression. The decline of its expression level suggests that patients with depression are at risk of aggravation, and the more serious the patient's condition is, the lower its expression level is.⁴ The release of NA in patients with depression is reduced, α 2 receptor activity increased. The decrease of NA content will aggravate the occurrence of depression.⁵ Our results showed that the NA content in the serum of drug addicts in the real acupuncture group increased, while the NA content in the serum of drug addicts in the sham acupuncture group and the waiting treatment group decreased, indicating that the depression level of drug addicts in the real acupuncture group was improved after receiving four weeks of acupuncture treatment.

BDNF is a protein with neurotrophic effect. More and more studies have shown that BDNF is related to the occurrence, development and treatment of depression, and is the most studied neurotrophic factor in the field of depression related neurobiology.⁵ There is a complex relationship between the change of BDNF activity, content and the occurrence of depression. Guiloux detected that the function of BDNF in amygdala of female patients with major depression decreased.⁶ Studies have shown that patients with depression, depression recurrence and suicide attempts are related to the decrease of BDNF levels in patients.⁷ Our results showed that the content of BDNF in the serum of drug addicts in the real acupuncture group increased drastically, while the content of BDNF in the serum of drug addicts in the sham acupuncture group decreased, and the content of BDNF in the serum of drug addicts in the waiting treatment group increased slightly.

Although the content of BDNF in the serum of drug addicts

in the real acupuncture group did not reach a significant level, which still indicates that this acupuncture therapy has a certain clinical effect.

The problem of drug relapse is the biggest problem in the current practice of detoxification, and it is also a scientific problem of great concern in the field of drug addiction research. A study has found that the existence of negative emotions in drug addicts is an important factor in the difficulty on getting rid of "heart addiction".⁸ Most drug addicts have negative emotions such as depression symptoms and psychological desire for drugs to varying degrees when their withdrawal reaction basically disappears, which is often the inducing factor of relapse. The result from Table 2 showed that the BDI score of drug addicts in the real acupuncture group decreased significantly after acupuncture treatment, and was adjusted from the original moderate depression to the normal level (17.77 vs. 9.54), and the difference in the mean BDI score before and after acupuncture treatment was statistically significant ($p < 0.05$). In order to show the changes of BDI score of drug addicts more intuitively in each group before and after treatment, this study took the group as the abscissa and the observed index values as the ordinate, and constructed Figure 1, as shown below. Compared with the waiting group, the BDI score of drug addicts in the real acupuncture group and the sham acupuncture group decreased more obviously.

Conclusion

Electroacupuncture at bilateral Shenmen, Neiguan, Zusanli and Sanyinjiao acupoints can effectively improve the serum NA and BDNF levels of drug addicts and have a significant adjustment effect on their depression level. More importantly, this method is safe, green and non-toxic. It is an ideal method to get rid of drug addiction and is worth promoting. Therefore, we will continue to

Table 2. Paired comparison of NA, BDNF Levels and BDI score before and after treatment

Observation Index	Before Treatment	After Treatment	t	p
Real Acupuncture				
NA (M ± SD)	2.84 ± 1.92	3.11 ± 3.88	t = -0.461	0.653
BDNF (M ± SD)	113.50 ± 82.16	165.99 ± 122.96	t = -1.307	0.216
BDI (M ± SD)	17.77 ± 7.27	9.54 ± 6.79	t = -3.947	0.002
Sham Acupuncture				
NA (M ± SD)	4.69 ± 3.44	2.95 ± 1.26	t = 2.258	0.050
BDNF (M ± SD)	156.08 ± 97.48	147.36 ± 109.46	t = 0.268	0.795
BDI (M ± SD)	18.90 ± 8.45	10.10 ± 5.97	t = 3.381	0.008
Waiting for Treatment				
NA (M ± SD)	4.72 ± 2.84	3.94 ± 2.83	t = 1.298	0.211
BDNF (M ± SD)	163.76 ± 81.31	183.67 ± 115.54	t = -0.539	0.597
BDI (M ± SD)	16.79 ± 8.47	12.47 ± 7.55	t = 2.787	0.012

BDI, Beck Depression Inventory; BDNF, brain-derived neurotrophic factor; NA, Noradrenalin; SD, Standard Deviation.

give full play to the advantages of traditional Chinese medicine and further explore and develop effective methods for drug abstinence and rehabilitation.

Limitations

This study has several limitations. The first is that the research subjects of this study are all women, and no men are selected for research, which may have a certain impact on the conclusion. In the future research, we will increase a certain number of male subjects for research to improve the results and conclusions. Second, although the contents of NA and BDNF in the results of this study have increased to a certain extent, there is no statistically significant difference. This may be due to the small sample size, which has not reached a significant level. We will further supplement it in future research.

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Conflict of interest

There is no conflict of interest in this study.

Author contributions

RFW: designed research, collected data, and conceptualized the study. JZH: conceptualized the study, performed literature review, wrote the article, and revised the article. BT and LL: organized investigation and data curation. JL, CWZ, ZLL, and BBW: provided resources and opinions. All authors contributed to this manuscript and approved the submitted version.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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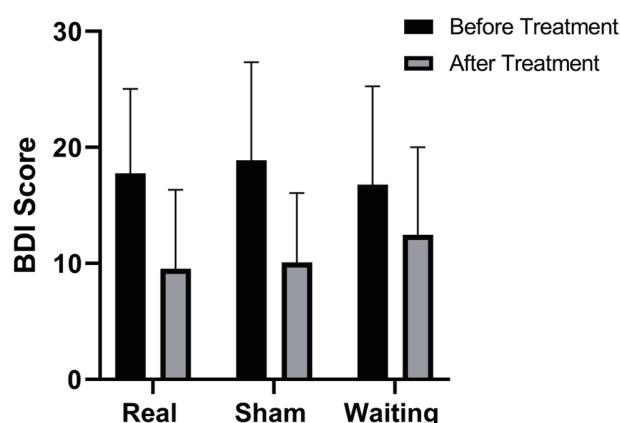


Fig. 1. Comparison of BDI Score of drug addicts in each group before and after treatment. BDI, Beck Depression Inventory.

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