

A Clinical Therapeutic Assessment for the Administration of Different Modes of Ultrasounds to Stimulate the Zusanli Acupuncture Point of Hypertension Patients

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Abstract

A clinical trial to assess the therapeutic effect of ultrasonic stimulations on the acupuncture point was carried out. Specifically, ultrasound frequencies of 1 and 3 MHz associated with different duty cycles of the tone burst wave at different acoustic power were employed to stimulate the Zusanli acupuncture point of a subject's right leg. The Ryodoraku values were measured from the 12 primary meridians of both hands to monitor the change of the meridian impedance following the stimulation. Totally 67 healthy volunteers and 60 hypertension patients were evaluated, in which these subjects were administered ultrasonic stimulations for 10 minutes. In addition to measurement of the Ryodoraku value, physiological quantities including blood pressure and pulse rate were also recorded.

Results demonstrated that after ultrasound stimulations on the Zusanli acupoint, the Ryodoraku values measured from both the hypertension patients and healthy subjects were significantly decreased ($p < 0.01$). The percentage change of the Ryodoraku value associated with stimulations using a 3 MHz is 8% larger than that of a 1 MHz. The application of a 770 mW ultrasound has an approximately 6% percentage change larger than that of a 380 mW. Moreover, ultrasonic stimulation of a 100% duty cycle developed an approximately 7% percentage change more than that of a 10% duty cycle. In addition, the systolic pressure, diastolic pressure, and pulse of hypertension patients were obviously reduced ($p < 0.05$) after the ultrasonic stimulation. The average decrease of these physiological quantities was from 3 to 7%. Therefore, this study verified that the therapeutic effect of ultrasonic stimulations on the acupuncture point, which could be taking into account for further development of an ultrasonic acupuncture system.

Keywords: Ultrasound, Ryodoraku value, Acupuncture, Hypertension

Introduction

The acupuncture, which integrates the concepts of qi (or chi), blood, meridian, and acupuncture points (acupoints), is a commonly applied medical procedure in traditional Chinese medicine (TCM). The practice of acupuncture procedures was performed for more than twenty-five hundreds years ago. The text related to acupuncture was originally written in the Yellow Emperor's Classic of Internal Medicine (Huang Di Nei-jing) in which the practice of the acupuncture is made by manually inserting a needle through the skin into tissues at strategic acupoints on the body and at different depths. When an appropriate treatment of the acupuncture is administered at a

specific acupoint, it will bring the therapeutic effects to improve the circulation of qi in the meridian and to balance five elements and the ying-yang quantities of the body [1]. Therefore, following a proper administration of the acupuncture, the body might be able to create its self-regulation and protective capability of resisting diseases. The therapeutic effects of the acupuncture are highly accepted in many Asian nations for quite a long time and however were recognized by the Western societies until 1970s [2], in which the therapeutic effects of the acupuncture are proved to be effective in the treatment of pain and other acute syndromes. Consequently, the procedure and effects of the acupuncture on different organs were discussed [3]. Many researchers began to explore the mechanisms behind the therapeutic effects of the acupuncture, which included Neurohumoral theory, morphogenetic singularity theory, and etc. [4].

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