

# Immediate effect of mind sound resonance technique on state anxiety and cognitive functions in patients suffering from generalized anxiety disorder: A self-controlled pilot study

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## ABSTRACT

**Objectives:** To compare the immediate effect of mind sound resonance technique (MSRT) with supine rest (SR) on state anxiety and psychomotor performance in 15 (eight male and seven female) right-handed generalized anxiety disorder patients (GAD) with an age range of  $34.8 \pm 12.8$  years.

**Materials and Methods:** Self as control design was followed. Diagnosis of GAD was made by a psychiatrist using sections of the Mini International Neuropsychiatric Interview (MINI). Participants practiced MSRT or SR (as control intervention) for 30 min at the same time for two consecutive days. The sequence of intervention was assigned randomly to the participants. State anxiety was assessed using state trait anxiety inventory (STAI; Form X1). Digit letter substitution task (DLST) was used to assess psychomotor performance, which involves visual scanning, mental flexibility, sustained attention, psychomotor speed and speed of information processing. Intervention was given in a quiet dark room on an empty stomach. Subjects received a training of MSRT and SR for 1 week before the data were taken. A pre-recorded audiotape was used to administer the technique of MSRT. Difference in scores after baseline and intervention was used to check normality, and was found to be normally distributed by the Kolmogorov–Smirnov test. The changes in STAI, DLST and difference in scores before and after two interventions (MSRT and SR) were compared using the paired samples *t* test.

**Results:** As compared with baseline, STAI scores reduced and DLST scores increased significantly (STAI;  $P < 0.01$ ; DLST;  $P < 0.01$ ) after MSRT. After SR, there was a significant reduction in STAI scores from baseline (STAI;  $P < 0.05$ ), but there was no significant change in the DLST scores ( $P = 0.26$ ). Comparison of the difference in scores for DLST and STAI before and after the two interventions (MSRT and SR) showed a significantly higher score for DLST ( $P < 0.05$ ) and a significantly lower score for STAI ( $P < 0.01$ ) for MSRT as compared with SR.


**Conclusion:** This pilot study suggests that MSRT may have a potential role in reducing state anxiety and enhancing psychomotor performance in patients suffering from GAD immediately after the practice. These findings need confirmation from studies with a larger sample size and randomized controlled design, which are implicated in the future.

**Key words:** Anxiety disorder; attention; mindfulness; mind sound resonance technique; psychomotor performance; state anxiety.

## INTRODUCTION

Generalized anxiety disorder (GAD) is a prevalent and

disabling mental disorder characterized by persistent worrying, anxiety symptoms, tension and higher sympathetic tone.<sup>[1]</sup> It is the most frequent anxiety disorder in primary care, being present in 22% of primary care patients who complain of anxiety problems.<sup>[1]</sup> GAD affects women more frequently than men, and the prevalence rates are high in midlife (prevalence in females over age 35 years: 10%) and older subjects. GAD is associated with a significant economic burden owing to decreased work productivity and increased use of health care services. Patients with GAD demonstrate a considerable degree of

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impairment and disability.<sup>[1]</sup> It is reported that anxiety disorders are associated with cognitive dysfunctions such as reduced processing speed, attention and inhibition,<sup>[2]</sup> which may be aggravated by anti-anxiety medications.<sup>[3]</sup>

Yoga is an ancient traditional science of holistic living that includes the practice of specific postures, regulated breathing and meditation. Yoga has been found to be an effective tool in managing stress levels.<sup>[4,5]</sup> Yoga, in its essence, is a technique to achieve control over the modifications of the mind and thereby balance the lifestyle.<sup>[6]</sup> Yoga reduces sympathetic tone and brings about a state of parasympathetic dominance.<sup>[4]</sup> There is mounting evidence that yoga reduces anxiety symptoms.<sup>[7]</sup> A recent randomized controlled study found encouraging results of mindfulness-based interventions in GAD patients even when the interventions are delivered remotely via the Internet.<sup>[8]</sup> Recent researches also suggest that mindfulness-based practices may enhance the efficacy of cognitive behavioral therapy in anxiety disorders by improving cognitive flexibility.<sup>[9]</sup>

Mind sound resonance technique (MSRT) is one of the advanced mindful relaxation yoga techniques that uses *mantra* to generate resonance, which mainly works through the *Manomaya Kosha* to induce deeper relaxation for both mind and body.<sup>[10]</sup> MSRT can be practiced in the supine or sitting posture for improving well-being, concentration, will power and relaxation.<sup>[10]</sup> One unpublished study found that immediately after MSRT, there was a significant increase in gamma brain wave coherence (indicative of deep relaxation) than controls and significant reduction in STAI scores in healthy volunteers in 32 subjects as compared with controls.<sup>[11]</sup> MSRT intervention also led to better reduction in pain, tenderness, disability and state anxiety in patients suffering from chronic neck pain.<sup>[12]</sup>

Hence, this study was planned with an aim to evaluate the immediate effect of MSRT technique on state anxiety and cognitive functions in GAD patients and compare it with the supine rest (SR) test.

## MATERIALS AND METHODS

Patients of GAD who had no general medical disease, substance abuse and head injury, who could read and write in English language and who had no previous exposure to MSRT practice were included in the study. Patients were recruited from inpatients and outpatients of the Holistic Health Home - Arogyadhama, Bangalore, India. They were diagnosed by a psychiatrist using sections of the Mini International Neuropsychiatric Interview (MINI). A total of 22 participants were screened within a 6-month period from August 2013 to January 2014, of whom 18 satisfied the inclusion criteria. Of the 18 participants

who satisfied the inclusion criteria, three participants dropped out because of inability to continue therapy at the center, leaving a final sample size of 15. A total of 15 subjects (eight male and seven female) in the age range of  $34.8 \pm 12.8$  years, with duration of education ranging from  $13.5 \pm 5.29$  years, were enrolled in this study after taking written informed consent. All the subjects were right handed. They were suffering from GAD since the last  $8.75 \pm 6.23$  years. A "self as control" design was followed. All the participants were continuing their medications as advised by their psychiatrist and achieved stable state since the last 4 weeks. No changes were made in medications during the course of the study. Subjects had no previous exposure to the practice of MSRT and were given a week-long orientation to the practice before the study. All the procedures were reviewed and accepted by the institutional review board.

## Measures

### State anxiety

The primary outcome measure was assessment of the state anxiety levels. It was assessed using a self-rated scale called Spielberger's State Anxiety Inventory (STAI; Form X-1) at the beginning and immediately after the end of the MSRT and control (SR) sessions. STAI is a reliable, valid and sensitive tool with a high degree of internal consistency with Cronbach's alpha of 0.86 for the total scores.<sup>[13]</sup>

### Psychomotor performance

The digit letter substitution task (DLST) was developed from the Digit Symbol Substitution Test (DSST) as one of the subsets of the Wechsler intelligence scale.<sup>[14]</sup> Substitution tests are essentially speed-dependent tasks that require the subject to match particular signs and symbols, digits or letters to other signs within a specified time period (90 s).<sup>[14]</sup> Substitution tasks involve visual scanning, mental flexibility, sustained attention, psychomotor speed and speed of information processing.<sup>[15]</sup> DLST is a valid tool for assessing neuro-psychiatric illnesses and has been standardized for the Indian population.<sup>[15]</sup>

### Assessments

All assessments were performed on an empty stomach between 6:30 pm and 7:00 pm. Both MSRT and control (SR) sessions were given in the supine position for 30 min in a dark, quiet room. A pre-recorded audio-tape was used to give the MSRT instructions. As a control session, simple SR was performed by the same subjects on different days under the same conditions. The sequence of control and intervention sessions was decided randomly. Data were taken immediately before and after MSRT and SR.

**Intervention**

MSRT is one of the advanced yoga-based mindful relaxation techniques that involves experiencing with closed eyes the internal vibrations and resonance developed while chanting the syllables A, U, M, Om and *Mahamrityunjaya mantra* sounds. The details of MSRT practice including the steps involved are described elsewhere.<sup>[12]</sup> As a control intervention, non-guided SR was given for a period of 30 min.

**Data analysis**

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS version 10.0). Difference in scores after baseline and intervention was used to check normality. This difference in scores was found to be normally distributed for both MSRT and SR by the Kolmogrov–Smirnov test. The changes in STAI, DLST and difference in scores before and after the two interventions (MSRT and SR) were compared using paired samples *t* test.

**RESULTS**

We observed that as compared with baseline, the STAI scores reduced and the DLST scores increased significantly after MSRT (STAI; *P* < 0.01; DLST; *P* < 0.01; Table 1), whereas after SR, there was a significant reduction in the STAI scores from baseline (STAI; *P* < 0.05; Table 1), but there was no significant change in the DLST scores (*P* = 0.26).

Comparison of the difference in scores for DLST and STAI before and after the two interventions (MSRT and SR) showed a significantly higher score for DLST (*P* < 0.05) and a significantly lower score for STAI (*P* < 0.01) for MSRT as compared with SR [Table 2].

**Table 1: Means and standard deviations of STAI and DLST scores before and after MSRT and SR (paired samples *t* test)**

| Group | Intervention | Mean±SD     |             | % change | P <sup>a</sup> -value |
|-------|--------------|-------------|-------------|----------|-----------------------|
|       |              | Before      | After       |          |                       |
| MSRT  | STAI         | 52.42±17.00 | 28.42±3.87  | -45.78   | 0.00**                |
|       | DLST         | 30.33±15.75 | 40.08±15.13 | +32.14   | 0.00**                |
| SR    | STAI         | 49.92±21.85 | 46.08±22.29 | -7.69    | 0.04*                 |
|       | DLST         | 28.08±15.00 | 30.85±16.80 | +9.86    | 0.26                  |

STAI = State and trait anxiety inventory; MSRT = Mind sound resonance technique; SR = Supine rest; <sup>a</sup>Paired samples *t* test, \*\**P*<0.01, \**P*<0.05

**Table 2: Comparison of the difference in scores for DLST and STAI before and after MSRT and SR**

| Group | Mean±SD (diff) |              | % change | P <sup>a</sup> -value |
|-------|----------------|--------------|----------|-----------------------|
|       | SR             | MSRT         |          |                       |
| STAI  | -3.83±3.71     | -24.00±18.48 | +526.63  | 0.00**                |
| DLST  | 2.67±7.80      | 9.75±4.02    | +265.16  | 0.02*                 |

STAI = State and trait anxiety inventory; MSRT = Mind sound resonance technique; SR = Supine rest; Diff = Difference in scores (post - pre), <sup>a</sup>Paired samples *t* test, \*\**P*<0.01, \**P*<0.05

**DISCUSSION**

To the best of our knowledge, this is the first study to assess the immediate effect of a yogic intervention on state anxiety in GAD patients. Previously, in a randomized controlled study, MSRT intervention, given daily for 10 days, was found useful in reducing the state anxiety in patients suffering from chronic neck pain as compared with SR.<sup>[15]</sup> The state anxiety (as assessed by STAI) reduced significantly by 19.3% whereas SR led to a non-significant reduction of 8.1% at the end of 10 days.<sup>[14]</sup> Another study used cyclic meditation (CM) in 57 healthy male volunteers to show reduction in state anxiety immediately after the practice (as assessed by STAI). There was a greater magnitude of decrease in state anxiety after CM (22.4%) compared with that after SR (5.6%).<sup>[16]</sup> In our study, we found a significant reduction in state anxiety after both MSRT as well as SR. A reduction of 45.78% and 7.69% was observed after MSRT and SR, respectively. This greater reduction in state anxiety after MSRT found in our study can be explained on the following basis: first, we had a comparatively small sample size and, thus, extreme values may have contributed more toward the shift of the means; secondly, our target population was already having anxiety disorder, and such a population may show higher sensitivity toward relaxation techniques such as MSRT and SR as compared to a population without anxiety disorder. The effect of MSRT on DLST has not been tested before, and this study shows that apart from reducing anxiety, MSRT technique can also lead to significant enhancement of psychomotor performance in GAD patients. This is an added benefit in this population as cognitive dysfunction has been observed in patients with anxiety disorders, both as a consequence of disease<sup>[2]</sup> and as a side-effect of anti-anxiety medications.<sup>[3]</sup>

As for the mechanism, it has been shown that yoga reduces stress and anxiety by improving autonomic functions via triggering neurohormonal mechanisms that suppress sympathetic activity through down-regulation of the hypothalamic–pituitary–adrenal axis.<sup>[4]</sup> Mindfulness-based practices may also enhance cognitive flexibility, which further helps in controlling anxiety.<sup>[9]</sup>

The strengths of the study are: (a) This multidisciplinary study encompasses the fields of yogic science, psychology and psychiatry; (b) no earlier study has reported an immediate effect of a yogic relaxation technique on state anxiety and cognitive functions in GAD patients; (c) because the duration of yoga intervention was short, acceptability and adherence to therapy was good; and (d) as MSRT was delivered through a standard protocol, it could be reproduced in the exact way for all cases.

This study also has many limitations, which restrict its generalizability. The most important limitation is the small

sample size. This study was a pilot project to assess the response to MSRT in a small patient population to plan for a better study with a much higher sample size and better design in the future. A self as control design was used because of the lack of a sufficient number of subjects. Secondly, this study did not follow-up as to how long the response to MSRT continues. In the future, a dose-response curve could be generated by performing repeated measures. Third, no objective parameters were used to understand the mechanism of action of MSRT at the electro-physiological, neurological and biochemical levels. Lastly, we could have used an active comparison such as music therapy delivered via an audio tape for more rigorous evaluation of MSRT, which we did not use this time.

In the future, a randomized controlled design with a larger sample size should be performed. Future studies should use objective variables of autonomic functions such as heart rate variability and galvanic skin resistance, advanced neuroimaging devices such as EEG, fNIRS and fMRI and biomarkers such as serum serotonin, oxytocin, etc., to understand the mechanism of action. Effect of MSRT should also be tested in other neuropsychiatric disorders where psychomotor retardation is observed, for example, brain-damaged individuals and patients suffering from dementia and depression. Future studies should try to use drug-naïve GAD subjects to rule out the effects of the drugs and compare the effect of MSRT with other mind-body relaxation techniques, including music therapy.

## CONCLUSION

This pilot study suggests that MSRT may have a potential role in reducing state anxiety and enhancing psychomotor performance in patients suffering from GAD immediately after the practice. These findings need confirmation from studies with a larger sample size and randomized controlled design, which are implicated in the future.

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