

Electroencephalographic study of auditory system while listening to Ohm chanting



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ABSTRACT

Background: World Health Organization defined that we must have Physical, Mental, Social and Spiritual Well-Being. The methods of building a healthy body and develop a strong immune are food, exercising, walking, running, yoga, swimming, Tai Shi Shuan and all types of sports. In spiritual well-being, the implementations are practice the dharma, compassionate prayer and meditation. These will make our mental status always in good state, greed, anger and infatuation will be decreased. **Aims and Objective:** This study aimed to investigate the effect of listening to Om chanting on human brain waves. **Materials and Methods:** The samples were twelve healthy Thai citizens with the age ranged between twenty-five and sixty years old. All participants listened to Ohm chanting for thirty minutes, with rest time in between. During the experiment, the participants were asked to open their eyes. In addition, their brain wave activities were recorded before, during and after listening to the Ohm chanting by the Electroencephalogram (EEG) at precise intervals. All data were tabulated to find mean and standard deviation. The changes in brain waves and subjective changes were also compared by applying paired t-test. People listening to Ohm chanting had subjective changes through electroencephalographic (EEG) fluctuations. **Results:** The exposed participants displayed statistically significant increases in delta and theta brainwaves at 0.05 after listening to Ohm chanting. This study revealed that participants were trained with the listening to Ohm chanting causing probably the stress level went down. There was an increase in delta and theta brainwaves while listening to Ohm chanting. **Conclusion:** The result might be nominated for health promotion to be used in conjunction with conventional medicine.

Key words: Brain; Brain waves; Listening; Ohm chanting

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INTRODUCTION

In order to have good health, World Health Organization defined that you must have Physical, Mental, Social and Spiritual Well-Being.¹ In terms of physical wellbeing, methods of building a healthy body and develop a strong immune are food, exercising, walking, running, yoga, swimming, Tai Shi Shuan and all types of sports. In terms of spiritual well-being, the implementations are practice the dharma, compassionate prayer and meditation. These will make our mental status always in good state, greed, anger and infatuation will be

decreased. Be able to accept the changes, adapting with all conditions and prepared when the time of life has ended. Relaxation methods could help enter the Alpha state easily by several steps including (a) alpha brainwave music, (b) close the eyes, (c) take a deep breath, slowly, fills the lung with the air, (d) relax the whole body and finally, and (e) living close to nature or imagine it.¹⁻³ Prayer is one of the spiritual development activities in religious since the ancient times. Prayer can make us feel relaxed easily. Many researches of modern medicine show that chanting help generate happiness, satisfaction in life, good mental status and solve life problems.

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Recently, several physicians have tried to find new ways of treatment by focusing on body and mind in order to make the balance both on body and mind. In science consciousness way; the brain and nervous system is operated by electrical signal and balance the functions of all the parts of the body. By Activating the nervous system too much could cause the dangerous to the brain mechanism.⁴⁻⁷ Therefore, both body and mind relaxation would make the autonomic nervous system works regularly. In addition, the neo-humanist indicated that human is different from machine because sometimes we do something that come from happiness and love, while doing something the brainwaves were sent from our brain. The brainwaves are different depends on emotion, feeling, sadness and happiness, respectively.⁸ Electroencephalography (EEG) is traditionally used to measure the brainwaves. Each type of brainwave is associated with one's state of consciousness and different mood state. The measurement of EEG activities of listening to chanting were done by the effectiveness of commercially available EEG devices, eego™mylab. The aim of this study was therefore to investigate the changes of human brainwaves to listening to Ohm chanting.

MATERIALS AND METHODS

Participants

The experiment was done with twelve volunteers, aged between 20-40 years old, who were in good health, no congenital illness, no record of brain surgery, not taking medicines or drugs that affect to nervous system. The protocol of this study was approved by the Ethical Committee of Mae Fah Luang University, Thailand.

Tools and equipment

Recording personal information, namely, age, gender, nationality and history of illness were recorded. The electroencephalography (EEG) was applied in this study. The neuroheadset was used to display the output, analyze and record EEG power spectrum. In this study, the effectiveness of commercially available electroencephalographic (EEG) device, eego™mylab (ANT Neuro, Hengelo, Natherlands), was applied. The eego™mylab is ideal for investigating all kinds of EEG paradigms. The eego™mylab is comes in four variants for recordings from 32 to 256 EEG channels. The number of channels can be easily increased by adding additional 64-channel amplifiers to the setup. Additionally, each of the 4 variants can be easily extended for simultaneous recordings with of up to 24 EMG channels or to a combination of EMG channels with a variety of physiological sensors from both the brain and body (Figure 1).

Statistical analysis

Analyzed the basic demographic data of volunteers by using descriptive analysis with qualitative data summarized

in term of frequency and percentage, with quantitative data summarized in term of average and standard deviation. Using inferential statistic compare each type of brainwaves both before and after listening to Ohm chanting by compared *t*-test. Every test was set to the statistic significant at $p < 0.05$.

RESULTS

Based on Table 1 and Figure 2, it was found that delta and theta brainwaves increased with statistically significant at the 0.05 level while alpha, beta, and gamma bands did not change. Delta brainwave increased after listening to Ohm chanting with statistically significant at the 0.05 level (before listening to Ohm chanting: $0.63 \pm 0.16 \mu V$; after listening to Ohm chanting: 1.49 ± 0.49 ; $p = 0.01$). Similar to delta brainwave, theta brainwave also increased after listening to Ohm chanting with statistically significant at the 0.05 level (before listening to Ohm chanting: $0.08 \pm 0.21 \mu V$; after listening to Ohm chanting: 1.45 ± 0.73 ; $p = 0.01$). Moreover, it was found that alpha brainwave increased after listening to Ohm chanting with no statistically significant (before



Figure 1: Electroencephalographic device, eego™mylab

Table 1: Comparison of electroencephalographic activities between before and after listening to Ohm chanting

EEG activities	Before		After		p-value
	Mean	SD	Mean	SD	
Delta brainwave	0.63	0.16	1.49	0.49	0.01*
Theta brainwave	0.08	0.21	1.45	0.73	0.01*
Alpha brainwave	0.64	0.21	0.95	0.67	0.82
Beta brainwave	0.33	0.14	0.46	0.19	0.17
Gamma brainwave	0.76	0.23	0.82	0.26	0.80

* $p < 0.05$

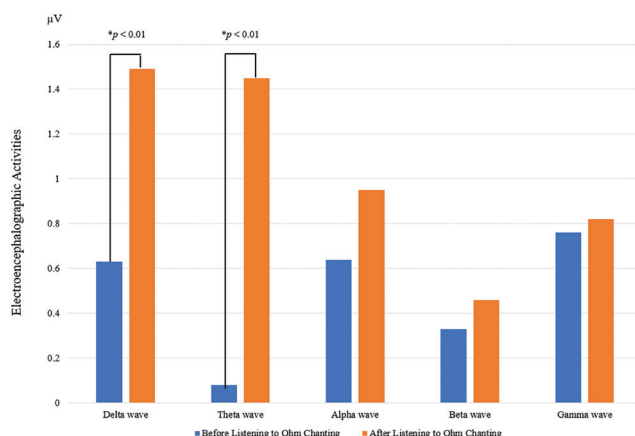


Figure 2: Comparison of electroencephalographic activities between before and after listening to Ohm chanting

listening to Ohm chanting: $0.64 \pm 0.21 \mu\text{V}$; after listening to Ohm chanting: 0.95 ± 0.67 ; $p=0.82$). In the same way, beta brainwave also increased after listening to Ohm chanting with no statistically significant (before listening to Ohm chanting: $0.33 \pm 0.14 \mu\text{V}$; after listening to Ohm chanting: 0.46 ± 0.19 ; $p=0.17$). Finally, it was found that gamma brainwave gradually increased after listening to Ohm chanting with no statistically significant (before listening to Ohm chanting: $0.76 \pm 0.23 \mu\text{V}$; after listening to Ohm chanting: 0.82 ± 0.26 ; $p=0.80$).

DISCUSSION

The exposed participants displayed statistically significant increases in delta and theta brainwaves at 0.05 after listening to Ohm chanting. This study revealed that participants were trained with listening to Ohm chanting causing probably the stress level went down. These results were consistent with previous study mentioned that the negative feeling went down and concentration in thinking process and decision making were increased.² Similar to previous studies revealed that major depressive disorder decreased and happiness feeling in mental health increased by listening to the chanting.^{3,9-11}

Some previous studies revealed that attending Ohm chanting had effect on delta and theta frequency bands, respectively. Our results were supported by previous studies^{9,11-13} mentioned that delta brainwave was related to deepest state of body relaxation. It was found during sleep while human body had low metabolic rate, low blood pressure, body temperature and heart rate; it was called the state of physical therapy. Moreover, our findings were consistent with previous studies in which related to the brain work slower as decreased of function in heart and blood vessel.¹⁴ People listening to chanting do not make instant decisions. Similar to the gamma brainwave

such as memory, learning process, mediation level and optimism, which had increased mean after ten minutes of meditation. This is consistent with the research result of previous study showing that those who have been practicing meditation for so long may lead to increase in gamma brainwave. The increase in gamma brainwaves can lead to permanently positive changes for the brain.⁸ People have wisdom and do not make instant decisions. In case of gamma brainwave (memory, learning process, mediation level and optimism) had increased mean after ten minutes of meditation. This is consistent with the research result of Richard Davidson¹⁵ which found that those who have been practicing meditation for so long may lead to increase in gamma brainwaves. The increase in gamma brainwaves can lead to permanently positive changes for the brain.

Previous studies reported that attending the Inner Wisdom meditation training program had effect on delta, theta and alpha frequency bands, respectively.¹⁶⁻¹⁹ The delta frequency band was related to deepest state of body relaxation. It was found during sleep while human body had low metabolic rate, low blood pressure, body temperature and heart rate; it was called the state of physical therapy.¹⁶⁻¹⁹ Moreover, previous studies in which related to the brain work slower as decreased of function in heart and blood vessel.²⁰ In addition, Pender²¹ revealed that stress relaxation benefit to the autonomic nervous system by reducing concerned hormone and increased alpha band. In 2012, some previous studies found that theta band was normal state when we were sleeping or had high relaxation, but sometimes could also occur when we were awake like while in meditation. This condition was related to the creativity in deep mind, calm and being optimistic, high concentration, capacity in long term memory and temporal lobe which processing interpretation, long term memory, learning in sound and music and emotional behavior. This is consistent with previous studies stating that delta brainwave occurred from highly-relaxing body conditions - deep sleeping or deep meditations. This is the reason why we had to practice the walking meditation so that the mind would be controlled. The body was still not deeply relaxed. So, the delta band was reduced due to deep meditation. This is consistent with previous study stating that delta brainwave occurred from highly-relaxing body conditions - deep sleeping or deep meditations.²²⁻²⁴

Additionally, previous study revealed that listening to the chanting had effect on delta brainwave in the frontal lobe, theta brainwave in the temporal lobe and alpha brainwave in the occipital lobe. Sankan²⁵ mentioned that delta brainwave was related to deepest state of body relaxation, found during sleep while human body has low metabolic

rate, low blood pressure, body temperature and heart rate; it is the state of physical therapy. This previous study also found more activities in dorsolateral prefrontal cortex which concerning to intellect on management, parietal lobe which concerning to processing information relating to the sense, hippocampus which plays an important role in the formation of memory, temporal lobe which processing sensory input, pregenual anterior cingulated cortex which plays role in error detection, anticipation of tasks, attention motivation, and modulation of emotional responses, striatum have role in the planning and modulation of movement pathways and pre-post central gyrus have role in attention and nervous system. In addition, several studies found that brain work slower due to decreased of function in heart and blood vessel.¹⁴ Moreover, Pender²⁶ mentioned that stress relaxation benefit to the autonomic nervous system by reduce concerned hormone and increase alpha brainwave. Carlson et al.,²⁷ found that mean of alpha brainwave rise up in parietal (P3, P4) occipital (O1, O2) while Salat and Dhaha (worship of the Allah's kindness).

This study might be revealed that participants were trained by listening to Ohm chanting causing the stress level went down and positive feeling increased. This result might be consistent with previous study mentioned that the negative feeling went down and concentration in thinking process and decision making were increased.²⁸ Similar to previous study done by Kulsirichai^{16-17,29-30} revealed that major depressive disorder decreased and happiness feeling in mental health increased by listening to the chanting.

CONCLUSION

We were able to observe the change of brain function. It was found that delta, theta and alpha frequency bands were increased after listening to Ohm chanting. Listening to Ohm chanting to observe the change of brain function found that delta and theta brain wave activities were increased while listening to Ohm chanting concerning to being optimistic, high concentration, capacity in long term memory and awareness.

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Authors Contribution:

SS- Concept and design of the study, statistically analyzed and interpreted; **PS-** Concept and design of the study, statistically analyzed and interpreted, manuscript preparation, critical revision of the manuscript.

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