Differences in practitioners' proficiency affect the effectiveness of massage therapy on physical and psychological states

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ABSTRACT

Objective: An examination was made of how differences in the proficiency of massage practitioners had different physical and psychological effects on clients.

Method: Eight healthy 50-year-old females, suffering from chronic neck and shoulder stiffness, were recruited and four interventions were conducted; three 40-minute massage therapy interventions, one each by a freshman and a sophomore student studying massage therapy, and one by their instructor, and one rest on the massage table. Visual Analogue Scale score for muscle stiffness in the neck and shoulder, state anxiety score, and salivary cortisol concentration levels and secretory immunoglobulin A were measured pre- and post- interventions.

Results: Visual Analogue Scale of neck and shoulder stiffness after massage by the instructor was significantly lower than that after the other interventions, and the score of state anxiety was lower than that after resting.

KEY WORDS

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

INTRODUCTION

Recently, the use of Complementary and Alternative Medicine (CAM) therapies has increased around the world, and the prevalence of and expectations for massage therapy have rapidly increased, particularly because of its emphasis on stress reduction and increased physical and psychological relaxation (Lovas et al 2002). In Japan, practitioners of massage therapy, including traditional Japanese massage called *Anma* therapy, foreign-style massage, and *shiatsu*, should undergo professional training for at least three years after finishing high school, then they should pass the national examination to obtain a national license for massage practitioner. In Japan, hands-on therapies, including those mentioned above, are often collectively called "massage" and are not properly distinguished from each other. In this case, traditional Japanese *Anma* therapy is the most widely used form of "massage". Thus, in this manuscript, the term, "massage" is used to refer to the traditional Japanese *Anma* therapy. (It is recommended that the previous study (Donoyama et al in contribution) be referred to for more detailed information on the traditional Japanese *Anma* therapy.)

Japanese law stipulates that students in schools for professional education, for at least three years, have to pass 77 units of coursework (one unit includes 15 to 30 lecture hours and 30 to 45 practical training hours), including basic massage studies

(e.g. anatomy, physiology, basic kinesiology, pathology, hygiene and public health, general clinical medicine, clinical medicine, rehabilitation medicine, medical systems overview), professional massage studies (e.g. oriental medicine, meridian and treatment points, massage theory, clinical oriental medicine, clinic management), and practical training (e.g. basic practical training, clinical training, clinical clerkship at massage clinics and medical settings). Special emphasis is placed on 10 units that involve about 450 hours of practical training and clinical clerkship (Japan Association of Massage and Acupuncture Teachers 2003).

In spite of this hard study and intensive practical training, the public and the government seem to believe that it is easy for anyone to treat physical symptoms, relieve mental stress, and induce relaxation. As evidence of that, it is easy in Japan for persons without a national license for massage therapy to practice illegally and almost none of them have been punished by the government. It is thought to be dangerous for therapists who are not adequately familiar with human body structures and functions, formation of diseases, and principles of massage therapy to treat clients. There is a review that has reported incidents of massage therapy practiced by unlicensed therapists and students that resulted in aggravation of lower back pain, induction of pain in part or even all of the body, infection through massage oil, and even rib fracture,

among other adverse effects (Donoyama 2002).

Even given the occurrence of such harmful mistakes, is it true that any practitioner can use massage therapy to treat clients? Massage therapy is composed of tactile, pressure, and mechanical stimuli given from the surface of the body to muscles and other soft tissues. Can massage therapy always have the same effect on clients, regardless of the proficiency or experience of the practitioner? In order to answer this question, the present study examined the results of massage sessions conducted by practitioners with differing levels of experience and the different physical and psychological effects these sessions had on clients, measuring the Visual Analogue Scale (VAS) of participants' symptom of the neck and shoulder stiffness, state anxiety, salivary cortisol, and secretory immunoglobulin A (s-IgA).

MATERIALS AND METHODS

Participants

Ten healthy females were recruited randomly from a volunteer list, in which about 150 persons are registered as a volunteer for the massage experiments in the laboratory. Requirements for participants for gender, age, and physical condition were i) to be a female in the fifth decade of life; ii) to feel chronic muscle stiffness around the

neck and shoulders;, iii) to have no disease requiring medical intervention; iv) to desire massage 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 shoulders is defined as symptoms which produce a feeling of irritation, 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 shoulders, and the absence of medical disease was confirmed by a doctor. They were asked to avoid strenuous exercise on the days they were to be participating in the study and to avoid eating and drinking within one hour of participating in the study.

Interventions

All participants received four interventions, conducted on different days. Three 40-minute massage therapy sessions, one each conducted by a freshman student (60-hour practical training, 6-month educated) and a sophomore student (240-hour practical training, 15-month educated) who were majoring in acupuncture and massage

therapy at a university, one session conducted by an instructor who taught them and had more than 15 years of experience in massage therapy and its education, and one session consisting of a 40-minute rest on the massage table without massage therapy. Student therapists (five freshmen and five sophomores) were recruited to conduct two interventions each. Participants were randomly assigned to the students by sortes but in a way that would guarantee that each participant would receive one intervention by a freshman and one by a sophomore. They did not know the academic year of the students. The instructor treated all 10 participants. Interventions were conducted in one-week intervals.

The massage procedure essentially consisted of basic and clinical versions of traditional Japanese massage taught at the university, *Anma* therapy, which is composed primarily of massage techniques that are commonly-used in Japan. *Anma* therapy is usually administered through clothing or using a piece of cloth; here, it was administered through clothing. Practitioners were given leeway with their massage sessions in order to deal adequately with individual participants' symptoms of neck and shoulder stiffness. However, all practitioners in this experiment were required to use at least the following massage procedure: Have the participant lie down on one side and stroke, knead, and press her neck, shoulder, back, lower back, arm, hand, leg and foot.

Next, have the participant lie down on the opposite side and repeat the same procedure on the other side of her body. Finally, with the participant in a prone position for several minutes, stroke, knead, and press her whole body except the head. This massage procedure was the same as in our previous study so please refer to our previous article for details (Donoyama et al in publishing).

Procedure of the experiment

Upon arrival at the laboratory, participants rinsed their mouths out with water from a disposable paper cup and took a 15-minute rest. Then, a saliva sample was obtained, and participants wrote self-assessments of their neck and shoulder stiffness using the Visual Analogue Scale and feelings of anxiety using the State Trait Anxiety Inventory. A 40-minute intervention was then performed. After the session, assessments were made again. Each time, the experiments began at 3:00 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 the Medical Ethics Committee of Tsukuba University of Technology. and performed according to the ethical standards set forth in the Helsinki Declaration of 1964 and its amendment of 2000.

Measurements

i) The Visual Analogue Scale (VAS) was used to assess the severity of the subjective symptoms, muscle stiffness in the neck and shoulders. A sheet of paper (width 100 mm × height 40 mm) was given to each subject and it was explained that the left edge of the paper represented no symptom and the right edge represented the most serious symptom that the subjects could imagine. The subjects were then asked to indicate how serious the degree of their neck and shoulder stiffness was at that time by ticking the corresponding location on the paper. The length from the left edge of the paper to the tick was measured and treated as the VAS score.

ii) The state anxiety score, which was measured by the Japanese version of the State Trait Anxiety Inventory (STAI) by Spielberger C.D. et al (Mizuguchi et al 1991), was a self-report Likert scale consisting of 20 items to assess the degree of anxiety being felt by participants at that time. The obtained scores ranged from 20 to 80, with higher scores representing stronger states of anxiety.

iii) Saliva was collected at pre- and post-interventions. Each time, a swab was removed from a Salivette® (sarstedt, Aktiengesellschatt & Co., Germany), chewed 60 times gently for a minute in synch with a metronome, then returned to the Salivette®.

It was sealed and frozen immediately in a freezer in the night when the intervention was conducted. The next morning, the Salivettes® were delivered to the assay company (SRL Inc, Tsukuba, Japan). Assays were conducted to determine concentration levels of salivary cortisol and s-IgA in samples by γ-cortisol and Enzyme Immunoassay (EIA) s-IgA test, respectively.

Statistical Analysis

In the present study, data for eight participants who could take part in all four of the interventions were analyzed; two persons withdrew from one intervention due to family circumstances.

To compare the immediate changes by interventions, repeated measures analyses of variance (ANOVA) with Bonferroni correction were performed. Next, values before interventions were converted into scores based on 100, values after interventions were calculated, and each intervention group was compared by repeated measures ANOVA with Bonferroni correction. 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

The repeated measures ANOVA with Bonferroni correction were performed to

clarify differences among massage therapy sessions by the freshman students, the sophomore students, and the instructor, and the rest (control), and results were shown in Table 1. Post-intervention VAS scores were significantly lower than those obtained pre-intervention ($F=38.2$, $p=0.0005$). There were significant differences among the four interventions ($F=9.7$, $p=0.017$); the VAS scores were significantly lower after massage therapy sessions by the instructor than those by freshman students ($p=0.041$) and after the rest sessions ($p=0.043$). Post-intervention state anxiety scores were significantly lower than those obtained pre-intervention ($F=16.7$, $p=0.005$); however, there were no significant differences among the four interventions ($F=0.7$, $p=0.448$). For concentration levels of salivary cortisol, post-intervention values were significantly lower than those obtained pre-intervention ($F=16.4$, $p=0.005$); however, there were no significant differences among the four interventions ($F=1.5$, $p=0.264$). Concentration levels of s-IgA post-intervention were increased significantly compared with those obtained pre-intervention ($F=23.1$, $p=0.002$); however there were no significant differences among the four interventions ($F=1.7$, $p=0.237$).

Secondly, values before interventions were converted into scores based on 100, values after interventions were calculated, and each intervention group was compared by repeated measures ANOVA with Bonferroni correction (Table 2). As a result, the VAS

scores of neck and shoulder stiffness were found to be significantly lower after massage therapy sessions by the instructor than after the other interventions (the instructor vs. the freshman students p=0.017, the instructor vs. the sophomore students p=0.049, the instructor vs. the rest p=0.004), and the value of state anxiety was lower after massage therapy sessions by the instructor than after resting on the massage table (p=0.002).

DISCUSSION

In the post-massage therapy by all three kinds of practitioners, VAS scores were lower than the pre-massage therapy VAS scores, whereas the rest sessions did not reduce the scores. Despite their relatively brief period of academic learning, the students could fractionally improve the symptoms of muscle stiffness in the neck and shoulders. In previous studies on anesthetized rats (Cao et al 1992, Sato et al 1996, 2002) tactile and pressure stimuli, from the surface of the body affected the autonomic nervous system and induced reflexive motions, somato-visceral reflexes, which are thought of as a massage therapeutic mechanism. According to previous studies (Field 2002a, Field 2002b, Mori et al 2004), it was found that manual mechanical stimuli by massage increase blood flow, remove metabolites and waste products. This suggests that massage stimuli by even unskilled students may be able to induce autonomic nerve reflexes and cause some alleviation of physical symptoms of muscle stiffness in the neck

and shoulders. Nevertheless, the massage therapy by the instructor was significantly different from that by freshman students and the resting (Table 1). The comparison of values after interventions when values before interventions were converted into scores based on 100, among the four interventions, clearly indicates that VAS scores after the massage therapy by the instructor was significantly lower than those by the other three types of interventions (Table 2). As a result, it was concluded that the massage therapy by the experienced and skilled practitioner was much more effective in improving the physical subjective symptoms than that by the unskilled practitioners.

The changes in the post-intervention state anxiety scores indicated that massage therapy by all three kinds of practitioners and the resting could reduce state anxiety compared with before interventions, though the differences among the four interventions were not clear (Table 1). Next, a comparison of values after interventions when values before interventions were converted into scores based on 100, among the four interventions, showed that the score of state anxiety after massage therapy by the instructor was significantly lower than after resting on the massage table (Table 2). The results imply that massage therapy by an experienced and skilled practitioner can affect to improve greatly not only physical symptoms of the muscle stiffness in the neck and shoulders but also psychological conditions, state anxiety.

Moreover, in the present study, salivary cortisol concentrations in the post-interventions were decreased significantly (Table 1). The significant decreases in salivary cortisol levels after massage sessions were the same as in previous studies (Field 1998, 2000; Field et al 1992, 1997, 1998; Hart et al 2001, Hernandez-Reif et al 2000). Cortisol is a major steroid hormone secreted by the adrenal cortex via reactions in the hypothalamus-pituitary-adrenal axis and autonomic nervous system that is commonly used as an index of stress (Fukuda & Morimoto 2001). This result suggests that stimulation from the surface of the body can affect the autonomic nervous system and help to release psychological stress through the Hypothalamus-Pituitary-Adrenal axis. In our previous study, in which saliva had been collected directly, not with Salivettes®, salivary cortisol concentration levels after massage therapy by the same practitioner participating in the present study were not reduced significantly compared with those before the massage sessions (Donoyama et al in contribution). It is thought that the use of Salivettes® to obtain saliva without distress could increase the accuracy of measurements taken of cortisol concentration levels before and after massage therapy. However, there were no significant differences among the four interventions (Table 1 and 2).

S-IgA concentration levels were significantly increased after interventions,

however there were no significant differences among the four interventions (Table 1 and 2). Previous studies on not only massage therapy (Green & Green 1987, Groer et al 1994) but also relaxation by watching a humorous movie (Dillon et al 1985) and imagery (Jasnoski & Kugler 1987) showed the same results, i.e., increase of s-IgA after interventions. These findings in previous studies suggested that increases in well-being (Dillon et al 1985) and holistic benefits (Groer et al 1994) caused s-IgA to increase. In the present study, it implied that all four kinds of interventions could enhance well-being and provide holistic benefits to participants and in the results, s-IgA concentrations were increased. This in turn may be able to enhance immunological functions and help to prevent illness. However, massage therapy is no more effective for increasing s-IgA than resting, watching humorous movies, or viewing images.

In conclusion, this study has verified that massage therapy practiced by a competent experienced practitioner can greatly alleviate subjective symptoms of muscle stiffness in the neck and shoulders and state anxiety, and lower salivary cortisol as an index of psychological stress. It is thought that the differences between the experienced practitioner and unskilled students on effectiveness depend on the proficiency of the practitioner, which has been cultivated by experience. Massage instructors have the responsibility to educate students to become professionals who can attend to clients'

needs. The results presented here strongly suggest that practical training and clinical clerkship should be an integral part of massage therapy education.

The limitations of this study should be noted. Since it was too difficult to recruit massage professionals with the same experiences and the same skill, one instructor was used across all eight subjects in the study. This was not the case with the freshman and sophomore interventions. All eight subjects should have been treated by each and every freshmen and sophomores. In the absence of this type of control, it's possible that variances across the five freshmen and across the five sophomores might have been a factor influencing the outcomes of the study.

In the present study, repeated measures ANOVA was performed twice to clarify differences among the four interventions, as Table 1 and Table 2 show. The first analyses using ANOVA were expected to reveal differences among the four interventions; however, they could not clearly indicate significant differences among the interventions. Therefore, values before interventions were converted into scores based on 100, values after interventions were calculated, and each intervention group was compared by repeated measures ANOVA with Bonferroni correction. As a result, statistically significant differences among the four interventions finally became clear. This suggested that our sample size had been too small to perform statistical analyses.

It would thus be advisable to try the study again with a sufficiently large sample size to confirm the results.

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Table 1. Comparison of Pre/post changes among four interventions (repeated measures analyses of variance ANOVA)

n=8

	pre/post intervention measures		Effect			
Values	**pre**	**post**	pre vs post		pre/post × four interventions	
	means ± SE (95%CI)	means ± SE (95%CI)	F	p	F	p
Visual Analogue Scale			46.9	0.0005 ***	10.9	0.0005 ***
Freshmen	75.8 ± 5.9 (62.6–86.9)	57.4 ± 8.3 (40.5–74.3)				
Sophomores	70.8 ± 5.9 (58.6–82.9)	54.9 ± 8.3 (38.0–71.8)				
Instructor	72.5 ± 5.9 (60.3–84.7)	23.3 ± 8.3 (6.3–40.2)				
Rest (control)	58.4 ± 5.9 (46.2–70.5)	57.1 ± 8.3 (40.2–74.0)				
State Anxiety			47.9	0.0005 ***	1.5	0.227
Freshmen	36.8 ± 2.7 (21.1–42.4)	30.0 ± 2.1 (25.8–34.2)				
Sophomores	37.5 ± 2.7 (31.9–43.1)	28.4 ± 2.1 (24.1–32.6)				
Instructor	36.4 ± 2.7 (30.8–42.0)	26.8 ± 2.1 (22.5–31.0)				
Rest (control)	34.1 ± 2.7 (28.5–39.7)	30.3 ± 2.1 (26.0–34.5)				
Cortisol (μg/dL)			21.6	0.0005 ***	0.6	0.597
Freshmen	0.239 ± 0.020 (0.198–0.279)	0.219 ± 0.019 (0.179–0.258)				
Sophomores	0.276 ± 0.020 (0.236–0.317)	0.240 ± 0.019 (0.209–0.279)				
Instructor	0.234 ± 0.020 (0.202–0.283)	0.199 ± 0.019 (0.159–0.238)				
Rest (control)	0.230 ± 0.020 (0.190–0.270)	0.205 ± 0.019 (0.166–0.244)				
s-IgA (μg/mL)			31.1	0.0005 ***	1.1	0.38
Freshmen	417.8 ± 54.1 (307.0–528.6)	819.6 ± 142.7 (527.3–1111.8)				
Sophomores	355.7 ± 54.1 (244.9–466.5)	813.5 ± 142.7 (521.2–1105.7)				
Instructor	389.3 ± 54.1 (278.5–500.1)	571.8 ± 142.7 (279.5–864.1)				
Rest (control)	434.1 ± 54.1 (323.2–544.9)	719.0 ± 142.7 (426.7–1011.2)				

*** $p<0.001$

Table 2.

Comparisons of values after interventions when values before interventions were converted into scores based on 100 (repeated measures analyses of variance ANOVA)

	Massage therapy by			rest	ANOVA	
	freshmen	sophomores	instructor		F	P
		*				
		*		**		
Visual Analogue Scale	76.1 ± 9.3	73.9 ± 10.7	32.7 ± 7.3	94.7 ± 7.5	11.0	0.0005 ***
	(54.2-98.1)	(48.5-99.3)	(15.4-50.0)	(77.1-112.4)		
				**		
State Anxiety scores	81.7 ± 3.1	76.6 ± 5.4	75.7 ± 4.3	89.5 ± 3.2	8.0	0.001 **
	(74.4-89.0)	(63.8-89.3)	(65.5-85.8)	(81.8-97.1)		
Cortisol (μg/dL)	91.7 ± 3.8	87.7 ± 5.3	80.8 ± 5.4	92.2 ± 6.5	1.2	0.350
	(82.6-100.8)	(75.1-100.3)	(68.0-93.7)	(76.9-107.4)		
S-IgA (μg/mL)	191.3 ± 19.7	231.9 ± 46.1	144.8 ± 16.5	183.2 ± 38.8	1.4	0.281
	(144.8-237.8)	(122.9-340.9)	(105.8-183.8)	(91.5-275.0)		

* $p<0.05$ ** $p<0.01$ *** $p<0.001$