

The Use of i/t Curve in Assessment of Phototherapy Effects

Study Protocol with SAP

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Study Protocol

Background: Conventional electrodiagnostic examination is useful in daily physiotherapeutic practice. Nevertheless, the subjective assessment of muscle contraction and perceived current vibrations carries the risk of error and thus is a limitation of the method. Therefore, the use of the I/T curve coefficient was proposed in this study. This coefficient is the arithmetic mean of the electrical charge needed to trigger a sensory or motor reaction at different widths of the electrical pulse. PILER (Polychromatic Incoherent Low-Energy Radiation) light affects the sensory and motor excitability of the tissue. The resulting changes may depend on the colour of the filter used in the irradiations. The influence of the colour of polarized light on the condition of excitable tissue has not yet been unambiguously determined, nor have the potential clinical uses of this dependence been defined.

Objective:

- 1. To evaluate changes in neuromuscular excitability occurring after PILER irradiation using filters of different colours.*
- 2. To evaluate the usefulness of the I/T curve coefficient in neuromuscular excitability test.*

Design: Randomized double-blind placebo-controlled trial.

Material and methods.

Participants: 60 healthy volunteers aged 21-23 are assigned to one of four groups: group v (n=15), group x (n=15), group y (n=15), group z (n=15). Group v: irradiation without a filter (white radiation in the entire spectrum and near-infrared radiation; 480-3400 nm)

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Group x: irradiation with a red filter (visible red radiation and infrared; 650-800 nm and 800-3900 nm, respectively).

Group y: irradiation with a blue filter (blue radiation; 440-480 nm) .

Group z: placebo irradiation (without a filter, 3 min, distance: 100 cm).

PILER light treatment consisted of 10 irradiations to the biceps brachii muscle of the non-dominant limb. Each irradiation lasted 10 minutes, and was performed at a distance of 10 cm. Irradiations were performed every weekday using a Bioptron Pro 1 lamp.

The study was carried out in the Centre for Innovative Research in Medical and Natural Sciences, the University of Rzeszów Faculty of Medicine, Poland

Interventions: Irradiations of the biceps brachii muscle with PILER light. The participants were randomized into 4 groups: group v - no filter/ group x - red filter/ group y - blue filter/ group z – placebo. Muscle examination was carried out before (examination 1) and after (examination 2) the series of PILER light treatments. It included a traditional electrodiagnostic examination and the assessment of the pressure pain threshold (PPT).

Main Outcome Measures: calculating I/T curve coefficient for rectangular (■ I/T coeff) and triangular (▲ I/T coeff) pulses and the pressure pain threshold (PPT).

SAP:

First, the results in the irradiated group v+x+y (n=45) and the control group z (n=15) were compared to determine differences regarding the sensory excitability parameters and PPT between baseline and outcome measure. The mean, standard deviation and the 95% confidence intervals for were calculated for each parameter. The Mann-Whitney test was used to assess the differences between the irradiated and control groups regarding the changes recorded after irradiation.

Afterwards, comparison was conducted between different filter groups(v, x, y) to determine differences regarding the sensory excitability parameters and PPT between baseline and outcome measure. The mean, standard deviation and the 95% confidence intervals for were calculated for each parameter. The Kruskal-Wallis was used to assess the changes recorded after irradiation in groups with different filter colour (differences between baseline and outcome measure). P values below 0.05 were considered statistically significant.