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AN EXPERIMENTAL INVESTIGATION ON THE EFFECTS OF PHOTOBIOMODULATION VS TENS IN PATIENTS AFFECTED WITH TINNITUS

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ABSTRACT: When no external or internal stimuli are present, a common condition known as tinnitus is characterized by sound in the ear. Low-level laser treatment (LLLT) was shown to enhance tissue repair in the 1960s by increasing cell proliferation and blood microcirculation. LLLT applied to the cochlea has been used extensively throughout the years to reduce the intensity of tinnitus. Trans-electrical nerve stimulation (TENS) of the skin close to the ear may increase its inhibitory effect on the central nervous system and potentially alleviate tinnitus by stimulating the dorsal cochlear nucleus via the somatosensory pathway. to evaluate the effects of photo biomodulation and TENS on individuals with persistent tinnitus. Groups A and B were assigned to the twenty patients who were selected for the trial. While Group A's regimen comprised TENS therapy, Group B's treatment program included LLLT in addition to conventional exercises. Every participant provided their informed permission. Each patient was released after six weeks of attending five sessions per week. The patients were selected using the inclusion and exclusion criteria. Patients in Group B performed better than those in Group A.

Keywords: tinnitus, Photo biomodulation, TENS, rehabilitation.

INTRODUCTION

Tinnitus is defined as a sound in the ear(s) without any external auditory stimulus. It is classified as subjective when experienced only by the individual, or, rarely, objective when the tinnitus can also be detected by others. The sensation is often described as sizzling or ringing but it can be rhythmic or pulsatile in nature. Tinnitus can have a sudden onset and an acute time course although more commonly the onset is gradual and follows a chronic time course. Somatosensory tinnitus can be modulated by afferents from the cervical region or temporomandibular joint. The most common form of tinnitus is subjective and non-pulsatile, without other known pathological processes other than hearing loss. This form, which is the subject of this review, is referred to as chronic subjective idiopathic tinnitus. About 15% of the general population experience at least one episode of tinnitus, which prevalence increases by age and reaches 85% in individuals older than 60 years. This symptom is intolerable in nearly 20% of the cases. Reaching as high as 67%, tinnitus is more prevalent among individuals suffering from hearing disorders. TENS involves cutaneous electrode placement, typically over the auricle or around the mastoid to target the auricular branch of the vagus nerve, or is delivered via a probe in the external auditory canal. Although the exact mechanism of the effect of LLLT on tinnitus is not clearly understood, it has been proposed that it may be induced by increasing cell proliferation, growth factor secretion, improvement in inner ear blood flow, and/or activation of the hair cells mitochondria.

METHODOLOGY

Study design: experimental (comparative study). Outcome measure: tinnitus handicap inventory. Participants recruitment: total 20 participants meeting the inclusion criteria and who were suffering from tinnitus were recruited for the study. An informed consent from each participant.

SELECTION CRITERIA

Inclusion Criteria: Age between 30-50 years , Having diagnosed with tinnitus, Sub-acute and chronic subjects were included. *Exclusion Criteria*: Any history of exposure to ototoxic drugs/substances, Psychotic disorders with auditory hallucination, acoustic trauma, head trauma, mumps, meningitis, Meniere's disease and contraindication for laser therapy. *Outcome Measure*: The Tinnitus Handicap Inventory (THI; Newman et al., 1996) is a 25-item self-report measure to determine perceived tinnitus handicap severity. The THI is a useful measure for determining the efficacy of psychological treatment for tinnitus (Zeman et al., 2011).

PROCEDURE

Group A: For three weeks in a row, five days in a week. There were seven total irradiation areas in each session. Group B: For three weeks in a row, five days in a week. Sham stimulation performed. Sstimulation intensity varies (i.e., 2–15 ma)

Conventional Exercises Protcol:

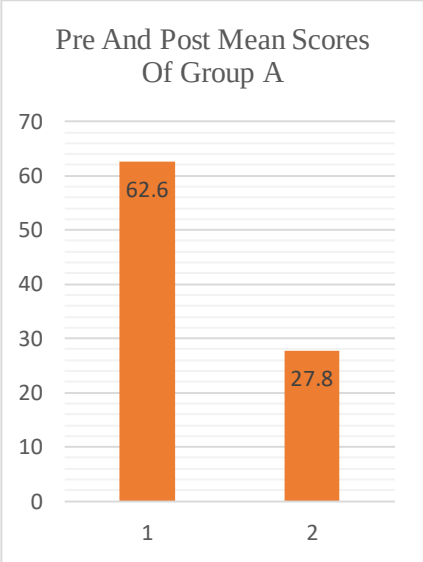
TECHNIQUE	DOSIMETRY
Neck Stretches	10 reps X 3 sets
Jaw Massage	12 reps X 3 sets
Progressive Muscle Relaxation	12 reps X 3 sets
Deep Breathing	10 reps X 3 sets
Neck Rotations	10 reps X 3 sets
Shoulder shrugs	15 reps X 3 sets
Shoulder rolls	10 reps X 3 sets
Neck tilt	10 reps X 3 sets
Chin tuck	15 reps X 3 sets
Goldfish exercises	15 reps X 3 sets

Data analysis: Statistical Tool: All analysis were obtained using **SPSS Version 23**. A level of o.o5 was used to determine the statistical significance. Statistical Test Descriptive Statistics: Mean, Standard deviation and Unpaired 't' Test

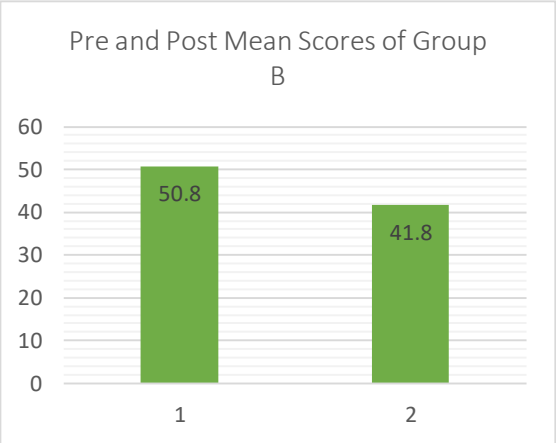
RESULTS

Group A	**N**	**Mean**	**Variance**	**SD**	**P Value**
Pre THI	10	62.6	129.83	11.3	2.67E-05
Post THI	10	27.8	80.4	8.9	
GROUP B	**N**	**MEAN**	**VARIANCE**	**SD**	**p value**
Pre THI	10	50.8	204.62	14.3	7.80E-03
Post THI	10	41.8	149.73	12.23	

Table 1: Pre and Post results of Group A and B individually



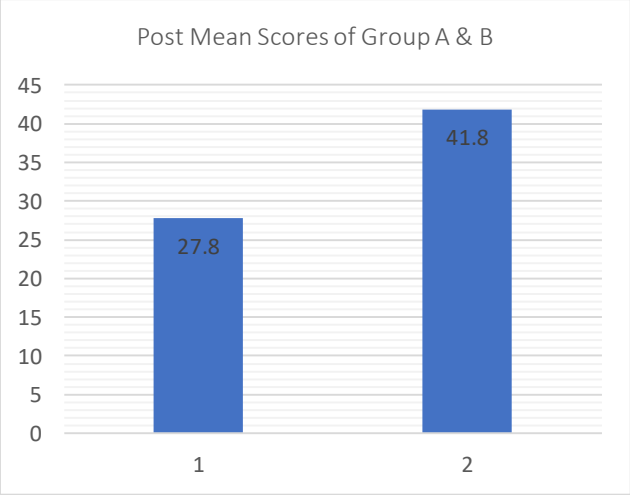
Graph 1: Pre and Post Mean Scores of Group A



Graph2: Pre and Post Mean Scores of Group B

Group A & B	N	t test value	p value
THI	10	9.00E-03	<0.05

Table 2: t-value and p-value of the study



Graph 3: Post Mean Scores of Group A and B

DISCUSSION

Previously published studies have reported the efficacy of LLLT in decreasing tinnitus to be between 15–67%. Tauber et al. used 10 sessions of LLLT with two different wavelengths (635 and 839 nm) during two weeks which was different from our practice. Okhovat et al. were treated patients with 20-minute sessions a day for 20 days using the same wavelengths to our study. While most of the former comparable studies have not taken concomitant hearing disorders into consideration.

TENS involves cutaneous electrode placement, typically over the auricle or around the mastoid to target the auricular branch of the vagus nerve, or is delivered via a probe in the external auditory canal. A placebo-controlled, randomized prospective study of unilateral (n = 20) or bilateral (n = 20) cutaneous TENS for chronic tinnitus reported that scores on the THI and a survey of depression significantly improved in both TENS-treated groups compared to their pre-intervention baseline. However, a significant placebo effect was observed among the sham-treated patients as well. Another RCT of cutaneous TENS for chronic tinnitus reported no significant benefit for the active intervention group as well as large placebo effects among sham-treated patients. In a large

study of 500 patients with tinnitus who received probe TENS to the tympanic membrane, approximately half (53%) reported some benefit in symptom reduction and 7% had complete suppression of tinnitus. Placebo effects were not assessed in that study, 13 patients experienced worsening of tinnitus, and 27% of the patients who reported initial benefits reported no benefit at 3 months.

Taken together, the evidence suggests that TENS may confer transient beneficial effects for tinnitus, but may be due to a high placebo effect and have no obvious long-term benefit. Three recent systematic reviews and meta-analyses likewise concluded that that electrical stimulation may indeed provide a benefit for tinnitus, but high bias is present in most studies and further investigation into the most effective stimulation pattern and modality are needed before recommendation to patients

LIMITATIONS AND RECOMMENDATIONS

Limitations of the study: Sample size is small. (20 patients were included). Restricted to specific age group.

Recommendations: In future study can be done on large sample size. Study can be done for long term.

CONCLUSION

Photo biomodulation is better than TENS in the effective treatment of Tinnitus. Since there is now no proven cure for tinnitus, patients may benefit from using any safe technique that will reduce or eliminate their symptoms, however each patient will react differently to these approaches. As a result, treating tinnitus requires a thorough therapeutic approach.

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