

An investigation into the effects of Rhythmic Sensory Stimulation on Fibromyalgia symptoms

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ABSTRACT

Studies suggest that chronic pain symptoms in Fibromyalgia (FM) are related to an imbalance of brain connectivity, dysfunction of central pain processing, and thalamocortical dysrhythmia. Rhythmic sensory stimulation (RSS) involves periodic stimulation of one or more senses (eg. tactile or auditory) that may attenuate chronic pain symptoms. We present here results from our previous work showing that RSS helps reduce pain and sleep symptoms in FM patients. We also present protocol for a new study which explores the mechanism behind FM pain and its response to RSS.

Introduction

Fibromyalgia is a chronic pain disorder characterised by widespread pain, tenderness in localized areas, extreme fatigue, and difficulty in mental processes. Studies suggest that these symptoms are related to an imbalance of brain connectivity, dysfunction of central pain processing, and thalamocortical dysrhythmia.

Rhythmic sensory stimulation (RSS) involves periodic sensory stimulation that may attenuate chronic pain symptoms by: 1) inhibiting afferent nerve fibers by direct stimulation (Gate Control Theory) or 2) drive the entrainment of neural oscillatory coherence.

Aim: Previously, we found the RSS device to show improvement of pain and sleep symptoms. Here we wish to further study the mechanism of Fibromyalgia pain symptoms and its relation to RSS therapy.

RSS Devices

- Nextneuro Lounge
- Sound Oasis (VTS-1000)
- 40Hz vibrotactile and auditory stimulus



Study 1: Exploring the effects of RSS on Fibromyalgia symptoms

Patients: 19 patients diagnosed with Fibromyalgia

Intervention: Used Nexneuro lounge for 10 treatments (twice per week for five weeks). Treatments involved 23 min of LFSS at 40 Hz (Skille recording), delivered using transducers in a supine position.

Study 1 Conclusion: RSS improved pain and sleep scores without any adverse effects.

| Outcome Measures | Fibromyalgia Patients | |
|---|-----------------------|--------|
| | Pre | Post |
| Fibromyalgia Impact Questionnaire (FIQ) | 85.8 | 19.9** |
| Jenkins Sleep Scale | 19.16 | 4.11** |

Study 2: A randomized parallel trial of RSS on Fibromyalgia symptoms

Patients: 50 patients diagnosed with Fibromyalgia. 38 completed the study. The data was analyzed as intention to treat analysis.

Treatment #1: sine wave single frequency stimulation at 40Hz
Treatment #2: Intermittent complex wave gamma range stimulation with 33 and 45 Hz peaks

Intervention: Use VTS-1000 for 30 minutes daily, 5 days per week, for a total of 5 weeks.

Study 2 Conclusion: There were significant improvements seen in pain and sleep quality in pre vs. post use of RSS. Both treatment #1 and #2 were effective.

| Outcome Measures | Treatment #1 | | Treatment #2 | |
|--|--------------|--------|--------------|-------|
| | Pre | Post | Pre | Post |
| Fibromyalgia Impact Questionnaire (FIQ) [†] | 70 | 57.5** | 63.7 | 56.8* |
| BPI | 7 | 6.3 | 6.1 | 5** |
| Pain Interference Score [†] | | | | |
| Patient Health Questionnaire (PHQ-9) [†] | 16.5 | 13.7* | 12.6 | 11.0* |
| Quality of Life (Q-LES-Q) [†] | 37.4 | 43.5 | 43.8 | 47 |
| Pittsburgh Sleep Quality Index (PSQI) [†] | 14.7 | 13* | 12.7 | 11.6 |

[†] No statistical difference between either treatment groups
* p<0.05
**p<0.005

Study 3: Examining the effects of RSS on brain oscillations and inflammatory biomarkers in Fibromyalgia

Purpose: To study the mechanism of response to RSS

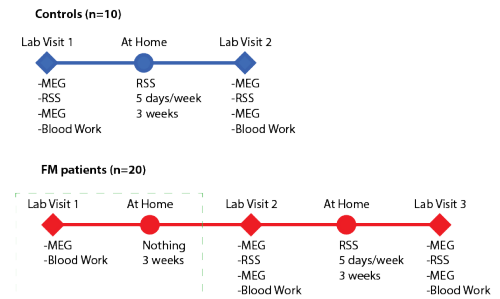
Design:

-Treatment Group: 20 Fibromyalgia patients
-Control: 10 Healthy controls

Intervention: Use VTS-1000 for 30 minutes daily, 5 days per week, for a total of 5 weeks.

Outcome measures:

- Self Report Questionnaire (FIQ, BPI, PGI, Sleep)
- EEG brain imaging
- Blood analysis (inflammatory biomarkers)



References

1. Naghdi L, Ahonen H, Macario P, Bartel L. The effect of low-frequency sound stimulation on patients with fibromyalgia: a clinical study. *Pain Res Manag.* 2015;20(1):e21-7. doi:10.1155/2015/375174
2. Braun Janzen T, Paneduro D, Picard L, Gordon A, Bartel LR. A parallel randomized controlled trial examining the effects of rhythmic sensory stimulation on fibromyalgia symptoms. *PLoS One.* 2019. doi:10.1371/journal.pone.0212011