Neural Correlation of Faradarmani Consciousness Field Mind Mediation: A Comparative Functional Connectivity and Graph analysis

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ABSTRACT

The study of the brain networks using analysis of electroencephalography (EEG) data based on statistical dependencies (functional connectivity) and mathematical graph theory concepts are common in neuroscience and cognitive sciences for examinations of patients and healthy individuals. Taheri Consciousness Fields and their applications in the optimization of the systems under study have been investigated in various studies. In this study, we examined the results of applying the Faradarmani Consciousness Field (CF) in the Faradarmangars' brain (a certified and trained individual who has been entrusted with the TCFs). According to Taheri, the effects of Faradarmani CF are initiated through Faradarmangars' minds. For this purpose, the functional and effective connectivity, and the corresponding brain graphs of EEG from the brains of a group of Faradarmangar are compared with that of non-Faradarmangar groups during Faradarmani CF Connection. According to the results, the brain of the Faradarmangars showed a significantly decreased activity in delta (BA8), beta2 (BA4/6/8/9/10/11/32/44/47), and beta3 (in 34 of 52 BA) frequency bands, mainly in the frontal lobe and after that in parietal and temporal lobes in comparison with the non-Faradarmangars. Moreover, the frontal network's functional and effective connectivity analysis showed dominant multiple decreased connectivity, mainly in the case of the beta3 frequency band in all parts of the frontal network. On the other hand, the graph theory analysis of the Faradarmangar brain indicated an increase in the activity of the O2-T5-F4-F3-FP2-F8 areas and a significant decrease in the characteristic path length and increases in global efficiency, clustering coefficient and transitivity. In conclusion, the unique higher graph function efficiency and the reduction in the brain activity and connectivity during the Faradarmani CF mind mediation showed the human brain's passive and detector-like function in this task.

Keywords: brain graph; EEG; Faradarmani Consciousness Field; Taheri Consciousness Fields, functional connectivity

INTRODUCTION

The nature of consciousness and understanding of its mechanism has been one of the most challenging topics in neuroscience and cognitive science in the last and current century. Many philosophical and scientific theories have been proposed in this area. Whether the source of consciousness is viewed to be from within the brain or as a result of events outside the brain (Chalmers, 1995), the study of brain function during various activities or in the different health and disease conditions is possible through the use of other methods.

In the 1980s, Mohammad Ali Taheri introduced novel fields with a non-material/non-energetic nature named Taheri-Consciousness Fields (TCFs). In this perspective, T-Consciousness is one of the three existing elements of the universe apart from matter and energy. According to this theory, there are various TCFs with different functions, which are the subcategories of a networked universal internet called the Cosmic Consciousness Network (CCN). The major difference between the theory of TCFs and other theoretical concepts about consciousness is related to the practical application of the TCFs. TCFs can be applied to all living and non-living creatures, including plants, animals, microorganisms, materials, etc.

Mohammad Ali Taheri, the founder of Erfan Keyhani Halqeh, a school of thought, introduced a new science in 2020 as a branch of this school. He coined the term Sciencefact for this new science because it utilizes scientific investigations to prove the existence of T-Consciousness as an irrefutable phenomenon and a fact. Although science focuses solely on the study of matter and energy and Sciencefact, by contrast, explores the effects of the [non-material/non-energetic] TCFs, Sciencefact has provided a common ground between the two by conducting reproducible laboratory experiments in various scientific fields, and it has used the scientific approach in proving TCFs.

The influence of the TCFs begins with the Connection between CCN as the Whole Taheri Consciousness of the universe and the subjects of study as a part. This Connection called "Ettesal" is established by a Faradarmangar's mind (a certified and trained individual who has been entrusted with the TCFs). The human mind has an intermediary role (Announcer) which plays a part by fleeting attention to the subject of study and then the main achievement obtained as a result of the effects of the TCFs. These fields cannot be directly measured by science, but it is possible to investigate their effects on various subjects through reproducible laboratory experiments (Taheri, 2013).

The research methodology in the study of T-Consciousness has been founded on the process of Assumption, Argument, and Proof, in which the basic Assumption is: The Cosmos was formed by a third element called T-Consciousness that is different from matter and energy.

The Argument: The existence of TCFs can be demonstrated by their effects on matter and energy (e.g., humans, animals, plants, microorganisms, cells, materials, etc.)

The Proof is the scientific verification of the effects of TCFs on matter and energy (according to the Argument) through various reproducible scientific experiments.

Accordingly, to investigate and verify the existence, effects, and mechanisms of TCFs, the following five research phases (Phases 0 through 4), and the aims of each phase are outlined below.

Phase-0 studies aim to prove the existence of TCFs by observing their effects. The nature of

T-Consciousness and what it is will not be addressed in this phase. Phase-1 explores the varied effects of different TCFs. Phase-2 examines the reason behind the varied effects of these fields. Phase-3 investigates the mechanism of TCFs effects on matter and energy. Finally, Phase-4 draws significant conclusions, particularly with regard to the mind and memory of matter and their relation to the T-Consciousness, etc.

This study analyzed *EEG* data of Fradarmangars and non-Faradarmangars, based on statistical dependencies (functional connectivity) and mathematical graph theory concepts to evaluate their brain neuronal correlation during Faradarmani CF. Various methods such as fMRI (functional magnetic resonance imaging), PET (positron emission tomography), EEG (electroencephalography), MEG (magnetoencephalography), TMS (transcranial magnetic stimulation), or a combination of these methods can reveal dimensions of brain function (Hecht and Stout, 2015), each with different strengths and weaknesses.

Among these methods, EEG has a higher temporal resolution than PET or fMRI, and resultant data can be time-locked to stimuli and responses on a millisecond scale. In this method, voltage fluctuations can be detected at the scalp; it is caused by the aggregate electrical activity of large numbers of neurons closely beneath the scalp. Moreover, oscillations filtered into different frequency bands, and the relative power of the bands can be compared for various stimuli (Hecht and Stout, 2015). In this way, the effects of various stimuli, also called tasks, can be measured with high accuracy and compared with the baseline state (rest or without stimulus).

Various analyses are performed on EEG data to obtain comprehensive information about each activity and the related brain processes. Measurements are based on the criterion that the human brain is organized along with two fundamental principles, functional segregation, and functional integration (Friston, 2002). In the functional segregation principle, the cerebral cortex, as a non-homogeneous entity, can be subdivided into regionally distinct modules in structure (brain anatomy) and function (processing of specific stimuli). On the other hand, the functional integration principle emphasizes the concept that no brain region is by itself sufficient to perform a particular cognitive process and a dynamic interplay and exchange of information between different regions of the brain is necessary. This principle is used in functional connectivity studies that explore the temporal coincidence of spatially distant neurophysiological events (Friston, 1994) in specific stimuli with the aim of finding the related brain network.

The most recent analysis of brain connectivity criteria that explores the organization of brain network patterns is graph theory. In a graph-based analysis of the EEG signals, the stationary behavior of EEG signals is obtained and explained while they cannot be achieved by other linear analysis methods (Ismail and Karwowski, 2020). In this regard, the use of graph theory represents distinctive characteristics of healthy and diseased patients such that it provides remarkable evidence about pathophysiological processes underlying related brain disconnection (Vecchio et al., 2017).

According to the Faradarmani CF theory, the human brain can manifest the effects of such connection in the role of a powerful detector, (Taheri, 2014). The study of the electrical behavior of Faradarmangars' brains during Faradarmani Connection was performed in a previous study (Taheri et al., 2020[a]).

In this study, we aim to investigate the differences in the Faradarmangars' brains compared to other persons under the Fadarmani CF connection. For this, we examined the electrical behavior of the Faradarmangars' brain compared to the non-Faradarmangars' brain. The Faradarmangars' brain EEG data were analyzed based on the functional effective connectivity and graph theory to demonstrate distinctive features of the Faradarmangars' brain network during the Faradarmani CF Connection.

METHODS

This study is designed to investigate and compare the effects of Faradarmani CF on EEG features as a biomarker of brain function in two different groups. We recruited 45 Faradarmangar (33 women and 12 men, in the age range of 20-50 years, M = 34.5, SD = 7.10) and 15 non- Faradarmangars (11 women and 4 men, in the age range of 20-50 years, M= 34.3, SD= 5.90).

Faradarmani CF application

In order to apply Faradarmani CF, two procedures were implemented. First, in the Faradarmangar group, each person announces the Faradarmani CF for themselves (here named the announcement process). An announcement is a process in which Taheri, or any certified announcer can declare and send the information of subjects under the study to the Cosmic Consciousness Net-

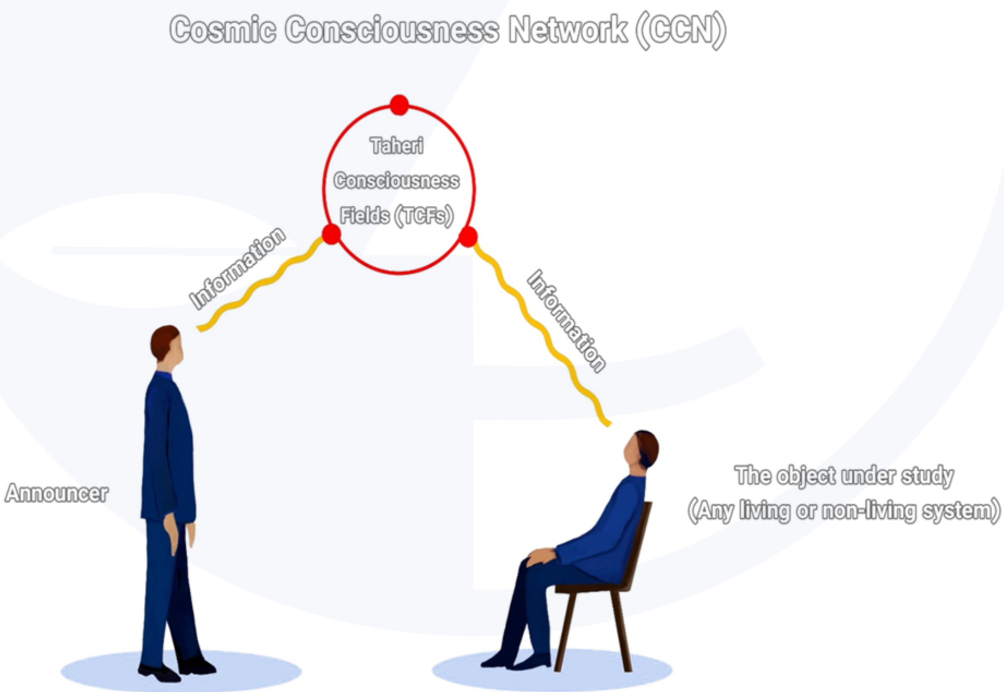

Figure 1. Announcement and Connection between the subject of study and the Cosmic Consciousness Network (CCN) through TCFs.

work by just recalling their names at the agreed time. The subject under study can be any individual willing to experience the CCN Connection. In the first procedure within the Faradarmangar group, the subject is the announcer. Second, in the non-Faradarmangar group, each person received the Connection via a Faradarmangar (figure 1). Here, the subject is non-Faradarmangar.

EEG activities were recorded by means of a 19-channel device in rest and task conditions. In the rest condition, the subjects' eyes were closed without performing any tasks. In the task condition within the Faradarmangar group, the subject was asked to start the Faradarmani Connection with its condition. On the other hand, in the task condition of the non-Faradarmangar group, a Faradarmangar states the Connection between the subject under study (a non-Faradarmangar person) and the CCN (figure 1).

Connecting to CCN is a process that is available to everyone 24 hours a day, anywhere in the world by following Cosmointel's instructions. In fact, for any study or experience using the TCFs, re-searchers must register on the COSMOintel Web-site (www.cosmointel.com). Once registered, they can go to the researcher/connection experience section and fill out a form. In order to study or experience the Connection at any given time and place, the researchers or volunteers simply need to introduce the testing center or the person to the guidance center. It should be noted that registration on the website is necessary, and requesting an announcement is free.

EEG assay

All volunteers in the present study were seated comfortably in a sound and light attenuated room.

EEG data were collected during approximately 15 minutes or more of closed-eyes task/rest by means of a 19-channel device (EEGR 19-26, Medi-com company, Russia). The data processing and analysis steps are the same as those of the aTaheri et al. (2020) study.

EEG-source localization analysis

eLORETA was applied to estimate the cortical electrical activity from the surface EEG data (Pascual-Marqui, 2007; Pascual-Marqui et al., 2011). A single nearest voxel was selected for defining the ROIs from seed points. The calculation of intracranial spectral density from purified EEG was carried out by eLORETA software with a resolution of 1 to 80 Hz. eLORETA functional images of spectral density were estimated for eight frequency bands: delta (1.5-4 Hz), theta (4–8 Hz), alpha 1 (8–10 Hz), alpha 2 (10–13 Hz), beta 1 (13–21 Hz), beta 2 (21–30 Hz), beta 3 (31-40 Hz) and gamma (40-80 Hz).

The significant differences between cortical voxels and comparisons were measured by statistical nonparametric mapping (SnPM) via randomization, which determined the critical probability threshold values for the observed t-values with corrections for multiple comparisons across all voxels and frequencies. This methodological capability exists within the eLORETA software. The methodology is based on fisher's permutation test (Nichols and Holmes, 2002). A total of 5,000 permutations was used to determine the significance of each randomization test. T-level thresholds corresponded to statistically significant thresholds ($p<0.05$ and $p<0.01$). T-level thresholds and the correspondent p values were provided after applying the correction for multiple comparisons (Canuet et al., 2011; Imperatori et al., 2016).

Functional and effective connectivity analysis

The whole-brain Brodmann areas (BAs) were provided by eLORETA software based on the Talairach Daemon (http://www.talairach.org/), which was selected for calculation of functional and effective connectivity. Lagged phase synchronization (LPS) was used as a measure of nonlinear functional connectivity.

Graph analysis

The graph analysis was calculated by the BRAPH toolbox (Mijalkov et al., 2017). Using this toolbox, the brain atlas and the cohort of subjects, as well as connectivity matrices were defined by selecting weighted undirected graph analysis capabilities. After uploading the Talairach functional atlas in BRAPH, EEG data were imported into the software. In this way, the nodes of the network were defined. This toolbox calculates edges representing the relationship between nodes by means of weighted undirected brain connectivity. The differences between the two groups at nodal and global levels were analyzed by non-parametric permutation (=1,000) tests.

RESULTS

We investigated the differences in the brain be-havior of Faradarmangars compared to non-Fara-darmangars in the present study. Considering the Faradarmangars mind mediation during commu-nication with TCFs such as Faradarmani CF, we measured and compared the brain activity of the Faradarmangar and non-Faradarmangar groups in the task state (Faradarmani Connection). For simplification, the Faradarmangar and the non-Faradarmangar group's brain activity during the Faradarmani CF connection task is named ex-perimental and control conditions, respectively.

Local assay comparison

The frequency bands with decreased activity obtained from task EEG data that show the differ-ences of the experimental and control groups and respective brain areas are shown in Table 1. As can be seen in Table 1, in the experimental group task, there is a significant decrease in activities of delta, beta 2, and beta 3

Table 1. Frequency bands with a significantly decreased activity show the differences between the experimental and control group's tasks and the related details (p value<0.001, threshold 1.19).

Frequency	X (MN)	Y (MN)	Z (MNI)	BA	Lobe*	Structure*
Delta	-35	20	50	8	Frontal	Middle Frontal Gyrus
	-40	20	50	8	Frontal	Middle Frontal Gyrus
	-35	25	50	8	Frontal	Middle Frontal Gyrus
Beta 2	148 coordinates in BA regions*: 10 (54), 11(62), 32(1), 4(1), 44(1), 47(3),6(7), 8(12), 9(7)				Frontal (147) Parietal (1)	Anterior Cingulate (1) Inferior Frontal Gyrus (8) Medial Frontal Gyrus (20) Middle Frontal Gyrus (45) Orbital Gyrus (6) Precentral Gyrus (11) Rectal Gyrus (4) Superior Frontal Gyrus (53)
Beta 3	2079 coordinates in BA regions*: 10 (134), 11 (228), 13 (135), 18(6), 19(59), 2(5), 20(109), 21(105), 22(89), 24(1), 25 (19), 27(2), 28(19), 32(36), 34(15), 35(13), 36(30), 37(96), 38(126), 39(29), 4(6), 40(165), 41(26), 42(19), 43(12), 44(51), 45(58), 46(43), 47(210), 5(8), 6(43), 7(1), 8(49), 9(132)				Frontal (905) Limbic, A (36) Limbic, I (1) Limbic, P (69) Limbic, P (35) Occipital (64) Parietal (179) Sub-lobar, Ext (10) Sub lobar, Ins (111) Temporal (587)	Fusiform Gyrus (86) Inferior Frontal Gyrus (1) Inferior Temporal Gyrus (75) Insula(1) Middle Temporal Gyrus(147) Sub-Gyral (11) Superior Temporal Gyrus (240) Supramarginal Gyrus (8) Transverse Temporal Gyrus (18)

* Number in the parenthesis demonstrates the frequency of each case in all coordinates.

waves compared to the control group task. The brain regions associated with the reduced activity of these three waves (mentioned in Table 1) are shown in Figure 2.

Functional connectivity analysis

The temporal coincidence of spatially distant neurophysiological events in the brain of control and experimental groups were measured and compared based on connectivity in the frontal net-work of the experimental task and control task, as shown in Figure 3 and Table 2.

The connectivity differences in the delta, theta, beta1, and gamma frequency bands between the two groups of the study are not significant. Moreover, as shown in Table 2, and Figure 3, the only case of increased connectivity is the alpha 1 frequency band and the most decreased connectivity between different frontal brain regions can be seen in the case of the beta 3 frequency band.

Effective connectivity results

In order to determine the changes in the direction of information transfer in different parts of the frontal network in the experimental task and

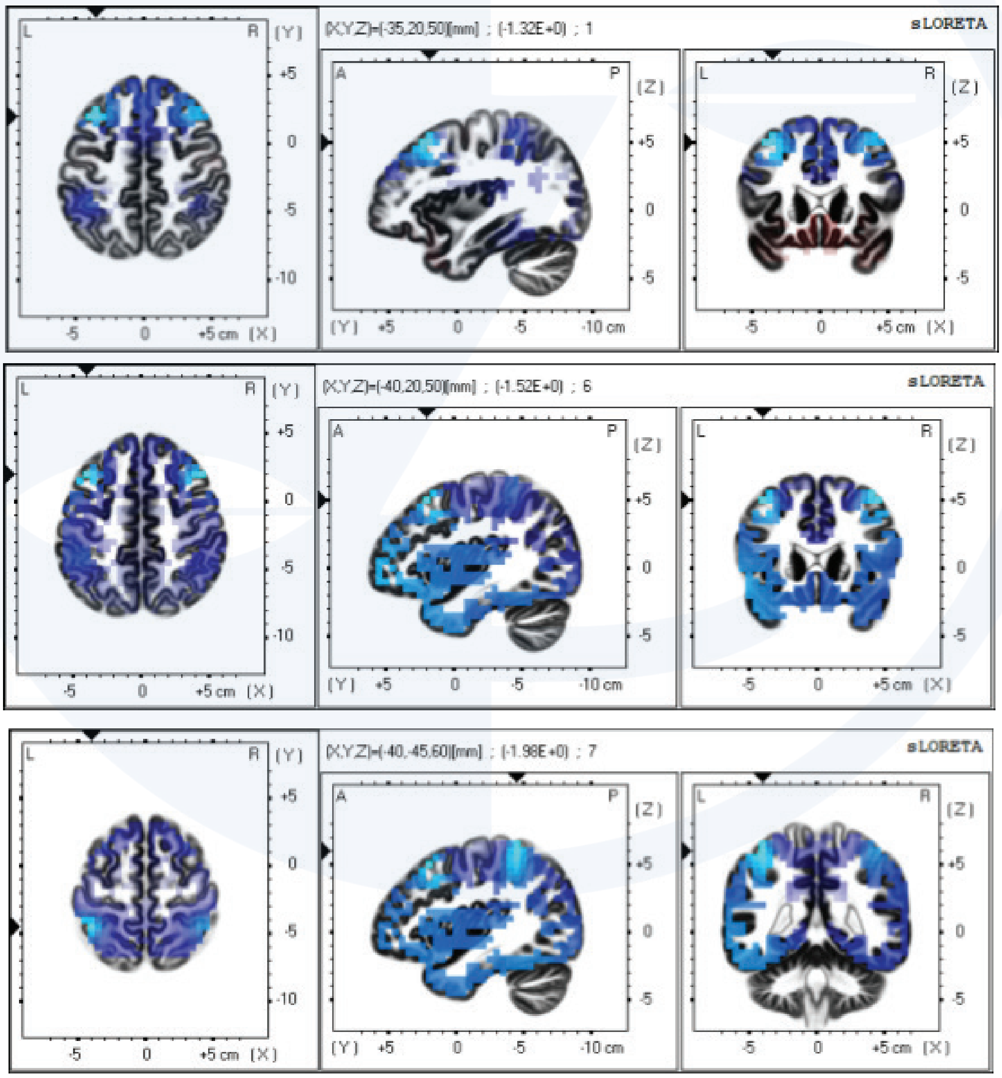

Figure 2. The transverse (left), sagittal (middle) and coronal (right) view of Faradarmangars' brain regions with decreased activity (in comparison with control) in (a) delta. (b) beta2 and (c) beta3 frequency bands during FCF connection.

Table 2. Changes in the connectivity between different regions of the frontal brain network of Faradarmangars in comparison with non Faradarmangar (p-value<0.05, threshold=2.06).

Frequency band	Related regions	Change in the connectivity
Alpha1	rSFG-ACC	Increase
Alpha2	rSFG-ACC rSFG-lMFG rSFG-LSFG	Decrease
Beta 2	LSFG-ACC LSFG-LmFG	Decrease
Beta 3	All parts of the frontal network	Decrease

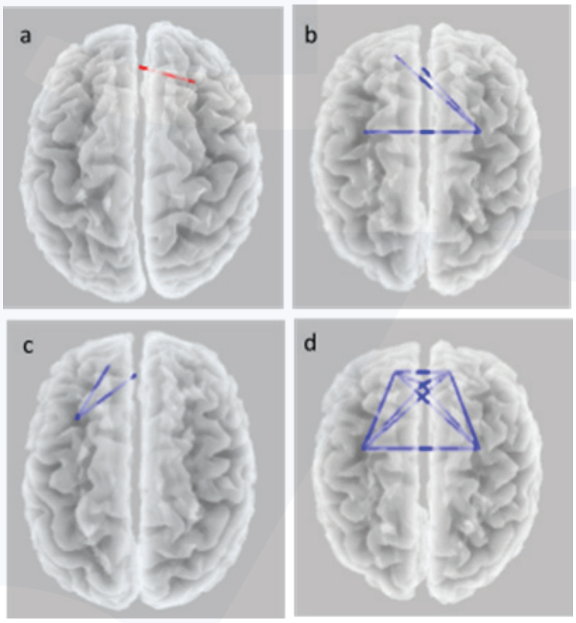

Figure 3. Increased (red) and decreased (blue) communication differences between the experimental group in comparison with control group in various regions of different frequency bands (a) alpha 1; (b) alpha 2; (c) beta 2, (d) beta 3.

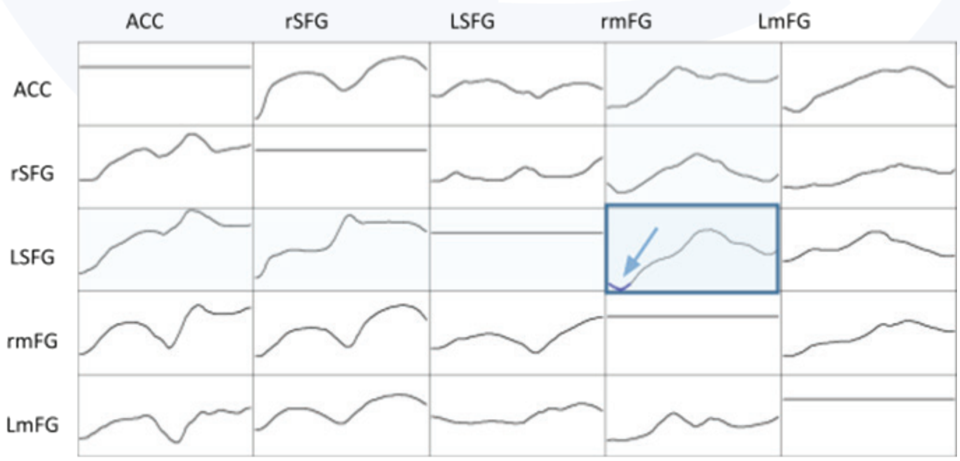

Figure 4. The changes in the effective connectivity matrix of the frontal network in the experimental group and control group showed reduced information flow between the highlighted area in the case of the delta band (blue arrow) (p-value= 0.022, threshold=2.1).

control task groups, we examined effective connectivity, as shown in Figure 4. The results suggest that only the delta wave frequency band had a reduced information flow from rmFG to LSFG regions (between the left and right cerebrum) in the experimental group compared to the control group.

Graph analysis

Graph analysis of the experimental group's brain activity in comparison with the control group can be seen in Table 3 and Figure 5.

For the global network topology, results show a significant decrease in the characteristic path length and an increase in global efficiency, clustering coefficient, and transitivity in the experimental group compared with the control. At the regional level, the nodal degree was significantly different between the two groups. The normal functional network as a small-world architecture is characterized by a high clustering coefficient (index of functional segregation) between neighboring nodes and short path length (index of functional integration) between any pair of nodes. In other words, there must be a suitable balance between local specialization and global integration.

As can be seen in Figure 5, the activity of the O2-T5-F4-F3-FP2-F8 areas in the experimental group is more than the control group. In fact, the areas in the experimental group have the most contact with their neighboring areas.

Table 3. The main characteristics of the Faradarmangars brain graph during Faradarmani CF connection in comparison with the control.

Measure	Experimental	Control	difference	p(1-tailed)
Char. path length	2.0854	2.3921	-0.3067	0.005
Global efficiency	0.5696	0.5092	0.0603	0.005
Local efficiency	1.4695	1.1839	0.2855	0.004
Clustering	0.518	0.4329	0.0851	0.001
Transitivity	0.7759	0.6494	0.1265	0.002

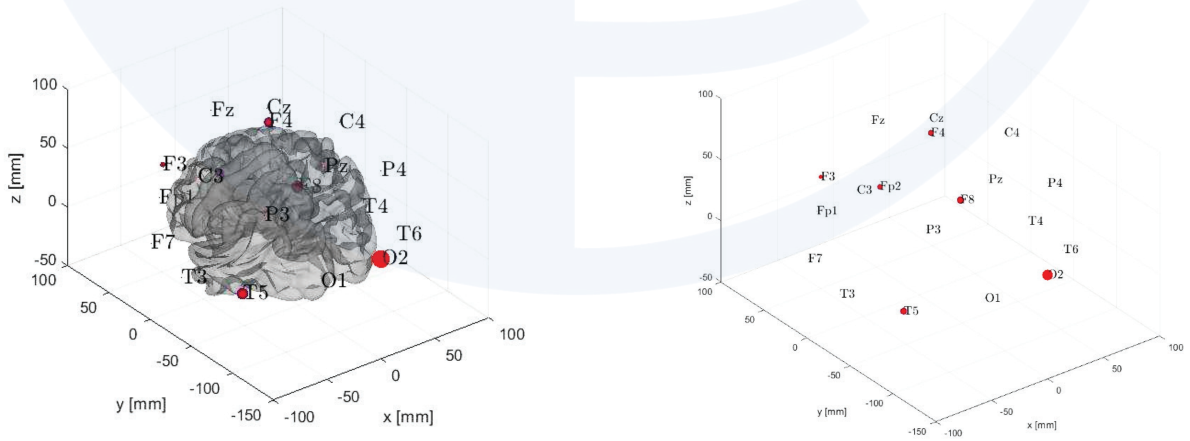

Figure 5. Graph analysis that indicates increased activity (in comparison with the control group) in the marked area in the experimental group.

DISCUSSION

The study of brain activity is of great importance in consciousness research. Studies that have been done in this category to date measure brain activity during specific tasks in cognitive science, behavioral sciences, and neuroscience. Although both groups were in the Connection with CCN; the Faradarmangars group were announcers, who established the Connection for themselves; however, the control group received the Connection. The significant difference between the brain's activity of both groups represents the mind mediation role of the Faradarmangar group. Due to the functional role of the Faradarmangar's mind as a mediator in the onset of TCFs Connection, their brain's activity was compared with the brain's activity of non-Fararmangars (as control) under the same conditions with the aim of observing possible represented differences due to the effects of this role at the brain level.

In Taheri's theory, the human brain is like a detector in relation to the Faradarmani CF, and a result of this connection is to repair the system under treatment. To begin this Connection, the presence of a person in the role of Faradarmangar is required. Previously, in a study conducted by the authors of this article, the electrical activity of the brains of Faradarmangars has been studied (Taheri et al., 2020a). In the Taheri et al. (2020a) study, there was an increase in the gamma frequency band in the fronto-parietal and DMN regions of the brain in Faradarmangars in comparison to control. Since connection with the TCFs is possible for all humans through the Faradarmangars, the effects were interpreted in both "subjects connected via Faradarmangar " and "Faradarmangar as a subject".

On the other hand, what is seen in the comparison of the brain manifestations in connection with the Faradarmani CF between two random and larger populations than in the previous study from Faradarmangars and non-Faradarmangars, is simply the result of being a Faradarmangar in the mind mediation of the Faradarmani CF Connection. In the present study, according to the Taheri et al. (2020a) study, not only there is no increase in activity in the frequency bands and regions related to other methods of meditation and mindfulness, but also a significant decrease in the activity of delta, beta 2 and beta 3 frequency bands in the different brain regions can be seen. Moreover, in comparison with the previously mentioned study, it can be concluded that the increased activity in the gamma frequency band is the result of a Connection with the Faradarmani CF in humans, regardless of being Faradarmangar or not.

Delta waves are the slowest recorded brain waves. They are frequently found in infants and young children and are associated with the deepest levels of relaxation and restorative healing sleep (Priyanka et al., 2016). Reduction in delta waves is suggested to correspond with the conscious state of emptiness in meditation (Hinterberger et al., 2014). In contrast, beta 2 waves (mid-range beta waves:15–20 Hz) are associated with increases in energy, anxiety, and performance, and beta 3 (high beta waves:18–40 Hz) wave is associated with significant stress, anxiety, paranoia, high energy, and high arousal (Priyanka et al., 2016). The reduction of beta 2 and beta 3 frequency bands in the Faradarmangar group during the Faradarmani CF mind mediation indicates the distinction of the activated and stimulated state of the brain and a general decrease in conscious brain activity during this task.

By further investigation around this mind mediation role of the Faradarmangars' brain, the results of the study reveal various decreased and a single increased connectivity pattern between different regions of the brain during this task and an increase in the functional connectivity only between two regions (ACC and rSFG) in the case of alpha1 frequency band and multiple decreased functional connectivity between different regions of the frontal network in the case of alpha2 and beta 2/3 frequency bands (in all frontal network). It also shows the decreased information flow in the delta band between the left and right cerebrum and also in the frontal network, which is generally associated with cognitive and motor activities during human evolution (Leisman et al., 2016). Moreover, the brain graph analysis shows a distinct brain graph with higher global efficiency associated with the specific tasks and six node areas that can all characterize and manifest the relationship with the mind mediation role of Faradarmangars' brain during Faradarmani CF Connection.

In conclusion, by considering five out of eight brain frequency bands as well as 39 out of 52 BA regions, our data shows a reduction in most frequency band activities and a significant reduction of connectivity in the frontal lobe. Along with these reductions and in addition to the increased graph of global efficiency, it is hypothesized that the human brain in the role of a Faradarmangar can be considered as a passive powerful detector or marker of the Faradarmani CF Connection rather than an operator or initiator. According to the results, investigation of the effect of other TCFs on the brain as well as the use of other neuroimaging techniques, including fMRI, is strongly recommended.

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