

# Usefulness of a Newly-Developed Device, the Power Tree<sup>®</sup>, for Body Massage: Evidence from a Medical Evaluation

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## Abstract

We investigated the effectiveness and usefulness of a novel tool: the Power Tree<sup>®</sup>, for body massage in 10 healthy female volunteers (age range, 24 - 55 years; mean age, 40.5 years) by evaluating several dermatological and psychological parameters, such as the amount of dermal collagen, the skin temperature, the level of salivary amylase and the scores on the State-Trait Anxiety Index (STAI). After 60-minute Power Tree<sup>®</sup>-mediated body massage, both the dermal collagen score determined from the DermaLab<sup>®</sup> images and skin temperature measured by infrared thermography were found to have increased significantly in several body sites compared to those before the treatment ( $p < 0.01$  and  $p < 0.001$ , respectively). Although the level of stress estimated by the amount of amylase in the saliva was not significantly different pre- and post-procedure ( $p = 0.3$ ), the treatment significantly reduced both the state anxiety (SA) and trait anxiety (TA) scores on the STAI ( $p < 0.001$  for the SA,  $p < 0.01$  for the TA). The treatment with this device was smoothly performed without any burden on the therapists during the present study. These data suggest that the newly-developed device is a powerful and useful tool for reflexology when used for full body massage therapy, and massage therapy using this device may produce beneficial, physiological effects as well as psychosocial improvements.

## Keywords

Dermal Collagen Score, Hand Massage, Power Tree<sup>®</sup>, Salivary Amylase, Skin Temperature, STAI

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## 1. Introduction

There are a number of procedures used in the aesthetic and aesthetic dermatological field, where people can re-

ceive non-invasive treatments for the purpose of anti-skin aging or slimming.

Among these procedures, a hand massage can be a good alternative not only to a facial but also to a full body treatment. It can be a relaxing, rejuvenating and sometimes becomes a therapeutic method for flabby skin. However, there have been only a few studies that have evaluated the effectiveness of a hand massage based on medical approaches [1]-[4].

The application of a treatment by hand or a hand massage is one of the commonly used non-invasive cosmetic procedures, and it not only provides the skin with nourishment and improves the circulation, resulting in rejuvenated skin, but also is known be a good way to relieve stress. On the other hand, therapists have to continue to work for long hours and utilize their skin and muscles in every possible type of motion and injuries of the hands and back are common among manual therapists. In addition, therapists sometimes become exhausted after performing the hard work for several days in succession, although certain breathing and stretching exercises may help.

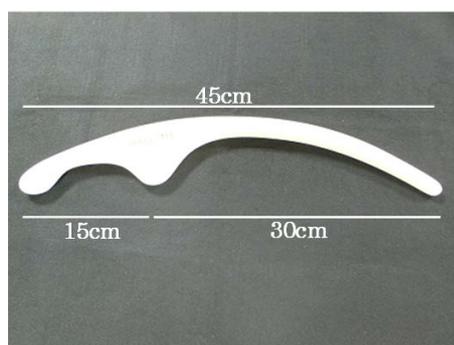
In such situation, the similar massage can be performed with appropriate products, such as stones or sticks. The quality or the effect of the treatment depends on how well therapists have been trained, how skilled they are, and how they feel when they are performing the treatment. Therefore, a treatment with these products may be helpful for practitioners, because it enables them to uniformly and stably add power and to control the intensity of the power applied to the subjects' skin, making them more comfortable. For example, a hot stone massage is a special kind of massage where therapists use and handle smooth, heated stones to massage the subject. By using the stones, the therapists can work more accurately, more quickly and more easily compared with the treatment using just their hands without the stones.

We recently developed a new device for body treatment using a tree instead of a stone. The device is made from Hinoki cypress and has a peculiar shape, which is perfectly configured for full body of humans. In this study, we examined the effectiveness and usefulness of this novel tool (Power Tree<sup>®</sup>) for body massage by evaluating several dermatological and psychological parameters.

## 2. Materials and Methods

We enrolled 10 healthy female volunteers (age range, 24 - 55 years; mean age, 40.5 years) in the present study. We applied the newly developed novel-shaped tool, the Power Tree<sup>®</sup>, made from Hanoi cypress, for a full massage body massage (Figure 1).

A typical full body massage consists of effleurage, friction, pressure, smoothing and kneading, and these treatments are performed in order on appropriate sites of the body with a mixture of massage oil (Table 1), typically for 60 minutes. In all of these steps, the Power Tree<sup>®</sup> was used instead of the hands and the treatments were performed by three female therapists in the present study.



**Figure 1.** The newly-developed device, the Power Tree<sup>®</sup>, made of Hinoki cypress.

**Table 1.** The major chemical constitutions of the essential oils used in the study.

Hydrogenated poly (C6-12 olefin)	35%
Oryza sativa (rice) bran oil	35%
Cetylethylhexanoate	30%

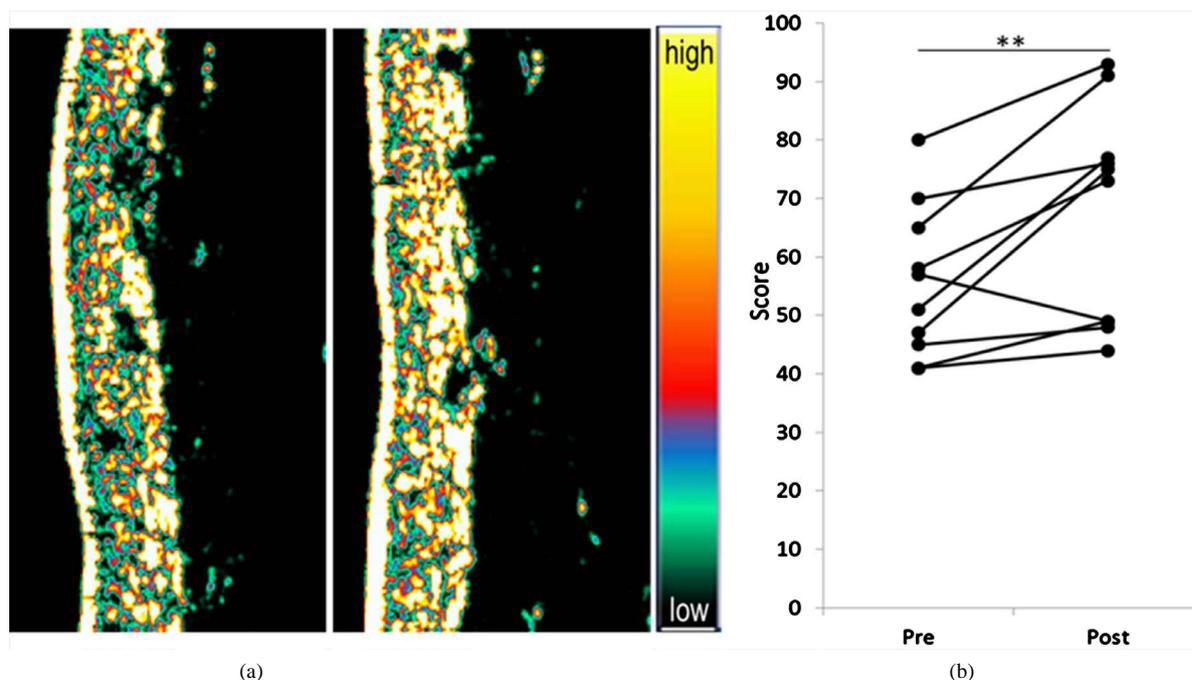
We analyzed the changes in the dermal collagen score, skin temperature and release of the salivary enzyme alpha-amylase, before and immediately after the body massage treatment by using a SkinLab Ultrasound system (DermaLab<sup>®</sup>, Cortex Technology, Denmark), a Thermo Shot F20 (NEC Avio Infrared Technologies Co., Ltd, Japan) and a Cocoro Meter (Nipro Co., Japan), respectively according to the manufacturers' instructions. The cross-sectional skin image obtained by the SkinLab device represents the intensity of collagen signals, where high density (yellow or red) areas contain abundant collagen. Before and after the procedure, ultrasound images were compared with an average density in the range 0 - 100. The higher the density in the dermis, the higher the collagen score is. This dermal collagen score was measured at the lateral site of the left thigh. The skin temperature was measured at three points; the center of the bilateral scapulae and the bilateral posterior site of the thigh before and after the procedure by using infrared thermal imaging camera. The Cocoro Meter is a stress detector and the level of the comprehensive stress can be evaluated by measuring the amount of amylase in the saliva with this meter after putting its spatula on the subject's tongue for 60 seconds. In addition, the Spielberger State-Trait Anxiety Index (STAI) (Chiba Test Center Co., Ltd, Tokyo) was measured as described previously [5] [6] to assess the subject' levels of anxiety. The STAI inventory is used to assess both state and trait anxiety (SA and TA) separately. Each type of anxiety has its own scale of 20 different questions that are scored. Scores range from 20 to 80, with higher scores correlating with greater anxiety. All of the measurements were carried out immediately after the therapy and there was no skin abnormality including edema and erythema.

All of the analyses were performed after obtaining institutional approval and written informed consent from the subject and the study was conducted according to the principles of the Declaration of Helsinki. The results are expressed as the means with SD. The statistical analyses were performed using the two-tailed student's t test for independent samples. Significant differences were recognized at  $p$  values  $\leq 0.05$ .

### 3. Results

The sixty-minute treatment with this device was smoothly performed without any burden on the therapists in the present study.

The dermal collagen score assessed by the SkinLab system increased from  $55.5 \pm 13$  to  $67.5 \pm 18.5$  by the treatment (**Figure 2(a)**, **Figure 2(b)**) and this change was statistically significant ( $p = 0.005$ ). In addition, the skin temperature of the back, right thigh and left thigh (mean  $\pm$  SD pre-treatment:  $34.5 \pm 0.9$ ,  $32 \pm 0.7$  and  $32.4$



**Figure 2.** An image showing the changes in dermal collagen score in a representative subject (a) and all of the data regarding the changes in the dermal collagen score (b). \*\*  $p < 0.01$ .

$\pm 0.7$ , respectively) was increased significantly by the treatment (post-treatment  $36.1 \pm 1$ ,  $35.1 \pm 1$  and  $35 \pm 0.9$ , respectively,  $p < 0.001$ ) (Figure 3(a), Figure 3(b)).

Regarding the level of general stress, the concentration (kU/l) of amylase in the saliva was not significantly different pre- and post-procedure (mean + SD:  $58 \pm 40$ ,  $64 \pm 28$ , respectively) ( $p = 0.3$ ) (data not shown). However, the mean  $\pm$  SD of SA and TA scores before the procedure were  $43 \pm 8$  and  $46 \pm 10$ , respectively, and changed to  $27 \pm 5$  and  $42 \pm 9$ , respectively, after the treatment. Both of these changes were statistically significant ( $p = 0.0002$  for the SA,  $p = 0.009$  for the TA) (Figure 4).

### 4. Discussion

There have been several reports of the psychological and physiological efficacy of hand massage therapy;

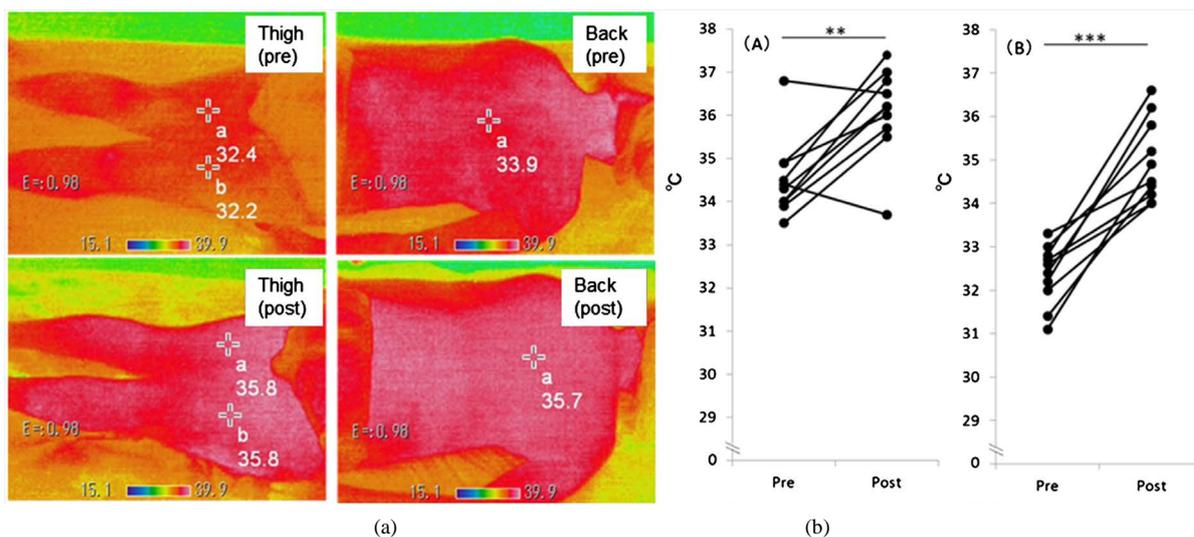


Figure 3. A representative image showing the changes in the skin temperature in a subject (a) and all of the data for the changes in skin temperature ((A) back; (B) left thigh). \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

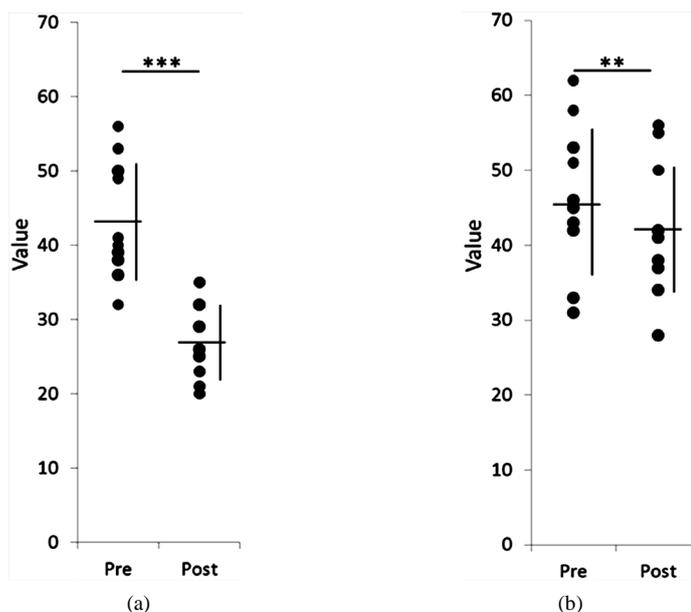


Figure 4. The changes in the STAI score. (a) State anxiety; (b) Trait anxiety. Vertical bar = SD, horizontal bar = mean value. \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

relaxation, improvement of the score estimated by the STAI and a decrease in the levels of cortisol and nor epinephrine [1]-[5].

In the present study, we evaluated the usefulness of a special tool; the Power Tree<sup>®</sup>-mediated massage therapy by assessing various parameters including the dermal collagen score, skin temperature, the level of stress based on the concentration of salivary amylase as well as the STAI score. The collagen stimulating effect of the Power Tree<sup>®</sup>-mediated treatment in the dermis visualized by the DermaLab<sup>®</sup> system was confirmed.

We also observed that the Power Tree<sup>®</sup> increased the skin temperature after the massage. However, there was little or no change in the level of salivary amylase after the procedure. The level of salivary amylase is one of the valuable biological indicators of physiological and psychological stress reactions. The lack of any differences between the salivary amylase levels before and after treatment may have been due to a lack of stress pre-procedure or the discomfort associated with the use of the Power Tree<sup>®</sup>, even though they were receiving a treatment considered to have a relaxing effect.

In the present study, we examined the psychological effects of the massage by evaluating the STAI scores, and we observed that the post-procedure scores were significantly lower for both the SA and TA compared to those pre-procedure. These results suggest that beneficial effects in terms of anxiety reduction were obtained by the full body massage using the Power Tree<sup>®</sup>. The improvement of the TA following the procedure implies the possibility that there is a healing effect induced by Power Tree<sup>®</sup>-mediated message therapy.

## 5. Conclusion

In conclusion, a newly-developed device, the Power Tree<sup>®</sup>, is a powerful and useful tool for reflexology during full body massage therapy, as evaluated by several medical parameters. By using this device, massage therapy may produce beneficial physiological effects as well as psychosocial improvement.

Because we performed this study in only a small number of subjects, and examined the data over a short period before and immediately after the treatment, it is necessary to validate the effects a longer period of time after the Power Tree<sup>®</sup>-mediated massage in a future study, and to examine the impact of the treatment in patients experiencing high levels of stress prior to the treatment.

## Conflict of Interests

One of the authors (S.M.) is a research adviser for the Bloom Classic Co.

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