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RESEARCH ARTICLE
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A Comparative Investigation to Observe the Effect of the Recitation of Al-Quran and Classical Music on Alpha Brain Wave in Medical Students

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ABSTRACT

Objectives: To determine the role of Quranic recitation in producing alpha wave increments on EEG in healthy subjects. To compare the level of increments, if any in alpha waves on EEG between Quranic verses and Classical music.

Materials and Methodology: After approval from the Ethical Review Committee, 32 healthy volunteers aged 20-25 years, comprising 16 males and 16 females were selected, from the undergraduate MBBS program, Foundation University Medical College (FUMC). A 10 minutes base line EEG was recorded for each of the participant prior to the procedure at Fauji Foundation Hospital (FFH) , to rule out any neuropsychiatric disorder. After adjusting the electrodes properly, a 5 minutes base line EEG was recorded .The participant was then exposed to the recitation of chapter 36 (Surah Yaseen) of Al-Quran for 5 minutes using earphones. A period of EEG at rest was recorded for 5 minutes after the exposure to Quranic recitation. Subsequently, the subject was exposed to Pachelbel's Canon in D major, which has been used as a “relaxing music” in researches. Statistical analysis was performed using SPSS version 21. Paired sample t-test was used to determine the significance of difference in increments.

Results: Mean values of Maximum negative alpha amplitude for Quranic Recitation, Baseline and Classical music were -39.9µV, -36.5µV, -35.8µV respectively. Maximum negative alpha amplitude was higher for Quranic recitation vs. Baseline (p=0.006) and Quranic recitation vs. Classical music (p = 0.001).

Conclusion: The results reveal that Quranic recitation increments alpha brain waves more than classical music which has been scientifically proven to be relaxing for mind. Therefore Quranic recitation can help in achieving a more relaxed state of mind and may be used as potent tool in music therapy as a part of CAM (complementary and alternative medicine).

Keywords: *Alpha waves, Quranic Recitation, Sound therapy, Brain waves, EEG*

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INTRODUCTION

In our modern age of vast technological advancement, increased stress and lack of healthy lifestyle, several diseases are becoming more and more prevalent. Depression, being one of the front runners of mental sickness has taken its toll on a majority of the population, affecting 121 million people worldwide [1] .People strive to maintain a high standard of life and to meet the demands of society and family without stopping to take a moment to consider their own mental and physical well-being. We have become susceptible to mental disease without even realizing the magnitude of its importance and the need for its immediate and effective treatment. The indisputable truth is that depression leads to suicide and is responsible for 850,000 deaths every year [1]

Mental illness is not a sign of weakness, and it's treatable. Recent researches have proven that music has a beneficial effect on a person's brain activity, causing an increase in the person's ability to maintain a state of composure and relaxation, [2, 3, 4, 5, 6, 7, 8] hence reducing incidences of disease by promoting mental relaxation. This is due to alpha wave production, which represents activity of brain during conscious wakefulness. Experiments have shown that soft music has been found to be highly effective in increasing relaxation, decreasing stress, treating mental disorders and curing depression [2, 3, 4 , 5 ,6,7 ,8]. Music can promote relaxation of tense muscles, enabling you to easily release some of the tension you carry from a stressful day. Music also decreases production of cortisol, a stress inducing hormone in the body.

It is a common belief in the Muslim community that Quranic Recitation also has a relaxing effect. Many books and online forums express faith in their belief regarding the relaxing abilities of the Quran [9, 10 , 11] Religious scholars stress the importance of Quranic Recitation for mental health and relieving stress. The purpose of this research is to identify on a scientific basis whether Quranic recitation does indeed aid in achieving a peaceful state of mind. Furthermore, the following research aims to investigate the difference in effects of Quranic recitation and classical music on alpha wave production in the brain.

The brain is the most important and central organ of the nervous system, exerting centralized control over the other organs of the body. It is an electrochemical organ which processes and integrates information.[12] Neuron signaling is an electrochemical process in which brain tissues generate an electric field once they are activated. Synchronization in the activity of neurons can produce an electric field large enough to be detected outside the skull, by a method known as Electroencephalography(EEG) or Magnetoencephalography(MEG). Electrical activities are recorded using electroencephalogram. It is important to note that the EEG signals are affected by stimulations from the external environment [13].The undulations in the recorded action potential are called brain waves, which are of five types; delta, theta, alpha, beta and gamma[13] .

Alpha waves are neural oscillations in the frequency range of 7.5-12.5 Hz[14]. Basic alpha waves originate from the occipital lobe during wakeful relaxation with closed eyes [15, 16 ,17]. Alpha waves are attenuated with open eyes as well as by drowsiness, depression, concentration & sleep [18, 19].

MATERIALS & METHODS

Participants

After approval from the Ethical Review Committee, 32 healthy volunteers aged 20-25 years, comprising 16 males and 16 females were selected, from the undergraduate MBBS program, FUMC. A 10 minutes base line EEG was recorded for each of the participant prior to the procedure at FFH, to rule out any neuropsychiatric disorder. All the subjects were physically and mentally healthy, unfamiliar with Arabic language & Right-handed.

Software & Hardware

Hardware: Bio-logic Ceegraph EEG machine Version 4

Software & Data Analysis: Data was analyzed using Paired Sample T-test with SPSS version

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21. The alpha waves were analyzed by the Neurologist and the amplitudes were determined by him, provided in form of reports, of individual participants, all the EEG were analyzed by one neurologist.

Experimental setup

For a single session, 2 participants were taken to FFH. The participants were requested to come with washed and dried hair, as oily hair can increase impedance and hinder signal conduction). A quiet environment and a suitable temperature were ensured in the EEG room. The participants were then asked to remove any head gears / ear studs .Ag-AgCl surface electrodes were then applied with an electrode paste and placed at the scalp with the 10-20 system electrode placements [22] .A conductive gel was inserted into the electrode tube to reduce the impedance between the scalp and the electrode. The 10–20 system or International 10–20 system is an internationally recognized method to describe and apply the location of scalp electrodes in the context of an EEG test .The "10" and "20" refer to the fact that the actual distances between adjacent electrodes are either 10% or 20% of the total front–back or right–left distance of the skull. After the application of the electrodes the participants were asked to lie down according to their own comfort but were instructed to limit their body movement, refrain from talking & keep their eyes closed during the procedure because these factors can affect the alpha wave.

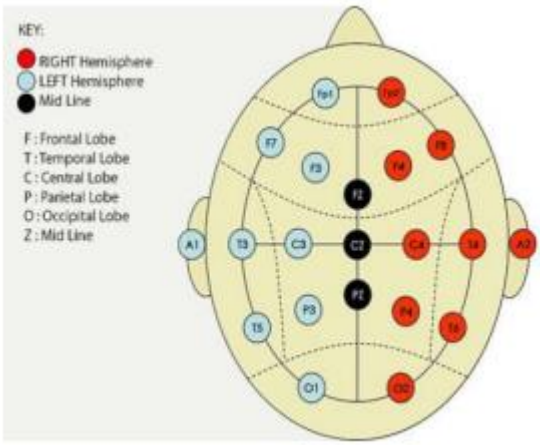

FIGURE 1: Electrode placement

FIGURE 2: Electrodes being placed on a subject

FIGURE 3: Subject undergoing the experiment

After adjusting the electrodes properly, a 5 minutes base line EEG was recorded .The participant was then exposed to the recitation of chapter 36 (Surah Yaseen) of Al-Quran for five minutes using earphones. Chapter 36 was used because it has been used in previous researches [20] and has been quoted in books to have a relaxing effect [23] . Recitations by different reciters were used for each of the participants to eliminate the possibility that the increments, if any, in the alpha wave are due to the voice of the reciter. A period of EEG at rest was then recorded for 5minutes after the exposure to Quranic recitation.

After a rest the same procedure was repeated again, but this time the subject was exposed to Pachelbel's Canon in D major which has been used as "Relaxing music" in researches and proven to "prevent stress-induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females"[24,25].

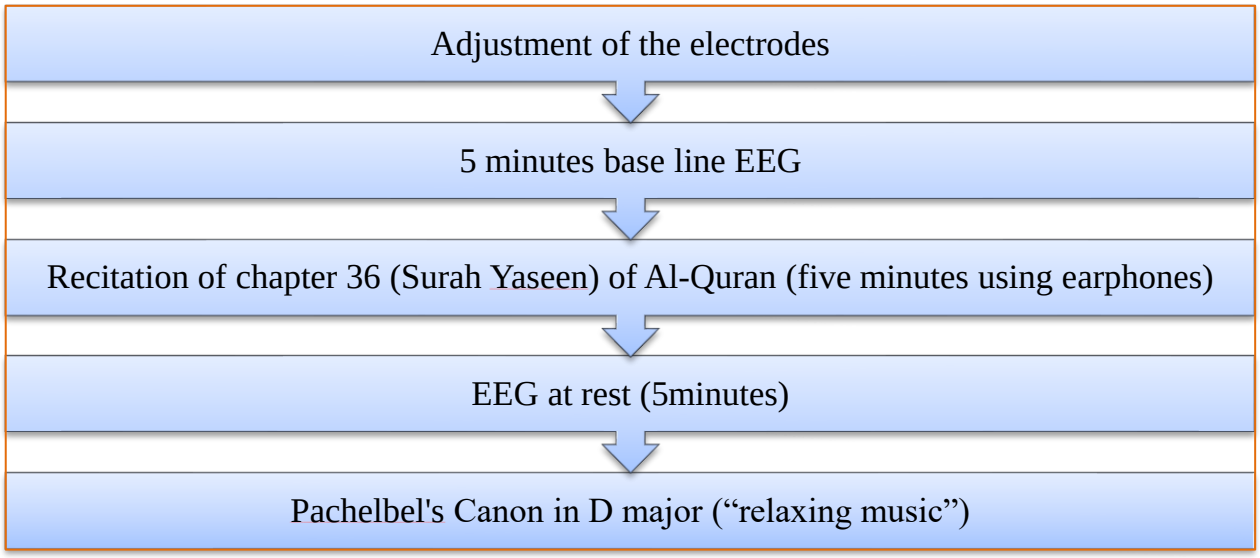

FIGURE 4: Algorithm of the study

RESULTS

The experiment was performed on 16 males and 16 females who were in a wakeful but relaxed state of mind, with their eyes closed. The experiment provided a lot of interesting data, indicating not only the effect of different music on brain activity, but also showing a difference in the brain activity of males as compared to females. The results obtained show that the negative amplitude for alpha waves is much

higher in response to Quranic Recitation as compared to classical music. The table below shows the results of paired sample test, and the mean values for alpha amplitude.

Data Analysis

TABLE 1: Paired Sample Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Max. Negative Amplitude at Baseline - Max. Negative Amplitude during Quranic Recitation	2.73438	5.22708	.92403	.84981	4.61894	2.959	31	.006
Pair 2	Max. Negative alpha Amplitude during Classical Music - Max. Negative Amplitude during Quranic Recitation	3.49063	5.19009	.91749	1.61940	5.36185	3.805	31	.001

TABLE 2: Paired Sample Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Max. Negative Amplitude at Baseline	-36.6250	32	10.70107	1.89170
	Max. Negative Amplitude during Quranic Recitation	-39.3594	32	13.64955	2.41292
Pair 2	Max. Negative alpha Amplitude during Classical Music	-35.8687	32	11.48096	2.02957
	Max. Negative Amplitude during Quranic Recitation	-39.3594	32	13.64955	2.41292

Mean values of Maximum negative alpha amplitude for Quranic Recitation, Baseline and Classical music were -39.9µV, -36.5µV, -35.8µV respectively. Maximum negative alpha amplitude was higher for Quranic recitation vs. Baseline (p=0.006) and Quranic recitation vs. Classical music (p = 0.001). Note the marked difference in the values for Quranic and Classical music. Maximum negative alpha amplitude was higher for Quranic recitation vs. Baseline (p=0.006) and Quranic recitation vs. Classical music (p = 0.001).

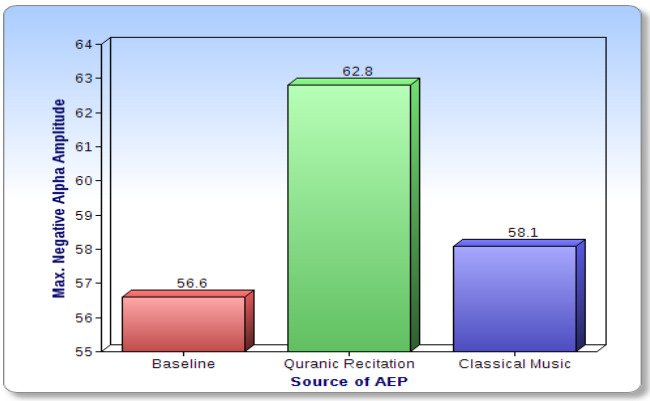

FIGURE 5: Maximum negative alpha amplitude for baseline, Quranic recitation and classical music respectively

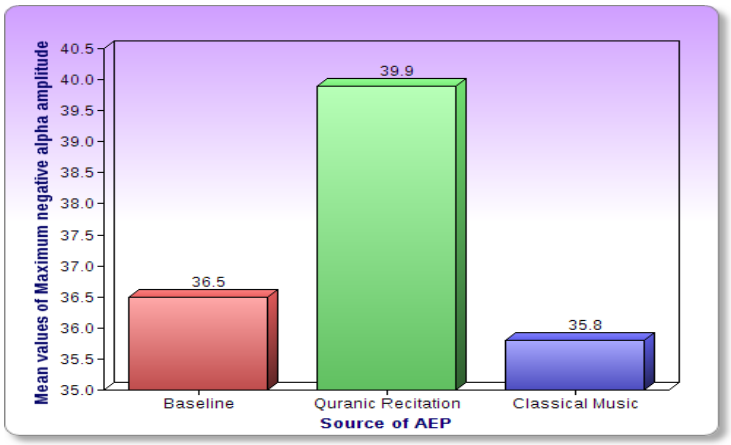

FIGURE 6: Mean values of Maximum negative alpha amplitude

Maximum negative amplitude achieved in any state was lower in males than in females ($p < 0.0001$).

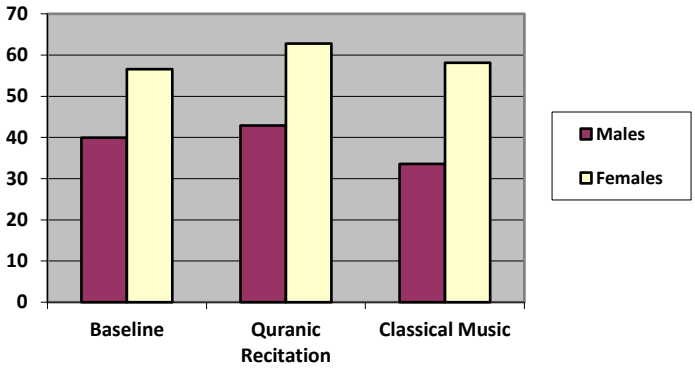

FIGURE 7: A comparison of maximum negative alpha amplitude amongst males and females

DISCUSSION

Over the years researchers have been trying to explore different methods and alternatives to reduce anxiety and treat depression non-pharmacologically through complementary therapies. This research was a part of such efforts, through which we found out that listening to Quranic recitation can help individuals in reducing their anxiety levels and achieving a relaxed state of mind , by augmentation of alpha waves.

Similar researches have been conducted in Malaysia and Egypt [20, 21] .Their results showed significant increments in alpha waves during Quranic Recitation, but this aspect has not been explored in Pakistan before. Moreover the past researches conducted in Malaysia and Egypt did not show any comparison between males and females, different age groups, and did not provide any information about the reciters, whereas this research included an equal number of test subjects from both genders, to reveal how a man's brain activity can differ from that of a woman in response to different music and Quranic recitation. Different age groups of people as well as different reciters were used. The studies conducted previously used a power lab as the main tool for recording and processing information, whereas this study was conducted using the latest EEG machines.

However this research had some limitations that need to be considered for future reference. The sample size was small, and the test subjects were all medical students of Foundation University Medical College, the age group tackled was generally people between 20-25 years of age and

all were having a healthy state of mind. For future advancement in this research, a larger sample size may be taken, non-Muslims as well as patients of other mental disorders such as autism and epilepsy can be used as test subjects. All these additions in future researches will also make the research itself more valid and void of any bias on the basis of age, religion, institution and mental disability.

CONCLUSION

From the research conducted, we conclude that Quranic recitation increments alpha brain waves more than classical music clinically proven to reduce anxiety ,and therefore can help in achieving a more relaxed state of mind. Thus it May be used as potent tool in music therapy as a part of CAM (complementary and alternative medicine).

Conflicts of Interest

The authors declare no conflict of interest

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REFERENCES

1. Bromet E, Andrade LH, Hwang I, Sampson NA, Alonso J, Girolamo GD, et al. Cross-national epidemiology of DSM-IV major depressive episode. BMC Medicine. 2011;9(1)
2. Silverman MJ. Music therapy and clients who are chemically dependent: a review of literature and pilot study. The Arts in Psychotherapy. 2003;30(5):273–81.
3. Pelletier CL. The Effect of Music on Decreasing Arousal Due to Stress: A Meta-Analysis. Journal of Music Therapy. 2004Jan;41(3):192–214.
4. Maratos A, Gold C, Wang X, Crawford M. Music therapy for depression. Cochrane Database of Systematic Reviews. 2008;
5. Gold C, Voracek M, Wigram T. Effects of music therapy for children and adolescents with psychopathology: a meta-analysis. Journal of Child Psychology and Psychiatry. 2004;45(6):1054–63.
6. Cevasco, A. M., Kennedy, R., & Generally, N. R. (2005). Comparison of movement-to-music, rhythmic activities, and competitive games on depression, stress, anxiety, and anger of females in substance abuse rehabilitation. Journal of Music Therapy, 42(1), 64-80
7. Edwards J. Music therapy in the treatment and management of mental disorders. Irish Journal of Psychological Medicine. 2006;23(01):33–5.
8. Hendricks, C. B. (2001). A study of the use of music therapy techniques in a group for the treatment of adolescent depression. Dissertation Abstracts International, 62(2-A). (UMI No. AAT3005267
9. Ahmad, Mahmood bin. The Magnificence of the Qur'an. Darussalam, 2006.
10. "Quran Helps Relax Heart and Mind | GulfNews.com." Accessed April 23, 2014. http://gulfnews.com/news/gulf/uae/general/quran-helps-relax-heart-and-mind-1.1053605
11. Hixon, Lex. The Heart of the Qur'an: An Introduction to Islamic Spirituality. Quest Books, 2003.
12. Applegate 1995; Schlogl et al. 2002
13. Johanson, D. C. (1996). From Lucy to language. New York: Simon and Schuster, p. 80
14. Gerrard, Paul, and Robert Malcolm. "Mechanisms of Modafinil: A Review of Current Research." Neuropsychiatric Disease and Treatment 3, no. 3 (June 2007): 349–64.
15. Palva, Satu and Palva, J. Matius, New vistas for alpha-frequency band oscillations, Trends Neurosci., 2007 Apr; 30(4):150-8. [CrossRef]
16. Goldman RI, Stern JM, Engel J Jr, Cohen MS (2002) Simultaneous EEG and fMRI of the alpha rhythm. Neuroreport 13: 2487–2492. [PMC free article] [PubMed]
17. Barnwal, Suresh Lal, and Asim Kulshrestha. "The Impact of Nadisodhan Pranayama on Alpha EEG." Quest-The Journal of UGC-ASC Nainital 5.2 (2011): 284-287
18. Kawamura, Ryota, et al. "Simultaneous stimuli of vibration and audio for in-vehicle driver activation." Intelligent Transportation Systems (ITSC), 2011 14th International IEEE Conference on. IEEE, 2011.
19. Kolev V, Başar-Eroglu C, Aksu F, Başar E. (1994). EEG rhythmicities evoked by visual stimuli in three-year-old children. Int J Neurosci. 75(3-4):257-70
20. Zulkurnaini, N.A.; Abdul Kadir, R.S.S.; Murat, Z.H.; Isa, R.M., "The Comparison between Listening to Al-Quran and Listening to Classical Music on the Brainwave Signal for the Alpha Band," Intelligent Systems, Modelling and

Simulation (ISMS), 2012 Third International Conference on , vol., no., pp.181,186, 8-10 Feb. 2012

21. Mudhir Sabir Shekha, Abdul lah O. Hassan. "Effects Of Quran Listening And Music On Electroencephalogram Brain Waves." The Egyptian Society of Experimental Biology 3, no. 1 (2013): 1–7.
22. Fachner, J. & Rittner, S. (2004) Sound and trance in a ritualistic setting visualised with EEG Brainmapping. Music Therapy Today. Vol. V, Issue 2
23. Hixon, Lex. The Heart of the Qur'an: An Introduction to Islamic Spirituality. Quest Books, 2003
24. Knight WE, Rickard NS. Relaxing music prevents stress-induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females. J Music Ther. 2001;38:254–72.[PubMed]
25. María J. Núñez, Paula Mañá, David Liñares, María P. Riveiro, José Balboa, Juan Suárez-Quintanilla, Mónica Maracchi, Manuel Rey Méndez, José M. López, Manuel Freire-Garabal Music, immunity and cancer, Life Sciences, Volume 71, Issue 9, 19 July 2002, Pages 1047–1057