

# The Effects of Yoga in Patients Suffering from Subjective Tinnitus

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## Abstract

**Introduction** Tinnitus is a perception of sound in the absence of an external source and it is a distressing issue. Yoga is a system of mind-body practices with the goal of uniting the body, mind and soul. It has been shown to reduce anxiety and stress, as well as improving the quality of life.

**Objective** The aim of this study is to investigate the effects of yoga in patients suffering from chronic subjective tinnitus.

**Methods** Twelve subjects previously diagnosed with chronic subjective tinnitus were selected for the study. The patients were asked to attend to yoga classes once a week and to practice yoga at home using a worksheet for 3 months. Each yoga class consisted of body exercises (asana), breathing (pranayama) and meditation (shavasana and yoga nidra). Tinnitus scores before and after the yoga classes were compared using the Wilcoxon test.

**Results** Among the 12 patients, there were 4 men and 8 women and their mean age was 52.5 years. The median duration of tinnitus among the group was 5.4 years. There were statistically significant differences in the stress ( $p = 0.01$ ), handicap ( $p = 0.004$ ) and severity ( $p = 0.007$ ) questionnaires scores.

**Conclusion** This study indicated that yoga practices may reduce life stress and symptoms of subjective tinnitus.

## Keywords

- ▶ complementary and alternative medicine
- ▶ tinnitus
- ▶ yoga
- ▶ complementary therapies

## Introduction

Tinnitus is an awareness of sound in the ears or head that does not come from an external source. The symptoms of tinnitus are often described as ringing, buzzing or whistling sounds. If the sound can be heard by the patient only, it is called subjective tinnitus. When the sound can be heard by somebody else, it is called objective tinnitus. If tinnitus symptoms have persisted for more than six months, it is described as chronic tinnitus. The exact mechanism of subjective tinnitus remains unknown and therefore, different treatment modalities are beneficial in some patients but not in others. The patients report depressed mood, low quality of

life, irritability, hopelessness and insomnia, and these conditions may change according to the severity and frequency of this entity. It must be emphasized that there is a relation between tinnitus and the activity of the prefrontal cortex and limbic system. This part of the brain is related to emotions, thus the association with depression, anxiety and other psychological diseases can be made when tinnitus is severe.<sup>1</sup>

Different treatment methods have been used for tinnitus, such as sound therapy, cognitive behavioral therapy, tinnitus retraining therapy, acupuncture, electromagnetic stimulation, biofeedback and pharmacological treatments (Ginkgo biloba, sedatives, antidepressants and anxiolytics).<sup>1,2</sup> These therapies present different results among the patients due to

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the different etiologies of tinnitus. So, patients suffering from tinnitus should be analyzed comprehensively in order to find the underlying etiology and to apply the correct treatment.

Yoga is an ancient and holistic system originated from India, which involves physical postures (asana), breathing exercises (pranayama) and meditation (shavasana and yoga nidra). Its name comes from the Sanskrit word 'Yuj', which means to unite, to join or to add. Yoga is thought to be the science of being present in the moment, and its goals are inner peace and union of mind, body and spirit. There are various paths of yoga, such as Ashtanga, Hatha, Karma, Jnana (Gyana), Bhakti and Kundalini, among others, that lead toward these goals, and each one is a specialized branch of one comprehensive system. Yoga has been reported to reduce sympathetic hormones, stimulate the limbic system and activate antagonistic neuromuscular systems. Meditation is a hypometabolic state that conduces to relaxation and reduces stress induced by sympathetic overactivity. It is reported that yoga has an effective role in reducing stress and anxiety, promoting general well-being and improving the quality of life.<sup>3</sup> There are various studies about the therapeutic effects of yoga in reducing anxiety, stress, depression, sleeping disorders and stress-related symptoms, such as insomnia and hypertension.<sup>4</sup>

Because tinnitus is thought to be related with stress, we aimed to investigate the effects of yoga in patients with chronic subjective tinnitus.

## Materials and Method

In this study, a single group, pre- and post test design was adopted between December of 2015 and March of 2016. Patients who visited the department of otorhinolaryngology for chronic tinnitus were investigated in this study. The exclusion criteria were; objective tinnitus, otosclerosis and other external, middle and inner ear pathologies, intracranial diseases, inability of doing the yoga exercises, using drugs for tinnitus and inadequate Turkish literacy skills. The ethical committee approval was granted by the Ethical Committee of Clinical Researches.

According to the power analysis, a sample of 18 subjects was adequate for the study. During the study, 6 subjects dropped out of the study due to personal reasons. Among the 12 participants who completed the study, there were 4 men and 8 women. The patients were prescribed pharmacological therapies such as trimetazidine dihydrochloride, betahistine and antidepressants previously. All the participants received detailed information about the purpose and benefits of the study and were provided with a written consent form. Participants filled three questionnaires as tinnitus handicap, tinnitus severity and tinnitus stress before and after the study.<sup>5</sup>

Tinnitus severity was evaluated by subjective analog scale. All patients were required to rate their tinnitus from 1 to 10, with 10 being the loudest and the worst and 1 being the best condition (tinnitus severity). However, the patients were also required to complete a 10-point handicap questionnaire (tinnitus handicap questionnaire). A five-point

scale for grading the degree of tinnitus used in the study of Kodama et al<sup>6</sup> was modified by Yetiser et al<sup>5</sup> for the Turkish population into a 10-point scale with the combination of loudness, annoyance and interference of tinnitus in everyday life. Each level was defined by a short explanation to simplify the grading process. Part A mostly includes functional questions, and Part B contains questions related to emotional status. Every question has three answer choices: yes, no and sometimes. If the answer was no, meaning that the patient had no complaint in a particular situation, then the patient was required not to rate that question (no point). If the answer was yes or sometimes, patients were required to rate their complaints from 1 to 10. Each question corresponds to a maximum of 2 points (the worst condition), which means that each following number from 1 to 10 is equivalent to 0.2 points in an increasing order (1 is 0.2 points, 2 is 0.4 points, 3 is 0.6 points, 10 is 2 points, etc.). Thus, the final score represents the quantification of tinnitus for each patient.

In this study, we also used the stress symptom scale. Dasgupta<sup>7</sup> et al developed the scale to detect signs of stress and this scale was adapted into Turkish by Hovardaoglu<sup>8</sup> et al. The stress symptoms scale consists of 38 questions. This scale consists of three sub-factors as cognitive-affective (factor 1; 2,8,9,14,15,16,20,23,28,33,34,35,36,37,38. Maddeler), physiological (factor 2; 3,7,10,11,12,13,17,19,24,26,27) and pain complaint (factor 3; 1,6,18,21,25,29,30,32). We asked patients to indicate how often they experienced the symptoms on the list over the past week. Each item can receive one of four ratings (1: never, 2: occasionally, 3: frequently and 4: always). The lowest score that can be reached on scale 38 and the highest score is 152. The increase of the score means the increase of the symptoms.

Yoga exercises were conducted for about 1 hour, once a week for 12 weeks at a gym. Researchers and a certificated yoga instructor held the classes. Yoga was practiced on yoga mats accompanied by relaxing music. Each class consisted of 15 minutes of warm up, 30 minutes of poses and 15 minutes of breathing exercises and meditation (► **Table 1**). Warm up exercises contained stretching of whole body and then, participants practiced yoga poses coordinated with breathing. During the meditation, participants' eyes were closed in a comfortable sitting position and they were meditating with the guidance of the instructor.

At the end of the first yoga session, participants were given worksheets which contained the same program practiced in the yoga class. They were told to practice yoga as often as possible.

Descriptive statistics are presented as mean and standard deviation. The data follows normal distribution according to the Shapiro Wilk test. So, the Wilcoxon test was used to compare the dependent means of the group and the significance level was set at 0.05.

Although the sample size was small, the results of this study were statistically significant. So, post-hoc power analysis was performed to compare the two dependent means of the group. The post hoc powers for 5% type 1 error were found 85.67%, 99.28% and 99.83% for stress, handicap and severity parameters respectively. GPower 3.1.9.2

**Table 1** Yoga exercise routine

<b>Step 1. Warm up exercises (Pavanamuktasana)</b>	<b>Step 3. Breathing exercises (Pranayama)</b> Swana Nadi Shuddhi Nadi Sodhana Bhastrika Sawitri
<b>Step 2. Yoga poses (yoga asanas)</b> Sun Salutation (Surya Namaskar) Standing Steady Pose (Tadasana) Raised Arms Standing Pose (Urdhva Hastasana) Half-Moon Pose (Ardha Chandrasana) Chair Pose (Utkatasana) Warrior Pose 1–2 (Virabhadrasana 1–2) Triangle Pose (Trikonasana) Standing Forward Bend (Uttanasana) High Lunge Pose (Ashwa Sanchalanasana) Plank Pose (Plankasana) Cat Pose (Marjariasana) Cow Pose (Bitilasana) Rabbit Pose (Shasangasana) Forward Bend Pose (Paschimottanasana) Reclining Hand to Big Toe Pose (Supta Padangusthasana) Side Reclining Raised Leg Pose (Anantasana) Seated Spinal Twist Pose (Matsyendrasana) Child Pose (Balasana)	<b>Step 4. Meditation and relaxation</b> Water sound Nature beauty visualization Love Consciousness Corpse pose (Shavasana) Deep relaxation (Yoga Nidra)

(Dusseldorf, Germany) software was used for the post-hoc power analysis.

## Results

In the beginning, there were 18 patients, but due to personal reasons 6 patients dropped out and the remaining 12 patients completed the study. There were 4 men and 8 women and their mean age was 52.5 years. The median duration of tinnitus among the group was 5.4 years. Only 3 patients had mild sensorineural hearing loss and none of the patients used hearing aid. All 12 participants attended to a total of 12 weeks of yoga sessions. The changes in tinnitus scores in the questionnaires before and after the yoga classes are presented in ► **Tables 2** and **3**.

At baseline, the mean tinnitus severity score was  $4.50 \pm 1.88$ , and it was  $1.91 \pm 1.24$  at the post-intervention visit. Tinnitus score was reduced as compared with baseline, and this reduction was considered clinically meaningful due to the difference being statistically significant ( $p = 0.007$ ).

The mean tinnitus stress score was  $74.08 \pm 16.04$  and  $59.41 \pm 12.18$  before and after the yoga sessions respectively. There was a statistically significant difference between the before and after scores of the stress questionnaire ( $p = 0.01$ ) as well. In factor 1 (cognitive-affective factor), the stress score was  $29.75 \pm 7.08$  and  $23.41 \pm 4.94$  before and after the yoga intervention ( $p = 0.007$ ). In factor 2 (physiological factor), the stress score was  $18.00 \pm 4.22$  and  $15.00 \pm 3.74$  before and after the yoga intervention ( $p = 0.025$ ). In factor 3 (pain complaint factor), the stress score was  $17.83 \pm 5.32$  and  $14.41 \pm 3.96$  before and after the yoga intervention ( $p = 0.025$ ).

In the handicap questionnaire, baseline score was  $44.15 \pm 15.09$  and the postintervention score was  $25.18 \pm 9.95$ . The difference was statistically significant ( $p = 0.004$ ). The mean score of handicap A was  $24.63 \pm 9.21$  and  $12.78 \pm 6.03$  before and after the yoga intervention respectively ( $p = 0.003$ ). For handicap B, the mean score was  $19.51 \pm 7.77$  and  $12.40 \pm 5.67$  before and after the yoga intervention respectively ( $p = 0.008$ ).

## Discussion

The exact pathophysiology of tinnitus is unknown; therefore, tinnitus treatments focused on symptomatic relief. Some medications are prescribed to relieve the associated symptoms of the tinnitus, such as depression, anxiety or insomnia, whereas some agents are applied for changing the pathophysiology. Lidocaine, benzodiazepines, antidepressants, anticonvulsants and antiglutamatergic agents target the neural activity underlying tinnitus. Others, such as systemic and intratympanic steroids, like ginkgo biloba, and melatonin, have anti-inflammatory, vasodilator or antioxidant effects on cochlea and neural pathways.<sup>1,5</sup> Also, in addition to pharmacological treatment, various treatment modalities have been used for subjective tinnitus, such as sound therapy, cognitive behavioral therapy, acupuncture, etc.<sup>1,2,9</sup>

In the literature, there are few studies about the effects of yoga on tinnitus. Our study is the first one showing that yoga reduced significantly the symptoms of tinnitus.

Yoga has been reported to reduce sympathetic hormones, stimulate the limbic system and to activate antagonistic neuromuscular systems. Meditation is a hypomethabolic

**Table 2** Effects of yoga on the scores of tinnitus stress, handicap and severity questionnaires (Handicap A mostly comprises functional questions, and handicap B contains questions related to emotional status)

Patients	Before				After					
	Handicap			Severity	Stress	Handicap			Severity	Stress
	A	B	Total			A	B	Total		
1	32.6	12.0	44.6	5.0	49.0	9.4	2.8	12.2	5.0	55.0
2	28.2	24.4	52.6	6.0	79.0	7.0	7.4	14.4	1.0	81.0
3	14.6	9.8	24.4	1.0	53.0	15.0	13.2	28.2	1.0	54.0
4	8.0	8.4	16.4	5.0	77.0	4.8	6.6	11.4	1.0	61.0
5	12.0	15.0	27.0	1.0	65.0	5.0	18.4	23.4	1.0	53.0
6	25.8	34.2	60.0	6.0	106.0	22.8	20.0	42.8	2.0	86.0
7	23.2	23.6	46.8	3.0	73.0	12.0	14.0	26.0	2.0	54.0
8	24.4	18.0	42.4	5.0	64.0	11.2	13.6	24.8	3.0	46.0
9	28.8	18.6	47.4	4.0	83.0	11.4	9.8	21.2	1.0	54.0
10	39.6	24.0	63.6	6.0	73.0	22.4	17.0	39.4	1.0	64.0
11	33.4	28.8	62.2	6.0	95.0	14.6	19.2	33.8	2.0	55.0
12	25.0	17.4	42.4	6.0	72.0	17.8	6.8	24.6	3.0	50.0

state that promotes relaxation and reduces stress induced by sympathetic overactivity. In previous studies, it is reported that yoga has an effective role in reducing stress and anxiety, improving general well-being and quality of life.<sup>3</sup> There are various studies about the therapeutic effects of yoga in reducing anxiety, stress, depression, sleeping disorders and stress-related symptoms, such as insomnia and hypertension.<sup>4</sup> The aim of this study was to evaluate the effects of yoga in patients with subjective tinnitus. The results showed that

practicing yoga exercises once a week for a period of three months improved the symptoms of tinnitus. In various studies, yoga was associated with reduced stress and anxiety levels and high quality of life.<sup>3,4,10,11</sup> It is thought that yoga may reduce stress by relaxing body muscles with some poses and controlling the autonomic nervous activity with deep breathing. During the meditation, one begins a journey toward the self. By assuming a comfortable posture, the body totally relaxes and this facilitates transcending the

**Table 3** Results of yoga on the scores of tinnitus stress, handicap and severity questionnaires (the Wilcoxon test was used to compare the dependent means of the group, and the significance level was set at 0.05)

		Mean ± std deviation	p	power
Severity	Before	4.50 ± 1.88	0.007	0.999
	After	1.91 ± 1.24		
Handicap - total	Before	44.15 ± 15.09	0.004	0.995
	After	25.18 ± 9.95		
Handicap A	Before	24.63 ± 9.21	0.003	
	After	12.78 ± 6.03		
Handicap B	Before	19.51 ± 7.77	0.008	
	After	12.40 ± 5.67		
Stress	Before	74.08 ± 16.04	0.010	0.905
	After	59.41 ± 12.18		
Factor 1 Cognitive-affective factor	Before	29.75 ± 7.08	0.007	
	After	23.41 ± 4.94		
Factor 2 Physiological factor	Before	18.00 ± 4.22	0.025	
	After	15.00 ± 3.74		
Factor 3 Pain complaint factor	Before	17.83 ± 5.32	0.065	
	After	14.41 ± 3.96		

body consciousness. In contrast to our study, Herwig et al reported that there is no significant effect of yoga on tinnitus. In that study, the effect of cognitive-behavioral tinnitus coping training (TCT) and yoga on tinnitus were compared. In TCT, group progressive relaxation was the main element in sessions. The patients focused on analyzing stressful events, dysfunctional irrational self-statements and catastrophizing thoughts and their effect on tinnitus. Yoga was presented by a yoga trainer including asanas, breathing and other exercises. Forty-three patients with chronic tinnitus were assessed at baseline, after therapy and at 3 months' follow-up. Patients treated with TCT reported more satisfaction compared with the yoga group. They also indicate that cultural differences may be an important factor on the therapeutic effect of yoga. Because yoga was originated in an eastern country, it can be unfamiliar to some patients.<sup>12</sup>

The effects of a yoga program alone, and in combination with cognitive-behavioral therapy (CBT) on reducing the symptomatology of panic disorder was evaluated by Vorkapic et al. Both therapies showed significant reductions in anxiety levels. However, the combination of CBT and yoga showed a greater reduction in all observed parameters.<sup>4</sup>

In a study by Patil et al<sup>13</sup>, yoga practice conducted for three months has shown to reduce serum malondialdehyde (MDA) levels, which is the indicator of oxydative stress. In the same study,<sup>13</sup> antioxidants levels such as superoxide dismutase (SOD) activity, serum glutathione and vitamin C was significantly elevated.<sup>13</sup> It is known that increased oxygen consumption during exercise leads to the generation of reactive oxygen species. However, yoga exercises were found to be associated with low oxygen consumption, which results in reduced MDA levels.<sup>14</sup>

Yoga was also shown to improve the symptoms of post-traumatic stress disorder, decrease the risk of alcohol and drug use, as well as reduce stress in cancer patients before chemotherapy.<sup>10,15</sup>

In our study, there were statistically significant differences in tinnitus handicap, stress and severity questionnaires scores and the results were better after the yoga intervention.

This study is limited by a small number of participants that reduces its statistical power. Furthermore, stress and tinnitus parameters were measured only by questionnaires, not by objective tests such as stress hormones or enzymes. Yoga is not only a sports activity or a relaxation method, it is a lifestyle; therefore, further studies would be needed with a larger number of participants for an extended period of time.

## Conclusion

As a conclusion, the findings of the current study suggest that yoga therapy may play a role in reducing the symptoms of tinnitus. The possible action mechanism of yoga therapy may be further analyzed by other studies.

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