CHAPTER V
DISCUSSION AND CONCLUSION

The present study investigated the immediate and sustained effects of Traditional Thai Massage (TTM) on alteration of skin temperature. The immediate and short term effects of TTM on hand mobility of patients with scleroderma were also observed.

5.1 The immediate and sustained effect of TTM on alteration of skin temperature

The finding showed that 15 minutes TTM performed at upper extremity for 15 minutes per limb was effective in increasing hand temperature measured by thermography. This finding supported previous studies that massage has an effect on the improvement of blood circulation. Possible reasons of increasing of skin temperature may involve with the vasodilatation of superficial blood vessels and increasing of the rate of blood flow. A previous study showed that increase in skin temperature was significantly greater with massage than rest (Mori et al, 2004). A change in muscle temperature was significantly greater following massage than ultrasound (Drust et al., 2003). Unfortunately, very little scientific data has supported this claim in patients with scleroderma. Although a recent study showed the efficacy of the massage on hand mobility in patients with SSc (Bongi et al., 2009), hand temperature was not observed.

Although the exact mechanisms of the effect of TTM on alteration of skin temperature remain unclear, the mechanical and reflex effects on the blood vessels provide an idea for describing. Relieve congestion by compression on the muscle to mechanical draining of the vessels and pumping action to increase venous return (Dawson et al., 2004). Light pressure of TTM push the arterial blood flow centripetally along the vessel. Increasing the venous return of a tissue area creates more space for the arterial blood flow to the same region (Lightfoot et al., 1997). Massage of the tissues, the skin and fascia has a reflex effect on the unstripped muscle

of the superficial arterioles. Reflex contraction of their muscular wall, follow by a paralytic dilatation of the involuntary muscle, temporarily paralyzed, and lead to vasodilatation and hyperemia at the superficial arterioles of skin (Mori et al., 2004). Massage reduces in blood viscosity, haematocrit and plasma viscosity. The lower their values result of higher the fluidity. Haemodilution is thought to occur as a result of reduced sympathetic tone and increase parasympathetic tone (Cassar et al., 2004). However, this finding was designed to elucidate the localized effect of TTM application without determining the detail of mechanism of increasing skin temperature.

Base on pathology of SSc, peripheral microvascular damage is characterized by structural alterations of the capillaries with a progressive decrease in capillary density. Enlarge and giant capillaries, haemorrhages, disorganization of the vascular array and ramified/bushy capillaries are present (Cutolo et al., 2004). Thus, it is not clear as to whether skin temperature increase was due to massage, heat conduction from physical therapist's hands, or both. A future study should be conducted having the physical therapist's hands statically placed on the participant's hand as the placebo-control condition. Study period was too short to evaluate TTM effect on structured change of capillaries.

In this study, the skin temperature after receiving TTM was increased until 30 minutes. No data reported the sustained effect of massage on skin temperature. Due to many factors influencing skin temperature increase such as type of massage, time of application, and environmental temperature. However, other treatments after TTM may improve hand functions by the sustained effect of skin temperature.

5.2 The immediate and short term effect of TTM on alteration of hand mobility

The finding showed that TTM to the upper extremity for 15 minutes per limb was effective in increasing hand mobility. Hand mobility was investigated by HAMIS at pre and post-treated times (after treatment and 2 weeks follow-up).

After the first treatment, the patient in the TTM group was treated by patient's relative everyday during 2 weeks. At the end of home program session, hand mobility was investigated with HAMIS by physical therapist. HAMIS score reduction in TTM

group showed significantly difference when compared with the control group ($p<0.05$). For 2 weeks follow-up, HAMIS score reduction also showed significantly difference between groups. However, HAMIS score reduction in TTM group after the first treatment and 2 weeks follow-up did not show a significant change. The improvement was confirmed after a period of follow-up. These results indicate that routine program of TTM can improve hand mobility and hand function in patients with SSc.

Hand Mobility in Scleroderma (HAMIS) is a new hand function test developed for adults who have SSc. The assessment of functional ability in SSc is a vital task since 90% of patients with SSc report loss of hand grasp ability (Silman et al., 1998; Poole, Steen, 1991). This finding demonstrates that the HAMIS is a reliable instrument for evaluation of hand mobility and functions on patients with SSc. Interrater reliability was calculated by match the test results obtained by different observers. The results showed good reliability. This finding agreed with the previous study (Sandqvist, Eklund, 2000a).

HAMIS score reduction indicates improvement of hand mobility and functions. Interestingly, the results of this finding showed score reduction in thumb functional abduction test item only. No data compared the level of severity of finger deformity. Thus, it is difficult to describe the reason of thumb movement increase. However, improvement of thumb mobility is the main key for hand function improvement in any tasks of activity of daily living (Poole, 1994).

A recent finding (Bongi et al., 2009) reported that in SSc, a combined rehabilitation approach is more effective than home-based exercises. Hand mobility in patients with SSc were improved by connective tissue massage and Mc Mennell joint manipulation and home program. HAMIS was also used to investigate the improvement of hand functions. In fact, connective tissue massage modifies local blood circulation and relaxes connective tissue by stretching (Alpiner, 1995), and Mc Mennell's technique focuses on joint movement. Although this study used TTM, the characteristic of TTM is combined connective tissue massage and joint stretching. Thus, the application of TTM on top of a home exercise program may be effective in the rehabilitative treatment of SSc hands.

Some evidence exists about the effectiveness of self-management in patients with SSc. Recently, a study showed the efficacy of self-administered stretching of each finger in patients with SSc, showing that improvement of range of motion was present in each finger after 1 month and maintain within 1 year (Mugii et al., 2006). The combination of stretching exercise may be potentially useful in order to maintain the efficacy reached with the TTM application.

5.3 Limitation of this study

This study has some limitations that should be addressed. First, only 15 minutes per limb was used for the current study. This amount of time may affect small changes in outcome measures. Although a previous study applied connective tissue massage 10 minutes per limb, hand was also treated by connective tissue massage combined with joint manipulation (Bongi et al., 2009). Moreover, the study of Bongi et al., which conducted longer time duration for follow-up when compared with this finding. This example suggests that the future studies that utilize longer period of time than 15 minutes of TTM per limb or extend duration of follow-up are warrantee to study.

Second, Base on pathology of SSc, the microvascular damage in hand of patients with SSc present. Thus, it is not clear as to whether increase was specificity due to massage, heat conduction from physical therapist's hands, or both. A future study should also conduct by having the physical therapist's hands statically placed on the participant's hand as the placebo-control condition.

Third, it is very difficult to control quality of TTM home program by patient's relative. However, Video compact disc (VCD) guideline may help the patient's relative for correcting performance. Moreover, telephone and home visit may be needed to stimulate the awareness of the patient's relative for caring.

5.4 Conclusion

The results of this study instruct that Traditional Thai Massage (TTM) to the upper extremity area of patients with SSc for 15 minutes per limb is effective in increasing hand temperature and improving hand mobility. TTM is a non-pharmacological treatment with less adverse effects, and can lead to improvement of

blood circulation and hand mobility of patients with scleroderma. Since this TTM technique can easily be taught to family members of patients, we therefore suggest that TTM could be one of potentially alternative treatments for patients with scleroderma.