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The Effect of External Electromagnetic Waves During REM Sleep on Brain Electrical Activity and Neurotransmitter Balance Understanding Schizophrenia.

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Abstract. This Schizophrenia is one of the most complex disorders because of its negative symptoms such as (apathy, withdrawal, difficulty in thinking, weak communication, …) and positive symptoms such as (delusions, hallucinations, paranoia, …). Previous research has focused on the factors behind these symptoms, whether genetic, environmental, or due to disturbances in neurotransmitters such as dopamine, which is well known to be associated with schizophrenia.
With the increase in the number of schizophrenia cases (both negative and positive symptoms), it becomes clear that there are neglected factors that must be focused on.
I assumed two hypotheses:
1- The first hypothesis: the natural decrease of noradrenaline during the REM (Rapid Eye Movement) stage causes high brain activity, which weakens protection and increases the brain's susceptibility to external electromagnetic waves, leading to disturbances in neurotransmitters and brain waves.
2- The second hypothesis: I propose the existence of superficial venous influence windows that allow the entry of external electromagnetic waves into the brain.
This study is considered a preliminary pilot study focusing on patients with schizophrenia and also individuals with negative or positive psychotic symptoms. The sample was expanded to help the study obtain initial results.
I also propose an innovative solution: a wearable device during sleep, AsmaSync REM , which works on brain protection, detecting harmful waves, and correcting brain wave disturbances with the aim of strengthening non-drug treatments in the future.
Keywords: REM sleep , Brainwaves , Schizophrenia , Psychosis , AsmaSync REM , Electromagnetic Fields

1. Introduction

Despite the great progress in neuropsychology and the abundance of research on schizophrenia, it is still considered one of the most complex disorders because of its unclear dimensions. Many previous studies have considered neurotransmitter dysfunction as a main factor in the occurrence of schizophrenia, and other studies have focused on genetic factors.
But I believe it is not limited to neurotransmitter dysfunction or genetic predisposition; rather, it may also involve the Rapid Eye Movement (REM) sleep stage.
During REM sleep, noradrenaline levels naturally decrease, leading to high brain activity and reduced brain protection. This may increase the susceptibility to environmental electromagnetic waves.
In this study, I present the hypothesis of the existence of superficial venous influence windows as potential biological gateways for these waves to enter the central nervous system.

The hypothesis is further grounded in a philosophical–topological perspective that redefines schizophrenia not solely as a chemical imbalance, but as a structural disturbance in holistic perception. Based on this, the study proposes a novel scientific vision in which schizophrenia-related dysfunctions are not only diagnosable but potentially modifiable through intelligent, precision-based technological interventions—specifically, the AsmaSync REM device, designed to correct the electrophysiological imbalance in brainwaves.

In the future, the researcher plans to expand this project to develop targeted interventions for Alzheimer's patients, reflecting the broader potential of this scientific initiative.

2. Materials and Methods

A descriptive–exploratory cross-sectional design was adopted to analyze the potential relationship between exposure to external electromagnetic waves during REM (Rapid Eye Movement) sleep and disturbances in brain electrical activity and neurotransmitter balance among individuals with schizophrenia.

In the initial phase, EEG will be used as the physiological tool, alongside validated clinical measures (PSQI, PANSS, and the medical history form).

It should be noted that the procedures described in this section represent a future plan for experimental data collection and have not yet been implemented at this stage. The researcher has obtained approval from the Ministry of Health Institutional Review Board (IRB), which strengthens the feasibility of moving toward practical application in the future.

Data will be analyzed using SPSS (means, standard deviations, frequencies, correlation coefficients, and appropriate statistical tests). EEG data may also be analyzed with specialized software such as EEGLAB, in collaboration with experts.

A brief outline of the main tools proposed for the future study is as follows:

- Pittsburgh Sleep Quality Index (PSQI): to assess sleep patterns and quality.
- Positive and Negative Syndrome Scale (PANSS): to evaluate the severity of schizophrenia symptoms.
- Medical history form: designed to exclude participants with chronic diseases, prior brain injuries, or medications that may affect brain electrical activity; this will be reviewed by the medical team to ensure research safety.
- EEG recording: to document brain activity during REM sleep, while ensuring a suitable and comfortable environment for participants.

3. Results

3.1. Subsection - Results

3.1.1. Subsubsection - Findings from Previous Studies

As this paper represents an initial exploratory phase, no direct experimental data have yet been collected. However, it draws upon findings from previous studies on individuals with schizophrenia, which have revealed abnormal patterns in brain electrical activity during the REM (Rapid Eye Movement) sleep stage:

- A marked reduction in gamma and theta waves, particularly in the frontal and central regions.
- A prominent appearance of delta waves in the central–parietal areas.
- Increased beta wave activity in the frontal lobe and central regions, which may reflect hyperarousal or dysregulation within cognitive neural networks.

These findings suggest a potential link between disrupted brainwave balance and neurotransmitter dysfunctions (such as dopamine and acetylcholine), and the severity of clinical symptoms in schizophrenia.

This evidence supports the hypothesis that exposure to electromagnetic waves during REM sleep, possibly via superficial venous influence windows, could disturb the brain's electrical–chemical equilibrium.

This hypothesis will later be tested experimentally using EEG, EOG, and EMG devices on a sample of 15 to 20 participants to analyze the relationships between sleep patterns, brainwave oscillations, and levels of environmental exposure.

3.2. Figures, Tables and Schemes

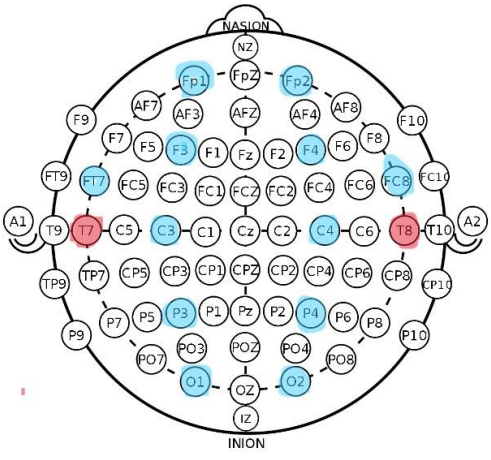
Figure 1. Theoretical map of electrode distribution affected during REM sleep in individuals with schizophrenia, according to the model proposed in this study.

Table 1. Theoretical distribution of expected brainwave patterns during REM (Rapid Eye Movement) sleep in patients with schizophrenia, based on the research hypothesis prior to data collection.

Wave Type	Wave Description	Region
Gamma	High Activity	T3-T4
Theta	High Activity	T3-34

[1] The T3–T4 region was selected due to the recurrent documentation of abnormal activity in this area among patients with schizophrenia, as reported in multiple studies. This makes it a strong candidate for hypothesis testing during the data collection phase.

Description: EEG electrode map based on the international 10–20 system, indicating the frontal, temporal, parietal, occipital, and central regions.



	Beta		Gamma عشوائية	Fp1 -Fp2
	Beta		Gamma غير مستقرة	F3 – F4
	Beta		Gamma	C3 – C4
			Gamma مصطربة	P3 – P4
		Theta	Gamma	O1 – O2
	Beta		Gamma	T3 - T4
	Beta		Gamma غير منتظمة	Fz
	Beta		Gamma متذبذبة	Cz
			Gamma	Pz
		Theta	Gamma	Oz
Delta	Beta	Theta	Gamma	Cp3 -Cp4
Delta	Beta	Theta واضحة	Gamma	Ft7 – Ft8

(**a**) (**b**)

Figure 2. (A) A map illustrating the EEG electrode positions used in the study based on the international 10–20 system, indicating the regions where wave disturbances have been previously observed. (B) A graphical representation of abnormal wave distribution patterns as reported in

previous studies on patients with schizophrenia.

Table 2. Patterns of brain electrical activity across EEG regions based on a review of prior studies involving individuals with schizophrenia.

Wave Type	Region	Wave Description	Note
Beta	C3-C4	High Activity	Hypervigilance or Anxiety.
	T3-T4	High Activity	Possible Auditory Hallucinations.
	FT7-FT8	High Activity	Impaired Emotional Response Inhibition.
Delta	CP3-CP4	High Activity	Sensory Processing Dysfunction.
	FT7-FT8	High Activity	Fronto-Temporal Connectivity Disruption.

* CP3 and CP4 may exhibit localized spikes as an abnormal response to the brain's attempt to process sensory or somatic imbalance.
This phenomenon is known as "paradoxical delta" — a compensatory delta activity that sometimes appears in individuals with schizophrenia as a response to disrupted brainwave balance. However, it should not be interpreted as a sign of healthy deep sleep.
Previous studies have shown that the T3–T4 region consistently displays abnormal activity in beta, gamma, and theta waves in individuals with schizophrenia, which supports the current study's Hypothesis.

4. Discussion

Although this study remains in a descriptive–theoretical stage, the future plan includes collecting experimental data using EEG alongside validated clinical measures (PANSS and PSQI), to enhance the accuracy of REM sleep staging. The researcher has obtained approval from the Ministry of Health Institutional Review Board (IRB), which supports the future transition from the theoretical framework to practical

application under formal and ethical regulations. This prospective direction strengthens the hypothesis and opens the way for developing an innovative approach to understanding the mechanisms of schizophrenia and potentially establishing non-pharmacological therapeutic solutions in the future.

Furthermore, the study introduces a future research extension that could be directed toward investigating other conditions such as Alzheimer's disease, particularly regarding the impact of NREM sleep on slow-wave activity and cognitive decline, which may broaden the applicability of the proposed model to neurodegenerative disorders.

5. Patents

The proposed device in this study, AsmaSync REM, is an innovative concept that has not yet been manufactured and remains in the theoretical development and initial design phase. The device is not part of a clinical trial and has not been tested on participants to date; rather, it represents a proposed technological model derived from the study's findings, with plans for future development in collaboration with a specialized engineering entity.

The researcher aims to register this innovation as a future patent, with manufacturing to be carried out later by an external implementing party under technical and engineering supervision, while the researcher retains all intellectual and conceptual rights related to the functional model**.**

Author Contributions: Asma Mohammed Felemban: Original idea, conceptual framework development, hypothesis formulation, theoretical model construction, literature review, study design, selection of research tools, preparation of tables and figures, drafting of the initial manuscript, formatting and structuring of the scientific paper, design of the proposed innovation, writing of the invention section, communication with the Research Ethics Committee, and preparation of conference submission requirements.

Funding: his research did not receive any external funding. The project was conducted through individual effort with the aim of presenting at the conference and supporting research-based innovation. Potential partnerships may be explored in later stages for the development of the proposed innovation.

Institutional Review Board Statement: This research was submitted to the Research Ethics Committee at the Ministry of Health in Jeddah for ethical approval to be conducted within the hospital setting. The application is currently under review. A supporting certificate from the NCBE has been attached by the researcher. There is currently no supervisory affiliation, as the entire study design and documentation were independently developed by the researcher.

Informed Consent Statement: Written informed consent will be obtained from all participants prior to data collection. The purpose of the study, procedures, and participants' rights—including confidentiality and the right to withdraw at any time—will be clearly explained. All collected data will be used for scientific research purposes only.

Data Availability Statement: No data has been collected yet for this study. Once data collection and analysis are completed, the data will be securely stored and documented. The dataset will be made available upon request for scientific research purposes only, with strict adherence to participant confidentiality.

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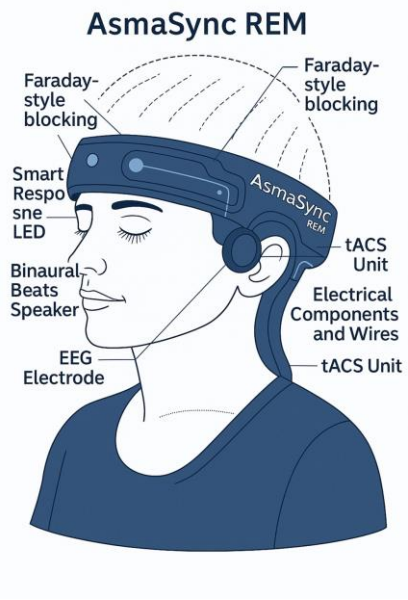
Conflicts of Interest: : The author declares that there is no conflict of interest related to this research work.

Appendix:

Appendix A: Conceptual Diagram of the AsmaSync REM Device



This diagram illustrates the conceptual design of the AsmaSync REM device—a smart, wearable device intended for use during the Rapid Eye Movement (REM) sleep phase.

The device integrates electromagnetic field (EMF) sensors,

electroencephalography (EEG) electrodes, transcranial alternating current stimulation (tACS) units, internal speakers for binaural beats, a smart response LED system, and embedded electrical components.

This illustration is for research purposes only. Some technical details have been deliberately omitted to preserve intellectual property rights

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