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Quran Virtual Reality Brainstorming Quran Technology-Based Educational Game: "Beautiful Brainwave Mindset" Therapy

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Abstract: Online game addiction causes a fatal impact on the brain, reduces cortical thickness, especially orbitofrontal cortex, and shows gray matter atrophy, bilateral insula, and right supplementary motor area. Quran and virtual reality therapy can be used as effective brainwave therapy, and it can improve cortex function and reduce addiction. This literature review aims to describe the potential of the Quran Virtual Reality Brainstorming (Q ViReBrain) Quran Technology-based educational game as a mindset therapy that affects function and brain waves of online game addiction. The method used is PRISMA; as many as 87 journals, 36 were considered appropriate and used as references. The result is Quran can support cortex function, especially the frontal area, as intelligence association, emotion, and thought patterns. Virtual Reality Therapy can also reduce the Young's Internet Addiction Scale score. The Q ViReBrain has great potential in online game addiction treatment. It has no side effects, can be applied many times, even with other patients and in different cases.

Keywords: brainwave, online game addiction, Quran, virtual reality.

古蘭經虛擬現實頭腦風暴基於古蘭經技術的教育遊戲：“美麗的腦波思維”療法

摘要：網絡遊戲成癮對大腦造成致命影響，減少皮質厚度，尤其是眶額皮質，並表現出灰質萎縮、雙側腦島和右側輔助運動區。古蘭經和虛擬現實療法可以作為有效的腦電波療法，它可以改善皮層功能，減少成癮。這篇文獻綜述旨在描述基於古蘭經技術的古蘭經虛擬現實頭腦風暴教育遊戲的潛力，作為一種影響在線遊戲成癮功能和腦電波的心態療法。使用的方法是系統評價和薈萃分析的首選報告項目；多達 87 種期刊，其中 36 種被認為是合適的並用作參考。結果是古蘭經可以支持皮層功能，尤其是額葉區域，作為智力聯想、情感和思維模式。虛擬現實療法還可以降低年輕人的網絡成癮量表分數。古蘭經虛擬現實頭腦風暴在網絡遊戲成癮治療方面具有巨大潛力。它沒有副作用，可以多次使用，即使是在其他患者和不同情況下也可以使用。

关键词：腦電波，網絡遊戲成癮，古蘭經，虛擬現實。

1. Introduction

A primary and chronic disorder of "brain rewards," brain circuits relativity, motivation, and memory is called addiction. Circuit dysfunction causes biological, psychological, social, and spiritual manifestations. Addiction disorders have cycles of relapse and remission. Without therapy, addiction develops progressively and causes ability to death [1]. The prevalence of online game addiction (OGA) worldwide reaches 2 billion, and 1-10% of gamers worldwide struggle with gaming addiction [2]. The number of smartphone users in Indonesia is estimated to reach 199.2 million users in 2021 [3] per 278 million population, with the number of mobile phones equivalent to 371.4 million users. On average, each person uses more than one cell phone.

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About 5-10% of gadget mania (Nomophobia) are accustomed to touching their gadgets 100-200 times a day [4], meaning a problem of overuse and reduced production time especially studying. In Indonesia, only 27% of children used gadgets recently. Two years later, the number increased to 73%, and 29% already have a personal tablet given by their parents [5].

OGA impacts health, education, and the environment with signs of excessive progressive loss of control over gaming, tolerance, and "dropout" symptoms. AGO belongs to addiction disorders according to DSM-5/ Diagnostic and Statistical Manual of Mental Disorders [6]. This condition requires further investigation, etiological, and clinical factors.

One of the ten most developed medical technologies is virtual reality, 4-dimensional technology designed to interact with their environment. In addition to being used for anxiety therapy, Virtual Reality can be used for psychotherapy, such as cognitive, affective, and psychomotor focused on addiction. So it can be used for immersive treatment and low-cost therapy.

Al-Quran can calm the soul, a combination of peaceful spiritual melodies, specific rhythms that can effectively intervene in psychic problems: stress, irritability, addiction, and improve memory. Al-Quran can also be an antidote/medicine for humans [7]. As contained in the QS Al-Isra 'verse 82: "And We send down from the Qur'an which healing and a mercy for those who believe, and the Qur'an does not add to zalimun nothing but loss" [8].

Therefore, the author provides a solution for people addicted to online games / AGO through a unique way in the form of a Quran-based educational game, the Q ViReBrain. In this way, many people can get creative, innovative, and economic education and motivation. Psychic education and motivation put into the game can be easily and effectively understood with a certain time.

2. Methods

This literature review scientific paper uses the PRISMA (Preferred Reporting Items for Systemic Reviews and Meta-Analyses) method. PRISMA is a literature study based on facts and random data collection. The structure used in this scientific work applies background; target; data source; journal eligibility criteria; participants and interventions; study appraisal and synthesis methods; results; scope of the problem; conclusion and keywords; and bibliography. The introduction includes PICOS (Participant, Intervention, Comparison, Outcomes, and Study design) principles that provide detailed data. The author used PubMed, ScienceDirect, GoogleSchoolar, PloseOne, Nature search engines with keywords: "Brainwave, Online Game Addiction, Virtual reality, Quran." Title and abstract will undergo a scanning process to exclude scientific journals irrelevant to Brainwave, Online Game Addiction, Virtual reality, Quran. Scientific journals that have successfully passed inclusion and exclusion criteria will undergo a re-scan process to find out if there are additional publications regarding Brainwave, Online Game Addiction, Virtual reality, Quran.

In this literature review, the authors used all scientific journals that discuss the analysis of benefits, mechanism of action, and clinical effects of the Q ViReBrain, a Quran-based educational game, as a treatment for children with online game addiction. Scientific journals will undergo an exclusion process if the year of the journal publication has exceeded five years. There are 87 articles or scientific journals that match the topics discussed, but only 36 journals meet the author's inclusion criteria.

3. Results and Discussion

3.1. Effects of AGO on the Brain

Observation of neuron images (neuroimaging) shows functional changes in the brain's response to video games that can activate the "brain reward" system in ordinary game users and AGO. Online games can enhance the dopamine circuitry of MRI observations and positron emission tomography [9]. Functional changes cortical-limbic circuit in MRI examinations of AGO participants. Prolonged playing online games can cause brain damage [10]. AGO causes a decrease in cortical thickness mainly in the orbitofrontal cortex (OFC) and shows atrophy. Gray matter in right OFC, bilateral insula, and right supplementary motor area [11]. OFC and insula dysfunction can be used as neurobiological markers in addictive disorders related to impulse control, cognitive flexibility, and decision making. Patients with AGO experience a neurobiological imbalance related to damage to almost all brain areas except the striatum [12].

The pharmacology of AGO is focused on mood targets conduction and impulses by regulating dopamine or serotonin-related synaptic pathways in the cortico-striatal-limbic circuit using methylphenidate, bupropion, and escitalopram [13].

3.2. Principles of Virtual Reality Therapy

Virtual Reality Therapy (VRT) is a psychotherapy method that uses virtual reality technology. Several studies have shown VRT to be effective in anxiety disorders, phobias, and PTSD [14]. VRT can also be used for addictive drugs treatment: nicotine, alcohol dependence [15]. In addiction therapy, VRT works by regulating neurobiological imbalances in the limbic system. VRT stimulates the limbic system (amygdala and nucleus accumbens) and reduces the dominance of drug response stimulus [16]. With this principle, the VRT program has functions to stimulate nucleus accumbens (dependence association) and amygdala (rejection association), facilitating limbic responses to

"reward" stimuli [17]. AGO shows a decrease in addiction and shows conductivity, problems with mood, and psychiatric symptoms [18].

3.3. Virtual Reality Therapy Educational Game Mechanism

A total of 12 AGO participants and 12 normal/non-addicted people were studied. AGO VRT participants (N=12) and normal people (N=12). Based on the DSM-V clinical structural interview, all participants were previously examined by psychiatry [19]. All participants were evaluated through a game-play pattern interview and had completed a 20-item Young's Internet Addiction Scale (YIAS). Since this study was conducted before DSM-V publication, inclusion and exclusion criteria were based on the latest research on AGO [20]. Inclusion criteria for the AGO group included: (1) age >18 years; (2) online game usage >30 hours per week; (3) disruption/fundamental change in daily habits due to online game overload; (4) maladaptive/distress habits at school and work; and (5) YIAS score >50 points. All AGO participants spend their time playing online games up to >90% of their time online. Game user inclusion criteria: (1) age >18 years; (2) game online playtime <3 days per week and <1 hour per day; and (3) YIAS score <50. Exclusion criteria for both groups: (1) history of axis I mental disorders; (2) suffer from alcohol dependence; and (3) a history of head trauma or other neurologic diseases. Furthermore, participants were asked to fill out an informed consent [21].

For four weeks, the study was carried out, prospective trials, including evaluation of pre-treatment, active treatment (VRT, two times per week), and post-treatment evaluation. All AGO participants underwent brain fMRI scanning before and after the treatment period. Participants who were not addicted were only measured on a clinical scale, and fMRI scans were not included in the treatment group [22].

Individual VRT groups had to complete one pre-interview and eight sessions in 3 steps: (1) relaxation for 5 minutes, (2) simulation of high-risk situations for 10 minutes, (3) reconstruction of cognition with sound for 10 minutes. This phase will be carried out in each session. Virtual reality system has a wide view with stereotypical images, goggles to display images, a separate monitor for an observer, keyboard input, and a computer platform. The VR room consists of 2 separate parts: the operating room and the control room. Participants wearing goggles sit in comfortable and relaxed chairs 2 meters from the operating room. There is another computer for supervision and control in the control room during the VRT session. Instructions and procedures are directed from the control room using a microphone [23, 24].

Pre-interview step for 30 minutes, participants will be asked the most valuable thing in life, the big problem they face caused by excessive online games. Narratives and scenarios were selected for participants' emotional stimulation. Then, participant demographics, photos, and sound files are inputted into the VR program. This file was used for the last VRT session, cognitive reconstruction using sound. The patient is exposed to a relaxation video for 5 minutes in the relaxation step. Participants can choose a video that they feel comfortable with. Participants were directed to enjoy the video as relaxed as possible to restore tension and neutrality at the beginning of each session. Steps to take high-risk situations are given to participants for 10 minutes, such as shooting, playing cards, or leveling up in games. Participants can choose the game situation at this stage [24]. It aims to induce a desire to play games, and a patient does not feel pressured and foreign. In the cognitive reconstruction step with sound, the background is given to increase the stimulus step stage is a high-risk situation aimed to participants not feel confused and unfamiliar with the way of the game. After that, an illustration of online games' negative impact will be shown in the long term, also shown "meaningful things for patient's life and problems they face," such as family photos, decreased academic achievement, interpersonal conflict, job loss, health problems. The microphone's voice leads to talking about problems and the most important things in life, and psychiatry can easily provide good direction and motivation.

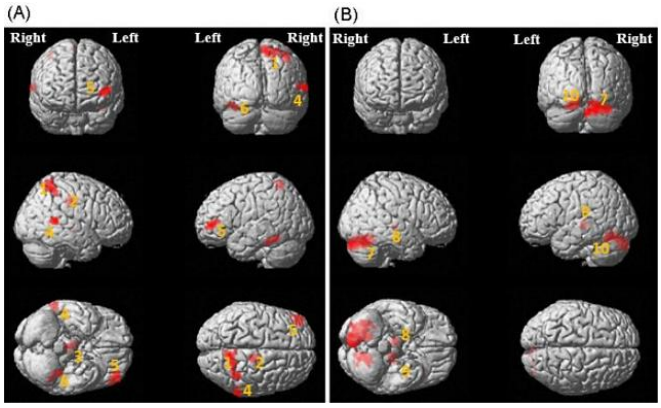

Fig. 1 Functional connectivity/brain FC in PCC triggering other brain areas: (A) normal brain, (B) AGO brain

3.4. PCC/ Posterior Cingulate Cortex: “Pleasure” Trigger Zone

The PCC is closely related to the cortical-limbic circuit and limbic system; these areas play an important role in cognitive control, including visual-spatial and sensorimotor processes. PCC dysfunction is associated with executive function deficiencies, impulsivity, and major/prominent habits or emotional problems [25, 26]. In AGO participants fMRI, connectivity with PCC was positively correlated with AGO severity in percutaneous, thalamus, caudate, nucleus accumbens, and lingual gyrus [27, 28].

Table 1 Demography and clinical characteristic of participants

	CBT group	VRT group	Casual game users	Statistics
Age	24 ± 3.2	23.6 ± 2.7	23.3 ± 2.9	P = 0.77
Years of education	16.7 ± 2.3	16.8 ± 2.8	16.3 ± 2.9	P = 0.95
YIAS	64 ± 11.4	60.8 ± 11.8	28.7 ± 4.9	P < 0.01
BDI	4.5 ± 4.3	8.5 ± 5.5	9.4 ± 3.6	P = 0.76

3.5. Quran Principles in Addiction Treatment

Al-Quran can make the mind and soul calm. As contained in the Quran Surah Ar Ra'd verse 28: "Those who believe and their hearts find peace in the remembrance of Allah. Remember, only with remembrance of Allah is the heart will find peace" [8].

EEG power spectrum has a high alpha band frequency range, frequencies between 8 Hz to 13 Hz on channels P3, P4, and Pz respectively during Quran reading compared to reading a book. In addition, Fast Fourier Transform (FFT) analysis shows that Alpha waves are higher when reading Qur'an than reading books [29, 30]. Reading Qur'an can increase thinking activities that involve emotions and religious activities. Areas that experienced a significant increase occurred in Fp1 (left prefrontal), Fp2 (right prefrontal), and P4 (right parietal) areas. In Fp1 and Fp2 areas, dominant waves that increase are beta, alpha, and theta. While P4, dominant waves increase was experienced by beta, theta, and delta [31-33].

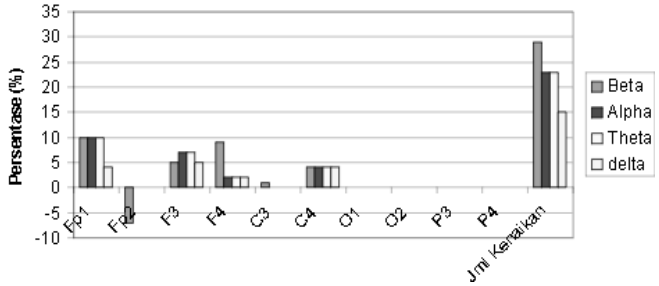

Fig. 2 Changes brain wave on Subject 1

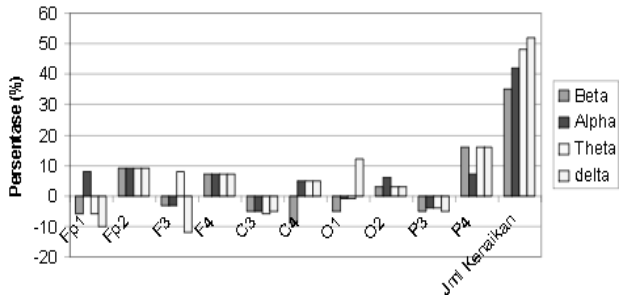

Fig. 3 Changes brain wave on Subject 2

There was an increase in brain waves in subjects 1 and 2, respectively, by 22.5% and 44.5%. In subject 1, the biggest increase was in beta wave at 29%, and the point-producing largest beta wave increase was at Fp1 or prefrontal point, which was 10%. Alpha and theta brain waves also experienced the largest increase at this point when compared to other points, which was 10%. This percentage is the highest when compared to other points. Fp1 is a point in the left prefrontal brain area. In the prefrontal area, the higher function process takes place. In addition, the largest increase in beta, alpha, and theta waves is at the Fp1 point, indicating that higher function activity at the Fp1 point has a higher intensity when compared to other activities and at other points. Because Fp1 is in the thinking area, beta, alpha, and theta waves dominate. In subject 2, the biggest increase is in delta wave, which is 52%, and point produces the largest delta increase at P4 or parietal lobe, which is 16%. Beta and theta brainwaves also experienced the largest increase at this point, by 16% compared to other points. This P4 point is located in the right Parietalis area, which is still a mystery, and some scientists believe this is the point where humans communicate with God. One of the dominant brain waves generated is the theta wave. Theta waves will be generated by the body when the human body is in strong emotion and at the point of highest concentration. These theta waves occur in the human subconscious mind, and all materials related to emotions, both positive and negative, are stored in the subconscious mind [34, 35].

Communication with God is also in this phase. Religious activities such as prayer, meditation generate these waves. Many people say that there is a God Spot in the theta wave. Therefore reading Qur'an may affect the emergence of this wave at point P4 [36].

Fig. 4 Statistic increasing memory on listening Quran

4. Conclusion

The Q ViReBrain has great potential in online game addiction treatment. It does not require much money, has no side effects as pharmacological treatment, and can be applied many times even with other patients and different cases. AGO can cause a decrease in its main work function in the PCC / posterior cyngulated cortex, which plays an important role in cognitive control, including visual-spatial and sensorimotor processing. In Quran therapy, FFT shows that Alpha waves are higher when reading Qur'an than reading books. The area that has significant increase occurred in Fp1 (left prefrontal), Fp2 (right prefrontal), and P4 (right parietal) areas. Prefrontal area as a continuation of higher function process, there were waves significant increase. Virtual reality therapy resulted in decreased YIAS scores and increased brain function. So, this technology has proven to decrease addiction, stabilize

mood, psychiatric symptoms. It also positively impacts to lingual gyrus, caudate, thalamus, and percutaneous. Thus, The Q ViReBrain can be used as addiction therapy, especially online games, in the future without forgetting to innovate and develop more effective methods.

5. Further Study

Further development and research of Quran technology are needed at a higher level to assess its effectiveness in certain cases of patients and cases of other addictions. It is hoped that with sufficient scientific evidence and research, The Q ViReBrain Quran-based educational game can be a more effective choice of online game addiction therapy.

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