



**EFFECT OF ELECTRICAL ACUPUNCTURE (FOOT MASSAGE) ON  
BLOOD PRESSURE IN PRESUMABLY HEALTHY STUDENTS  
OF OLABISI ONABANJO UNIVERSITY, OGUN STATE,  
SOUTH-WEST, NIGERIA**

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**ABSTRACT**

Electrical acupuncture has been in existence for a very long time, and it has been known to cure many ailments such as its application on pre-hypertensive and hypertensive patients to have reduced systolic and diastolic blood pressure. The aim of this study was to investigate the effect of electrical acupuncture on Blood Pressure of presumably healthy undergraduates. Fifty (50) undergraduate students from Physiology Department, Olabisi Onabanjo University, were used in this study. The Systolic and Diastolic Blood Pressure of the subjects were taken before and after the application of electrical acupuncture (foot massage) for ten days. It was revealed from this study that, there was a non-significant difference ( $p > 0.05$ ) in the mean systolic blood pressure after the intervention of electrical acupuncture but there was a significant difference ( $p < 0.05$ ) in the mean diastolic blood pressure. Inferential statistical result of this study as seen in Systolic and Diastolic Blood Pressure was based on presumed healthy undergraduates that participated, those who had a normal blood pressure as baseline before the commencement on application of electrical acupuncture. In conclusion, this study showed that the application of electrical acupuncture in specified duration, such as in few days (ten) from this study slightly reduced Systolic Blood Pressure while there was a statistically significant increase in Diastolic Blood Pressure, that which could result from the presumably healthy undergraduates that participated.

**Keywords:** Acupuncture, Diastolic Blood Pressure, Foot massage, Systolic Blood Pressure

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**INTRODUCTION**

Electro-acupuncture was an electrical modified variation of acupuncture used to enhance traditional therapeutic management of High Blood Pressure and other means for massaging. The diagnosis of ailment was ascertained from the acupuncture point where electrodes are placed. Thus, it was a device used to massage the body during pains which have been said to be more effective today [1].

The prevalence of hypertension was a major factor for the increase in cardiovascular diseases [2], such that it was considered as a significant public health issue and risk of death globally [3]. Most people's presentation of high blood pressure (HBP) was during heart attack, stroke and of various ailments encountered in a physical examination [4]. In developed Countries, it has been declared that one in every three adults has hypertension [5], and approximately in the United States of America 50 million of adults who were 18 years and above were suffering from hypertension [6]. Blood pressure (BP) should be treated seriously as regards its measurement since inaccuracy from its measurement results in misdiagnosis [7]. Majority of physicians recommend changing of lifestyle before prescription of the medications in the maintenance of BP [8].

Epidemiologic studies revealed hypertension as either an elevation in Diastolic Blood Pressure (DBP)

to 90mmHg or an elevation in Systolic Blood Pressure (SBP) to 140 mmHg [5]. Various findings on BP treatment had been disclosed, but the current guidelines on treatment advocates classifying and treating patients based on either SBP or DBP elevations [9]. It has been observed that most findings believed massage was effective in reduction of the systolic and diastolic BP in the treatment/management of hypertension and as a source for non-pharmacological agent. On the other hand, many studies have examined the durability effects of foot massage for its effectiveness in blood pressure control. However, this study aimed to evaluate the effects of electrical acupuncture (foot massage) on the systolic and diastolic blood pressure of presumably healthy students.

**MATERIALS AND METHODS**

**Study area and sites**

Ogun State lies in + latitude 6.9980° N and + altitude 3.4737° E. It occupies a land mass of about 16.762 km<sup>2</sup>

Ethical Clearance: Ethical consideration of this study was in compliance and obtained from Ethical Approval from Board of Committee of Olabisi Onabanjo University, Sagamu Campus, and Sagamu.

### Experimental design

Fifty (50) undergraduate participants of 20 years and above gave their informed consents to take part in the study from the Department of Physiology, Olabisi Onabanjo University, Ogun State, Nigeria. Each participant was made to take part in two sessions which were the pre-test session and post-test session. An initial SBP and DBP of subjects were noted for pre-test session while electrical acupuncture was applied before the post-test session at a moderate frequency stimulation of 60Hz for 10 minutes. To avoid the influence of circadian fluctuation on heart rate variability, every session was scheduled in a room temperature at the same time (between 8:00 am-1:00 pm). Participants were instructed to keep their respiration uncontrolled.



### Materials

- Acupuncture device (Slippers) [Mini Massager 1080-16; Model – AS1080]
- Automated sphygmomanometer (OMRON Model M2) with arm cuff, arm plug, air tube and arm jack

### Methods

Electrical Acupuncture (Foot Massager) Application: The device cables were plugged to the massage slippers and connected to the device monitor. The monitor was turned on and the foot mode massager was selected. Thereafter, each subject put on the massage slippers in a comfortable manner. Then the intensity of the massage was set to 60Hz and the timer was set to 10 minutes which stopped automatically when the time was over.

**Plate 1:** Acupuncture device (Slippers) [Mini Massager 1080-16; Model – AS1080] Blood Pressure Measurements Procedure: The arm cuff was applied to a participant who sat erect on and placed the arm on a table in parallel section to the level of the heart. The following procedures were used in fixing the arm cuff:

- The air plug was inserted into the air jack securely.
- The subjects who wore tight fitting clothing and tight rolled up sleeves were told to roll up their sleeves.
- Then the air plug was inserted into the air jack securely and the arm cuff was wrapped firmly around the subject's left mid-arm.
- The systolic blood pressure and diastolic blood pressure were deduced

### Statistical analysis

The data was analyzed using the SPSS version 25 statistical package software for analysis of data. The data were expressed as mean  $\pm$  standard error of mean (SEM) from statistical analysis carried out using the student's t-test. Statistical significance values were deduced when  $p < 0.05$ .

## RESULTS

**Table 1:** The effect of electrical acupuncture on Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) in healthy undergraduate students of Olabisi Onabanjo University.

Blood Pressure after 60Hz foot massage stimulation		MEAN $\pm$ SEM (mmHg)	P Value
Baseline	Systolic Blood Pressure (SBP)	108.12 $\pm$ 3.56	0.178
Final session		106.67 $\pm$ 1.36	

<b>Baseline</b>	Diastolic Blood Pressure (DBP)	72.68±2.71	0.041
<b>Final session</b>		73.62±1.1*	

\*p<0.05 is significant

As shown in Table 1, there was a non-statistically significant difference (p>0.05) in Systolic Blood Pressure (SBP) when final session was compared to baseline while there was a statistically significant increase (p<0.05) in the Diastolic Blood Pressure when the final session was compared to baseline.

### DISCUSSION

Electrical acupuncture which evolved from traditional Chinese has been known for its effectiveness in decreasing Blood Pressure and has been applied as therapy for managing some ailments. The present study investigates the effect of electrical acupuncture (foot massage) on Systolic and Diastolic Blood Pressure of healthy undergraduate students. There was a statistically non-significant decrease in the Systolic Blood Pressure (p>0.05) when the final session was compared to baseline, while there was a statistically significant increase in the Diastolic Blood Pressure (p<0.05) when the final session was compared to the baseline in presumably healthy undergraduates. In this present study, electrical acupuncture (foot massage) was applied to fifty (50) healthy undergraduate students for 10 days, and their Systolic Blood Pressure slightly reduced and diastolic blood pressure significantly increased. In contrary to our study conducted in few days (< 2 weeks), Zhang *et al.* [10], reported a 5 week, 30 minutes electrical acupuncture exposure studies where it's reported that at week 3 the mean systolic and diastolic blood pressure of the control groups did not show a difference i.e., significant decrease in systolic blood pressure to that of the fifth week in both control and treated group and mean diastolic blood pressure reduced non-significantly in treated group. Another study reported similarity from findings that mean systolic and diastolic blood pressure of test groups were significantly lower in comparison with the control groups (p<0.001) [11] and concluded that evaluation of durability of massage effects on diastolic blood pressure needs applying massage in a long-term period.

### CONCLUSION

In conclusion, this study showed that application of electrical acupuncture on healthy young adults such as seen in undergraduate students slightly decreased their Systolic and an increased Diastolic Blood Pressure which implied that electrical acupuncture might be effective in application for epidemiological conditions pertaining to the use of foot massager for a long term. It is therefore recommended that more studies should not only be on presumed healthy individuals but aged people with pain conditions and patient with pre-hypertensive or hypertensive conditions for long-term exposure effect.

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