Comparative Study of Brain Wave in Foot Massage by Hand and by Machine

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Abstracts

The present study is a quasi-experimental study utilizing the two group pre-and post-tests in order to compare the relaxation effects of foot massages by hand and by Machine on Brainwaves since Massages Can reduce stress and have good effects on people's bodies Objectives: To investigate the effects of foot massages by hand and by Machine on brainwaves; and to compare the brainwaves before, during and after the foot Massages by hand and by Machine. Methods: The samples were 40 healthy men and women aged 30-50 years old. They were divided into two groups (1) foot Massage by hand group (n=20) and (2) foot Massage by Machine group (n=20). The samples in both groups received the foot massage for 30 minutes. Their stresses were massages before and after the experiment with the Thai Stress Test (TST). Their brainwaves were individually massage with the electroencephalogram (EEG) from the beginning to the 5^{th} minute. and from The 25^{th} to 30^{th} minute. The measurement results were analyzed in order to calculate means and standard deviations as well as compared by using the paired t-test

Results: (1). After the of experiment, the mean of the stress levels of the samples in the foot massage by hand group were significantly decreased at the significance level of 0.05 (P=0.01). Their positive feelings were significantly-increased at the significance level of 0.05 (P=0.01). Their negative feelings were significantly reduced at the significance level of 0.05 (P=0.018). The mean of the stress levels of the samples in the foot massage by hand group were significantly decreased at the significance level of 0.05 (P=0.60). Their positive feelings were significantly-increased at the significance level of 0.05 (P=0.60). Their positive feelings were not significantly changed at the significance level of 0.05, While negative feelings were not significantly changed at the significance level of 0.05 (p=0,048). (2) For the foot massage by hard group, The means of the low and high alpha brainwaves were Significantly changed at the significance level of 0.05 (p=0.001). The means of the delta (p=0.06). theta (p=0.38), law beta (P=0.74) and high beta brainwaves (P=0.10) were not significance changed at the significantly level of 0.05. For foot Massage by machine group the means of the low alpha (p=0.77), high alpha (p=0.19) delta (p=0.57), theta (p=0.17), low beta (p=0.92) and high ware not level of high beta (P=0.26) ware not significance changed at the significance level of 0.05

Conclusion: After receiving the foot massages by hand and by machine for 30 minutes, the mean of alpha brainwaves ware increased for the foot massage by hand, the mean of the lover alpha brainwaves was significantly changed at significance level of 0.05, While that after receiving the foot massage by machine was not significantly increased at by significantly level of 0.05 Therefore, the foot massage by hand could significantly relax the people's bodies at the significance level of 0.05.

Keywords: Brainwave; Foot Massage by Hand; Foot Massage by machine; stress

* Received: February 26, 2023; Revised: May 24, 2023; Accepted: May 30, 2023

Introduction

Medicine has been significantly developed Since the average lifespan of the world population is increased. Moreover, the people. one aware of taking care of their health. The anti-aging and regenerative Science has roles in applying relevant knowledge to taking care of people before they have deteriorating conditions and recovering them when their are old in order to result in their physical balances, good qualities of lives and long lifespan.

Thai massage has been applied to treating people with modern medicine (That Traditional Medicine Network, Sanchai, 2007:online). Spa and Thai massage businesses are very popular since these businesses can provide income for the cantry for 12,813 million bath a year.

Massage is one of the leading anti-aging sciences because it is not only a tool for reducing fatigue, but it also lowers stress.

It is good for people's health and minds because it helps their bodies release endorphin, which trigger, positive feelings. Stress can adversely affect the bodies and stimulate the production of free radicals, that can destroy tissues and organs and then lead to premature deteriorations. Every can be stressed However, the appropriate stress level can push a person to fight and achieve his/her goals.

If a person has excessively and continuously high and uncontrollable stress level, then it will adversely affect his / her physical systems such as immune, circulation and hormone systems Stress can be measured from brainwaves According to the theory of neo-humanism humans are different from machines because are the result of our preferences. while taking an action, a person's brain releases different- brainwaves according to his/her feelings.

Therefore, brainwaves are emphasized by this theory. Alpha or low brainwaves are beneficial for humans because our brain release high wide, sloe or calm brainwaves that Can balance the functions of both left and right brains.

As a result, our bodies are relaxed and the functions of our organs are optimized.

Accordingly, Massage is an effective way to relax our muscles. It is - similar to an elixir since it can boost our blood and lymphatic circulation system

that transfer nutrients and oxygen from red blood cells to tissues as will as improve our excretory system.

Literature Reviews By reviewing literatures

A number of research Studier considered the effects of foot massages on physical changes. Massage techniques and benefits were used for treating symptoms of muscles.

Moreover, Massages might affect the endocrine system that release hormones-functioning organ and indirectly lead to good health and long lifespan.

Heavy Massages cold affect the immune systems of people Who have to stay in their beds for a long time

If a person has high stress level, then the person will not be able to sleep tight because his/her brain still concerns over problems. Consequently, the brain can not generate be new brain cells and repair damaged brain cells. Moreover, the size of the brain will be reduced and the memory will also be deteriorated The person's movement skills will be worsen.

The person will feel pain his/her spine, hope bone arms and Legs .Thus, massage is a therapeutic science that is locally and internationally accepted.

Body, foot, face, aroma and acupressure massages have different objectives such as health improvement, relaxation and Treatment.

Nevertheless, the effects of foot Massages by hand and by Machine on brainwaves have never been studied and compared.

For body languages, reduce massage is a very interesting way to reduce stress. Hence, the researcher is interested in comparing the effects of foot massage by hand and by machine on brainwaves because the foot massage by hand is widely used and the foot Massage by machine is also popular among people.

These Massages are considered as the options for services' providers. and users.

Objectives" (1) To examine the effect of the foot massage by hand and by- machine on brainwaves and, (2). To compare the brainwaves before and after the foot massages. by hand and by machine.

Research Methods

(3.1) Population and Samples The samples were healthy persons who volunteered for participation in the present study. They were deviled into two groups. Each group consisted of 20 samples. The total number of the samples was 40. The first group received the foot massage by hand, While the second group received the foot Massage by machine.

(3.2) Instruments

3.2.1 The Thai Stress Test (TST) (Phattharayuttawat, S., 2000) is a test that measures the stress levels of people. It uses three Likert Scales: (1) has never felt stressed (2) Occasionally feel stressed, and (3) frequently feel stressed.

The Test has question items that can be decided into two parts 1). item 1-12 are about negative feeling and, 2) items 13-24 are about positive Feelings.

3.2.2. Mobile Electro encephalogram (EEG)

3.2.3 . Foot massager (Power Supply: 33W, voltage: 220-240V, operating speed: 20-45 RPM, Dimension: L51.5 X 631.0 X H 37.5 CM BOX: L58.0x B46.0 x H 40.0 CM, Net weight: 12.0kg Weight: 15.0kg)

3.2.4 Massage Positions: 50 (Thai Traditional Medicine college RMUTT)

3.3 DATA Collection

The samples brainwaves were measured by the researcher with the Mobile Electroencephalogram EEG". The Massagers were persons Who have been trained for 330 hours. The data that were recorded in forms and computers by the researcher were as follows

(a) the samples' baseline characteristic data,

(b) positive and negative stress before and after the massages, and,

(c) brain waves before and after the massages. Brainwaves were assured while the samples were receiving the foot massages at the 25^{th} to 30^{th} minute.

3.4 Data Analysis

The collected data were analyzed with a Statistical Software package.

Results

Table 1 The Samples Baseline Characteristic Data

Foot Massage by		
Variable		
	Hand	**Machine**
Gender: N(%)	Number (Percentage)	Number (Percentage)
Male	8(40.00)	9(45.00)
Female	12 (60.00)	11 (55.00)
Average (Years)		
(±SD)	40.30±6.69	38.45±7.44
Congenital diseases): N(%)		
Yes	-	-
No	40 (100)	40 (100)
unknown	-	-

Foot Massage by		
Variable		
	Hand	**Machine**
A disorder(s) prohibited by the EEG N (%)		
Yes	-	-
No	40 (100)	40 (100)
Skin infection or a wound(s) of the foot (feet): N (%)		
Yes	-	-
No	40 (100)	40 (100)
Skin infection: N (%)		
Yes	-	-
No	40 (100)	40 (100)

Table 2 The Comparison of the Means ($\overline{X}$) of the Negative and Positive Stress Levels before and after the Foot Massages by Hand and by Machine

Group	**Before**		**After**		**d**	**S.D.**	**t**	***p***
	$\overline{X}$	S.D.	$\overline{X}$	S.D.				
Negative feelings								
Foot massages by hand	5.30	2.76	4.75	2.65	-11	0.39	1.396	0.18
Foot massages by machine	5.80	2.24	5.45	2.064	7	0.49	0.717	0.48
Positive feelings								
Foot massages	32.55	3.10	33.60	2.64	-21	0.38	2.761	0.01*

by hand								
Foot massages by machine	52.95	3.30	32.75	3.26	4	0.37	0.535	0.60

*p<.05

In Table 2, the negative stress level after the foot massage by hand was insignificantly lower than that before the foot massage at the significance level of .05, while the positive stress level after the foot massage was significantly increased at the significance level of .05. The negative stress level after the foot massage by machine was insignificantly lower than that before the foot massage at the significance level of .05, while the positive stress level after the foot massage was insignificantly increased at the significance level of .05.

Table 3 The Comparison of the Percentages of the Stress Levels before and after the Foot Massages by Hand and by Machine

Stress Level		Before (Hand) N%	After (Hand) N%	Before (Machine) N%	After (Machine) N%
Good	mental	2 .10	15	15	15
health		13.65	16.80	15.75	17.85
Normal	mental	5.25	3.15	4.20	2.10
Health	--	--	--	--	--
Low stress					
High stress					

According to Table 3, it was found that the percentage of the samples with good mental health (i.c. they were not stressed) after the foot massage by hand was 5 and that before the massage was 10. The percentage of the samples with normal mental health after the massage was 80 and that before the massage was 65. The percentage of the samples with low stress after the massage was 15 and that before the massage was 25. No sample with high stress was found in this group. For the massage by machine. the percentages of the samples with good mental health were 5 before and after the massage. The percentage of the samples with normal mental health after the massage was 85 and that before the massage was 75. The percentage of the samples with low stress after the massage was 10 and that before the massage was 20. No sample with high stress was found in this group.

Table 4 The Comparison of the Delta Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	**n**	$\overline{X}$	**S.D.**	**t**	***p***	**Interpretation**
by Hand from the Beginning to the 5th Minute	20	8.86	0.09	1.96	0.65	Not different
by Hand from the Beginning to the 25th to the 30th Minute	20	8.32	3.78			

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Machine from the Beginning to the 5th Minute	20	7.72	5.34	0.57	0.57	Not different
by Machine from the Beginning to the 25th to the 30 th Minute	20	8.25	6.80			

As demonstrated in Table 4. the delta brainwaves while receiving the foot massage by hand from the beginning to the 5th minute and that from the 25th to the 30th minute were not different after using the paired-sample t-test. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 8.32) was lower than that from the beginning to the 5th minute ($\overline{X}$ = 8.86). The delta brainwaves while receiving the foot massage by machine from the beginning to the 5th minute and that from the 25th to the 30th minute were not different. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 8.25) was higher than that from the beginning to the 5th minute ($\overline{X}$ = 7.72).

Table 5 The Comparison of the Theta Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	1.95	6.37	0.90	0.38	Not different
by Hand from the Beginning to the 25th to the 30 th Minute	20	1.86	5.65			
by Machine from the Beginning to the 5th Minute	20	1.81	1.01	1.44	0.17	Not different
by Machine from the Beginning to the 25th to the 30 th Minute	20	2.25	2.12			

According to Table 5, the theta brainwaves while receiving the foot massage by hand from the beginning to the 5 th minute and that from the 25 th to the 30 th minute were not different after using the paired-sample t-test. The mean of the brainwaves from the 25 th to the 30 th minute ($\overline{X}$ = 186) was lower than that from the beginning to the 5 th minute ($\overline{X}$ =1.95). The delta brainwaves while receiving the foot massage by machine from the beginning to the 5 th minute and that from the 25 th to the 30 th minute were not different. The mean of the brainwaves from the 25 th to the 30 th minute ($\overline{X}$ = 2.25) was higher than that from the beginning to the 5 th minute ($\overline{X}$ = 1.81).

Table 6 The Comparison of the Low Alpha Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	5.52	1.93	-2.84	0.01*	Not different
by Hand from the Beginning to the 25th to the 30th Minute	20	5.81	2.41			
by Machine from the Beginning to the 5th Minute	20	4.08	1.77	-0.29	0.77	Not different
by Machine from the Beginning to the 25th to the 30th Minute	20	6.39	8.41			

*p<0.01

As shown in Table 6, the low alpha brainwaves while receiving the foot massage by hand from the beginning to the 5th minute and that from the 25th to the 30th minute were different after using the paired-sample t-test. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 5.81) was higher than that from the beginning to the 5th minute ($\overline{X}$ = 5.52). The delta brainwaves while receiving the foot massage by machine from the beginning to the 5th minute and that from the 25th to the 30th minute were not different. The mean of the brainwaves from the 25th to the 30 minute ($\overline{X}$ = 6.39) was higher than that from the beginning to the 5th minute ($\overline{X}$ = 4.08)

Table 7 The Comparison of the Low Alpha Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	5.52	1.93	-2.84	0.78*	Not different
by Machine from the Beginning to the 5th Minute	20	4.08	1.77			
by Hand from the Beginning to the 25th to the 30th Minute	20	5.81	2.41	169	0.11	Not different
by Machine from the Beginning to the 25th to the 30th Minute	20	6.39	8.41			

in Table 7, the low alpha brainwaves while receiving the foot massages by hand and by machine from the beginning to the 5th minute were not different after using the paired-sample t- test. The mean ($\overline{X}$) of the brainwaves while receiving the foot massages by machine from the beginning to the 5th minute was 4.08, while that ($\overline{X}$) of the brainwaves while receiving the foot massages by hand in the same period of time was 5.52 The low alpha brainwaves while receiving the foot massages by hand and by machine from the 25 to the 30 minute were not different after using the paired-sample t-test. The mean ($\overline{X}$) of the brainwaves while receiving

the foot massages by machine from the beginning to the 5 th minute was 6.39, while that ($\overline{X}$) of the brainwaves while receiving the foot massages by hand in the same period of time was 5.81.

Table 8 The Comparison of the High Alpha Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	7.60	8.93	-0.03	0.01*	Not different
by Hand from the Beginning to the 25th to the 30th Minute	20	5.47	2.82			
by Machine from the Beginning to the 5th Minute	20	4.41	8.81	1.035	0.19	Not different
by Machine from the Beginning to the 25th to the 30th Minute	20	4.95	5.04			

*p<0.01

According to Table 8, the high alpha brainwaves while receiving the foot massage by hand from the beginning to the 5th minute and that from the 25th to the 30th minute were different after using the paired-sample t-test. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 5.47) was lower than that from the beginning to the 5th minute ($\overline{X}$ = 7.60). The delta brainwaves while receiving the foot massage by machine from the beginning to the 5th minute and that from the 25th to the 30th minute were not different. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 4.95) was higher than that from the beginning to the 5th minute ($\overline{X}$ = 4.41)

Table 9 The Comparison of the Low Beta Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	3.30	1.18	-0.34	0.74	Not different
by Hand from the Beginning to the 25th to the 30th Minute	20	3.52	9.67			
by Machine from the Beginning to the 5th Minute	20	3.01	1.18	0.97	0.92	Not different
by Machine from the Beginning to the 25th to the 30th Minute	20	3.25	1.40			

In Table 9, the low beta brainwaves while receiving the foot massage by hand from the beginning to the 5th minute and that from the 25th to the 30th minute were different after using the paired-sample t-test. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 3.52) was lower than that from the beginning to the 5th minute ($\overline{X}$ = 3.30). The delta brainwaves while receiving the foot massage by machine from the beginning to the 5th minute and that from the 25th to the 30th minute were not different. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 3.25) was higher than that from the beginning to the 5th minute ($\overline{X}$ = 3.01)

Table 10 The Comparison of the High Beta Brainwaves while Receiving the Foot Massage by Hand from the Beginning to the 5th Minute and from the 25th to the 30th Minute and the Foot Massage by Machine from the Beginning to the 5th Minute and from the 25th to the 30th Minute

Foot massages	n	$\overline{X}$	S.D.	t	*p*	Interpretation
by Hand from the Beginning to the 5th Minute	20	3.31	1.87	1.36	0.19	Not different
by Hand from the Beginning to the 25th to the 30th Minute	20	2.86	1.27			
by Machine from the Beginning to the 5th Minute	20	2.88	1.89	-1.165	0.26	Not different
by Machine from the Beginning to the 25th to the 30th Minute	20	4.56	6.49			

As demonstrated in Table 10, brainwaves the high beta While receiving the foot massage by hand from the beginning to the 5th minute and that from were not the 25th minute to the 30th minute different after wing the paired-sample t-test

The mean of the brainwaves from the 25th to than the 30th minute ($\overline{X}$ = 2.86) was lower than that from the beginning to 5th minute ($\overline{X}$ = 3.31).

The delta brainwaves while receiving the foot massage by machine from beginning to the 5th minute and that 5th to from the 25th the 30th minute were not different. The mean of the brainwaves from the 25th to the 30th minute ($\overline{X}$ = 4.56) was higher than that from the beginning minute ($\overline{X}$ = 2.88).

Discussion

By testing the hypothesis about the brainwaves, it could be discussed that the foot massage by hand had better relaxation effects on the brainwaves than that by machine.

The finding showed that the foot massage by hand group's stress levels were decreased, positive feelings were increased. and negative feelings were decreased.

After the experimenting the feet massage by hand was found that the foot massage was a way to relieve stress This was consistent with Pender (1987), who reported that stress relief is good for the autonomic System and reduce hormone production.

After comparing the different types of the brainwaves during the foot massages by hand and by machine, It was found that the delta brainwaves that related to sleep, problem solving and, unconscious mind were decreased from the beginning to the 5 minute and from the 25th

to 30th minute. Possibly, this war because the samples" bodies were not highly relaxed. These findings were supported by Sangkhanan, P. (2012), who mentored that delta brainwaves can be numerously fond if our bodies are highly relaxed; for example, sleeping tight without dreaming.

The theta brainwaves that relate to memories, inspiration and Creative thinking are the brainwaves that reflect the - functions of our subconscious and peaceful minds.

These brain waver are commonly found. While we were sleeping. However, the brainwaves can be found while we not sleeping.

While receiving the foot massages, the samples' theta brainwaves were levered from the beginning to the 5^{th} minute and from the 25^{th} to 30^{th} minute.

A plausible reason was that the bodies were not highly relaxed.

There findings were consistent with Sangkhanan, P. (2012), who mentioned that theta brainwaves are generally found while our bodies are relaxed.

The alpha brainwaves associate with relaxation.

There brainwaves are found in the samples who felt relaxed and leisurely.

The brainwaves were increased during the foot Massage by hand from the beginning the 5^{th} minute and from the 25^{th} to 30^{th} minute.

This confirmed to the first hypothesis predicting that the foot massage by hand can relax the samples' bodies as well as on article,…

“Alpha Brain Wares, Brain Ware to Increase the Power of Mind” and Sankharan, P. (2012), who explained that alpha brainwaves can normally be found while our muscles or bodies one relaxed.

This is because while our brains are functioning, the parietal robe of cerebrum releases acetylcholine, which associates our memories and learning process as well as stimulator and inhibits the functions of our muscles and then Lead to mental balance.

There findings also comply with Pender (1987), who elaborated that stress relief is good for the automatic nervous system, reduces hormone production and increaves alpha brainwaves in on brain.

While the receiving the foot massage by machine from the beginning to the 5^{th} minute and from the 25^{th} to 30^{th} minute, the brainwaves during those two periods of time were not different.

Possibly, the samples might felt uncomfortable while they are being massaged.

These findings were supported by a study of Miguel A. diego, who examined the effects of three types of massages: light, moderate and vibration massager, on the brainwaves of 36 students of large urban medical school and fond that the light and vibration massage could increase the Students' awareness and street.

The beta brainwaves are the brainwaves that can be generally found when we are thoughtful Serious and/or confused. The brainwaves during both periods of time were not different, but the brainwaves were increased after receiving the Massages. Warmachot, J. (2010) explanted that by contouring the recorded brainwaves of children recessing massages, beta brainwaves were Increased. Nevertheless, this type of brainwaves might be the ones that could be easily fond. Thus, the charger of these branwares might not be significant.

Conclusion

The effects of the two types of foot massages: foot massages by hand and by machine, on stress relief were massaging the samples for 30 minutes was investigated.

It was found that the means the of the alpha brainwaves of the samples in the two groups were increased

The brainwaves of the samples receiving the foot massages by hand were Significantly changed at the statistical significance level of 0.05, while

While that of the samples receiving the foot massages by machine were not significantly changed at the statistical significance level of 0.05. Therefore, the foot massages by hand affected the samples' nervous systems including the s Central and automatic nervous systems.

In other words, the massage helped those systems exercises. The Massage is considered as a nonverbal form of communication of human. This type of massage influenced the central nervous system by making the samples significantly felt happy and relaxed at the statistical significant love of 0,05.

The massaging devices could also relax the sampler bodies, but the effects of the- devices were not significant at the statistical significance level of 0.05.

This may be an option in case that there is no massager.

Suggestion

Since the effects of the foot massages by hand and by machine on the brainwaves or stress relief were examined by the researcher the following Suggestion are provided for further study including:

(1). The types of massager should be increased
(2). The residual effects of The massages should be examined.,
(3). Different periods while receiving the massages should be investigated, and
(4). The effects of the pressures of the massager should be studied.

Acknowledgement

We would like to express our sincere appreciation to the staff of Thai school of Anti-Aging and Regenerative Medicine for the professionalism in handling the work.

In particular, our sincere gratitude extends to all my colleagues and others who have provided helpful opinions and suggestions at various occasions.

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