

The Effect of Walking Meditation on Brainwave Activities among Buddhist Priest

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Abstract

The objectives are investigating and understanding the effects of walking meditation to brainwave. The Thai Stress Test developed by Associate Professor Dr. Sucheera Pattharayuttawat at Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University, was applied to measure the stress level before and after walking meditation. Electroencephalography (EEG) mobile was applied to measure the changes of brainwave during walking meditation.

Results of this study showed that stress level was decreased while the level of concentration and attention increased. The decrease of both delta and theta brainwaves were also found in relation to those mentioned in the literatures that the delta brainwave is related to the dreamless sleep and subconscious state whereas the theta brainwave is related to recall memory. Both of these types of brainwave occurred during high relaxation. Walking meditation is known as a practice for mind-controlling and is the first state of meditation but still could not go through subconscious state. Alpha brainwave was increased during walking meditation and caused acetylcholine to be generated from parietal lobe of the cerebrum. It is related to the characteristics of alertness, peacefulness, concentration, calm and rejuvenation. Finally, the gamma brainwave was also increased and caused improvement on memory, learning and concentrate ability.

Keywords: Walking Meditation/Brain/Brainwave/Meditation/Stress\

1. Background and Reason

With scientific, technological and industrial advancements, people have to consume foods with preservatives and live in polluted environments. They are also stressful because of economic, social and political problems. Scientifically, it is found that minds are in relation to bodies. If a person is stressful, then his/her adrenal gland will release adrenalin, which inhibits the functions and reduces the performance of his/her organs. Consequently, the person's immunity level is lowered. Therefore, physical and mental factors are important factors of good quality of life and long lifespan. Accordingly, many countries are finding new solutions for solving physical and mental problems as well as curing diseases by focusing on physical and mental treatments in order to balance both people's bodies and minds. This is consistent with the World Health Organization's statement: "[h]ealth is the state of complete physical, mental and

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social well-being.” These three components must be balanced in order to have good health and long lifespan.

For Buddhism, it is mentioned that mediation can result in relaxation, good temper and cheerfulness. It was scientifically proved that the meditation affected people’s bodies and minds since it could improve their immune systems. After measuring their brainwaves, it was also found that the mediation affected their brainwaves and relaxed their brains (Concentration and Scientific Evidences, 2014). Thus, the mediation is being used for solving health problems and taking care of people’s health with medical treatments.

There are many ways to use the meditation in order to solve health problems and take care of people’s health such as T.M., Zen, Tibetan, and Theravada Buddhist meditations. For Buddhism, the walking meditation is practice that has been used by people for a long time. Hence, the researcher wanted to study on and compare the effects of the walking meditation on people’s brainwaves with other types of meditations in order to obtain information for solving physical, mental and social problems influencing quality of life and lifespan.

2. Objective

To indentify and understand the effects of the walking meditation on brain activities.

3. Methodology

3.1 Population and Samples

The population included the Buddhist monks of Wat Pacharoenrat, Pathum Thani Province, who have been ordained for at least one phansa (i.e. a period of three lunar months) and practiced the walking meditation of Phra Kru Weeranont. The samples were 17 monks from this temple.

3.2 Instruments

Data were collected by using the mobile electroencephalogram (EEG) and Thai Stress Test (TST), which is developed by Assoc. Prof. Dr. Sucheera Phattharayuttawat and the Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University and consists of 12 items of questions about positive feelings and 12 items of that about negative feelings.

3.3 Data Collection

Relevant concepts, information and literatures were reviewed in order to identify the framework, methodology and instruments of the study. Equipments and places were then prepared. The monks who practiced the walking meditation of Phra Kru Weeranont, Wat Pacharoenrat, Pathum Thani Province were contacted.

The program for recording results was also set.

Procedures are as follows.

1. The procedures were explained to the 17 monks as they had to be prepared for the brainwave measurement, for example, by stopping drinking caffeinated drinks and drugs for curing some congenital diseases before the measurement date.
2. The research place was a peaceful one that interfering factors can be controlled.
3. Each sample had to wear the EEG in order to measure their brainwaves.
4. The samples had to take the TST in order to measure their stress level before the walking meditation,
5. The samples had to do the walking meditation for 20 minutes.
6. The samples’ brainwaves were measured for one minute after they started the walking meditation.
7. After they did the walking meditation for 10 minutes, their brainwaves were measured the second time for one minute (while they were still doing the walking meditation).
8. After they did the walking meditation for 20 minutes, their brainwaves were measured the third time for one minute.

9. After they did the walking meditation for 20 minutes, they had to take the TST again in order to measure their stress level after the walking meditation.
10. The equipments were stored and data were recorded. The results were statistically analyzed.

3.4 Data Analysis

The data were analyzed and processed by the researcher with computer software package and the following statistics.

Paired-sample t-test was used in order to compare the means before and after the walking meditation.

1. The means of the stress levels before and after taking the TST at the significance level of .05
2. The means of the meditation scales and brainwaves while practicing the walking meditation for 20 minutes (There were the comparisons: a) the 1st and 10th minute, b) the 1st and 20th minute, and c) 10th and 20th minute, respectively.) at the significance level of .05

One-way ANOVA is utilized in order to compare the medication and attention scales as well as the means of brainwaves while practicing the walking meditation for 20 minutes. There were the comparisons: a) the 1st and 10th minute, b) the 1st and 20th minute, and c) 10th and 20th minute, respectively, at the significance level of .05

4. Results

The effects of the walking meditation on the monks' brainwaves were studied. The samples comprised of 17 Buddhist monks who have been ordained for at least one phansa at Wat Pacharoenrat, Pathum Thani Province. There were two methods used in this study. Firstly, the samples had to take the TST before and after the walking meditation and then their stress levels before and after the walking meditation were compared. Secondly, their brainwaves were measured for three times: 1st, 10th and 20th minutes, respectively, with the EEG and then compared. The results of the study can be summarized as follows.

4.1 The Comparison of the Stress Levels before and after the Walking Meditation

The results of the comparison indicated that the samples' stress levels before and after the walking meditation were statistically different at the significance level of .01 (as shown in Table 1). Moreover, most samples' stress levels were "low" before the walking meditation. Their stress levels were decreased to "null" after the walking meditation. Only one sample had "null" stress level. However, his stress level was increased to "low".

Table 1. Comparison of the Stress Level before and after the Walking Meditation

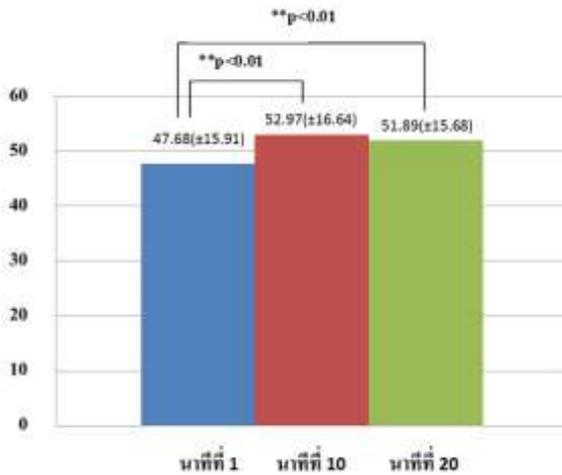
Stress Level	n	\bar{X}	SD	t	p
Positive Feelings (before)	17	32.06	3.25	-3.86	< 0.01**
Positive Feelings (after)	17	34.00	2.45		
Negative Feelings (before)	17	6.47	2.53	3.19	0.01**
Negative Feelings (after)	17	4.71	2.49		

Remark ** means the statistically significant difference at the level of .01

4.2 The Results of Meditation and Attention Level during Walking Meditation

The comparison result on meditation scale of the sample group during 20 minute walking meditation indicated that walking meditation practice affected the meditation level at the statistically significant level of 0.05. At the 10th minute, the mean of meditation level was increased. However, at the 20th minute, the meditation level was decreased. In term of the comparison results of attention scale of the sample group while practicing walking meditation for

20 minutes, from three durations it was found that practicing walking meditation did not have statistically significant result on any change of attention level. During the 10th minute, the mean of attention level was slightly decreased from the mean of attention level at the 1th minute. But the attention level was increased at the 20th minute (as shown in figure 1).

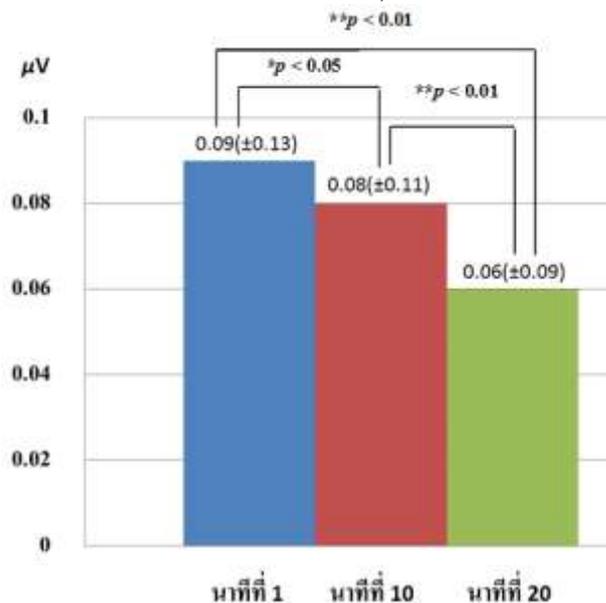


Remark ** means the difference at the statistically significant level of 0.01

Figure 1. The Meditation Level during 20-Minute Walking Meditation using Meditation Scale

4.3 The Results of Brainwave Change during Walking Meditation

The results of delta brainwave change while practicing walking meditation for 20 minutes indicated that walking meditation practice affected delta brainwave change at the statistically significant level of 0.05. The mean of delta brainwave at the 10th minute was decreased from the mean at the 1st minute. Then, it was decreased at the 20th minute (as shown in figure 2).



Remark * means the statistically significant difference at the level of .05

** means the statistically significant difference at the level of .01

Figure 2. The Comparison of Delta Brainwave Change during 20-Minute Walking Meditation

The results of theta brainwave change while practicing walking meditation for 20 minutes indicated that there was no statistically significant difference. The mean of delta brainwave at the 10th minute was decreased from the mean at the 1st minute. Then, it was decreased at the 20th minute.

The results of alpha brainwave change while practicing walking meditation for 20 minutes indicated that there was no statistically significant difference. The mean of delta brainwave at the 10th minute was slightly increased from the mean at the 1st minute. Then, it was further increased at the 20th minute.

The results of beta brainwave change while practicing walking meditation for 20 minutes indicated that there was no statistically significant difference. The mean of delta brainwave at the 10th minute was increased from the mean at the 1st minute. Then, it was decreased at the 20th minute.

The results of gamma brainwave change while practicing walking meditation for 20 minutes indicated that there was no statistically significant difference. The mean of delta brainwave at the 10th minute was increased from the mean at the 1st minute. Then, it was slightly decreased at the 20th minute.

5. Conclusions and Discussions

From the hypotheses testing, meditation practice by walking meditation had impacts on stress level and brainwave change. The conclusions and discussions are as follows;

5.1 Pre- and Post Walking Meditation Stress Levels

According to the results, it indicated that most Buddhist monks had lower stress levels after walking meditation. So, it is evidence stating that walking meditation - a form of meditation practice in Buddhism – has an effect in stress level reduction. This is consistent with the research of Pannee Phanuwatsook (2014) who found that meditation can result stress and increase empirical and creative self-perception ability. However, stress levels may increase due to external factors as well. The external factors include interrupting temperature or practice awareness etc.

5.2 Meditation Level and Attention Level during Walking Meditation

According to the comparison results between meditation scale and attention scale of the sample group during 20-minute walking meditation, it found that the means of both scales increased due to concentration which decreases thinking process. As a result, peace and relaxation happen.

5.3 Analysis Results of Brainwave Change during Walking Meditation

According to the comparison results among different brainwave changes during walking meditation, it found that delta brainwave (sleeping, complex problem solving and subconscious mind) had decreased mean during the 10th minute and the 20th minutes, respectively. The reason is that walking meditation is a meditation practice. It happens before changing postures and for body preparation. So, the mind is controlled. The body is still not deeply relaxed. So, the mean of delta brainwave was reduced due to deep meditation. This is consistent with the research of Parichat Kankhanan (2012) stating that delta brainwave occurs from highly-relaxing body conditions - deep sleeping or deep meditations, for examples. In case of theta brainwave (memory, subconscious information solicitation and creativity) had slightly decreased mean in the 10th minute and the 20th minute, respectively. The reason may be that walking meditation is a meditation practice. It happens before changing postures and for body preparation. So, the mind is controlled. The body is still not deeply relaxed. So, the mean of delta brainwave was reduced due to deep meditation. This is consistent with the research of Parichat Kankhanan (2012) stating that delta brainwave occurs from highly-relaxing body conditions - deep sleeping or deep meditations, for examples.

In case of alpha brainwave (relaxation, peace and wisdom) had increased mean in the 10th minute and the 20th minute, respectively. It shows that walking meditation leads to relaxed body, peace and concentration. This is consistent with the research result on Alpha Brain Waves, Brain Waves to Increase the Power of Mind (n.d.) and the research result of Parichat Kankhanan (2012) which found that alpha brainwave is frequently found when muscles or body relaxed or when the mediation is not too deep. Parietal lobe and cerebrum during alpha brainwave activities usually produce a nervous substance called Acetylcholine. This substance is concerned with

memory and learning process. It is also a stimulator and an inhibitor for body muscles. As a result, mental balance in relaxed condition happens. 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 Davidson (referred in Kaufman, 2005) 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. In case of beta brainwave (caused by confusion and frustration) had no differences for all the three periods. The reason may be that the research studied on strict walking meditation among Buddhist monks is strict. So, there were no differences on this type of brainwave.

6. Suggestions

In this study, the research examines the effects of walking meditation on brainwave activities for the sample group (Buddhist monks at the Buddhist monks of Wat Pacharoenrat, Pathum Thani Province, who have been ordained for at least one phansa (i.e. a period of three lunar months). So, the study period and the meditation experience are important factors for the study. So, the research has suggested to increase diverse sample groups for the future research as follows;

6.1 The comparison between practical Buddhist monks (Pha Pa) and meditate Buddhist monks (Pha Baan) should be made.

6.2 The comparison between short-phansa Buddhist monks and long-phansa Buddhist monks should be made.

6.3 The study on high-stress-level career people should be made.

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