IOP Conf. Series: Materials Science and Engineering **288** (2018) 012015 doi:10.1088/1757-899X/288/1/012015

Dhikr to Manage Epileptiform Activity in a Teenager with Depressive Disorder

A Sulianti*, Y Yulianti, R Riswanda, A D Amalia and R Anwar

UIN Sunan Gunung Djati Bandung, Jl. A.H. Nasution No. 105 Bandung, West Java, Indonesia.

*ambarsulianti@uinsgd.ac.id

Abstract. An epileptic seizure is a transient symptom of excessive or synchronous neuronal activity in the brain, which can be observed by electroencephalography (EEG). The epileptic seizure which characterized by abrupt loss of consciousness followed by tonic contraction of the muscles often impact depressive disorder. Although dhikr has been widely used to reduce depressive disorder, only a little research is known about the impact to epileptic seizure. This research aims to determine influence of dhikr on epileptiform activity in a teenager with depression disorder. The method used in this research was quasi experimental study using the Single Subject Randomized Time Series Design in a teenager with high depression disorder. Dhikr were conducted routinely in 4 weeks. This study's result showed there's a reduction to zero on artefact signs of seizure in EEG record of the subject even under stressful conditions. There's also an enhancement of epileptic fuze resistance. Dhikr succeeded to reduce epileptiform activity in the subject. This can be considered in other epileptic teenager with depression disorder.

1. Introduction

Epilepsy is a condition characterized by recurrent seizures caused by abnormal and excessive electrical discharge in brain neurons in paroxysmal way, and is caused by a variety of aetiologies, not by acute brain disease [1,2]. Epilepsy is a collection of symptoms, with common symptoms of seizures.

Low quality of life is found in children with epilepsy disorders. Some things that affect the quality of life are the level of education, mental development, age at the time of diagnosis, the early age of the attack, the frequency of attack, the duration of the attack, and the number of drugs [1,3,4]. Epilepsy makes up about 1% of the total burden of all the world's diseases (Global Burden of Disease), similar to malignancy of the breast in women and malignancy of the lung in men. And 80% of this burden lies in the developed country [5].

Epilepsy is one of the health problems that become medical problems as well as social problems. Medical problems arise from the impact of the disease directly and the long-term side effects of treatment. Social problems in epilepsy arise because of the social stigma about epilepsy. Many myths and misconceptions are evolving among societies who regard epilepsy as a contagious, hereditary, and even cursed disease. Myths, discrimination, and misunderstandings that grow in society can shut out educational and employment opportunities for people with epilepsy.

Epilepsy is often associated with severe physical disability, disability, and psychosocial consequences for the sufferer. Manifestation of epilepsy symptoms can occur over the years thus causing long suffering.

Epileptic seizures often appear unexpectedly, causing the sufferers to be afraid of driving, swimming, and getting seizures in public. Therefore, the condition of epilepsy can cause prolonged stress that leads to unstable emotions from the sufferer. This emotional disorder can get worse in the sufferers who have a disorder in the limbic system of the brain which is the nerve centre of the emotional controller. The relationship of epileptic seizures and emotion is a two-way relationship. Unstable epilepsy emotions also trigger epileptic seizures. Thus, the management of emotions in people with epilepsy becomes important.

In the approach of religious psychology, dhikr has been investigated as a method that can stabilize emotion [6]. Dhikr draws us closer to "Allah" The Mighty, thus effects on increasing self-awareness, the essence of life, awareness of human weakness and the greatness of Allah SWT. Although the dhikr method has been widely used to stabilize emotion, until now the relationship with epileptic seizures has not been widely reported. This study aims to analyze the changes that occur in a teenage epilepsy sufferer who suffered severe depression, after being given Dhikr intervention.

2. Methods

2.1. Research Design

This research is a quasi experimental research using Single Subject Randomized Time Series Design. Single subject research is experimental in nature to capture the functional relationship between independent and dependent variables. Single subject studies use comparisons between and among subjects to control the ultimate threat to internal validity. The condition of the subject baseline functions as a control. Performance before dhikr interventions is compared with performance during and / or after dhikr intervention.

2.2. Research Subject

The subject is a 16-year-old teenage girl with initial W who suffers from epilepsy Grand mal since the age of 14 with very severe depressive disorder comorbidity. Measurement of depressive disorder uses human rights criterion HAM-D 17 [7]. This study was conducted after the signing of informed consent.

2.3. Research Procedure

This experiment uses the Dhikr intervention starting with apology (*istighfar*), dhikr *La ilaha illa'lloh*, and being grateful for the blessings of Allah SWT. The Dhikr core consists of: Al Ikhlas, Al Falaq, An Nas, Al Ma'tsurat which are read after the Subuh, Zuhur, Ashar, Magrib, Isha, Duha, and Tahajjud Prayers. Before Dhikr intervention, subject is given pre-tests up to 3 times to determine base line stability. The experimental research design can be seen in table 1.

Table 1. Single Subject Research Design

Pretest	**Posttest**
	(X)
Y_1 Y_3 Y_5	Y_{10} Y_{15} Y_{20}

Note:
X: Dhikr
Y: Observation time

Observations are directed at signs of depressive disorder based on human rights assessment HAM-D 17. The HAM-D-17 score divides the depression as follows [7]:

- 0-7 = Normal
- 8-13 = Mild Depression
- 14-18 = Moderate Depression
- 19-22 = Severe Depression
- ≥23 = Very Severe Depression

Seizure assessment is done through questionnaires, observations, and records of brainwave changes using electroencephalographic (EEG) spectral analysis that reflects brain function. The International 10-

20 System is used to install electrodes on the scalp. The EEG channel consists of Fp1, AF3, F3, F7, FC5, FC1, C3, T7, CP5, CP1, P3, P7, PO3, O1, Oz, Pz, Fp2, AF4, Fz, F4, F8, FC6, FC2, Cz, C4, T8, CP6, CP2, P4, P8, PO4, and O2 [8]. Subject was lying on the bed during an EEG recording and was asked to close the eyes for 10 seconds and then open them in another 10 seconds. This procedure was repeated 10 times. Changes in brainwaves were observed in relaxed conditions with eyes open, sleep, eyes open while thinking, and speaking. Recorded frequency bands, observed from low to high frequency, each of them are called Delta (1-3Hz), Theta (4-7Hz), Alpha (8-13Hz), Beta (14-30Hz), and Gamma (31- 50Hz) [9].

The analysis of this single subject research was conducted by comparing the effect of intervention with performance during baseline, or condition comparison.

3. Results and discussion

3.1. Baseline Condition Analysis

Subject often suffers from headache when he is tired. The seizures are triggered by puddle, blood, physical exhaustion, and stress. Epilepsy seizure attack starts with a heavy head feeling like fainting. The subject's parents often argue with each other and are in the process of divorce. This makes the subject very depressed with a score of 28 HAM-D-17. Signs of depressive disorder in W are almost visible in all goods except early insomnia, retard, and insight.

3.2. Seizures and Depressive Disorder Observations

Changes in seizures and depressive disorder can be seen in figure 1 below.

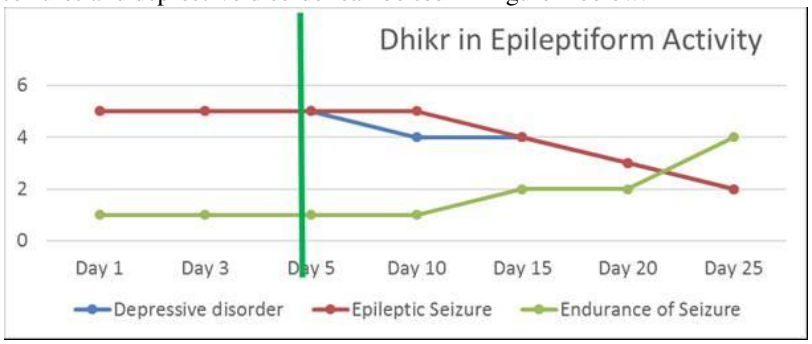

Figure 1. Dhikr Effect on Epileptiform Activity

The score of depressive disorder was reduced sharply from 28 (classification 5 to very severe) to 11 (mild classification) on the subject. The reduced aspects are especially depression, guilt, work and interest, anxiety, genital symptoms, and weight loss. Seizures and faint are still experienced at the beginning of observation with rainwater puddle as the trigger. After coming to the 20th day, the subject has no seizure when he looked at puddle. On 25th observation day, the subject didn't get seizure when he saw blood, he even dared to help his brother whose finger was cut by a knife.

The results of the EEG record at the end of the observation in the condition of concentrating awakening and speaking awakening are presented in Figures 1 and 2 below.

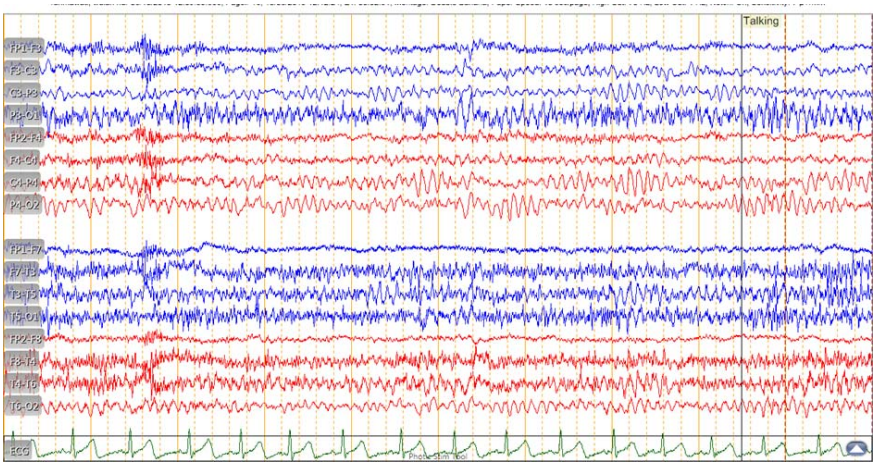

Figure 2. EEG Record in Concentrating Awakening on Math

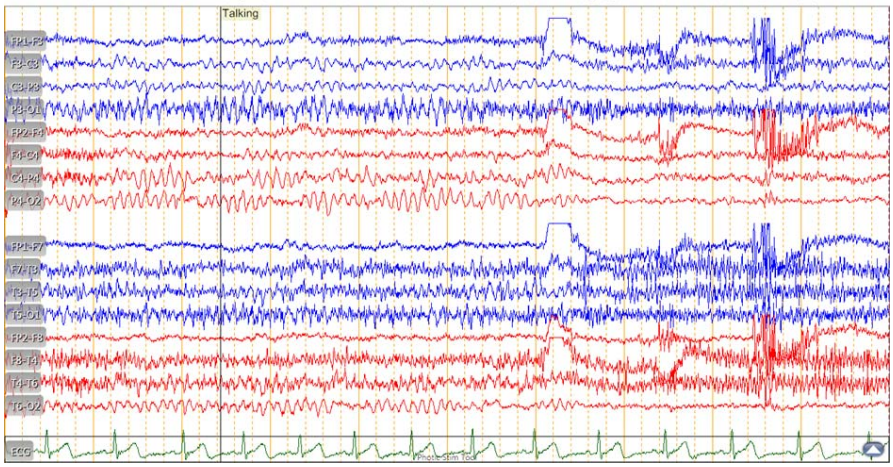

Figure 3. EEG Record on Speaking Awakening

The EEG record on the 25th day showed no artefacts even when the subject was given a stressor of mathematical computation.

The results of this study indicate that Dhikr decreases depressive disorder, decreases seizures, and increases resistance to the seizure's trigger on the subjects. Electroencephalography (EEG) has been used over the last century to study how brain function is related to human performance [9]. This technique uses electrodes on the scalp to record an electric field generated by the dynamics of neurons, which can be analyzed to examine how certain cognitive tasks modulate brain activity. Seizures in epilepsy are due to cerebral hypersynchronous nerve abnormalities that result in irreversible damage [10].

Epilepsy has a negative physical and social impact on juvenile subjects, apart from its emotionally unstable factors as well as abnormalities of electrical jumps on the nerves that are disturbed by epilepsy. The condition of depressive disorder in the initial subject of therapy is at the serious level. This is in line with a study comparing the psychological effects of epilepsy with other chronic diseases: asthma, diabetic, leukaemia, and HIV, suggesting that epilepsy has a severe social impact, similar to that of HIV patients. Teenagers with epilepsy are often considered to pretend being ill, unpopular, and unsupportive

[11]. This condition is worsened on the subject with the parents' divorce. The response to stress consists of adaptive changes in the physiology of the organism, which results in the optimal physical and psychological state to restore homeostasis. Neural responses to stress are sympathetic nervous system activation and hypothalamic-pituitary-adrenal (HPA) axis which together initiate changes throughout the body that result in vigilance and adaptation to the situation [12].

Expression of stress occurs within a few seconds of the autonomic nerves by activating the nerves while suppressing the parasympathetic. This autonomic nervous system is controlled by a nerve control centre in the brainstem and hypothalamus, where sensory information is integrated with information from the cerebral cortex and the limbic system that is the centre of human emotions. From the hypothalamus and brainstem, the projection of neurons continues into the preganglionic neurons in the brainstem and the upper part of the spinal cord. Postganglionic neurons project into the internal organs, resulting in the release of adrenaline catecholamine. Adrenaline from the adrenal glands may increase noradrenaline levels by activating the HPA axis slowly. Through the bloodstream, the adrenal cortex produces and secretes corticosteroids that reach a peak level of 20-30 minutes after the stress initiation, affecting cellular processes throughout the body, including the brain [12]. Research which was conducted by Doodipala S. Reddy and Michael A. Rogawski in mice shows that stress stimulates seizures through the role of tetra-hydro-deoxy-corticosterone (THDOC) which is GABAA receptor-modulating neurosteroids [13].

Every soul is potentially divine. Dhikr is one form of meditation that helps to get purity of mind and peace of mind. Meditation focuses on sounds, phrases, prayers, objects, visualized images, breaths, rituals or movements. Meditation improves concentration and lowers stress. Research conducted by Maclean (1996) shows that meditation lowers stress through the mechanism of steroid hormones namely cortisol, growth hormone, thyroid-stimulating hormone, and testosterone [14]. With decreased stress, the subject can accept the situation and feel happier. This happy condition increases resistance to seizures. This is in accordance with research conducted by Jatupaiboon et al. [15].

Through Dhikr, subjects are trained to be able to concentrate on the meaning of life, the role of human beings in the world, and the purpose of human creation. After knowing the stimulus of the trigger, the subject made an assessment of what was known, the subsequent process with a calm state of mind as a result of Dhikr, the subjects responding well to the seizure stimulus including puddle, blood, and parents' divorce. The subject feels more accepting that circumstances are not always in line with expectations. Through Dhikr, subjects can calmly respond to the incompatibility between their father and mother. This is what lowers the level of depressive disorder, reduces stress. This decrease in stress increases resistance to seizure triggers, so the subject does not easily get seizure.

4. Conclusion

This study shows the Dhikr intervention in the subject causing major changes in the subject from very high depression to mild depression. This has an impact on the increased endurance of the subject against the seizure triggers of a teenager with a very severe depression resulting in a decrease in seizures.

References

[1] Beghi E, Giussani G and Sander J 2015 The natural history and prognosis of epilepsy *Epileptic Disord.*

[2] Fisher R S, Acevedo C, Arzimanoglou A, Bogacz A, Cross J H, Elger C E, Engel J, Forsgren L, French J A, Glynn M, Hesdorffer D C, Lee B I, Mathern G W, Moshé S L, Perucca E, Scheffer I E, Tomson T, Watanabe M and Wiebe S 2014 ILAE Official Report: A practical clinical definition of epilepsy *Epilepsia* **55** 475–482

[3] Semah F, Picot M, Adam C and Broglin D 1998 Is the underlying cause of epilepsy a major prognostic factor for recurrence? *Neurology*

[4] Yong L, Cheng-Ye J, Jiong Q and Zhang Z 2008 Parental Anxiety and Quality of Life of Epileptic Children11This study was supported by fund from Research of Genetics and Environment of Chinese Birth Defects (*Environ. Sci.*

[5] Nayel M 2000 Mutual benefits from epilepsy surgery in developed and developing countries *Epilepsia*
[6] Zhou J, Qu F, Sang X, Wang X and Nan R 2011 Acupuncture and Auricular Acupressure in Relieving Menopausal Hot Flashes of Bilaterally Ovariectomized Chinese Women : A Randomized Controlled Trial **2011**
[7] Hamilton M 1960 HAMILTON DEPRESSION RATING SCALE (HAM-D) Instructions for the Clinician : HAM-D Scoring Instructions : *J. Neurol. Neurosurgery, Psychiatry 2356-62, 1960* **23** 56–62
[8] Jirayucharoensak S and Pan-Ngum S 2014 EEG-based emotion recognition using deep learning network with principal component based covariate shift adaptation *Sci. World*
[9] Ahammad N, Fathima T and Joseph P 2014 Detection of epileptic seizure event and onset using EEG *Biomed Res. Int.*
[10] Trinka E, Cock H, Hesdorffer D, Rossetti A O, Scheffer I E, Shinnar S, Shorvon S and Lowenstein D H 2015 A definition and classification of status epilepticus - Report of the ILAE Task Force on Classification of Status Epilepticus *Epilepsia* **56** 1515–1523
[11] Nickels K 2015 Seizure and psychosocial outcomes of childhood and juvenile onset generalized epilepsies: Wolf in sheep's clothing, or well-dressed wolf? *Epilepsy Curr.* **15** 114–117
[12] Campen J van, Jansen F and Graan P de 2014 Early life stress in epilepsy: a seizure precipitant and risk factor for epileptogenesis *Epilepsy Behav.*
[13] Reddy D S and Rogawski M A 2002 Stress-induced deoxycorticosterone-derived neurosteroids modulate GABA(A) receptor function and seizure susceptibility. *J. Neurosci.* **22** 3795–3805
[14] Sitepu N F 2009 Effect of Zikr Meditation on Post Operative Pain Among Muslim Patients Undergoing Abdominal Surgery , Medan , Indonesia Nunung Febriany Sitepu A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Nursing Science
[15] Jatupaiboon N, Pan-ngum S and Israsena P 2013 Real-time EEG-based happiness detection system *Sci. World J.*