

Effectiveness of Vagal Nerve Stimulation on Obsessive Compulsive Disorder Among Post Covid-19 Infected Individuals

Padma Priya.R¹, Vignesh Srinivasan², Prathap Suganthirababu³,
Priyadharshini Kumar⁴, Dhanusia S⁵, Kumaresan A⁶, Surya Vishnuram⁷

¹Post graduate, ²Assistant Professor, ^{3,6}Professor, ^{4,5,7}Tutor, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India.

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Abstract

Background: COVID-19 has impacted everyday life and many people are affected by it. Regular Hand washing, maintaining hygiene, avoiding handshaking & face-to-face interaction, social distancing, quarantine are precautionary measures which result in rapidly increasing depression and anxiety among common population and it results in OCD.

Purpose: This study aims to investigate the effectiveness of vagal nerve stimulation on obsessive compulsive disorder among post-covid 19 infected individuals.

Methodology: A total of 20 participants was selected using the Purposive sampling technique based on the inclusion and exclusion criteria. Then, the participants were allocated into 2 groups by closed envelope method and the participants in the control group receive cognitive behavioural therapy for 30 minutes, 4 sessions/week for 4 weeks. The experimental group receive Transcutaneous auricular vagal nerve stimulation. The stimulation was given for 30 minutes, 4 sessions/week along with CBT.

Result: With a p value of 0.001, transcutaneous auricular vagal nerve activation significantly reduced obsessive compulsive disorder symptoms after 4 weeks in experimental group.

Conclusion: The Study showed that transcutaneous auricular vagal nerve stimulation was effective in reducing symptoms of OCD among post covid-19 infected individuals.

Key Words: Obsessive compulsive disorder, post covid- 19, transcutaneous auricular vagal nerve stimulation.

Introduction

The COVID-19 Pandemic, which was originally detected in the month of December in Wuhan, China, is causing widespread suffering today¹. The new coronavirus is responsible for the highly contagious as well as the severe respiratory sickness caused

by it. COVID-19 has impacted everyday life and is bringing down the world economy. Numerous thousands of people have been impacted by this pandemic, either by illness or death its spread. When an infected individual sneezes, coughs, talks, or breathes, respiratory droplets are the main way that

Corresponding Author: Vignesh Srinivasan, Assistant professor, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical sciences, Chennai, Tamil Nadu, India.

E-mail: vigneshphysio1989@gmail.com

COVID-19 spreads. Fever, a cold, a cough, discomfort in the bones, difficulty breathing, and pneumonia are the most typical signs of this illness. Currently, there aren't any vaccines available because this is a newly viral disease that is affecting people for the first time. Therefore, a focus is placed on taking important precautions, like wearing masks, maintaining a strict hygiene regimen, and keeping a distance from others in social situations^{2,3}. During a pandemic, people are afraid of the infectious agent and use a variety of preventive measures to reduce the infection, such as physical separation, regular hand washing, quarantines, and widespread public awareness campaigns on the value of washing their hands and avoid shaking hands, are preventative measures that have a rapid negative impact on the general population's levels of anxiety and despair and lead to obsessive-compulsive disorder (OCD)⁴. OCD is associated with a symptom that is very sensitive to the worry and potential for contamination, as well as thoughts of getting sick, spreading a disease, and engaging in protective behaviours to lessen the possibility of contamination. They maintain personal hygiene Obsessively in guilt to avoid spreading an infection to others and recurring worries about illness and contamination, intentional avoidance of possible contaminated environments, and compulsive washing are frequently used to describe OCD and it result in significant stresses for people with OCD⁵. OCD is a mental illness characterized by intrusive, upsetting, and constant thoughts known as obsessions, causing anxiety and suffering. Compulsions, repetitive actions or thoughts, are performed to reduce this worry. It impairs everyday functioning, relationships, and overall quality of life⁶. The cause is not fully understood but may involve genetic, neurological, and environmental factors. OCD often coexists with depression, anxiety disorders, and body dysmorphic disorder (BDD)⁷. However, it is treatable, and cognitive-behavioural therapy (CBT), especially exposure & response prevention (ERP), is an effective treatment. Medications like selective serotonin reuptake inhibitors (SSRIs) can also be used. Early intervention by a multi-disciplinary team can significantly improve the affected person's quality of life⁸. The vagus nerve aids in controlling the autonomous nervous system, which controls bodily functions like digestion, respiration, heart

rate and inflammation etc. It helps in controlling emotions and affects how the body responds to stress. To increase calmness, relaxation, and general wellbeing, the vagus nerve can be stimulated⁹.

In recent years, non-invasive transcutaneous auricular vagus nerve stimulation devices have become increasingly used. These devices don't require surgical implantation and are applied via external devices like clip electrodes. The clip electrode is fixed to the ear's outer surface. By providing electrical stimulation the auricular branch of the vagus nerve, which innervates the cymba concha in the ear, (TaVns), a non-invasive procedure, triggers the inflammatory reflex¹⁰. Therefore, the goal of the research is to find out whether the vagal nerve stimulation is effective in treating OCD in people who were exposed to COVID 19.

Aim

To determine the effectiveness of transcutaneous auricular vagal nerve stimulation on obsessive compulsive disorder among post covid-19 infected individuals.

Material and Methods

The research was carried out using an experimental study design between November 2022 and February 2023. The study proposal was submitted to the Institutional Scientific Review Board Committee (ISRB) and approved by the ISRB (ISRB no-01/022/2022/ISRB/PGSR/SCPT) before enrolling the Participants in the study. The participants in the study were given an open invitation to participate, and those who had a willingness in doing so were enrolled.

Both the individual who participated and the evaluated person in this study were blinded.

Inclusion criteria:

- Participants infected by covid-19.
- Both the genders
- Age group between 25 and 50 years.
- Participants who scored more than 50 in the DOCS scale.

Exclusion criteria:

- Participants who showed no signs of OCD.
- Those with a history of mental or neurological conditions,
- Pregnant women.
- Those with pacemakers, those who had received cervical vagotomies or neck chemotherapy.
- Those who had no interest in participating in the study were excluded.

Outcome measure:

DOCS: A 20-item self-report tool called the DOCS measures how severe OCD symptoms are. It has 4 dimensions a) Concerns about germs and contamination, (b) Concerns about being responsible for harm, injury or bad luck (c) unacceptable thoughts (d) Concerns about symmetry, completeness and the need for things to be 'Just right'. On a scale from 0 [no symptoms] to 4 [extreme symptoms].

Procedure

As a result, 20 people were chosen for this study. The study's 20 participants were each given information about it and asked for their consent. The

participants were randomly divided into two groups of Ten each using the closed envelope method. Group A received transcutaneous auricular vagal nerve stimulation, for 30mins /day , 4days in a week for a duration of 4 weeks. The electrodes were placed over the cymba concha in the left ear. The selection of the stimulation settings was a sinusoidal waveform with a pulse width of 250 milliseconds, a frequency of 20 Hz, pulse width 80µs and an amplitude of 0-3 milliamperes along with CBT treatment. The stimulation followed an ON-OFF pattern, with 30 seconds of stimulation followed by 5 minutes rest. Group B received cognitive behavioural therapy for 30mins/day, 4days in a week for a duration of 4 weeks. Pre and Post treatment the DOCS was used as an outcome measure to evaluate OCD symptoms. The data collected were tabulated and statistically analysed.

Data analysis

A statistical analysis was done with the Intention of to reduce the OCD symptoms. Pre- and post-test values for DOCS were noted. A paired t-test was used for within-group analysis, and a Mann-Whitney U test was used for between-group analysis.

Table 1: Pre and Post-test values of Group A obtained using DOCS, indicating the reduction of OCD symptoms.

Outcome	Pre test	Post test	t- Value	P Value
	Mean & SD	Mean & SD		
DOCS	61.4±4.1	50.1±4.0	6.155	<0.001

Table 2: Pre and Post-test values of Group B obtained using DOCS, indicating the reduction of OCD symptoms

Outcome	Pre test	Post test	t-Value	P Value
	Mean and SD	Mean and SD		
DOCS	61.4±4.1	60.21±4.2	0.638	<0.001

Table 3: Post test analysis of both the group, indicating the difference in reduction of OCD symptoms:

Outcome	Group A	Group B	t - Value	P Value
	Mean and SD	Mean and SD		
DOCS	50.1±3.83	60.2±4.07	-5.45	<0.001

Result

In this study we assessed the effect of TaVns on OCD among individuals. TaVns showed a significant effect in reducing symptoms of OCD at 4weeks, with a p value which is <0.001 . Though both the group showed an improvement there was significant effect of TaVns than the conventional therapy within the 4-week protocol in reduction of OCD among individuals. The obtained post-test values were analysed using Mann-Whitney-U test, revealing the statistical significance of <0.001 .

In statistical analysis the intervention group has significant effect by using docs scale were analysed by Mann whitney-U test and control group also have some considerable effects.

Discussion

This study aimed to determine the prevalence of OCD and the effect of TaVnS.vagal nerve has an impact on autonomic function of the body and considered to be safe in treating psychiatric issues. OCD is an ignored public health concern that needs more attention. Chronic OCD dramatically lowers quality of life, especially when it coexists with depression so in this study we used TaVnS for OCD.

Ang L et al., has conducted a review in 2023, and he says that the COVID-19's substantial effect on mental health globally is one of the major concerns it presents. Due to the epidemic, the world's population has been put in an unprecedented scenario. He stated that more people are experiencing higher levels of stress, fear, depression and other psychological issues¹¹.

A study Wang Y et al., in January and February 2020 with 1210 participants from 194 cities, and he stated 29% of the people surveyed indicated considerable to serious anxiety symptoms, and 17% of individuals reported considerable to severe depression symptoms, and that 54% of those who participated assessed the psychological impacts of the COVID-19 epidemic as moderate or severe¹².

In 2020, Huang and colleagues et al., conducted a survey study on, GAD, symptoms of depression and sleep quality at the time of pandemic" they stated that generalized anxiety in particular OCD

and depressive symptoms were much more common in younger individuals than in older individuals. Numerous studies found that COVID-19 and OCD were associated with adults¹³.

Another author named Howland RH et al., in 2020 has stated that Vagal nerve created an interaction between the human body and the peripheral functions, and that should be focused in the treatment of psychological disorders¹⁴.

In addition to this ,Ben- Menachem et al., conducted research on stimulation of vagal nerve on epilepsy and depression, in that he concluded that vagus nerve stimulation is a potential therapy. All VNS treatment needed the placement of electrodes surgical that were linked to a activating the implanted device which is placed under the chest wall anteriorly. Although VNS which is implanted that are safe & tolerated well, risky events (AEs) have been linked to surgical technique as well as the electrical stimulation. The techniques of nVNS delivery does not require surgical implantation were developed as a result's reduces anxiety and fear-related processes in the brain while increasing peripheral inflammatory and sympathetic activation processes in the periphery and the CVS implying potential utility for a wide range of conditions associated with stress and dysregulation of stress and inflammatory systems, including irritable bowel syndrome, RA and fibromyalgia, in addition to depression and anxiety¹⁵.

In a review by Hsiangkuo Yuan et al. on the advantages of non-invasive vagus nerve stimulation (VNS) in 2015. In that,They succeeded to have the development of VNS back to 19th century, when it was unsuccessful at first but encouraged study into using animals to regulate seizures. other types of electrical stimulation devices have been designed over time, some of which have the aim of treating cardiovascular diseases and control seizures. For the treatment of epilepsy, pain, headaches, and other conditions, non-invasive transcutaneous implants that activate the auricular is also being investigated. With better safety features, non-invasive VNS (nVNS) is thought to be equally efficient as its invasive version

Norbert Kathmann et al .,conducted a study to examine the effects of CBT for obsessive-compulsive disorder (OCD) and he conclude that individual CBT

was for OCD was provided to patients in an exposure-based, non-manualized treatment approach¹⁶.

Covid -19 pandemic has created a considerable impact over the over all well being of the individual ie ; economical, social¹⁷.

Non-invasive vagus nerve stimulation specifically targets the vagus A fibers connected to the brain, not the C fibers associated with other organs. However, therapeutic pathways in the brain for treating depression likely have similar connections to the peripheral nervous system. Given the financial burden, risks, and invasiveness of surgical operations, non-invasive vagal nerve stimulation shows promise as a more widely applicable technique in psychology. It could potentially serve as a substitute for conventional treatments like psychological therapy and pharmaceuticals¹⁸.

We were not gone for any quantitative analysis like parametric test because this project is self-funded project.

Conclusion

To Conclude, the Transcutaneous auricular vagal nerve stimulation plays a significant role in reducing symptoms of OCD among individuals. Comparing other studies, the transcutaneous auricular vagal nerve stimulation is found to be safe and effective in psychiatric illness. Because it has an influences autonomous tone, cardiac function, inflammatory reactions, and emotion regulation, anxiety disorders (OCD) .

Ethical clearance: The ISRB committee of a private hospital and institution in Chennai has provided its clearance for the conduct of human research that complies with all applicable national laws, institutional regulation. (01/022/2022/ISRB/PGSR/SCPT Application Number).

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