Is an acupuncture point identifiable with skin electrical resistance measurement?

INTRODUCTION

One of the basic beliefs of traditional acupuncture is that needling and massaging on certain skin areas called acupuncture points (AP) help to treat medical conditions. While acupuncture is widely accepted as a useful non-pharmacological method for pain reduction, the mechanism of acupuncture is still debated—whether it works through the mechanical stimulation of skin and muscle nociceptors or through anatomically invisible APs and meridians. Some researchers have found that the electrical resistance of the skin over an AP is lower than that over a non-AP, and proposed the finding as indirect evidence of the existence of APs.\(^1\text{–}^6\) However, the precision of skin electrical resistance measurement can be influenced by numerous factors such as dryness of skin, skin thickness, size of the sensing electrode, pressure applied on the electrode, inter-electrode distance, room temperature and humidity.\(^7\) Most of the previous studies on AP identification were done with the sensing electrode being stabilised by hand\(^1\text{–}^5\); however, it is likely that small motions of the hand-held electrode could alter the reading of skin resistance and even bias the measurement.

In the present investigation, the AP LI4 and an adjacent skin site were selected for skin resistance measurements. The measurements were conducted under stringent control in a laboratory setting. The collected data were analysed for the potential difference in the electrical resistance between the AP and non-AP.

METHODS

Sixty-five healthy male college students aged 17–26 years were recruited by convenience sampling. Their mean±SD age was 20.6±2.1 years, weight 69.7±5.6 kg and height 171±3 cm. Participants were excluded if they had hyperhidrosis, radiculopathy in the upper limb, a cardiac pacemaker implanted, previous upper limb surgery, tremor or involuntary muscle control, systemic rheumatic or inflammatory diseases, injury or pain in the upper limbs in the previous 6 months, a chronic medical condition that required regular use of medicine or cognitive impairment that precluded protocol compliance.

Prior to data collection, the participants washed their hands according to the guidelines of the Association for Professionals in Infection Control and dried them naturally.\(^8\) The participants were then seated comfortably and the dominant hand was positioned with the forearm neutrally on a plinth (figure 1A).

A lab jack (Poly-Jaque; Scienceware, Pequannock, New Jersey, USA), modified as a probe holder with three-dimensional precision adjustments, was used to hold a sensing probe with bipolar electrodes (Ultroid, Tampa, Florida, USA) and it was allowed to move freely in a vertical direction so that the weight of the probe (75 g) would provide a consistent pressure on the skin (figure 1A). The resistance (in kohms) was quantified using a skin electrical resistance monitor (IT-1, Toshiba Medical Systems, Tochigi-ken, Japan). With the tip of the bipolar electrodes at 1 mm and the inter-electrode space at 3 mm, the sensing probe was placed over the dorsal first web space and, by applying a direct current of 0.5 V through the probe, data on skin resistance were acquired at the sampling rate of 100 Hz. During the experiment the room temperature, humidity and air velocity were kept constant in the range of 22–23°C, 52–55% and 0.1–0.2 m/s respectively.\(^9\)

All the participants were assessed by a licensed acupuncture practitioner who measured the skin electrical resistance on the point LI4 and on a neighbouring non-AP located about 2 cm laterally. In order to minimise random errors, the AP and non-AP were measured in random order and each site was measured statically for 60 s and the mean of the 60 s values was calculated.

Using SPSS Statistics V.21.0 software (IBM, Armonk, New York, USA), the within-group comparison between the AP and non-AP was conducted by the paired t test with \(\alpha\) set at 0.05.

RESULTS

The descriptive statistics of the detected values of skin electrical resistance are shown in table 1. The paired t tests did not identify any difference in skin electrical resistance between the AP LI4 and the non-AP on the first hand web space (p=0.22).
DISCUSSION

Skin resistance measurement by quantifying the ability of the dermis to conduct an applied electric current has been proposed as a quantitative approach for identifying the AP. The AP is reported to be located intramuscularly; if it is within the dermal and subcutaneous tissues, cutaneous wounds and liposuction could extensively destroy the AP. By placing the bipolar electrodes on top of the skin over a purported AP, the current would flow superficially between the electrodes and would probably bypass the area of interest (Figure 1B). This could indicate that the skin electrical resistance may not be valid for detecting the electrical properties of the AP.

Limitations of the present study include the fact that only one AP was tested and the use of healthy subjects may not demonstrate changes in the electrophysiology of the skin as readily as in those with medical conditions. Second, ageing lowers the capacity of the skin to retain water, which would affect the skin resistance readings. The average age of the participants in the present study was 21 years and all were men, so the results cannot be directly generalised to other age groups or to women.

CONCLUSION

Based on the skin resistance measurements of the AP LI4 and the adjacent skin site, the hypothesis that APs and non-APs have different electrical resistance was not proved in the present study.

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Competing interests None.

Patient consent Obtained.

Ethics approval The study protocol was approved by the Human Research Ethics Committee, Health Science Unit, Hong Kong Physically Handicapped and Able Bodied Association and all study procedures were performed in compliance with the relevant law and institutional guidelines in accordance with the ethical standards of the Declaration of Helsinki.

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REFERENCES


3 Croley TE. Electrical acupuncture point conductance in the living compared to that in the dead. Am J Acupunct 1986;14:57–60.

4 Colbert AP, Hammerschlag R, Aickin M, et al. Reliability of the


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