Effects of *Anma* Therapy (Traditional Japanese Massage) on Body and Mind

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ABSTRACT

Introduction: *Anma* therapy is a traditional style of Japanese massage, one of touch and manual therapies, and one of the most popular CAM therapies in Japan. It was brought from China in the 6th century and, while based on the theory of Chinese medicine, it developed in Japan according to Japanese preference and has recently come to include theories of Western medicine. The purpose of this study was to clarify the physical and psychological effects of *Anma* therapy.

Participants and Methods: Fifteen healthy 50-year-old female volunteers with chronic muscle stiffness in the neck and shoulder, received two interventions; 40-minute *Anma* therapy and 40-minute rest intervention. The design was cross-over design. Participants were randomly divided into two groups. Group A was started on *Anma* therapy from the first day followed by the rest intervention after a three-day interval. The order of the *Anma* therapy and the rest intervention reversed for Group B. Visual Analogue Scale (VAS) score for muscle stiffness in the neck and shoulder, state anxiety score, and salivary cortisol concentration levels and secretory immunoglobulin A (s-IgA) were measured pre- and post-interventions.

Results: *Anma* therapy significantly reduced VAS scores and state anxiety scores. S-IgA concentration levels increased significantly across both groups.

Conclusion: *Anma* therapy reduced muscle stiffness in the neck and shoulder and anxiety levels in this pilot study of 50 year old females.

KEY WORDS:

Anma therapy, traditional Japanese massage, muscle stiffness in the neck and shoulder, Visual Analogue Scale (VAS), state anxiety, salivary cortisol, secretory immunoglobulin A (s-IgA)

BACKGROUND:

What is *Anma* Therapy?

Anma therapy is a traditional Japanese massage brought from China as "*Do-in* and *Ankyo*" in the 6th century at approximately the same time as acupuncture, moxibustion, and Chinese medicine were introduced. "*Do-in* and *Ankyo*" were a kind of touch and manual therapy including movement and breathing exercises that were designed to stimulate the flow of ki, or life energy, throughout the body. This therapy is capable of rebalancing the flow of vital energy through the meridians. It originated as a way to prevent disease, maintain and promote good health. The art developed according to Japanese preferences, supported by public confidence, and at present, it is called *Anma* therapy ("*an*" is the Japanese term for applying pressure and kneading, and "*ma*" the term for stroking), one of the most popular therapies in Complementary and Alternative Medicine in Japan.

Recently, *Shiatsu* (literally, in Japanese, “pressing with the thumb”) has become famous worldwide, although it is only one technique of many in *Anma* therapy. In Japan, a massage practitioner license is given only to those who have passed a national examination, which allows the practice of all kinds of touch and manual techniques, including *Anma* therapy, *Shiatsu*, and other massage therapies such as

Western and other Asian massage styles. In modern day Japan, the terms "*Anma* therapy" and "massage therapy" are commonly used synonymously. The public call *Anma* therapy "massage"; however, scholastically there are differences between *Anma* therapy, or traditional Japanese massage and Western style massage. *Anma* therapy is composed of seven techniques (Kimura et al 2003), including stroking, kneading, and pressing, with kneading being used most frequently. These stimuli are applied to the deep muscle, usually through clothes, to achieve tactile and pressure sensation, whereas Western style massage is applied directly to the skin using stroking technique more frequently with softer superficial tactile stimulation and lubrication.

In the classical works of traditional Japanese medicine, the stimulation produced by *Anma* therapy was claimed to affect the functions of not only the body but also of the mind because it was based on traditional Chinese medicine. In traditional Chinese medical theory it is hypothesized that the body and the mind are associated with each other; disorders of the seven emotions — anger, joy, worry, grief, melancholy, fear, and fright result in injury to physical organs, and physical and psychological strain were thought to be etiology (Simple Question, Spiritual Axis). According to one classical work (Simple Question), *Anma* therapy is effective in the treatment of muscle stiffness when stressful hassles cause the flow of ki in the meridians to stagnate.

Modern *Anma* therapy has come to embrace a wider acceptance of aspects of Western medicine, such as in anatomy and physiology. Some studies (Sato & Schmidt 1971, Cao et al 1992, Sato et al 1996, 1997, 2002) have revealed that tactile and pressure stimulation given to the surface of the body in anesthetized rats elicited a somato-visceral reflex, which is currently believed to be the mechanism of the clinical effect of *Anma* therapy: For example, in anesthetized rats, abdominal pressure stimulation inhibited gastrointestinal motility and the excitatory gastric response elicited by pressure stimulation of a hind paw, which are reflex responses. Moreover, cutaneous stimulation by brushing produced a reflex inhibition of the sympathetic nervous system to the adrenal medulla that resulted in decreased secretion of catecholamines. Thus, tactile and pressure stimulation affects the autonomic nervous system and internal secretion through the brain to act on physical modulation. Tactile and pressure stimulation to skin and muscles are important methods in *Anma* therapy, so organ reactions to somatosensory input ("somato-autonomic reflexes") are considered to be the effective mechanism of *Anma* therapy.

Anma therapy has been empirically shown to maintain well-being, promote health, treat illness, and prevent disease. It has often been used to treat symptoms which are not treated by medical doctors, such as muscle stiffness in the neck and

shoulder, lower back pain, musculoskeletal or arthritic pain, chronic pain, neuralgia, autonomic nerve disorders, fatigue and so on (Donoyama & Katahira 2002, Oride et al 2002, Yamashita et al 2002).

INTRODUCTION

Recently, the use of Complementary and Alternative Medicine (CAM) therapies has increased around the world, and the prevalence of massage therapy has rapidly increased, particularly because of its emphasis on stress reduction and increased physical and psychological relaxation (Lovas et al 2002). According to the surveys, the rate of persons who have used some form of CAM therapy in the past one year is 42% of the individuals in the USA (Eisenberg et al 1998), 20% in the UK (Ernst & White 2000), and 76% in Japan (Yamashita et al 2002). Among these, individuals who received massage therapy were 11%, 1%, and 15% in the USA (Eisenberg et al 1998), the UK (Ernst & White 2000), and in Japan (Yamashita et al 2002), respectively. Moreover, in Sweden, 17% of respondents (patients) reported having consulted a CAM provider during the preceding year and 40% reported that the most frequently used CAM therapy was massage (Al-Windi 2004).

The main goal of *Anma* therapy in Japan is to treat the musculoskeletal

symptoms (Yamashita et al 2002), among which, muscle stiffness in the neck and shoulder is one of the most frequent (Donoyama & Katahira 2002, Oride et al 2002). In addition, according to national surveys in Japan (Health and Welfare Statistics Association 1996, 2001), the most frequent symptoms reported by the public were muscle stiffness in the neck and shoulder and lower back pain, and the number of people receiving *Anma*/massage therapy increased. Thus, *Anma* therapy is one of the most popular CAM therapies in Japan, a therapy from which patients expect much. In spite of its long history and popularity, *Anma* therapy only has anecdotal evidence for its effectiveness and no evidence resulting from studies employing scientific methodology can be found from a Medline search.

As for Western style massage therapy, many scientific studies aimed at verifying its effectiveness have been published recently. Previous studies on massage therapy (Field 1998, 2000; Field et al 1992, 1997, 1998; Hart et al 2001, Hernandez-Reif et al 2000) have indicated that anxiety scores, salivary stress hormone (cortisol) levels and catecholamine levels in blood decrease significantly and physical symptoms improve after massage treatment compared to control groups. In addition, some studies on the effects of massage therapy on immunological function have been published, using secretory immunoglobulin A in saliva (s-IgA) as an indicator (Green & Green 1987,

Groer et al 1994). Results show s-IgA concentration increase in massage groups.

Thus, a preliminary study on the effect of *Anma* therapy was undertaken; Visual Analogue Scale of clients' symptoms, state anxiety, salivary cortisol, and s-IgA were measured (Donoyama et al 2005). In the study, three female clients participated in five *Anma* therapy sessions (two times per week for two and one half consecutive weeks) of 40 minutes' duration. Immediate changes between pre- and post-therapy, and longer-term changes between first and last session were observed. According to the results, the degree of all chief complaints and state anxiety scores exhibited both immediate and longer-term decreases across all three women. Another immediate change seen in *Anma* therapy was an increase in s-IgA levels in saliva. Salivary cortisol concentrations, however, remained unchanged. These results suggested that *Anma* therapy may be effective in ameliorating physical symptoms and anxiety, and in enhancing immune function. Changes of salivary cortisol concentration by *Anma* therapy were different from those of Western style massage. However, these statements were premature because sample size was small and the conditions were varied. In the present study, a larger sample size was prepared, sample conditions were controlled, and the effects of *Anma* therapy were examined utilizing the Visual Analogue Scale of participants' symptoms, state anxiety, salivary cortisol, and s-IgA, using statistical

analyses.

MATERIALS AND METHODS

Participants

Seventeen healthy volunteers were recruited for participation in this study through 3 part-time female workers employed at the university. Inclusion criteria for gender, age, and physical conditions were i) to be a female in the fifth decade of life; ii) to feel chronic muscle stiffness around neck and shoulder; iii) to have no disease requiring medical intervention; iv) to desire *Anma* therapy; and especially to eliminate the influence from sexual hormones suggested in the study by Kirschbaum et al (1999) showing that salivary cortisol levels are affected by menstrual cycle, v) to be a few years post-menopause; and vi) to feel no current symptoms of menopause. Muscle stiffness in the neck and shoulder is defined as symptoms which produce a feeling of annoyance, an unpleasant sensation, strain, stiffness, ache, and/or pain in the *regio axillaris* and/or *regio scapularis* muscles (Hirabayashi 2002, Ishii & Hirasawa 2002). All participants gave their informed consent, were screened for conditions of chronic muscle stiffness in the neck and shoulder, and the absence of medical disease was confirmed by a doctor. Participants were asked to avoid strenuous exercise on the days of participation in the

study and to avoid eating and drinking within two hours of participation in the study.

Interventions

All participants received two interventions on two different days. One was *Anma* therapy and the other was a rest intervention. The 40-minute *Anma* therapy was performed by a female therapist in possession of a national massage practitioner license with greater than 15 years' treatment experience. On the massage table, *Anma* therapy was performed on the body, except the face, head and abdomen, with a focus on the neck and specific points of shoulder stiffness. *Anma* therapy techniques were standard versions composed mainly of kneading and lesser amounts of stroking and pressing, with intensity of stimulation applied within the range of comfort.

Outline of the procedure of the *Anma* therapy is described briefly in the following:

Summary description of *ANMA* procedure

I Lying down on one side for 17 minutes

A. Procedure for the back including the shoulder, the back, and the lower back

(1) Stroking starts at the base of the neck along the upper shoulder to the shoulder joint

(2) Downward strokes along the full length of the back, starting at the base of the neck down to the waist

(3) Thumb kneading by circular or linear (back and forth) movement: the upper shoulder from the side of the 7th cervical vertebra (Cv7) to the *acromion* along the *trapezius*

(4) Thumb kneading by circular or linear movement: from Cv7 via the superior angle of the *scapula* and the *supraspinous fossa* to the *acromion*, on the *levator scapulae*, *rhomboid*, and *supraspinatus*.

(5) Thumb kneading by linear movement along the spine: from the side of Cv7 to the side of the 5th lumbar vertebrae (Lv5) on the *erector spina*e and the *quadratus lumborum*

(6) Thumb or other four-finger kneading by circular or linear movement on the *medial* and *lateral border of scapula*

(7) Heel of the hand kneading by circular movement on the *infraspinous fossa*

(8) Downward strokes again along the length of the back, starting at the base of the neck down to the waist

(9) Stroking again starting at the base of the neck along the upper shoulder to the shoulder joint

B. Procedure for the upper limb and the hand

(1) Stroking down from the shoulder to the fingertips

(2) Palm grasp kneading over the upper limb on the *deltoid*

(3) Palm grasp kneading over the upper front limb on the *biceps brachii*

(4) Palm grasp kneading over the back of the upper limb on the *triceps brachii*

(5) Thumb kneading on the back of the forearm

(6) Palm grasp kneading on the front and the side of the forearm

(7) Thumb kneading on the hand

(8) Knead and squeeze each finger along the full length using the thumb and the index

(9) Stroking down from the shoulder to the fingertips

C. Procedure for the neck

(1) Stroking starting at the superior nuchal line along the neck to the base of the neck

(2) Thumb kneading over the back of the neck on the *semispinal capitis*, the *splenius capitis*, and the *trapezius* descending part

(3) Thumb, two-finger (thumb and index), or four-finger kneading to the side of the neck, on the *sternocleidomastoid*

(4) Apply four-finger kneading to the front of the neck

(5) Thumb kneading and pressure along the superior nuchal line

(6) Stroking again starting at the superior nuchal line along the neck to the base of the neck

D. Start again the cycle for item A.

E. Procedure for the lower limb and the foot

(1) Stroking from the buttock to the toes

(2) Kneading over the buttock with the heel of the hand

(3) Palm kneading on the front thigh, on the *quadriceps femoris* muscle

(4) Palm grasp kneading to the back thigh or hamstrings

(5) Palm grasp kneading on the *patella*

(6) Thumb kneading on the front lower leg

(7) Palm grasp kneading on the calf muscles

(8) Palm grasp kneading of the Achilles tendon

(9) Finger kneading over the top of the foot

(10) Thumb kneading and pressure on the sole

(11) Knead and squeeze each toe along the length using thumb and index finger.

(12) Intermittent palm pressure on the entire leg

(13) Stroking again from the buttock to the toes

II Lying down on the opposite side, repeat A B C D E for 17 minutes

III Conclusion: in the prone position for 6 minutes

(All the techniques in this concluding section are done simultaneously on the left and

right side of the subject.)

(1) Stroking starts at the superior nuchal line along the sides of the neck and the upper shoulders to the shoulder joints

(2) Downward strokes along the full length of the back, starting at the base of the neck down to the waist

(3) Grasp hand kneading, thumb kneading, and pressure over the back of the neck

(4) Four-finger kneading and pressure on the sides of the neck

(5) Grasp hand kneading, thumb kneading, and pressure on the upper shoulder

(6) Thumb kneading and pressure along the spine

(7) Palm grasp hand kneading over the sides of the back, from the waist to the shoulder joints — *latissimus dorsi*

(8) Downward strokes again along the full length of the back

(9) Stroking again from the superior nuchal line along the sides of the neck and the upper shoulders to the shoulder joints

Notes: It is recommended that the guide book by Kimura et al (2003) be referred to for more detailed information on the basic techniques of *Anma* therapy.

In the Rest Intervention (controls), participants lay on the massage table and rested for 40 minutes, without *Anma* therapy.

Design and setting

The design of this study was cross-over. Participants were assigned randomly to two groups: Group A (9 subjects); *Anma* therapy was performed on the first day, and the Rest Intervention was performed three days after. Group B (8 subjects); received the rest intervention on the first day, and *Anma* therapy after a three days interval. The participants did not know to which group they had been assigned until the first intervention.

Two persons in Group B withdrew from participation on the first day due to family circumstances. Therefore, the subject number in Group B decreased to 6 subjects prior to the beginning of the study. No subjects withdrew from participation during the study. The mean age ± standard deviation (SD) of participants in the study was 55.4 ± 2.1 years of age and the mean Body Mass Index (BMI) ± SD was 21.2 ± 1.8. In Group A, the mean age ± SD was 55.1 ± 2.2 years of age and the mean BMI ± SD was 21.2 ± 2.0, and in Group B, the mean age ± SD and BMI ± SD were 55.8 ± 2.1 years of age and 21.3 ± 1.4, respectively. Unpaired (independent samples, 2-tailed) t-test was performed in order to determine the differences in basic physical attributes between the two groups, and it was confirmed that there were no significant differences in age (t (df 13) =0.6, p=0.54) or BMI (t (df 13) =0.09, p=0.93).

Procedure

Upon presentation to the laboratory, participants washed their mouths out with water from a disposable paper cup and took a 15-minute rest. Then, a saliva sample was obtained, and participants answered self-assessments of the neck and shoulder stiffness condition and feeling of anxiety. A 40-min. intervention was then performed. After the session, assessments were performed again. Each time, the experiments began at five o'clock p.m. in consideration of the circadian rhythms of cortisol and s-IgA in saliva (Walker et al 1984, Dimitriou et al 2002).

This study was approved by Human Ethics Committee of the Institute of Health and Sport Sciences, University of Tsukuba and performed according to the ethical standards set forth in the Helsinki Declaration in its revised version of 1975 and its amendments of 1983, 1989, and 1996.

Measurements

i) The Visual Analogue Scale (VAS) was used to assess the severity of the subjective symptom, muscle stiffness in the neck and shoulder. A sheet of paper (width 100 mm × height 40 mm) was given to the subject and it was explained that the left edge of the paper represented no symptoms and the right edge represented the most serious symptoms that the subject could imagine. The subject was then asked to

indicate how serious the degree of their neck and shoulder stiffness was at that time and to record it as a tick on the paper. Length from the left edge to the tick on the paper was measured and treated as the VAS score.

ii) The state anxiety score was measured by the Japanese version of the State Trait Anxiety Inventory by Spielberger, Gorsuch, and Leshene (Mizuguchi et al 1991), a self-report Likert scale, to assess the degree of anxiety being felt by participants at that time. The State Anxiety scale consists of 20 items that assess how the individual feels at that very moment, on a scale of severity including, 1 "not at all"; 2 "somewhat"; 3 "moderately so"; and 4 "very much so"; and the scores of items are added. The range of obtained scores is from 20 to 80. The higher the score obtained, the stronger the state anxiety. The reliability and validity of this scale has been repeatedly demonstrated (Mizuguchi et al 1991). Cronbach's alpha coefficients of this scale in the present study were 0.94, 0.91, 0.77, and 0.82 for pre-AI, post-AI, pre-RI, and post-RI, respectively.

iii) 2mL unstimulated saliva was collected at pre- and post-interventions, into serum-tubes, sealed and frozen immediately in a freezer on the night when the intervention was conducted. On the next morning, they were delivered to the assay company (SRL Inc, Tsukuba, Japan). Assays were conducted for concentration levels of salivary cortisol and s-IgA in samples by γ-cortisol and Enzyme Immunoassay (EIA)

s-IgA test, respectively.

Statistical Analysis

To assess the immediate effects of *Anma* therapy comparing to those of rest without *Anma* therapy, VAS, state anxiety, salivary cortisol concentration level, and s-IgA concentration level were analyzed by repeated measures analyses of variance (ANOVA). To assess the longer-term effects of *Anma* therapy, repeated measures ANOVA were performed again. Moreover, to clarify differences between *Anma* therapy and the rest intervention effects on each item of the state anxiety, significant differences between pre- and post-intervention scores for each of the 20 State Anxiety items were determined by paired (2-tailed) t-test. All statistical analyses were performed by SPSS 15.0. Alpha was set equal to 0.05, thereby implying that any statistical outcome that had a $p < 0.05$ would indeed be statistically significant.

RESULTS

To assess immediate changes of *Anma* therapy, differences of intervention order by the cross-over design, i.e. differences between group A (*Anma* therapy was performed on the first day) and Group B (the rest intervention was performed on the first day) were not effective (VAS $F=0.2$, $p=0.652$; state anxiety $F=1.2$, $p=0.277$; cortisol

F=0.5, p=0.479; s-IgA F=0.012, p=0.913) (Table 1). Post-intervention VAS scores were significantly lower than those obtained pre-intervention (F=42.4, p=0.0005); there was significant difference between *Anma* therapy and the rest intervention (F=20, p=0.0005). Further, post-intervention state anxiety scores were significantly lower than those obtained pre-intervention (F=15.0, p=0.001); difference between *Anma* therapy and the rest intervention was F=4.1, p=0.053. For concentration levels of salivary cortisol, no significant differences between *Anma* therapy and the rest intervention (F=0.8, p=0.383) and within pre-intervention and post-intervention (F=1.1, p=0.301). Concentration levels of s-IgA post-intervention were increased significantly compared with those obtained pre-intervention (F=6.39, p=0.0005); however there was no difference between *Anma* therapy and the rest intervention (F=0.1, p=0.756) (Table 1).

To assess the longer-term effects of *Anma* therapy, pre-first intervention values and pre-second intervention values were compared between Group A and the B (Table 2). In group A, pre-second intervention VAS scores, 47.2 ± 5.7 were lower than those obtained pre-first intervention, 60.7 ± 6.0, but not statistically significantly different (F=3.4, p=0.087); whereas in Group B, those obtained pre-second intervention, 58.5 ± 7.0 was not almost changed as those obtained pre-first intervention, 58.7 ± 7.3; there was no significant difference between Group A and the B (F=3.3, p=0.094). Pre-second

intervention state anxiety scores were significantly lower than those obtained pre-first intervention (F=4.8, p=0.048); however, there was no significant difference between Group A and the B (F=0.1, p=0.740). For concentration levels of salivary cortisol, there were no significant differences within pre-first intervention and pre-second intervention (F=1.8, p=0.198) and between Group A and the B (F=2.5, p=0.135). Moreover, for concentration levels of s-IgA, there were no significant differences within pre-first intervention and pre-second intervention (F=0.1, p=0.756) and between Group A and the B (F=0.004, p=0.951) (Table 2).

Table 3 shows the results of an examination of the significant differences between pre- and post-interventions on each of the 20 items of state anxiety. After *Anma* therapy, the scores improved significantly in 10 items: "I feel at ease"; "I feel rested"; "I feel anxious"; "I feel comfortable"; "I feel self-confident"; "I am relaxed"; "I feel content"; "I am worried"; "I feel joyful"; and "I feel pleasant"; on the other hand, after the rest intervention, the score for the item "I am tense" improved significantly. There were no items that revealed significant differences between pre-*Anma* therapy and pre-rest intervention start lines.

DISCUSSION

The immediate change in the post- *Anma* therapy VAS scores verified that *Anma* therapy, distinguished from rest lying on the massage table, can improve subjective symptoms of muscle stiffness in the neck and shoulder. The effectiveness of Chinese and Western massage therapies for similar symptoms was discussed in previous studies: Can et al (2003) suggested that traditional Chinese massage was effective for neck pain. In some studies on fibromyalgia (Sunshine et al 1996, Field et al 2002, 2003), improvement of muscle pain and stiffness were demonstrated by Western style massage. On the therapeutic effective mechanism of massage therapy, Field (2002a, 2002b) hypothesized that massage therapy may reduce muscle tension, facilitate the removal of toxic metabolites and waste products, and allow oxygen and nutrients to reach the cells and tissues. In a study by Mori et al (2004), it was revealed that massage increased the blood flow although it was performed on the lower back. In the present study, it is suggested that manual mechanical stimuli by *Anma* therapy also increase blood flow, remove metabolites and waste products that may in turn, result in the alleviation of the subjective symptoms in the neck and shoulder.

Gregory & Mars (2004) showed that mean external cross-sectional diameter increased on microscopic examination by 8% immediately after compressed air massage of muscle and suggested that compressed air massage of muscle caused vasodilation of

skeletal muscle capillaries that persisted for a minimum of 24 hours after treatment. VAS score reduction in the present study was also found three days after *Anma* therapy, though there was no statistically significant difference. It is implied that *Anma* therapy reduces muscle tension, causes vasodilation of skeletal muscle capillaries, and boosts circulation, resulting in the alleviation of symptoms of annoyance, unpleasant sensation, strain, stiffness, ache, and pain in muscles, and that the effectiveness of this may continue for a minimum of three days. Further studies are needed to verify these points. It was thought that sample size in the present study was too small to analyze two factor repeated measures ANOVA; the number of the participants who had been given *Anma* therapy on the first day was nine, and that of those who had been given the rest intervention on the first day was six.

In the immediate change in the post- *Anma* therapy state anxiety scores, it was verified that *Anma* therapy can reduce state anxiety, however significant probability differed from rest lying on the massage table was 0.053. This result was the same as results obtained in previous studies on Western style massage therapy (Field et al 1992, 1997, 1998, 2002, 2003; Hart et al 2001, Hernandez-Reif et al 2000, 2001, 2003, 2005, 2007). However, it is not meaningful to compare state anxiety scores three days after *Anma* therapy with scores obtained pre- *Anma* therapy, because the state anxiety scale

assesses the degree of anxiety being felt at that moment. Further studies, using an appropriate measurement (i.e. the Trait Anxiety Inventory, designed to assess susceptibility to long-term feelings of anxiety), are needed to clarify consecutive effect on anxiety by *Anma* therapy.

From the results of analysis on the 20 items for state anxiety, it is thought that *Anma* therapy can eliminate emotional discomfort, induce psychological relaxation and enjoyment, and improve the anxious condition. On the other hand, the score for the item "I am tense" improved significantly after rest, while the score after *Anma* therapy was not changed. A close relationship between the client and the therapist is created in the usual clinical setting for *Anma* therapy. A client usually chooses a person as therapist whom they can trust based on the personality and technique. In this study, however, participants did not know the personality of the therapist or what techniques the practitioner could perform, because they were recruited only for the study. On the other hand, rest is not necessarily associated with a given individual. It is presumed that this is the reason why rest could alleviate the feeling of tension more than *Anma* therapy could in the study. This implies that it is important for *Anma* therapists to develop a good relationship with clients for more effective treatment.

Cortisol is a major steroid hormone secreted by the adrenal cortex via reactions

in the hypothalamus-pituitary-adrenal axis and autonomic nervous system, and is used commonly as an index of stress (Fukuda & Morimoto 2001). In this study, salivary cortisol concentration was reduced only marginally after *Anma* therapy. This is in contrast to results obtained in previous studies on Western massage therapy (Field 1998, 2000; Field et al 1992, 1997, 1998; Hart et al 2001, Hernandez-Reif et al 2000), in which salivary cortisol levels decreased significantly after massage sessions. We can consider two reasons for these results at present. One is an equation on a method to collect saliva. In this study, 2mL unstimulated saliva was collected directly from the mouth into the serum-tube by the participants, themselves. The difficulty of saliva collection may have varied among participants, requiring more time for some participants to perform and causing some to feel a psychological burden. It is possible that these circumstances prevented the reduction of cortisol. Further studies, using easier means of collect saliva, are needed to verify these points. Another possibility is that there was a baseline effect with cortisol levels being so low that any intervention, no matter how effective would cause these levels to become significantly lower. Further studies are necessary to clarify these points on salivary cortisol.

In immediate changes by both of *Anma* therapy and rest, in the present study, s-IgA concentration levels were significantly increased. Several studies demonstrate

that relaxation by the watching of a humorous movie (Dillon et al 1985), imagery (Jasnoski & Kugler 1987), and massage (Green & Green 1987) leads to highly significant increases in s-IgA concentrations. Dillon et al (1985) showed that a humorous movie led to increases in s-IgA, suggesting that increases in well-being are accompanied by increases in s-IgA. Groer et al (1994) also demonstrated an elevation in s-IgA concentration after a 10-min. back rub and provided the rationale for the holistic benefits. On the other hand, during overtraining, athletes are susceptible to upper respiratory tract infection (URTI) because of decreases in s-IgA (Mackinnon et al 1993, Mackinnon & Hooper 1994). S-IgA, the predominant immunoglobulin type in mucosal secretion is a major effector of resistance against pathogenic microorganisms causing URTI (Mackinnon et al 1993, Mackinnon & Hooper 1994). These results, therefore, indicate that *Anma* therapy as a holistic treatment may increase s-IgA by increasing well-being, enhance immunological function, and contribute to the prevention of illness, although the immediate changes by therapy are no more effective than the control and other previous interventions in increasing s-IgA levels. In addition, s-IgA concentration changes could not be demonstrated for long-term periods. Further studies measuring s-IgA concentration levels over time are needed to clarify this point.

In conclusion, it is found that *Anma* therapy by which stimulation is applied to

the surface of the body can reduce muscle stiffness in the neck and shoulder and anxiety.

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Table 1. Immediate intervention comparison (repeated measures analyses of variance ANOVA)

n=15

	pre/post intervention measures		Effect					
Values	**pre**	**post**	pre vs post		pre/post × Anma/Rest		pre/post × Group A/B	
	means ± SE (95%CI)	means ± SE (95%CI)	F	p	F	p	F	p
Visual Analogue Scale			42.4	0.0005 ***	20	0.0005 ***	0.2	0.652
Anma therapy	59.6 ± 4.3 (50.4–68.8)	25.8 ± 5.8 (13.1–38.6)						
Rest intervention	52.9 ± 5.0 (42.2–63.7)	46.7 ± 5.2 (35.4–57.9)						
State Anxiety			15.0	0.001 **	4.1	0.053	1.2	0.277
Anma therapy	35.6 ± 1.9 (31.9–39.4)	28.3 ±1.7 (24.8–31.7)						
Rest intervention	35.0 ± 1.9 (31.1–38.8)	32.7 ±1.7 (29.3–36.1)						
Cortisol (μg/dL)			1.1	0.301	0.8	0.383	0.5	0.479
Anma therapy	0.229 ± 0.022 (0.183–0.275)	0.210 ± 0.020 (0.169–0.251)						
Rest intervention	0.196 ± 0.022 (0.149–0.242)	0.194 ± 0.020 (0.153–0.235)						
s-IgA (μg/mL)			63.9	0.0005 ***	0.3	0.605	0.012	0.913
Anma therapy	582.9 ± 69.5 (439.9–725.4)	1082.8 ± 131.4 (812.8–1352.9)						
Rest intervention	586.0 ± 69.5 (443.3–728.8)	1156.3 ± 131.4 (886.3–1426.4)						

** p<0.01 *** p<0.001

Group A: n=9, first intervention = Anma therapy, second intervention = rest

Group B: n=6, first intervention = rest, second intervention = Anma therapy

Table 2. Longer-term intervention comparison (repeated measures analyses of variance ANOVA)

	pre/post intervention measures		Effect			
Values	**pre-first**	**pre-second**	pre-first/pre-second		ɔre-first/pre-second × GroupA/E	
	means ± SE (95%CI)	means ± SE (95%CI)	F	p	F	p
Visual Analogue Scale			3.4	0.087	3.3	0.094
GroupA	60.7 ± 6.0 (47.7-73.6)	47.2 ± 5.7 (34.8-59.6)				
GroupB	58.7 ± 7.3 (42.8-74.5)	58.5 ± 7.0 (43.3-73.7)				
State Anxiety			4.8	0.048 *	0.1	0.740
GroupA	41.8 ± 2.3 (36.7-46.9)	37.4 ±2.4 (32.2-42.7)				
GroupB	32.5 ± 2.9 (26.3-38.7)	29.3 ±3.0 (22.9-35.7)				
Cortisol (μg/dL)			1.8	0.198	2.5	0.135
GroupA	0.263 ± 0.035 (0.187-0.339)	0.201 ± 0.020 (0.159-0.243)				
GroupB	0.190 ± 0.043 (0.097-0.283)	0.195 ± 0.024 (0.143-0.247)				
s-IgA (μg/mL)			0.1	0.756	0.004	0.951
GroupA	528.9 ± 81.5 (352.9-704.9)	515.5 ± 93.8 (312.8-718.2)				
GroupB	656.6 ± 99.8 (441.0-872.1)	636.5 ± 114.9 (388.2-884.7)				

* $p<0.05$

Group A: n=9, first intervention = Anma therapy, second intervention = rest

Group B: n=6, first intervention = rest, second intervention = Anma therapy

T

Mean ± standard deviation for pre/post intervention measures

for immediate intervention conparison for each of the 20 State Anxiety items

n=15

	no.	Items of State Anxiety	*Anma* therapy intervention		Rest intervention	
			pre	post	pre	post
●	1	I feel calm	1.67±0.62	1.60±0.74	1.53±0.74	1.60±0.76
●	2	I feel secure	1.87±0.99	1.60±0.53	1.53±0.64	1.80±0.86
	3	I am tense	1.47±0.52	1.27±0.59	1.47±0.52	1.07±0.26 (t=3.1 **)
	4	I am regretful	1.40±0.63	1.20±0.41	1.13±0.35	1.33±0.82
●	5	I feel at ease	2.27±0.96	1.87±0.74 (t=3.1 **)	2.33±0.90	2.20±1.01
	6	I feel upset	1.07±0.26	1.00±0.00	1.07±0.26	1.00±0.00
	7	I am presently worrying about possible misfortunes	1.20±0.41	1.00±0.00	1.07±0.26	1.26±0.78
●	8	I feel rested	2.33±0.98	1.73±0.80 (t=2.4 *)	2.07±0.88	1.73±0.96
	9	I feel anxious	1.60±0.83	1.27±0.46 (t=2.6 *)	1.53±0.64	1.33±0.45
●	10	I feel confortable	2.33±1.05	1.40±0.74 (t=4.1 **)	2.47±0.74	2.27±0.80
●	11	I feel self-confident	2.80±0.68	2.27±0.96 (t=4.0 **)	2.93±0.80	2.73±0.80
	12	I feel nervous	1.27±0.59	1.07±0.26	1.13±0.35	1.07±0.26
	13	I am jittery	1.13±0.35	1.07±2.58	1.07±0.26	1.00±0.00
	14	I feel "high strung"	1.20±0.41	1.20±0.41	1.47±0.64	1.27±0.59
●	15	I am relaxed	2.60±1.06	1.47±0.64 (t=4.4 **)	2.33±0.72	2.13±0.92
●	16	I feel content	2.67±1.05	2.00±0.85 (t=2.6 *)	2.47±0.74	2.20±0.56
	17	I am worried	1.60±0.74	1.27±0.46 (t=2.6 *)	1.53±0.52	1.33±0.49
	18	I feel over-excited and "rattled"	1.00±0.00	1.13±0.36	1.00±0.00	1.00±0.00
●	19	I feel joyful	2.93±0.96	2.20±0.94 (t=3.2 **)	3.00±0.85	2.60±0.63
●	20	I feel pleasant	2.40±0.91	1.53±0.64 (t=4.0 **)	2.33±0.82	2.13±0.74

● reversed item

test: paired t-test

* $p<0.05$ ** $p<0.01$