

# MINDFULNESS BASED STRESS REDUCTION TECHNIQUES IN TINNITUS THERAPY

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## AIMS OF THE PROJECT

The present clinical study was designed to evaluate the effects of mindfulness based training in reducing tinnitus annoyance.

## BACKGROUND

There is now a lot of scientific evidence indicating that MBSR techniques can be useful in the treatment of many chronic conditions that are not better controlled by pharmacological or psychological treatments such as chronic depression, hypertension and chronic pain. There is now a lot of scientific evidence on the physiological effects of MBSR techniques on the brain and body functions.

Since there is growing evidence supporting the efficacy of mind-body therapies for chronic pain, Mindfulness-based stress reduction (MBSR) is an intervention that may be effective in reducing pain and emotional distress, and improving function in patients with chronic pain and since chronic pain is very similar to tinnitus in many aspects (e.g hyperactivity in similar brain activation areas), MBSR is likely to be beneficial for tinnitus patients.

Furthermore, there is evidence that MBSR is useful in treating not only chronic depression and anxiety problems, but also it reduces relapses. These symptoms are prevalent if not determine entirely the level of tinnitus annoyance.

A recent study describes a particular electroencephalographic (EEG) pattern in tinnitus subjects. In fact, people who perceive the tinnitus show less alpha waves in the temporal lobe and more delta waves especially in the frontal lobe, compared to non tinnitus people. With neurofeedback instrument it is possible to measure these patterns even in this simplified EEG setting. The neurofeedback instrument is set to record the electrical signal originated from the frontal and the temporal lobes. Its software elaborates the signal calculating a ratio resulting from alpha waves (F3 and F4) and delta waves (Fp1 and Fp2). Starting from a condition of a lack of alpha rhythm and an over-representation of delta rhythm, an increase of the alpha/delta ratio will be an index of an electric activity more similar to what seen in non tinnitus subjects.

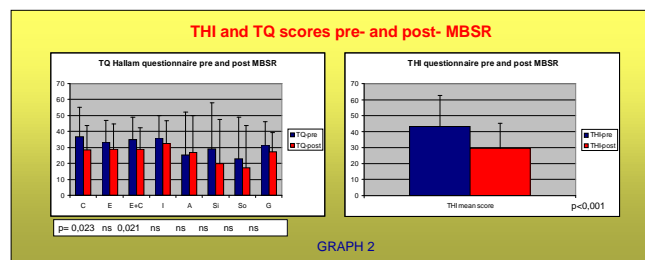
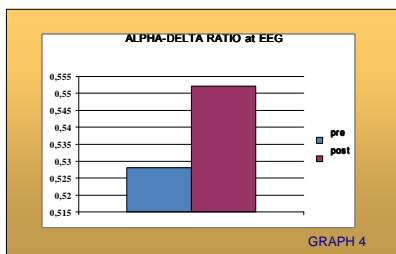
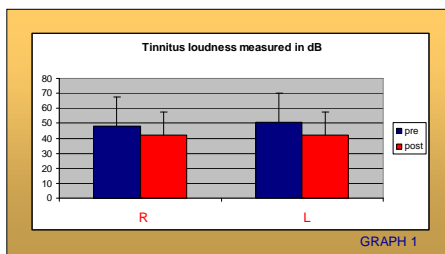
In this study we want to analyse the changes in the alpha/delta ratio in tinnitus subjects after the treatment with MBSR techniques and whether the increasing of the alpha/delta ratio is correlated with a reduced tinnitus annoyance.

Efficacy of the MBSR techniques in reducing tinnitus is measured by subjective measures (questionnaires) and objective measures (neurofeedback).

## STUDY DESIGN

39 tinnitus patients, 19 males and 20 females, aged 31-75, were enrolled in Mindfulness based stress reduction courses.

Before therapy their tinnitus was assessed by means of ENT evaluation, audiometric tests: pure tone audiometry, pitch and loudness tinnitus match, minimum masking levels, OAE, uncomfortable levels, tinnitus questionnaires (Hallam, THI, VAS). A simplified EEG measuring Alpha/delta peaks ratio has also been performed to possibly identify a mean to objectively verify the effects of MBSR on tinnitus. The electrodes are applied on the scalp in Fp1, Fp2, F3 and F4, according to the 10-20 positioning system (Jasper, 1958). The neurofeedback instrument is set to record the electrical signal originated from the frontal and the temporal lobes. Its software elaborates the signal calculating a ratio resulting from alpha waves (F3 and F4) and delta waves (Fp1 and Fp2). Starting from a condition of a lack of alpha rhythm and an over-representation of delta rhythm, an increase of the alpha/delta ratio will be an index of an electric activity more similar to what seen in non tinnitus subjects. This signal is amplified and carried to a computer. Alpha/delta ratios are elaborated with Matlab.

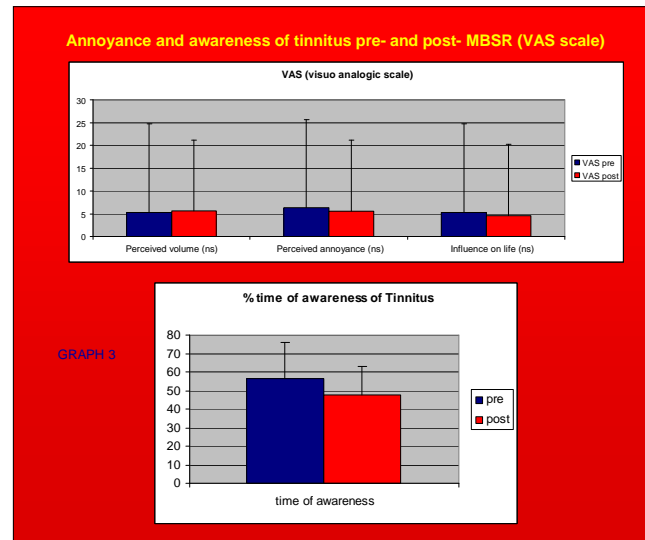


## RESULTS

We recruited 39 subjects with no drop outs. 19 males aged 31-75 (mean 48,4) and 20 females aged 51-70 (mean 57,3).

The perceived Tinnitus (loudness) subjectively improved across patients, although the magnitude of this change had no statistical significance (GRAPH 1). The results of the tinnitus handicap inventory (THI) showed a significant improvement of the questionnaire score, indicating a reduced tinnitus annoyance. The Hallam questionnaire, showed as well a reduction in the mean score for all the items: emotional (E), cognitive (C), emotional+cognitive (E+C) distress, intrusiveness (I), auditory perceptual difficulties (A), Sleep disturbances (Si), Somatic complaints (So) and the global score (G), but the statistical significance was present only for few items (C and E+C) (GRAPH 2). The visuo-analogic scale giving a subjective scoring of volume, intrusiveness and impact on life of the perceived tinnitus (VAS) showed no significant difference in scoring the tinnitus after the MBSR experience, but the percentage of time in which the subjects were aware of their tinnitus during the day had diminished (GRAPH 3).

Interestingly, the Alpha/ delta ratio measured after the MBSR training, shows an increase in favour of alpha peaks (GRAPH 4).



## CONCLUSIONS

In our group there was a general trend in improving not just the qualitative aspects of the perceived tinnitus (pitch and loudness, VAS etc), but the intrusiveness (% time of awareness) and annoyance (THI and TQ questionnaires) has showed a clear improvement significant especially for the THI questionnaire scores. For the TQ items the trend is also for improvement although not always statistically significant. This could be due to the fact that over a short time (8 weeks courses) the effects of MBSR are still subtle (short experience and practice). Another important result is the increased in alpha peaks and decreased delta peaks usually associated to relaxing and well being conditions. MBSR seems to be useful in reducing tinnitus awareness and distress. Based on these encouraging results, we believe that MBSR could be proposed to tinnitus patients as part of the therapeutic program.

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