



# The Effectiveness of Acupuncture on Addiction Severity Index: A Single Case Experimental Design in a Case of Methamphetamine Abuser Patient With Trismus Syndrome

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## Abstract

Trismus is one of the side effects of methamphetamine use which is associated with contractions of the jaw muscles. Acupuncture is a traditional and complementary treatment that is effective in reducing pain and psychological indices. The purpose of this study was to investigate the effectiveness of the acupuncture in a case of trismus caused by methamphetamine abuse. The patient was a 31-year-old man with a history of chronic methamphetamine use, reported to have dependence and severe jaw pain. In a single case study and in an ABAB design with multi-baselines, we used acupuncture for 3 weeks to reduce pain and addiction severity index (ASI). Data were analyzed through a generalized estimating equation (GEE). The results showed that there was no significant correlation between severity of addiction and pain ( $P > 0.05$ ). Due to damage caused in the process of production of tyrosine hydroxylase and mitogen-activated protein kinase and the role of these precursors in the production of dopamine as an effective factor in the acupuncture, the effectiveness of this treatment can be limited.

**Keywords:** Acupuncture, Stimulus, Trismus, Addiction

## Introduction

Trismus-pseudocamptodactyly syndrome (TPS) is a disorder of muscle with a limited range of motion of the hands, legs, and mouth. The most serious complications of the condition occur as a result of the limited mobility of the mouth (trismus). TPS is typically reported to be inherited in an autosomal dominant manner and is caused by mutations in the *MYH8* gene. Trismus is a sympathomimetic effect of chronic methamphetamine use. Ear acupuncture (EA) is a specific type of acupuncture and is an evidence-based approach (1). The points on the ear are sympathetic, Shen Men [point on the ear, is used in the treatment of most ailments], liver, kidney and lung. Several studies have suggested that acupuncture ameliorates the effects of Methamphetamine abuse (2). However, some studies have provided contradictory results (3). Therapeutic effects of acupuncture on drug addiction are unclear, however, changes in the dopaminergic system and consequently modulation of pain can limit the effectiveness of acupuncture (4). The present study aims to examine the effects of EA on the pain scale and addiction severity index (ASI) in a chronic

methamphetamine-dependent patient.

## Case Presentation

This study was a single-case study in the form of  $A_1B_1A_2B_2$  design with multiple baselines. Data were collected from August to November 2015. The patient was a 31-year-old young man who was treated for tooth pain with a continuous history of methamphetamine abuse during a period of 2 years with the amount of  $>0.5$  g/d. Preliminary evaluation which was carried out 28 days prior to the registration of the baseline included an electroencephalograph examination, blood and urine tests by a team consisting of 1 psychiatrist, 2 clinical psychologists, and 1 nurse.

In baseline  $A_1$  and  $A_2$  (5 weeks, 12 evaluations), only the evaluation was carried out, and no interventions were made. EA was performed 3 times a week for a period of 6 weeks ( $B_1$  and  $B_2$ , 12 evaluations) and the duration of each session was 30 to 45 minutes before lunch. EA in both ears was performed using stainless steel disposable needles (0.25+13 mm) with a depth of 2-3 mm by a trained physician and acupuncturist with a degree and five-year

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experience of treatment (Fourth author, K. P.).

In addition, in this study, a structured clinical interview (SCID), researcher-made demographic questionnaire, visual analog scale (VAS) and ASI were used. The data were analyzed by a generalized estimating equation (GEE) (5) through IBM SPSS statistics version 20.0 (IBM Corp., Armonk, NY, USA). The whole process was carried out based on the latest version of the Declaration of Helsinki.

Primary outcome showed that acupuncture did not have any significant effect on pain index ( $P>0.05$ ) (Figure 1).

Secondary outcome showed that acupuncture did not have any significant effect on ASI ( $P>0.05$ ) (Figure 2).

**Discussion**

This study was the first study to treat Trismus caused by methamphetamine use that was done with the aim of evaluating the effectiveness of EA and reflection of the side effects of using stimulants in evaluating the effectiveness of the treatment. Primary outcome showed that EA treatment had no significant effect on the ASI. Secondary outcomes of the study showed that EA had not a significant effect on reducing pain. Lack of effectiveness of acupuncture can be explained from 3 dimensions in the present study. The first cause is hormonal changes caused by methamphetamine use, the second factor is the difference in the topography of the stimulation and the third one is the way of applying stimulation in evaluating the effectiveness of the treatment. Acupuncture has a modulating effect on pain signals through the release of endorphins, serotonin and dopamine (6). This is while the dopaminergic system and specifically the levels of

tyrosine hydroxylase as a precursor of dopamine under the influence of methamphetamine use experience dramatic changes.

The anti-depressant mechanism of auricular acupuncture on mitogen-activated protein kinase (MAPK) and the signaling pathways of dopaminergic synapses was confirmed in previous studies (7).

It seems that dopaminergic system can play a role in central pain modulation (4). In contrast to our findings, in a study by Ferreira et al (8), EA has been reported to be effective in the treatment of trismus in a patient with cancer. Moreover, the results of a study by Pirnia et al (9) showed that acupuncture was accompanied by a decrease in the back pain in patients with colon cancer.

In this study, a symptom of Trismus is the consequence of chronic methamphetamine abuse that can affect the outcome of treatment compared with cancer differently.

In the cancer of dopaminergic system, in contrast to methamphetamine addiction, the structural and histological changes do not occur, and the signaling pathways of dopaminergic synapse remain undisturbed.

A part of the results of the present study showed that acupuncture did not have any significant effect on the ASI. In this regard, in case of the place and the kind of the stimulus, some differences were reported in the effectiveness of acupuncture in the field of addiction. In the present study, EA was used in the form of manual stimulation, this is while a systematic study on the effects of acupuncture on stimulant dependence show that among different types of stimulus position, body points, and the types of stimulation machines, electroacupuncture needs

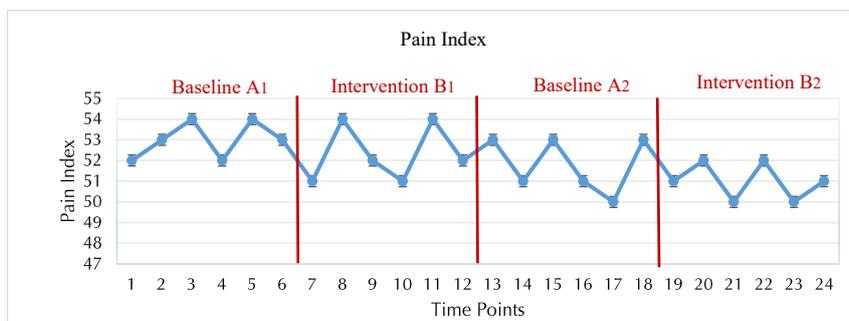


Figure 1. The Index of Visual Analog Scale During Acupuncture Process.

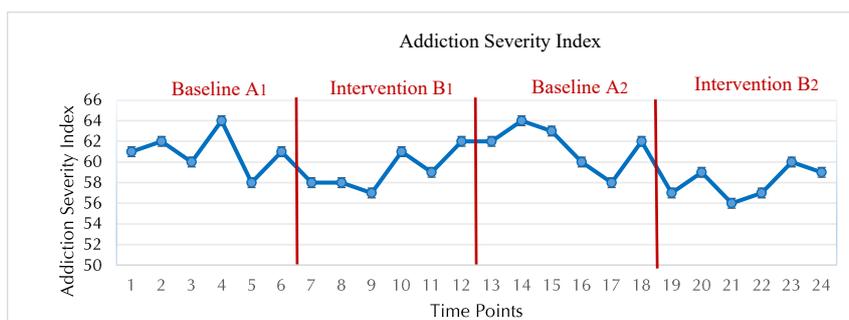


Figure 2. ASI Index During the Acupuncture Process.

more research justifications in clinical studies in samples of dependent patients (10).

### Conclusions

The results of this study showed that EA was not effective in reducing pain and decreasing the ASI. These findings, in addition to hormonal, neurophysiologic and topographical differences, show the effectiveness of different types of stimulation which can be helpful in the prospects of planning complementary treatments in the field of addiction. The study of hormonal changes (11) can help to increase the effectiveness of complementary therapies in the field of addiction.

### Conflict of Interests

None declared.

### Ethical Issues

The patient provided written informed consent for participation.

### Financial Support

None.

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