

Review Article

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Author for correspondence:

Dr Rohit Ravi, Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal 575001, India
E-mail: rohitravi94@gmail.com
Fax: +91 824 242 8379

Effect of yoga and meditation on tinnitus: a systematic review

D R Gunjawate and R Ravi

Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, India

Abstract

Objective. The present systematic review aimed to explore the published literature on the application of yoga and meditation for tinnitus.

Method. A systematic search was carried out to identify the eligible studies exploring the effect of yoga and meditation on tinnitus in PubMed, Scopus and Cochrane Library electronic databases. Studies on the application of yoga and meditation on tinnitus were identified following a three-step screening process by both the authors independently. A mixed-methods appraisal tool was used to perform the quality appraisal of the included studies.

Results. Five studies were shortlisted and included in the present review. Four studies had used different types of yoga and pranayama, while one used relaxation therapy. Three studies concluded that there were positive effects of yoga on tinnitus, such as a reduction in severity, stress, anxiety and irritability associated with tinnitus and improved quality of life.

Conclusion. This review highlights the application of yoga and meditation in management of tinnitus along with regular otological and audiological treatment options. Furthermore, there is a need to have more randomised controlled trials in this area to evidence the effect of yoga and meditation on tinnitus empirically.

Introduction

Tinnitus is the perception of hearing sound in the absence of any external stimulus and can sound like a buzzing, roaring, hissing or clicking sound. It comprises two components: the perception of sound and the emotional reaction towards it. There have been attempts toward trying to understand tinnitus pathophysiology and provide specialised treatments to individuals with tinnitus.^{1,2} Audiological treatment options include hearing aids, cochlear implants, tinnitus retraining therapy, sound devices, biofeedback, counselling and tinnitus maskers.³ The most commonly used psychological therapies for tinnitus management included cognitive behaviour therapy, internet-delivered cognitive behaviour therapy and tinnitus education.⁴

The clinical practice guidelines for tinnitus have recommended against the use of pharmacological options, medicinal plants, dietary supplements and transcranial magnetic stimulation for tinnitus management.⁵ A recent systematic review on the effect of mindfulness-based intervention on tinnitus concluded that a decrease in tinnitus was noted among moderate-to-high quality studies. However, long-term effectiveness is uncertain and needs further exploration.⁶ There have been several treatment options explored for tinnitus management. No single curative treatment has been found so far for tinnitus, and most are aimed at ameliorating the impact rather than curing tinnitus.⁷

There is growing interest and evidence towards the effectiveness of yoga in improving physical and mental health. Yoga involves several mental, physical and spiritual practices that help to bring good health and balance. It is often depicted metaphorically as a tree comprising eight aspects or limbs including: physical postures (asana), concentration (dharana), meditation (dhyana), ethics (niyama), breath control (pranayama), control of senses (pratyahara), universal ethics (yama) and bliss (samadhi).⁸ Yoga helps in enhanced muscular strength and flexibility, improved respiratory and cardiovascular function, reduced stress, depression, anxiety, better sleep and enhanced overall wellbeing and quality of life of an individual.^{9,10} Recent systematic reviews on the effect of yoga and meditation as an adjunct therapy have shown promising effects on reducing stress,¹¹ hypertension,^{12,13} post-traumatic stress disorder, anxiety and depression.¹⁴

To date, there has been no systematic review of the literature on the effect of yoga and meditation on tinnitus. Thus, the present systematic review was planned to explore the published literature on the application of yoga and meditation on tinnitus.

Materials and methods

This systematic review was carried out and reported according to quality standards in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses ('PRISMA') checklist.¹⁵ A systematic search was carried out to identify the eligible studies exploring the

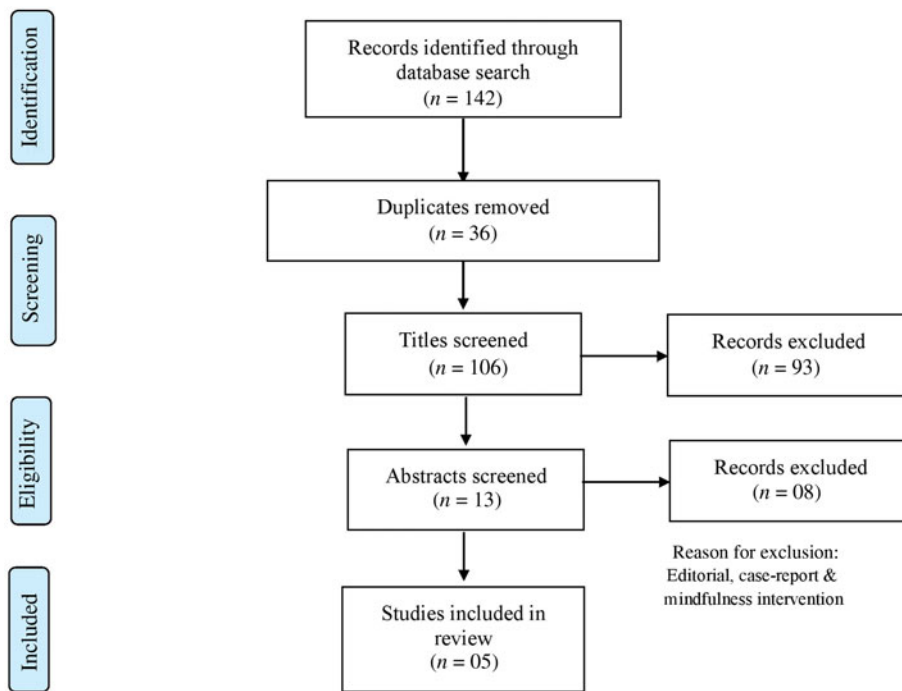


Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses ('PRISMA') flowchart explaining the steps followed in review.

effect of yoga on tinnitus. The eligible studies published up to June 2020 were included. PubMed, Scopus and Cochrane Library electronic databases were searched using suitable keywords and Boolean operators. The Population, Intervention, Comparator and Outcomes ('PICO') model was used in analysis.¹⁶ The Population, Intervention, Comparator and Outcomes search terms for the present review were as follows: population, individual with tinnitus; intervention, yoga or meditation; comparator, no comparison group; and outcome, change in tinnitus.

Only articles published in the English language were included. The exclusion criteria were: case reports, case series, letter to the editor and mindfulness-related intervention studies. Both the authors independently carried out the screening process. The relevant searches across the databases were gathered using Mendeley reference management software, and duplicates were removed. The authors sorted the articles based on inclusion and exclusion criteria, and any disparity was discussed and resolved.

The data from the included study were extracted using a pre-designed extraction sheet. The information that was extracted from the studies were: author and year of publication, country, study design, number of participants, age and gender, type of tinnitus, duration of tinnitus, objective of the included study, yoga and meditation related details, duration of yoga and meditation practice, and instrument used to measure the outcome and the results. The mixed methods appraisal tool (2018 version) was used for quality appraisal of the included studies.¹⁷ As per the procedural requirements, the mixed methods appraisal tool was independently administered by both the reviewers and compiled.

Results

A total of 142 studies were obtained, which were merged using reference management Mendeley desktop software, and 36 duplicates were removed. After the title and abstract screening based on inclusion and exclusion criteria, five studies were included. [Figure 1](#) illustrates the schematic representation of the study selection process, and [Table 1](#) displays the characteristics of studies included in the present review.

Summary of study findings

The five studies in the review were conducted in different countries: Germany, India, the UK, Turkey and Poland. One study was a randomised controlled trial whereas the remaining studies used different observational study designs. All the included studies used validated questionnaires for studying outcomes on tinnitus following yoga and meditation. The type and duration of yoga and meditation varied across the studies. The duration varied from 5 to 120 minutes for 8 to 12 weeks. The quality appraisal of included studies was performed using the mixed methods appraisal tool (2018 version) as shown in [Tables 2](#) and [3](#). The discussion is based on the different types of yoga and meditation and their effects observed across the different tinnitus outcome measures.

Discussion

The present systematic review aimed to explore the published literature on the application of yoga and meditation on tinnitus. Three electronic databases were searched to overcome publication bias and provide as many studies as possible. Both authors independently screened the studies at three levels to overcome reviewer bias. Five studies were found suitable and included in the review.

The studies included different types of yoga such as Hatha yoga,¹⁸ Brahmari pranayama,¹⁹ yoga and pranayama,²¹ and Ashtanga yoga,²² while one study used relaxation therapy.²⁰ Hatha yoga¹⁸ comprises yoga exercises for fostering relaxation through breathing exercises and body postures (asanas). Brahmari pranayama¹⁹ involves pressing the tragus to occlude the external auditory meatus with the thumbs. The middle finger and index fingers are placed above the eyebrows while the ring and little finger are placed over closed eyelids. A deep breath is taken, and then a humming sound similar to a bee is made while releasing the breath while closing the mouth.

The yoga exercise routine used by Köksoy *et al.*²¹ involved warm-up exercises, yoga postures and breathing exercises (pranayama) ending with meditation and relaxation. Ashtanga yoga²² practices involved focus on the diaphragm

Table 1. Characteristics of included studies

Study	Location	Study design	Participant details	Tinnitus details	Outcome measures	Intervention
Kröner-Herwig <i>et al.</i> ¹⁸	Germany	–	9 (6 males, 3 females); mean age: 47.6 years (\pm 14.6 years)	Continuous, mean duration 60.2 months	Tinnitus diary, tinnitus questionnaire, different measures of general well-being (Befindlichkeits-Skala, Beschwerden-Liste, Depressivitäts Skala)	Hatha yoga (breathing exercises and body postures)
Pandey <i>et al.</i> ¹⁹	India	–	25 ears	Continuous	Loudness and Tinnitus Handicap Inventory, Hospital Anxiety and Depression Scale	Brahmari pranayama (humming sound similar to a bee)
Arif <i>et al.</i> ²⁰	UK	Randomised controlled trial	27 (13 females, 14 males); mean age: 58.3 (\pm 13.2) years, 25 to 80 years	Varied, mean duration: 6.5 (\pm 4.4) years	Tinnitus Reaction Questionnaire, Hospital Anxiety and Depression Scale, visual analogue scale, health state thermometer	Relaxation therapy (5 planned sessions from explanation to application)
Köksoy <i>et al.</i> ²¹	Turkey	Single group, pre- and post-treatment design	12 (8 females, 4 males); mean age: 52.5 years	Chronic tinnitus, median duration: 5.4 years	Tinnitus handicap questionnaire, tinnitus severity using subjective analogue scale & tinnitus stress symptom scale	Yoga and pranayama (warm-up, yoga postures, pranayama, meditation and relaxation)
Niedziątek <i>et al.</i> ²²	Poland	Case control	25 (14 females, 11 males); mean age: 52 years (\pm 12.22), 17 to 67 years	Chronic tinnitus, mean duration of more than 6 months	Tinnitus Functional Index magnetic resonance imaging findings	Ashtanga yoga (practices aimed at improving blood circulation and reducing tension)

Table 2. Quality appraisal of included studies using the Mixed Methods Appraisal tool (2018)

Study	2.1: Is randomisation appropriately performed?	2.2: Are the groups comparable at baseline?	2.3: Are there complete outcome data?	2.4: Are outcome assessors blinded to the intervention provided?	2.5: Did the participants adhere to the assigned intervention?
Arif <i>et al.</i> ²⁰	Yes	Yes	Yes	No	Cannot tell

Table 3. Quality appraisal of included studies using the Mixed Methods Appraisal tool (2018)

Study	4.1: Is the sampling strategy relevant to address the research question?	4.2: Is the sample representative of the target population?	4.3: Are the measurements appropriate?	4.4: Is the risk of nonresponse bias low?	4.5: Is the statistical analysis appropriate to answer the research question?
Kröner-Herwig <i>et al.</i> ¹⁸	Yes	Yes	Yes	No	Yes
Pandey <i>et al.</i> ¹⁹	Yes	Yes	Yes	No	Yes
Köksoy <i>et al.</i> ²¹	Yes	Yes	Yes	No	Yes
Niedziątek <i>et al.</i> ²²	Cannot tell	Yes	Yes	No	Yes

and stretching muscles in the head, back, neck, torso, limbs and pelvis. These practices were aimed at improving blood circulation and reducing tension. The Hatha yoga, yoga and pranayama, and Ashtanga yoga were all taught and practised under the guidance of a qualified yoga instructor. Arif *et al.*²⁰ conducted relaxation therapy across five sessions. The first session involved exploration and explanation. The second session involved mental skill development focusing on relaxation and visualisation. The third session was on cue controlled relaxation focusing on breathing. The next session

was differential relaxation focusing more on relaxation while performing everyday activities. The final session involved rapid relaxation application.

Brahmari pranayama¹⁹ helped to reduce the irritability, anxiety and depression associated with tinnitus. The authors concluded that this positive change could be a result of inducing the parasympathetic system, with the humming acting as a source of self-generated noise and by acting as a relaxation technique. Kuppusamy *et al.*²³ systematically reviewed several studies to conclude the encouraging effect of Brahmari

pranayama on several physiological systems. Brahmari pranayama thus seems to be a low cost and quick technique that could be useful for individuals with tinnitus. Yoga and pranayama²¹ helped in reducing the tinnitus handicap scores and reduced stress and tinnitus severity, and this is indicative of the usefulness of yoga in this population. After a 12-week course of Ashtanga yoga,²² there was improvement seen in terms of control over tinnitus, sleep, intrusiveness of tinnitus and quality of life. Niedzialek *et al.*²² also carried out magnetic resonance imaging studies and noted significant changes in the thickness of the right anterior circular sulcus of the insula and an increase of white matter volume in the right paracentral area following yoga. A reduction in the grey matter in the subparietal sulcus was also noted, which is indicative of a higher degree of emotional calming after the yoga training. These changes could also lead to an overall improvement in the patients' perceptions towards their tinnitus. Out of the four studies exploring the effect of yoga on tinnitus, only one study did not support the effectiveness of yoga. Kröner-Herwig *et al.*¹⁸ compared yoga and tinnitus coping training. They concluded that patients treated with tinnitus coping training had higher satisfaction compared with yoga because tinnitus coping training gave the patient a feeling of more control over the symptoms of tinnitus. Arif *et al.*²⁰ explored the effect of mindfulness meditation and relaxation therapy on various tinnitus outcomes. After relaxation therapy, improvement was noted for outcome measures such as distress, interference with activities, distress severity, avoidance, anxiety and depression associated with tinnitus.

- Yoga, as a physical, mental and spiritual practice, has a positive effect on tinnitus
- The present review highlights the usefulness of yoga in individuals with chronic tinnitus
- The combination of yoga along with the regular otological and audiological treatment option can lead to better prognosis

Limitations and future recommendations

Studies published in English language and peer-reviewed journals only were considered for inclusion. Grey literature, unpublished work and articles in non-peer reviewed journals would have been missed out. Most of the included studies lacked a strong methodology and study design and included a limited number of participants. There is a need to have more randomised controlled trials in this area to evidence the effect of yoga on tinnitus empirically. Furthermore, the outcome measures used in the studies were mainly questionnaire-based, which could have an investigator or participant bias.

Conclusion

In order to have successful management of tinnitus, it is important to recommend options that help patients to overcome the symptoms. The findings of the present review highlighted the limited yet growing evidence towards the application of yoga in tinnitus management. Based on this, yoga and meditation could be included in the supportive treatment options that are made available for individuals with tinnitus.

Competing interests. None declared

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