

# Effect of Mind Sound Resonance Technique on Autonomic Variables in People with Visual Impairment-A Pilot Study

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**Abstract:** *Individuals with visual impairment undergo physical, emotional, behavioural problems as reported by the previous studies. Mind Sound Resonance Technique (MSRT) is known to be effective in decreasing anxiety, stress, and psychological distress. The aim of this study is to examine the effects of MSRT on autonomic variables in people with visual impairment. Seven male and female participants with visual impairment took part in a 6-week Mind sound resonance technique intervention. Autonomic variables using HRV device was recorded before and 6 weeks after the intervention. There was a significant effect of MSRT on autonomic functions. There was a significant increase in HRV ( $p < 0.05$ ) on HF power, RMSSD and SDRR. There were no significant changes in other autonomic measures such as RR, LF power, LF/HF ratio. This study shows that six weeks of MSRT intervention improved autonomic functions significantly which suggest parasympathetic dominance over sympathetic activity.*

**Keywords:** Visual impairment, Mind sound resonance technique, Autonomic variables, Heart rate variability

## 1. Introduction

A loss of vision in an individual that fails even corrective lenses is termed as visual impairment [1]. The international classification of diseases (2018) categorizes visual impairment into distance and near presenting vision impairment. WHO estimates that there are nearly 1.3 billion people worldwide who live with specific form of distance or near vision impairment. Nearly 188.5 billion are estimated to have mild vision impairment. Likewise 217 million have moderate to severe vision impairment and approximately 36 million are blind [2].

The eye being an important sensory organ accounts for a major chunk of information accessible to a person through the senses. A person becomes reserved from the physical world with the loss of sight. A loss of sensory social and physical inputs creates anxiety and adjustment problems in the personality of blind subjects [3]. Visual impairment interferes independent functioning of the individual. It causes disability in performing activities of everyday life, safe travel or commute in the surroundings [4].

Open areas are demanding to commute for the visually impaired as these area demand spatial and directional information. Stress levels go up with unfamiliarity of an area, lack of travel skills and knowledge of routes [5]. The loss of vision is permanent and every so often progressive leading people to experience mental stress due to worries, anxiety and fear with secondary concerns like depression and social isolation [6]. Vision is a main sensory modality for interpersonal interactions along with social communication, thus it may lead to loneliness for people with visual impairment [7]. Visual impairment individuals experience severe psychological along with behavioral problems specially during adolescence [8].

In comparison to individuals with sight, the chances of exposure to traumatic events like falls and injuries are much higher [7]. A sense of anxiety and psychological stress is

observed in usually impaired people during analysis of their electro dermal activity and electroencephalography signals, while they walk on busy shopping streets, or pass through large open areas or cross junctions [9].

Loss of vision not only leads to prolonged stress but sometimes aggravates the situation. The autonomous nervous system imbalance (sympathetic) and vascular deregulation adversely impacts the eye and brain as a result of continuous stress and elevated cortisol levels. Stress could also be a major reason for diseases like glaucoma and optic neuropathy. Stress is not only a known risk factor but also a cause for many developmental or progressive visual system disorders. Stress is both a consequence and also cause for vision loss creating a vicious cycle of a downward spiral [6].

Stressful events induce psychiatric disorders and often disturbing emotional reactions. Stress leads to physiological and psychological responses [10]. Fight or flight is one of the autonomic responses to psychological stress in the body. The common response to physical and psychological stress is the activation of the sympathetic nervous system (SNS) and inhibition of the parasympathetic nervous system (PNS) [11]. SNS becomes dominant during physical or psychological stress leading to a physiological arousal. Increased pulse, heart rate is often symptoms of arousal. During periods of safety, and stability PNS is observed to be dominant. PNS decreases heart rate and decreases physiological arousal. The ease with which this adaptability happens is dependent on the ability of the Autonomic nervous system (ANS) [12].

An indicator of a healthy functioning ANS is seen in the variability in the time intervals between successive heart-beats, known as heart-rate variability (HRV). A wide range of analytical techniques enable one to quantify heart rate variability (HRV) from heart rate [13]. Heart-rate is dependent on physical, emotional, cognitive activities and physiological oscillations that lead to beat-to-beat

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fluctuations in heart rate (HR). HR and HRV are the most sensitive and reachable indicators of autonomic regulation and vagal activity [14].

Numerous studies undertaken to study the influence of yoga on autonomic nervous system, indicate that yoga in fact reduces autonomic arousal and also assist in a wide range of stress related disorders [14]. A study on visually impaired children has shown reduction in physiological arousal, compared to normal sighted children following yoga practice [15]. In the framework of visual impairment, none of the identified published study exists where mindfulness is considered, though mindfulness has been studied in relation to several health conditions [16].

Meditation and breathing techniques not only calms the mind but also improves concentration and enhances better work output, thus promoting the overall health by altering the autonomic balance[17]. Mind sound resonance technique involves recitation of mantra which recurrently produces a sound resonance all through the body [18]. A study suggested that spiritual wellbeing is enhanced through mindfulness practice where blind and partially sighted people participated in mindfulness practice [19].

In the literature, there is scarcity of studies on autonomic functions in people with visual impairment with meditation as an intervention. There are studies reporting the prevalence of physical, emotional, behavioral problems in people with visual impairment. This study is aimed at studying the effect of MSRT on autonomic functions in people with visual impairment.

## 2. Therapeutic assessment and focus

An advanced relaxation techniques of yoga is Mind sound resonance technique, which is practiced in either sitting or supine posture for attaining will power, positive health, concentration and deep relaxation. Mind sound resonance technique (MSRT) was developed by taking the concepts from traditional texts that explain the power of 'Om' as given in Mandukya Upanishad and Nadanusandhana as mentioned in Hata Yoga Pradipika. Internal mastery over the mind can be attained by overcoming the modifications of the mind as mentioned in Patanjali's definition of yoga). MSRT discloses the secret of traditional chants known as mantras [20].

## 3. Methods

### 3.1 Participants and Procedure

The study recruited participants from a NGO with visual impairment. Seven male and female participants of age between 17- 45 years were enrolled after taking their informed consent and procedures were followed with relevant guidelines of the institution. Non probability convenience sampling technique was used to select samples in the study. The participants with any learning disability, or who had a second handicap other than visual impairment or chronic illness were excluded from the study. They were

assessed before and after intervention after 6 weeks of MSRT intervention.

### 3.2 Assessments/ outcome measures

Individual measurements were carried out at the NGO before starting MSRT intervention and after 6 weeks of intervention. The participants were instructed to remain relaxed and breathe normally before measurement.

### 3.3 Autonomic variables using Heart Rate Variability

For all participants HRV was measured during the day. The subjects were seated on a chair and device electrodes were connected to chest and are paired with mobile via Bluetooth. Using HRV, parameters was calculated over the recording time of 335 seconds. Collected Heart Rhythm data is sent to server where it gets analyzed with time and frequency domain analysis. The subjects were given instructions to stay undisturbed during the recording.

Data was analyzed using time domain and frequency domain analysis using HRV. Frequency domain variables are measured in absolute units-  $ms^2$  include: The low frequency power LF comprises of the frequency area from 0.04 - 0.15 Hertz. High frequency power HF (0.15 - 0.40 Hertz.) and the ratio LF/HF. Time domain variables of HRV comprise of: RR (bpm), SDRR (ms). RR (bpm) is the average heart frequency in beats per minute calculated over the recording time of 335seconds. SDRR (ms) is a standard deviation, and is the root of the variance of all RR times of the measured period. RMSSD (ms) is calculated as the square root of the sum of the squared difference between adjacent RR-Intervals. RR (bpm) is the average heart frequency in beats per minute calculated over the recording time of 335seconds.

### 3.4 Intervention

MSRT intervention was given for 30 minutes in supine position for 5 days a week. The directions were given to practice with awareness and relaxation. The chanting of Mrtyunjaya Mantra is used along with OM karajapa. The steps of MSRT are briefly explained in [Table 1].

### 3.5 Data extraction and analysis

All statistical analysis was done using IBM Statistical SPSS 20 Package. The data were assessed for normal distribution using the Shapiro wilk test. Wilcoxon signed ranks test and paired sample test were used to compare data that was collected before and after intervention. The statistical significance level was  $P < 0.05$  for all analyses.

## 4. Results

Table 2 below shows values obtained for pre and post test

**Table 2:** Time domain and frequency domain parameters

Variables	Pre			Post			Sig. (2-tailed)
	Mean	Std. deviation	Std. error	Mean	Std. deviation	Std. error	
LF	536.80	416.22	157.31	969.93	876.09	331.13	.176
HF	432.12	356.13	134.60	655.22	297.57	112.47	0.037
LF/HF	1.492	.842	.381	1.913	1.978	.747	.735
RR	79.15	4.74	1.79	75.42	9.12	3.45	.310
SDRR	45.46	17.10	6.46	56.69	14.39	5.43	.023
RMSSD	32.46	14.07	5.32	41.18	9.52	3.59	.039

LF power = low frequency range (0.04-0.15 Hz). Mainly reflects sympathetic activity

HF power = high frequency range (0.15-0.4 Hz), indicates parasympathetic activity.

LF/HF ratio = Correlated with symptho-vagal balance

SDRR= standard deviation, and is the root of the variance of all RR times of the measured period

RR(bpm) is the average heart frequency in beats per minute

RMSSD(ms) is calculated as the square root of the sum of the squared difference between adjacent RR-Intervals.

Corelated with parasympathetic activity

SDRR(ms) is a standard deviation, and is the root of the variance of all RR times of the measured period. Reflects an overall autonomic activity.

## 5. Discussion

In this study, the effect of MSRT intervention was evaluated on autonomic functions. After the analysis of HRV data in present study revealed that after 6 weeks of MSRT intervention, there is a statistically significant change seen in HF, SDRR and RMSSD at  $P < 0.05$  level indicating parasympathetic dominance. In addition, there is a change in LF power component, LF/HF component but failed to reach statistical significance. Stress, panic, anxiety, or worry is correlated with lower HF power. The modulation of vagal tone aids in maintaining the dynamic autonomic regulations which is necessary for cardiovascular health [21].

The increase in HF indicates enhanced cardiac parasympathetic activity during relaxation training [22]. Previous study on MSRT on a people with occupational stress, there was change in RMSSD and SDNN. There was also change in HF but was not statistically significant. The results of the study were suggestive of vagal dominance and decrease in sympathetic activity [23].

Visually impaired children have greater physiological arousal compared to children who have normal sight. After yoga, visually impaired were found to have a marginal reduction in arousal [15]. Autonomous nervous system imbalance (sympathetic) and vascular dysregulation is caused due to continuous stress and elevated cortisol levels which adversely impacts the eye and brain which may also be one of the key causes of conditions like glaucoma and optic neuropathy [6] where in this study it shows there is statistically significant change in HF and RMSSD, both indicative of parasympathetic dominance indicative of vagal tone.

It was reported that chanting mantras will generate vibratory sensation around the ears and these sensations are communicated through branches of vagus nerve [22]. The

vagus nerve has several functions and the activity that is most open to valuation is its effect in controlling the cardiac rhythm which can be assessed by determining the heart rate variability. One of the natural way to stimulate vagus nerve by improving HRV, that is parasympathetic tone is stress reduction [24].

Meditation is a widespread form of stress management, which is said to mediate stress reactivity. Results on a study involving mindfulness meditation suggested that mindfulness practice could promote heart rate regulation effectively [20]. Increase in high frequency (HF) HRV commonly occurs in response to positive emotion as shown in an earlier study [25]. Chanting OM mentally leads to increase in alertness, though the subject was in physiologically relaxed state [26].

## 6. Conclusion

Overall, MSRT had a positive effect on autonomic nervous system in people with visual impairment showing parasympathetic dominance as demonstrated by increase in HF, RMSSD and significant increase in SDRR. Participants felt relaxed, supported the results found by the measurements of the study. However larger randomized controlled studies are necessary to confirm the effects of MSRT on autonomic nervous system.

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## References

- [1] Agesa L. Journal of Education and Practice [www.iiste.org](http://www.iiste.org) ISSN [Internet]. Vol. 5, Online). 2014 [cited 2019 Mar 11]. Available from: <http://www.tsbvi/2011>
- [2] World Health Organization [Online]. Available from: URL:<https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>
- [3] Mishra, Mishra DV, Singh A, Student FME. A comparative study of self-concept and self-confidence of sighted and visually impaired children [Internet]. Vol. 2, EXCEL International Journal of Multidisciplinary Management Studies. 2012 [cited 2019 Mar 17]. Available from: [www.zenithresearch.org.in](http://www.zenithresearch.org.in)

- [4] Fraser Freeman K, Author Roy Gordon Cole P, Eleanor Faye OE, Freeman PB, Gregory Goodrich OL, Stelmack JA, et al. Optometric clinical practice guideline care of the patient with visual impairment (low vision rehabilitation) Reference Guide for Clinicians Prepared by the American Optometric Association Consensus Panel on Care of the Patient with Low Vision Reviewed by the AOA Clinical Guidelines Coordinating Committee [Internet]. 1997 [cited 2019 Mar 10]. Available from: <https://www.aoa.org/documents/optometrists/CPG-14.pdf>
- [5] Crudden A, Cmar JL, McDonnall MC. Stress Associated with Transportation: A Survey of Persons with Visual Impairments [Internet]. Vol. 111, Journal of Visual Impairment & Blindness (JVIB). [cited 2019 Mar 10]. Available from: <http://www.jvib.org>.
- [6] Sabel BA, Wang J, Cárdenas-Morales L, Faiq M, Heim C. Mental stress as consequence and cause of vision loss: the dawn of psychosomatic ophthalmology for preventive and personalized medicine. EPMA J [Internet]. 2018 Jun 9 [cited 2019 Mar 18];9(2):133–60. Available from: <http://link.springer.com/10.1007/s13167-018-0136-8>
- [7] Bruner A, B. Hansen M, Heir T. Post-traumatic stress reactions among individuals with visual impairments: a systematic review. Disabil Rehabil [Internet]. 2018 Apr 12 [cited 2019 Mar 17];1–8. Available from: <https://www.tandfonline.com/doi/full/10.1080/09638288.2018.1459884>
- [8] Bolat, N., Doğangün, B., Yavuz, M., Demir, T., & Kayaalp, L. (2011). Depression and anxiety levels and self-concept characteristics of adolescents with congenital complete visual impairment. Turk Psikiyatri Dergisi, 22(2), 77–82.
- [9] Saitis C, Kalimeri K. Identifying Urban Mobility Challenges for the Visually Impaired with Mobile Monitoring of Multimodal Biosignals. In 2016 [cited 2019 Mar 10]. p. 616–27. Available from: [http://link.springer.com/10.1007/978-3-319-40238-3\\_59](http://link.springer.com/10.1007/978-3-319-40238-3_59)
- [10] Hallemani S, Kale M, Gholap M. Level of Stress and Coping Strategies Adopted by Adolescents with Visual Impairment [Internet]. Vol. 3, International Journal of Science and Research (IJSR) ISSN. 2012 [cited 2019 Mar 15]. Available from: [www.ijsr.net](http://www.ijsr.net)
- [11] Ziegler MG. Psychological Stress and the Autonomic Nervous System. Prim Auton Nerv Syst [Internet]. 2004 Jan 1 [cited 2019 Mar 18];189–90. Available from: <https://www.sciencedirect.com/science/article/pii/B9780125897624500517>
- [12] Appelhans BM, Luecken LJ. Heart rate variability as an index of regulated emotional responding. Rev Gen Psychol [Internet]. 2006 Sep 1 [cited 2019 Mar 20];10(3):229–40. Available from: <http://doi.apa.org/getdoi.cfm?doi=10.1037/1089-2680.10.3.229>
- [13] Scheff JD, Griffel B, Corbett SA, Calvano SE, Androulakis IP. On heart rate variability and autonomic activity in homeostasis and in systemic inflammation. Math Biosci [Internet]. 2014 Jun [cited 2019 Mar 17];252:36–44. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24680646>
- [14] Tyagi A, Cohen M. Yoga and heart rate variability: A comprehensive review of the literature. Int J Yoga [Internet]. 2016 [cited 2019 Mar 21];9(2):97–113. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27512317>
- [15] Telles S, Srinivas RB. Autonomic and Respiratory Measures in Children with Impaired Vision Following Yoga and Physical Activity Programs. Int J Rehabil Heal [Internet]. 1998 [cited 2019 Mar 18];4(2):117–22. Available from: <http://link.springer.com/10.1023/A:1022912626238>
- [16] Marquès-Brooksopp L. Mindfulness, spiritual well-being, and visual impairment: An exploratory study. Br J Vis Impair [Internet]. 2014 May 24 [cited 2019 Mar 29];32(2):108–23. Available from: <http://journals.sagepub.com/doi/10.1177/0264619614528343>
- [17] Vinay A V, Venkatesh D, Ambarish V. Impact of short-term practice of yoga on heart rate variability. Int J Yoga [Internet]. 2016 [cited 2019 Mar 21];9(1):62–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26865773>
- [18] Rao M, Metri KG, Raghuram N, Hongasandra NR. Effects of Mind Sound Resonance Technique (Yogic Relaxation) on Psychological States, Sleep Quality, and Cognitive Functions in Female Teachers: A Randomized, Controlled Trial. Adv Mind Body Med [Internet]. [cited 2019 Apr 5];31(1):4–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28183071>
- [19] Marquès-Brooksopp L. Mindfulness, spiritual well-being, and visual impairment: An exploratory study. Br J Vis Impair [Internet]. 2014 May 24 [cited 2019 Mar 29];32(2):108–23. Available from: <http://journals.sagepub.com/doi/10.1177/0264619614528343>
- [20] Vijayakumar PS, Sahana AU. Complimentary Effect of Yogic Sound Resonance Relaxation Technique (MSRT) in Prostate Cancer: A Case Study [Internet]. International Journal of Science and Research (IJSR) 2018. Available from: [URL: https://pdfs.semanticscholar.org](https://pdfs.semanticscholar.org)
- [21] Shaffer F, Ginsberg JP. An Overview of Heart Rate Variability Metrics and Norms. Front public Heal [Internet]. 2017 [cited 2019 Apr 4];5:258. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/29034226>
- [22] Sakakibara M, Takeuchi S, Hayano J. Effect of relaxation training on cardiac parasympathetic tone. Psychophysiology [Internet]. 1994 May [cited 2019 Apr 8];31(3):223–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/8008785>
- [23] Dr. Vandana A Nikkam DSSPS, Nikkam DVA. Effect of mind sound resonance technique on autonomic variables in occupational stress individuals – a randomized controlled trial. Int J Emerg Technol Innov Res JETIR [Internet]. 2018 [cited 2019 Apr 4];(Vol. 5-Issue 7 (July-2018)). Available from: <http://www.jetir.org/view?paper=JETIR1807087>
- [24] Patra S, Telles S. Heart Rate Variability During Sleep Following the Practice of Cyclic Meditation and Supine Rest. Appl Psychophysiol Biofeedback [Internet]. 2010 Jun 17 [cited 2019 Apr 4];35(2):135–40. Available from: <http://link.springer.com/10.1007/s10484-009-9114-1>

- [25] Arya NK, Singh K, Malik A, Mehrotra R. Effect of Heartfulness cleaning and meditation on heart rate variability. *Indian Heart J* [Internet]. 2018 Dec 1 [cited 2019 Apr 3];70:S50–5. Available from: <https://www.sciencedirect.com/science/article/pii/S0019483217308878>
- [26] Telles S, Nagarathna R, Nagendra HR. Autonomic changes during “OM” meditation. *Indian J Physiol Pharmacol* [Internet]. 1995 Oct [cited 2019 Apr 4];39(4):418–20. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/8582759>

**Table 1:** MSRT practice steps

<i>Duration of MSRT</i>	<i>Time</i>
Quick relaxation technique(QRT) – observe the abdominal breathing with closed eyes	3 minutes
Prayer – MahaMrityunjaya Mantra- salutation to the divine	1 minutes
Loud chanting of A, U, M and AUM (3 rounds)	26 minutes
Ahata(loud chanting) – Anahata(chanting in the mind) of A,U,M and AUM (3 Rounds).	
Loud chanting of Mrtyunjaya Mantra	
Ahata – Anahata chanting of Mrtyunjaya Mantra (3 rounds)	
Anahata chanting of AUM (9 rounds)	
AjapajapaAUM to silence (9 rounds).	
Stay in silence	
Resolve	
Closing prayer	

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