

# OPTIMALIZATION OF MAGNETIC ELECTROSTIMULATOR ELECTRODE FOR NON INVASIF ACCUPUNCTURE THERAPY EFFECTIVITY

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## ABSTRACTS

Electroacupuncture therapy is electrical energy stimulation at acupuncture points. This method is implemented by placing electrode needle inserted at acupuncture points. The flow of energy from the source of stimulation that is electrostimulator which will stimulate the body's meridian system of the patient in order to achieve energy balance. Non-invasive therapy, such as the installation of metal electrodes on the surface of the skin. This study aims to produce a magnetic electrode to the effectiveness of acupuncture therapy. Research methods include designing, creating and testing electrostimulator magnetic electrode at various magnetic field strengths. Research result showed that of the most effective of the electrostimulator electrode for non-invasive therapies are acupuncture electrode with strong magnetic fields  $> 120$  mT. These electrodes produce a small output voltage (70 V) which does not cause pain.

Key word: electro acupuncture therapy, non invasive, magnetic electrode

## 1. INTRODUCTION

Acupuncture therapy is one of the traditional methods of therapy that originated in China. In principle, this therapy seeks to restore the energy balance in the body. The imbalance of energy in a body system is resulting in disruption of the physiological function of these organs. Methods of acupuncture therapy attracted many people in Indonesia because the effectiveness of the therapy is good and relatively cheap cost. A variety of equipment and methods of acupuncture therapy has been developed according to the progress of technology [1].

One method that many do acupuncture therapy is electro acupuncture. This treatment method has advantages in terms of effectiveness and cost of therapy (operational costs and the tool price is relatively cheap). The main drawback of this therapy is pain arising as a result of the puncture needle to acupuncture points [2].

Electro-acupuncture stimulation therapy is electrical energy at acupuncture points. This method is inserted a needle electrode at acupuncture points. The electric energy from the source of stimulation (electrostimulator) will flow to the body's meridian system of the patient. to achieve energy balance. Electrostimulator is an electronic device that generates electrical wave with wave shape, intensity, and specific frequencies. The magnitude of each variable is adjusted to the needs and the type of treatment performed [3].

Non-invasive methods of treatment such as the installation of metal electrodes on the skin surface aims to avoid the onset of pain caused by acupuncture needle prick. The weakness of the method is non-invasive therapy reduced effectiveness. In this research, a modified electrostimulator electrode, the form of magnet that is expected to increase the effectiveness of therapy, without the pain of the puncture. This study aims to produce a magnetic electrode to the effectiveness of acupuncture therapy. The magnetic field in this type of electrode works to increase the current flow in the meridians, thus also increasing the effectiveness of therapy [4].

## 2. MATERIAL AND METHODS

### The set-up of magnetic electrostimulator electrode

Magnetic electrode assembly system originated from a pulse source oscillator circuit using principal component IC NE 555. Frequency and pulse width output of this circuit relies on a combination of the RC value specified [5].

Oscillator or multivibrator output is connected to the signal processor to obtain the pulse circuit that is used to control the voltage of a transformer folder. The system is controlled by a transistor transformer work. The output voltage pulse transformers are expected to spike-shaped, with a narrow pulse width and height [6]. A narrow spike pulse is effective voltage value is much smaller than the generated peak voltage, so that better treatment effectiveness. In addition to the folder voltage, the transformer also functions as an isolated circuit. Such a system guarantees the safety of therapy, because there is no direct current flowing in the patient.

Output voltage of the transformer is connected to a pair of electrodes attached to the patient's skin surface. Electrode used is stainless metal pieces attached by neodymium magnets to produce stimulation electric and magnetic field [7]. System block diagram of a non-invasive electro acupuncture with magnetic electrodes are shown in Figure 1.

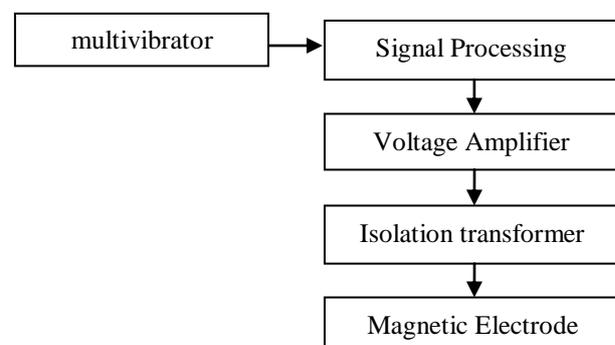


Figure 1: Block Diagram of a non-invasive electro acupuncture with magnetic electrodes