Comparison of the effects of manual acupuncture, electroacupuncture and TENS on regional pressure pain thresholds

Examination of the reliability of baseline algometry pressure pain threshold readings

Steve Szabo BAppSci (Env Health), BHealthSci (Acupuncture).

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Faculty of Science
University of Technology, Sydney
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Certificate of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree.

I also certify that the thesis has been written by me. Any help that I have received in my research and the preparation of the thesis itself has been acknowledged. Additionally, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

Background: Since 1999, research at the College of Traditional Chinese Medicine at the University of Technology Sydney (UTS) has focused on the effects of a series of manual acupuncture (MA) interventions upon regional pressure pain thresholds (PPT). The present research contains two separate studies and both provided a replication of manual acupuncture (MA) to Large Intestine 4 (LI4) (the standard UTS intervention) and an acupoint, Liver 3 (LR3), that has been used in a previous UTS study. The current study extends the research to examine the effects of electroacupuncture (EA) and transcutaneous electrical nerve stimulation (TENS) on regional PPT. In addition, the research examined a range of variables that could possibly influence the PPT values obtained, independent of experimental interventions, and thus impact on the reliability of the algometry technique and experimental design employed.

Aims: Study 1: To compare the effects of MA to LI4, TENS to LI4, EA to LI4 and EA to LR3 on PPT measured at ten regional sites.

Study 2: To compare the effects of MA to LI4, MA to LR3, EA to LR3 and EA to a nonacupoint (NAP-Foot) on PPT measured at ten regional sites.

The reliability of algometry study: To compare mean PPT values (kg/cm^2) by regional site and gender. To evaluate the stability of regional PPT values (kg/cm^2) by site over time with respect to two timeframes; (i) extended time frame of at least four weeks; (ii) sequence of five measures within ten minutes.

Design: Both Study 1 and Study 2 were within subjects experiments that used the same research paradigm including randomisation and dual blinding (subject and assessor) and involved healthy volunteers. PPT was measured before and after each intervention at ten PPT measurement sites (both acupoints and nonacupoints) across the body. In addition, subjects rated their levels of pain, intervention sensation and tension experienced during, and anxiety prior to the intervention, on visual analogue scales (VAS).

The data for the reliability of algometer study were collected as the baseline PPT values (kg/cm^2) for all subjects and across visits in Study 1 and Study 2.

Results: Study 1: Among the ten sites significant increases from preintervention PPT means were obtained at eight sites following MA to LI4 (mean PPT range 3.5%-10.4%), six sites following TENS to LI4 (3.4%-10.9%), and nine sites following both EA to LI4 (6.4%-15.8%) and EA to LR3 (6.4%-10.9%). The effects on PPT of EA to LI4 were significantly greater than that produced by TENS to LI4 at four sites; and

that of MA to LI4 at two sites. EA to LR3 significantly elevated PPT more than TENS to LI4 at two sites; and that of MA to LI4 at one site.

Study 2: Following both MA to LI4 and EA to LR3 significant increases in mean PPT were achieved at all ten sites (ranging from 9.6% - 15.6 and 8.6% - 16.9% respectively). For both MA to LR3 and EA to NAP-Foot the significant increases involved nine of the ten measurement sites (ranging from 8.1% - 16.4% and 7.1% - 12.7% respectively). EA to NAP-Foot was significantly less effective than MA to LI4 (two sites), MA to LR3 (two sites) and EA to LR (three sites). The effect on PPT of MA to LI4 and EA to LR3 were statistically greater than that produced by MA to LR3 at one site each. For both studies, the analyses of the subjective perceptions associated with each intervention showed that nonspecific effects did not appear to contribute to changes in PPT. Results from Study 1 and 2 found that TENS, EA and MA were all effective in increasing PPT. While TENS was less effective it should be noted that the way the TENS intervention was set up was not typical of a clinical treatment.

The results from the reliability of algometry study showed that typically males had higher PPT values (kg/cm^2) than females. While mean PPT values remained stable in a sequence of five measures over a ten minute period, the longer timeframe of four weeks did affect mean PPT levels, independent of gender. Typically, for both genders, mean PPT was lower at the first visit compared with the fourth visit. This may reflect changes in familiarity with the experimental protocol.

Conclusions: The PPT effects following MA to LI4 were consistent with previous research at UTS. The interventions of EA to LI4 and EA to LR3 elicited similar significant increases in mean % PPT to those following the UTS standard intervention of MA to LI4. The results of the reliability of algometry study illustrate the importance of well controlled experimental design. The randomisation process must ensure equal proportions of subjects will receive each different intervention at each visit in sequence and if males and females are involved, a stratification of randomisation is required so that a balanced design by gender and visit is achieved. Where possible, a within subjects experimental design should be considered.

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As a result of this project, I have developed many skills in using a variety of computer software packages.

I am especially appreciative of the volunteers who took part in and completed all four interventions.

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