

ผลของการนวดหน้าโดยใช้ครีมนวดหน้า น้ำมัน และ สมุนไพร ต่อการเปลี่ยนแปลง ของคลื่นสมอง

EFFECTS OF HAND FACIAL MASSAGE WITH CREAM OIL AND HERB ON BRAINWAVE CHANGES

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สำนักวิชา เวชศาสตร์ชะลอวัยและฟื้นฟูสุขภาพ

มหาวิทยาลัยแม่ฟ้าหลวง

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บทคัดย่อ

การนวดหน้า เป็นหนึ่งวิธีการผ่อนคลายทั้งทางร่างกายและอารมณ์ซึ่งเป็นที่นิยมในปัจจุบัน โดยเฉพาะคนที่อาศัยในเมืองใหญ่ที่มีสังคมซับซ้อนและสภาพแวดล้อมไม่เป็นธรรมชาติ การนวดหน้า ไม่ได้ให้แค่การผ่อนคลายแต่ยังให้ผลในด้านความสวยงามอีกด้วย การวิจัยนี้ได้ศึกษาผลของการนวดหน้าที่มีต่อการเปลี่ยนแปลงของคลื่นสมองหลังการนวดหน้า โดยมีอาสาสมัครสุขภาพดีเข้าร่วม 28 คน โดยทุกคนจะได้รับการนวดหน้า 4 ครั้งด้วยสารหล่อลื่นที่ต่างกัน คือ นวดหน้าด้วยมือเปล่า, นวดหน้าด้วยครีม, นวดหน้าด้วยน้ำมัน และนวดหน้าด้วยสมุนไพร ซึ่งในการทดลองนี้เลือกใช้สมุนไพรทานาคา อาสาสมัครจะเข้ารับการนวดหน้า 4 แบบดังกล่าวในลำดับแบบสุ่มและมีการเว้น 7 วันระหว่างการนวดแต่ละครั้ง ค่าคลื่นสมอง Electroencephalogram (EEG) จะถูกวัดเพื่อเก็บผลก่อนและหลังการนวดแต่ละครั้งและนำผลคลื่นสมองทั้ง 5 คลื่น เดลต้า ธีต้า อัลฟ่า เบต้า และแกมมา มาวิเคราะห์เชิงสถิติ ผลเปรียบเทียบทางสถิติ Paired T-test ภายในกลุ่มการนวด พบว่าค่าของคลื่นสมอง เดลต้า ธีต้า อัลฟ่า เบต้า และแกมมา ระหว่างก่อนและหลังการนวดไม่มีการเปลี่ยนแปลงอย่างมีนัยสำคัญทางสถิติ ยกเว้นคลื่นแกมมาในการนวดหน้าด้วยสมุนไพรซึ่งผลลดลงอย่างมีนัยสำคัญ ทั้งนี้คลื่นแกมมาเป็นคลื่นที่ค้นพบหลังสุดและยังไม่ได้มีการสรุปแน่ชัดว่าเกี่ยวข้องกับการทำงานของสมอง แกมมานั้นถูกตรวจพบในการวิจัยหลายงานทั้งในขณะตื่น และขณะหลับ และสาเหตุการเกิดและกลไกการทำงานของคลื่นแกมมานั้นยังเป็นที่ถกเถียงกันและเป็นเรื่องที่ยังไม่ได้คำตอบแน่ชัด ในปัจจุบันเป็นที่เชื่อกันว่าคลื่นแกมมาเกี่ยวข้องกับการหยั่งรู้อย่างละเอียดซับซ้อนและเกิดขึ้นในขณะมีสติ

ส่วนผลการเปรียบเทียบทางสถิติระหว่างกลุ่ม พบว่าค่าของคลื่นสมองหลังการนวดทั้ง 5 คลื่น ไม่มีการแตกต่างกันอย่างมีนัยสำคัญทางสถิติระหว่างทั้ง 4 กลุ่มการนวด การศึกษาในครั้งนี้บ่งชี้ได้ว่า ไม่พบการเปลี่ยนแปลงอย่างมีนัยสำคัญของคลื่นสมองหลังการนวดหน้าทั้ง 4 แบบ

คำสำคัญ: การนวดหน้า/คลื่นสมอง/EEG/นวดหน้าแบบยุโรป/นวดหน้าด้วยครีม/นวดหน้าด้วยน้ำมัน/นวดหน้าด้วยทานาคา

Abstract

Facial massage is one of the popular treatments that people nowadays use for relaxation as well as beauty benefit especially for those who live in big cities that have complex social and unnatural environment. This study was investigated the effect of Facial massage with different lubricants on the Brainwave changes which experimentally measured in 28 healthy volunteers randomly recruited in Bangkok. Each participant was asked to be treated with 4 Facial massages, by Hand, Cream, Oil and Herb, with 1-week intervention between treatments. Electroencephalogram (EEG) was recorded at before and after of each treatment. The results showed that the Paired T-test comparison between pre-massage and post-massage within group of all 4 facial massages treatments were statistically non-significant for Delta, Theta, Alpha, Beta except for Gamma waves in Herb group ($p=0.03$) which is statistically significant reduction. However, it is not yet concluded about the relation of Gamma wave and brain functions. Research into this theory is still ongoing. Gamma rhythms are commonly observed in many brain regions during both waking and sleep states, yet their functions and mechanisms remain a matter of debate. Though further investigation is yet to be completed, the theory points to an interesting possibility that gamma waves are involved in self-awareness. Some researches concluded that the pattern of gamma wave activity is strongly related to the presence or absence of large amplitude slow waves and is quite independent of state of behavioral arousal.

As well as the results of post-massage comparison between groups, for all 5 brainwaves were also statistically non-significant. This study indicated that there was no obvious change of individual brainwave frequency effected by facial massage that can be observed after the facial massage treatment.

Keywords: Facial Massage/Brainwave/EEG/Hand Facial massage/Facial massage with cream/Facial massage with Oil/Facial massage with Tanaka

Introduction

Nowadays, rapid changes on environments, societies and economies effect on our behaviors and our ways of living. Stress is another factor that increased by this complex changes and can happen to everyone, especially people who lives in cities today. Although, in some ways, stress can be useful as a power to push ourselves to achieve the goals but too much stress can be harmful to health physically and mentally in a long run e.g. heart disease, vascular system or immune system deficiencies, hormonal imbalance etc. However, stress can be controlled by a certain methods or therapies such as exercises, relaxation, meditation as well as massage.

According to report from Department of Mental Health of Thailand (DMH), 2014, indicated that more than 450 million people suffer from mental disorders all over the world. In Thailand, there were 1.4 Million mental disorder patients as of year 2014 which stem from many causes and one of the causes is the fast changing societies and environments. Mental health problems affect society as a whole, and not just a small, isolated segment. As long-term stress can lead to a mental disorder, therefore, DMH issued a “Manual of Stress Relief Revision October, 2012” for Thai people, and one of the relieving methods stated in the handbook is a Massage.

Facial massage becomes popular today because facial massage treatment helps slowing down the aging process, reduce wrinkle, brightening and firming skin. Facial massage helps stimulate blood circulation, peeling dead skin cells and strengthen facial muscles for face lifting. In addition, facial massaging together with cream, oil or lotion can give better result because substances and vitamins in the cream are absorbed into skin better than normal cream applying. Also, cream, lotion or oil and herb help reducing rubbing on the skin during massaging. In addition, facial massage not only gives a beauty effect on a client but can probably also gives psychological benefits especially relaxation, relieving stress, anxiety, migraine and headache.

In traditional way, the mean to quantify the psychological status for example mood or stress, is based on physiological signals and body language techniques. Some methods like hormone analysis have a drawback of invasive procedure and cannot measure variety psychological statuses in a single test. Brainwave is another mean to measure psychological state directly from the signal from the brain with Electroencephalography (EEG) technique, which is non-invasive procedure and multi-dimension of psychological aspects results interpreted by 5 known brainwave bands so far.

There're numbers of researches and studies about body massage that brings many psychological and physiological because body massage treats large muscles on the whole body. In case of facial massage, much small evidences have been reported that facial massage can enhance relaxation just as well as body massage. To date, only few studies have reported the change in psychological parameters and electroencephalogram (EEG) data following aesthetic facial massage. They observed higher subjective scores in both general deactivation and deactivation-sleep factors, significant reduction of anxiety, and a marked attenuation of Alpha wave accompanied by a small increase in Theta wave during massage, an effect which they attributed to sleep induction by facial massage. Therefore, facial massage might have positive effects no only on beauty, but also on psychological status or cerebral activity.

In a study by Jodo and colleagues (1988), the first study that investigated on a relationship between Facial massage and the Brainwave (but Delta and Gamma waves were excluded), a daily 20-minute facial massage, seemed to produce greater physiological homeostasis including a greater sense of perceived relaxation compared to controls. There also have been many claims that massage influences biochemical reactions (hormones and enzymes) within the body as well as changes to peripheral body tissues.

This study aims to identify the instantaneous effect of facial massage on the brainwave change by means of Electroencephalogram or EEG in order to investigate the change of the Delta, Theta, Alpha, Beta and Gamma waves after receiving 20-minute esthetic hand facial massage.

Objective

To compare the effects of hand facial massages with cream oil and herb on brainwave change

Scope of research

Research studies on group of 28 volunteers, were in Bangkok, that were healthy, age between 25-50 years, all genders. All 28 volunteers were receiving facial massage by hand with cream oil and herb. Each of the participant will receive 4 different facial massage sessions, those were by hand, by hand with cream, with oil and with herb in randomized sequence, 1 session per week. Electroencephalogram (EEG) was recorded at before and after of each treatment. The data were analyzed and presented into 2 parts: demographic data which have gender, age, height and occupation. And statistical analysis result of the brain wave comparisons within groups and between groups of 4 different treatments. Period of the research was during January 2016 to May 2016

Literature Review

A study that investigated the effect of facial massage on Brainwave in 1988 [Eiichi Jodo, Yoshiaki Yamada, 1988] that conducted with 24 subjects, female undergraduate students age between 19-21 years old those received 4 days of facial massage sessions and the EEG was recorded before and after the treatments as well as anxiety STAI score by questionnaire and behavioral observations before, during and after the treatment. This study considered Theta, Alpha and Beta waves (not Delta and Gamma). The results found that Theta wave was slightly increased after receiving 20-minute facial massage while Alpha and Beta decreased obviously. There were no significant differences observed among groups in the Theta and Beta bands while marginally significance among group in the Alpha band. This study said that Facial massage is seen to produce state of rest. However, the EEG comparison results tended to become not significant, the changes in the EEG record cannot be considered as unique to facial massage.

Another study that inspected the effect of massage therapy on EEG pattern together with anxiety reduction and math computation ability [Tiffany Field, Gail Robinson, Frank Scafidi, 1996]. The subjects of this research those were 50 medical faculty members, male and female,

average age 26 were asked to have massage therapy while sitting on a special chair by professional massage therapists for 15 minutes with the EEG cap positioned on the subject's head while massaging to record Delta, Theta, Alpha and Beta waves. The Brainwave result revealed that Delta wave increased during the massage session (Pre: 4.29 ± 0.93 , Dur: 4.55 ± 1.14 , $F=6.32$, $p=0.004$), suggesting enhanced relaxation. Theta decreased for the massage group from pre- to During massage (Pre: 3.02 ± 1.38 , Dur: 2.71 ± 1.1). Alpha decreased for the massage group from pre- to During massage with significant difference (Pre: 5.5 ± 1.58 , Dur: 4.64 ± 1.3 , $F=6.51$, $p=0.003$). And Beta also decreased for the massage group from pre- to During massage with significant difference (Pre: 1.71 ± 1.81 , Dur: 1.45 ± 2.14 , $F=8.23$, $p=0.001$). Anyway, this study studied on "body massage" not facial massage and evaluated the EEG data "during" the body massage not after.

Research design

Research design was clinical trials to participate in experimental, randomized study to determine the effect of facial massage by hand with cream, oil and herb on brainwave changes in normal people. 28 healthy volunteers randomly enrolled. All the participants were randomly assigned to different sequences of 4 facial massage treatments. Each participant was asked to be treated with 4 Facial massages, by Hand, Cream, Oil and Herb in sequence as per assigned prior, with 1-week intervention between treatments. Before each facial massage treatment starts, participant was asked to lay on the treatment bed with eyes closed and 5-minute of EEG data were recorded. And after the 20-minute facial massage is finished, another 5-minute EEG data were recorded while the participant was lying on the bed in the same posture all along the experiment session. All patients provided written informed consent prior to beginning of experiment.

Results

The data were analyzed and presented into 2 parts: demographic data which have gender, age, height and occupation. And statistical analysis result of the brain wave comparison within groups and between groups of 4 treatments.

- Hand facial massage without lubricant (Hand group)
- Hand facial massage with cream (Cream group)
- Hand facial massage with oil (Oil group)
- Hand facial massage with herb (Herb group)

Demographic data analysis

The participants of this study consisted of 21 females (75%) and 7 males (25%). The age of the 28 participants in this study was classified into ranges of: 20-29 years = 17, 30-39 years = 8, 40-50 years = 3. The average age \pm SD was 28.79 (± 6.35 years). Most of the occupations of participant were office employee, which represents 67.86%. While student took 25% of all participants. And business owner and maid have small proportion, with 3.57% each.

	Participants (n =28)	Percentage
Gender		
Male	7	25%
Female	21	75%
Age		
20 – 29	17	60.71%
30 – 39	8	28.57%
40 – 50	3	10.71%
$\bar{X} \pm SD$	28.79 \pm 6.35	
Occupation		
Student	7	25%
Office employee	19	67.86%
Business Owner	1	3.57%
Maid	1	3.57%

Table 4.1 General demographic statistical data

4.2 Analysis results of Brainwave comparison between pre- and post- facial massage treatments (within group)

Brainwave Bands	Pre-Massage		Post-Massage		t	df	p-value
	Mean	SD	Mean	SD			
Delta	0.0725	0.0546	0.0566	0.0436	1.30	27	0.20
Theta	0.0169	0.0103	0.0140	0.0075	1.47	27	0.15
Alpha	0.0048	0.0023	0.0046	0.0016	0.47	27	0.64
Beta	0.0030	0.0016	0.0027	0.0008	0.91	27	0.37
Gamma	0.0013	0.0015	0.0010	0.0006	0.86	27	0.40

Table 4.2 Brainwave difference pre- and post- facial massage by hand without lubricant (n = 28)

The statistical within group comparison result between pre- and post-treatment of Hand group in table 4.2, derived by Paired T-Test method, showed non-significant differences ($p > 0.05$) for all 5 brainwave bands. Delta, Theta, Alpha Beta and Gamma average powers over 5-minute after facial massage were all decreased compared to what measured before treatment with p-value 0.2, 0.15, 0.64, 0.37 and 0.40 respectively.

Brainwave Bands	Pre-Massage		Post-Massage		t	df	p-value
	Mean	SD	Mean	SD			
Delta	0.0649	0.0426	0.0609	0.0491	0.50	27	0.62
Theta	0.0173	0.0105	0.0151	0.0111	1.19	27	0.25
Alpha	0.0049	0.0024	0.0048	0.0024	0.20	27	0.85
Beta	0.0034	0.0025	0.0030	0.0017	0.87	27	0.39
Gamma	0.0013	0.0010	0.0011	0.0010	1.08	27	0.29

Table 4.3 Brainwave difference pre- and post- facial massage by hand with Cream (n = 28)

Brainwave Bands	Pre-Massage		Post-Massage		t	df	p-value
	Mean	SD	Mean	SD			
Delta	0.0596	0.0413	0.0620	0.0409	-0.39	27	0.70
Theta	0.0165	0.0127	0.0151	0.0088	0.81	27	0.43
Alpha	0.0045	0.0026	0.0045	0.0017	0.00	27	1.00
Beta	0.0030	0.0019	0.0029	0.0015	0.12	27	0.91
Gamma	0.0011	0.0009	0.0011	0.0008	0.12	27	0.90

Table 4.4 Brainwave difference pre- and post- facial massage by hand with Oil (n = 28)

Similar to the hand group, the statistical within group comparison result between pre- and post-treatment of Hand group in table 4.3 and 4.4 showed non-significant differences ($p > 0.05$) for all 5 brainwave bands. For cream group, average powers of all 5 brainwave bands were all decreased. But for oil group, average powers Delta wave was slightly increased while Alpha and Gamma average powers were stable. Anyway, all the differences were statistically non-significant

Brainwave Bands	Pre-Massage		Post-Massage		t	df	p-value
	Mean	SD	Mean	SD			
Delta	0.0637	0.0371	0.0510	0.0345	1.80	27	0.08
Theta	0.0164	0.0105	0.0146	0.0082	1.18	27	0.25
Alpha	0.0042	0.0027	0.0043	0.0016	-0.12	27	0.91
Beta	0.0026	0.0017	0.0025	0.0011	0.83	27	0.41
Gamma	0.0010	0.0011	0.0008	0.0007	2.24	27	0.03 *

Table 4.5 Brainwave difference pre- and post- facial massage by hand with Herb (n = 28)

For herb group, the statistical result showed non-significant difference within group of Delta, Theta, Alpha, Beta waves between pre- and post-treatment with p-value 0.08, 0.25, 0.91 and 0.41 respectively. Except for Gamma wave, which $p = 0.03$, that the result showed significantly difference between pre- and post-treatment at the 0.05 level.

4.3 Comparison analysis of Brainwave post-massage among 4 treatment groups

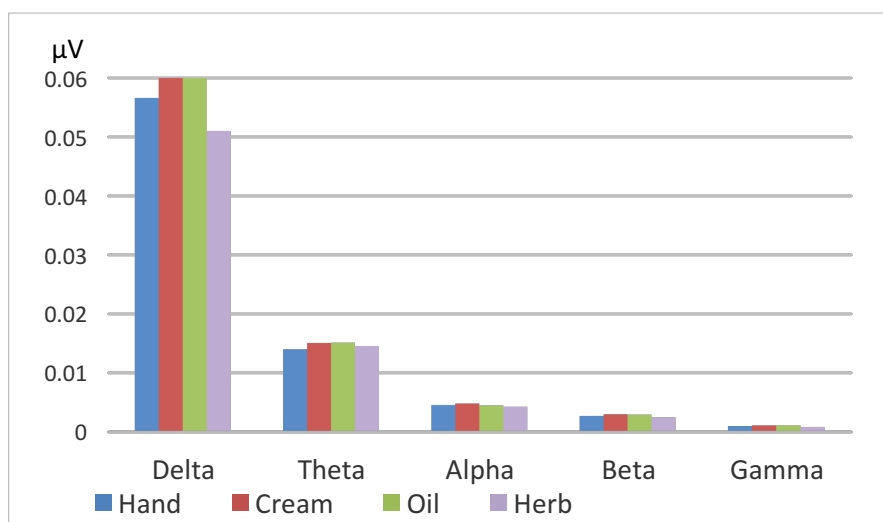


Fig 4.5 Average Brainwaves power comparison between groups of post- facial massage treatments

Brainwave Bands	Hand		Cream		Oil		Herb		F	p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Delta	0.0566	0.0436	0.0609	0.0491	0.0620	0.0409	0.0510	0.0345	0.39	0.76
Theta	0.0140	0.0075	0.0151	0.0111	0.0151	0.0088	0.0146	0.0082	0.10	0.96
Alpha	0.0046	0.0016	0.0048	0.0024	0.0045	0.0017	0.0043	0.0016	0.42	0.74
Beta	0.0027	0.0008	0.0030	0.0017	0.0029	0.0015	0.0025	0.0011	0.91	0.44
Gamma	0.0010	0.0006	0.0011	0.0010	0.0011	0.0008	0.0008	0.0007	0.76	0.52

Table 4.6 Brainwave bands post- facial massage treatment comparison among 4 treatments (ANOVA)

Post-Massage Comparison of Delta wave: The result of statistic comparison of average post-massage Delta wave between hand group 0.0566 ± 0.0436 and cream group 0.0609 ± 0.0491 was non-statistical significant difference ($p = 0.98$), between hand group 0.0566 ± 0.0436 and Oil group 0.062 ± 0.0409 was non-statistical significant difference ($p = 0.96$), between hand group 0.0566 ± 0.0436 and Herb group 0.051 ± 0.0345 was non-statistical significant difference ($p = 0.96$), between cream group 0.0609 ± 0.0491 and Oil group 0.062 ± 0.0409 was non-statistical significant difference ($p = 1.0$), between cream group 0.0609 ± 0.0491 and herb group 0.051 ± 0.0345 was non-statistical significant difference ($p = 0.82$), between oil group 0.062 ± 0.0409 and herb group 0.051 ± 0.0345 was non-statistical significant difference ($p = 0.76$).

Post-Massage Comparison of Theta wave: The result of statistic comparison of average post-massage Theta wave between hand group 0.014 ± 0.0075 and cream group 0.0151 ± 0.0111 was non-statistical significant difference ($p = 0.97$), between hand group 0.014 ± 0.0075 and oil group 0.0151 ± 0.0088 was non-statistical significant difference ($p = 0.97$), between hand group 0.014 ± 0.0075 and herb group 0.0146 ± 0.0082 was non-statistical significant difference ($p = 1.0$), between groups cream group 0.0151 ± 0.0111 and oil group 0.0151 ± 0.0088 was non-statistical significant difference ($p = 1.0$), between cream group 0.0151 ± 0.0111 and herb group 0.0146 ± 0.0082 was non-statistical significant difference ($p = 1.0$), between oil group 0.0151 ± 0.0088 and herb group 0.0146 ± 0.0082 was non-statistical significant difference ($p = 1.0$).

Post-Massage Comparison of Alpha wave: The comparison result of average post-massage Alpha wave between hand 0.0046 ± 0.0016 and cream group 0.0048 ± 0.0024 was non-statistical significant difference ($p = 0.96$), between hand 0.0046 ± 0.0016 and oil group 0.0045 ± 0.0017 was non-statistical significant difference ($p = 1.0$), between hand 0.0046 ± 0.0016 and herb group 0.0043 ± 0.0016 was non-statistical significant difference ($p = 0.93$), between cream group 0.0048 ± 0.0024 and oil group 0.0045 ± 0.0017 was non-statistical significant difference ($p = 0.91$), between cream group 0.0048 ± 0.0024 and herb group 0.0043 ± 0.0016 was non-statistical significant difference ($p = 0.68$), between oil 0.0045 ± 0.0017 and herb group 0.0043 ± 0.0016 was non-statistical significant difference ($p = 0.97$).

Post-Massage Comparison of Beta wave: The comparison results of average post-massage Beta wave between hand group 0.0027 ± 0.0008 and cream group 0.003 ± 0.0017 was non-statistical significant difference ($p = 0.86$), between hand group 0.0027 ± 0.0008 and oil group 0.0029 ± 0.0015 was non-statistical significant difference ($p = 0.92$), between hand group

0.0027±0.0008 and herb 0.0025±0.0011 was non-statistical significant difference ($p= 0.9$), between cream group 0.003±0.0017 and oil group 0.0029±0.0015 was non-statistical significant difference ($p= 1.0$), between cream group 0.003±0.0017 and herb group 0.0025±0.0011 was non-statistical significant difference ($p= 0.45$), between oil group 0.0029±0.0015 and herb group 0.0025±0.0011 was non-statistical significant difference ($p= 0.55$).

Post-Massage Comparison of Gamma wave: The comparison results of average post-massage Gamma wave between hand group 0.001±0.0006 and cream group 0.0011±0.0010 was non-statistical significant difference ($p= 0.95$), between hand group 0.001±0.0006 and oil group 0.0011±0.0008 was non-statistical significant difference ($p= 0.95$), between hand group 0.001±0.0006 and herb group 0.0008±0.0007 was non-statistical significant difference ($p= 0.87$), between cream group 0.0011±0.001 and oil group 0.0011±0.0008 was non-statistical significant difference ($p= 1.0$), between cream group 0.0011±0.001 and herb group 0.0008±0.0007 was non-statistical significant difference ($p= 0.57$), between oil group 0.0011±0.0008 and herb group 0.0008±0.0007 was non-statistical significant difference ($p= 0.56$).

Conclusions and Discussion

The statistical result shows non-significant differences within group of all 5 brainwave bands, Delta, Theta, Alpha, Beta and Gamma waves, between pre- and post-treatment of Hand group. Similarly, the statistical result also shows non-significant differences within group between pre- and post-treatment of Cream group and Oil group for all 5 brainwave bands. For Herb group, the statistical result shows non-significant difference with in group of Delta, Theta, Alpha, Beta waves between pre- and post-treatment except for Gamma wave, that the result shows significantly difference between pre- and post-treatment at the 0.05 level.

The result of statistic comparison between groups shows that: Average post-massage Delta waves power between groups of Hand 0.0566±0.0436, Cream 0.0609±0.0491, Oil 0.0620±0.0409 and Herb 0.0510±0.0345 was non-statistical significant difference at 0.05 level ($p = 0.76$). Average post-massage Theta waves power between groups of Hand 0.0140±0.0075, Cream 0.0151±0.0111, Oil 0.0151±0.0088 and Herb 0.0146±0.0082 was non-statistical significant difference at 0.05 level ($p = 0.96$). Average post-massage Alpha wave power between groups of Hand 0.0046±0.0016, Cream 0.0048±0.0024, Oil 0.0045±0.0017 and Herb 0.0043±0.0016 was non-statistical significant difference at 0.05 level ($p = 0.74$). Average post-massage Beta wave power between groups of Hand 0.0027±0.0008, Cream 0.0030±0.007, Oil 0.0029±0.0015 and Herb 0.0025±0.0011 was non-statistical significant difference at 0.05 level ($p = 0.44$). And the average post-massage Gamma wave power between groups of Hand 0.0010±0.0006, Cream 0.0011±0.0010, Oil 0.0011±0.0008 and Herb 0.0008±0.0007 was non-statistical significant difference at 0.05 level ($p = 0.52$).

Regarding to this study hypothesis is that “Effect of Facial massages on Brainwave changes”. After the completion of our research, which studied on 4 Facial massages; by hand with

cream, oil, herb and without lubricant, it was found that the results of pre-massage and post-massage comparison within group of all 4 facial massages treatments for Delta, Theta, Alpha, Beta and Gamma waves were not significant different. (Except Gamma wave for Herb massage that was statistically significant, $p=0.03$). As well as the results of post-massage treatment comparison between the groups for all 5 brainwaves were also statistically non-significant. This maybe because all participants were aware that they're in the experimental research and wore a special tool on their heads during brainwave measurement, so that they were nervous or excited. Besides, maybe the duration of facial massage program was too short with only 20 minutes. Whereas in some previous researches, they used longer massage duration such as 30-minute duration [Visarut, 2012] and 40-minute [Jin-ji Wu, 2014])

When comparing between post-massage and pre-massage, Brainwaves power, Delta, Theta, Alpha, Beta and Gamma waves power were mostly decreased or stable. Same behavior has been reported in prior research [Tiffany Field, 1996] that Delta, Theta, Alpha and Beta waves were attenuated after chair massage. Similarly, in another research with Hand massage therapy [Miguel A. Diego, 2004], also reported with decreased power of Delta, Theta, Alpha and Beta waves after the massage treatments. However, Tiffany's research [1996] concluded that Delta wave increases during Chair massage treatment, which is different from this study. But the post-massage brainwaves gave decreased values which supported with this study. And in Miguel's research [2004], indicated that for moderate massage, Delta wave increased during massage treatment, which is different from this research. However, if considering on only Post-massage, Delta, Alpha and Beta also decreased. Moreover, for light massage, Delta, Theta, Alpha and Beta waves all attenuated for both During-treatment and Post-treatment, which is aligned with this study. Noted that this referred 2 studies did not include "Gamma wave"

Recommendations

A longer period of facial massage treatment should be applied for more distinct Brainwave change measurement. Other styles or modification of facial massage techniques such as Eastern-style facial massage could give a different results of Brainwave change. Lastly, a modified study similarly to this research should include stress level effected by facial massage such as Salivary cortisol level or Stress test.

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