








# Network of specialized care for patients with tinnitus in Brazil: professional profile, assessment and intervention methods and techniques

Rede de cuidado especializado em pacientes com zumbido no Brasil: perfil profissional, métodos e técnicas de avaliação e intervenção

Red de atención especializada a pacientes con acúfeno en Brasil: perfil profesional, métodos y técnicas de evaluación e intervención

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## Abstract

**Introduction:** Tinnitus is a highly prevalent symptom in the population, which requires specialized care centered on the patient and their individualities. **Objective:** to investigate the specialized care network for patients complaining of tinnitus in Brazil. **Method:** A national search was carried out with

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**Received:** 12/29/2023

**Accepted:** 05/02/2024





152 professionals who serve the public with tinnitus, through social networks, in addition to using the “snowball” technique. Professionals with clinical experience or participation in a tinnitus research group were selected. To those selected a Google Forms questionnaire was sent via email or social media, consisting of twelve objective questions, in order to identify the profile of these professionals, as well as the service they offer. The data were categorized and tabulated in a digital spreadsheet for subsequent descriptive and inferential statistical analysis. **Results:** the results showed that there are professionals working in tinnitus in 21 Brazilian states, most of them in the Southeast and Northeast regions, mainly in the private sector and the majority in multidisciplinary teams that include at least one otorhinolaryngologist and one speech therapist, presenting similar evaluative and therapeutic practices. **Conclusion:** it was possible to observe that, although the number of professionals is still small, in addition to not being well distributed geographically, there is a similarity in the evaluation and treatment methods used, as well as the multidisciplinary approach has become a reality in practice clinic, although more present in the private sector, which renews the perspectives of the public affected by tinnitus, for the near future.

**Keywords:** Tinnitus; Patient Assistance Team; Health Care Models; Interdisciplinary Practices; Health services.

### Resumo

**Introdução:** O zumbido é um sintoma de alta prevalência na população, que necessita de cuidado especializado e centrado no paciente e suas individualidades. **Objetivo:** investigar a rede de cuidado especializado em pacientes com queixa de zumbido no Brasil. **Método:** Realizou-se uma busca a nível nacional com 152 profissionais que atendem o público com zumbido, por meio de redes sociais, além de utilizar a técnica “snow ball”. Foram selecionados os profissionais com atuação clínica ou participação de grupo de pesquisa em zumbido. Aos selecionados, foi enviado por e-mail ou rede social um questionário do *Google Forms* composto por doze questões objetivas, a fim de identificar o perfil desses profissionais, bem como do atendimento oferecido por eles. Os dados foram categorizados e tabulados em planilha digital para posterior análise estatística descritiva e inferencial. **Resultados:** os resultados mostraram que há profissionais atuantes em zumbido em 21 estados brasileiros, sendo a maior parte nas regiões Sudeste e Nordeste, inseridos principalmente no setor privado e a maioria em equipes multidisciplinares que contam, pelo menos, com um otorrinolaringologista e um fonoaudiólogo, apresentando práticas avaliativas e terapêuticas semelhantes. **Conclusão:** foi possível observar que, embora o número de profissionais ainda seja um número reduzido, além de não serem bem distribuídos geograficamente, há uma semelhança quanto aos métodos de avaliação e tratamento utilizados, bem como a abordagem multidisciplinar tem se tornado uma realidade na prática clínica, ainda que mais presente no setor privado, o que renova as perspectivas do público acometido pelo zumbido, para um futuro próximo.

**Palavras-chave:** Zumbido; Equipe de Assistência ao Paciente; Modelos de Assistência à Saúde; Práticas Interdisciplinares; Serviços de Saúde.

### Resumen

**Introducción:** El acúfeno es un síntoma altamente prevalente en la población, que requiere atención especializada centrada en el paciente y sus individualidades. **Objetivo:** investigar la red de atención especializada a pacientes que se quejan de acúfeno en Brasil. **Método:** Se realizó una búsqueda nacional profesionales que atienden al público con acúfeno, a través de las redes sociales y la técnica de la “bola de nieve”. Se seleccionaron profesionales con experiencia clínica o participación en un grupo de investigación de acúfeno. Se les envió a través de correo electrónico un cuestionario de *Google Forms*, compuesto por doce preguntas objetivas, con el fin de identificar el perfil de estos profesionales, así como el servicio que ofrecen. Los datos fueron categorizados y tabulados en una hoja de cálculo digital para su posterior análisis estadístico descriptivo e inferencial. **Resultados:** los resultados mostraron que hay profesionales que actúan en acúfeno en 21 estados brasileños, la mayoría en las regiones Sudeste y Noreste, principalmente en el sector privado y la mayoría en equipos multidisciplinares que incluyen al menos un otorrinolaringólogo y un logopeda, presentando prácticas evaluativas y terapéuticas similares.





**Conclusión:** se pudo observar que, si bien el número de profesionales aún es pequeño, además de no estar bien distribuidos geográficamente, existe similitud en los métodos de evaluación y tratamiento utilizados, así como el enfoque multidisciplinario se ha vuelto una realidad en clínica de práctica, aunque más presente en el sector privado, que renueva las perspectivas del público afectado por acúfeno, de cara al futuro próximo.

**Palabras clave:** Acúfeno; Equipe de Assistência ao Paciente; Modelos de Assistência à Saúde; Práticas Interdisciplinares; Serviços de Saúde.

## Introduction

Tinnitus is the conscious perception of a sound or noise without a corresponding and identifiable external sound source. It becomes a disorder when associated with emotional distress, cognitive dysfunction, and/or autonomic arousal, leading to behavioral changes and functional impairment<sup>1</sup>. Tinnitus can significantly impact the daily lives of those affected by it, as well as the lives of those around them<sup>2</sup>. It is commonly related to anxiety, depression, and other psychological and/or psychiatric symptoms<sup>3,4</sup>. Therefore, it is important to consider that this problem can affect an individual's relationships, professional life, and overall social life<sup>5</sup>. Tinnitus is difficult to evaluate, and so far, no form of treatment has gathered sufficient evidence to be named as the best option.

Previously published epidemiological studies estimate that 10 to 15% of the general adult population experiences this symptom<sup>6</sup>. According to the World Health Organization, 278 million people worldwide have tinnitus, which corresponds to approximately 15% of the global population, including about 28 million Brazilians<sup>7</sup>. Despite the high incidence of people with tinnitus, studies show that only one-quarter of those with tinnitus complaints seek care. This may reveal a lack of knowledge about the treatment alternatives available for tinnitus and a lack of information on which professionals and services to seek in this case<sup>8</sup>.

It can be asserted that tinnitus remains a difficult topic even for professionals specifically trained in the field, such as those working directly with hearing, like otolaryngologists and audiologists. This is due to its complex, subjective nature and the diversity of etiological factors. Therefore, there is no absolute consensus regarding tinnitus treatment, and often the statement that there is no cure for this symptom is propagated<sup>9,10</sup>. Due to a lack of studies in the literature, tinnitus has long been

considered an enigma in health sciences<sup>11</sup>. Given its variability of etiological factors, the need for a thorough evaluation, and the diverse therapeutic alternatives, it is crucial to provide multidisciplinary care to individuals affected by tinnitus, as it impacts various aspects of life. Proposing multidisciplinary care is about establishing bridges between services to offer systemic and continuous assistance. Due to its difficult characterization and treatment, tinnitus is considered a public health issue with significant demand in clinical practice and is often neglected by professionals<sup>12</sup>.

The affected public frequently reports difficulty in finding services with specialized professionals who offer evaluative methods and/or can direct them to the most appropriate therapeutic option. This complicates access to treatment and/or cure possibilities, especially in the public sector, which is a national reality. The literature has increasingly highlighted the importance of multidisciplinary evaluation, diagnosis, and treatment of tinnitus patients<sup>13</sup>. It also emphasizes the effectiveness of multidisciplinary care for these patients<sup>14</sup>.

Currently, the type of personalized multimodal therapy for tinnitus offered by specialized centers worldwide depends largely on good interdisciplinary practices, cooperation, and mutual understanding of scientific and clinical aspects related to tinnitus<sup>15</sup>. However, little is known about the number of professionals working with tinnitus in Brazil, as well as aspects related to its evaluation and treatment, which are still not well articulated. Therefore, this study aimed to investigate the network of specialized care for tinnitus patients in Brazil.

## Methods

This study was approved by the Research Ethics Committee of a Higher Education Institution under opinion number 4.241.540. Informed consent was obtained from all participants. All procedures



were conducted in accordance with the guidelines and regulations of the ethical standards governing bodies. This was a quantitative, field-based, and cross-sectional study aimed at observing, collecting, analyzing, and interpreting the current scenario of professionals specialized in treating tinnitus patients in Brazil. This study was conducted electronically, with participants responding to a Google Forms questionnaire consisting of twelve questions. The studied population comprised 152 volunteers working with tinnitus patients. The sample included those who met the following eligibility criteria: clinical practice or participation in a tinnitus research group, as referred to by the volunteers themselves.

Initially, secondary data of public domain were used through the Lattes curriculum platform of the CNPq and the professional social network LinkedIn. To obtain the research data, the descriptors “zumbido” and “tinnitus” were used. However, it was challenging to identify the professionals’ emails from the mentioned databases, considering that most Lattes curricula and LinkedIn profiles did not include this information, making it unfeasible to contact professionals through these platforms. The questionnaire was then disseminated on other social networks, such as WhatsApp and Instagram, reaching a larger number of professionals than before. Additionally, the “snowball” sampling technique was used, involving asking participants to name other people to participate in the study. Thus, each volunteer was asked to indicate another professional treating tinnitus patients, providing their email in a specific section of the questionnaire. The professionals answered twelve questions focused on tinnitus patient care.

At the beginning of the form, there was an Informed Consent Form (ICF), and a copy was sent by email to the professionals. Those who agreed to participate in the study signed the form

and continued to fill out the questionnaire. The questionnaire included questions about age, professional background, qualifications, location of practice, information about the multidisciplinary team (if involved and which professionals were included), length of practice, dynamics of care, evaluation tools, type of service (public or private), and therapeutic options offered. There was also a section at the end for those who wished to promote their service, providing address and contact information, which is intended to be disclosed later to reach the affected population.

The data were categorized and tabulated in a digital spreadsheet for subsequent descriptive and inferential statistical analysis using R software version 4.1.1, considering a significance level of 5%. Absolute and relative frequency measures were extracted to describe the sample and the tinnitus evaluation and treatment practices. Additionally, Fisher’s Exact Test was performed for inferential data analysis to associate variables related to the training and region of practice of professionals who care for patients complaining of tinnitus in Brazil.

## Results

A total of 152 professionals working in the field of tinnitus participated in this study. Most of these professionals were between the ages of 31 and 40, with backgrounds in Audiology, Otorhinolaryngology, or Physiotherapy, and their highest qualifications were typically specializations or master’s degrees (Table 1).

The study included professionals from 21 Brazilian states, with the majority coming from the Southeast and Northeast regions, respectively. They reported having worked in the field for a maximum of five years and having taken free courses to improve their knowledge on the subject (Table 1).





**Table 1.** Profile, insertion, and activities of professionals involved in the care of patients with tinnitus complaints in multidisciplinary teams in Brazil

VARIABLES	N		%	
<b>AGE</b>				
20 to 30 years	30		19,7	
31 to 40 years	65		42,8	
41 to 50 years	41		27,0	
51 to 60 years	16		10,5	
<b>PROFESSIONAL QUALIFICATION</b>				
Speech therapist	68		44,7	
Otolaryngologist	38		25,0	
Physiotherapist	37		24,3	
Dentist	5		3,3	
Acupuncturist doctor	2		1,3	
Psychologist	2		1,3	
<b>HIGHER ACADEMIC DEGREE</b>				
Graduation	14		9,2	
Specialization	52		34,3	
Residence	24		15,9	
Master's degree	38		25,0	
Doctorate degree	21		13,8	
Post doctoral	3		2,0	
<b>TIME OF ACTION</b>				
Up to_5_years	69		45,4	
5_to_10_years	30		19,7	
More_than_10_years	53		34,9	
<b>ACTING REGION</b>				
North East	42		27,6	
Midwest	9		5,9	
North	3		2,0	
Southeast	67		44,1	
South	31		20,4	
<b>SPECIFIC TRAINING</b>				
No	48		31,6	
Free course	94		61,8	
Specialization	3		2,0	
Graduation	1		0,7	
Search group	4		2,6	
Extension project	1		0,7	
Supervision	1		0,7	
VARIABLE	NO		YES	
	N	%	n	%
<b>OPERATION SECTOR</b>				
Private	14	9.2	138	90.8
Public	98	64.5	54	35.5
Search	125	82.2	27	17.8
School clinic	139	91.4	13	8.6
<b>MULTIDISCIPLINARY TEAM</b>				
Otolaryngologist	64	42.1	88	57.9
Speech therapist	72	47.4	80	52.6
Physiotherapist	93	61.2	59	38.9
Psychologist	99	65.1	53	34.9
Nutritionist	116	76.3	36	23.7
Dentist	107	70.4	45	29.6
Occupational Therapist	141	92.8	11	7.2

Source: Research data





Participants also responded about the market sector they are involved in and provided information about the presence of other professionals in the multidisciplinary team assisting patients with tinnitus (Table 1). It was observed that they are primarily involved in the private sector and that most teams include at least one otorhinolaryngologist and one audiologist.

Additionally, it was quite common for teams to include professionals such as physiotherapists, psychologists, dentists, and nutritionists (Table 1). Other professionals mentioned less frequently, but who may also be part of the multidisciplinary team, included social workers, physical educators, and neurologists.

The procedures, techniques, and methods most frequently used in the assessment and intervention of tinnitus were investigated using a multidisciplinary approach. The professionals working in tinnitus in Brazil reported primarily performing

the following procedures during assessment: specific anamnesis, audiometry, physical examination, self-assessment using the Tinnitus Handicap Inventory (THI) protocol, and the Visual Analog Scale (VAS), immittance audiometry, and tinnitus pitch matching, respectively (Table 2). In addition to the procedures listed in Table 3, other procedures mentioned included high-frequency audiometry, temporomandibular disorder (TMD) investigation, otoneurological exams, posturography, and surface electromyography.

Regarding intervention procedures, the most frequently recommended were: hearing aid fitting, sound therapy, and medication, respectively (Table 2). Other less frequently performed interventions listed in Table 3 included counseling, dry needling, osteopathy and manual therapy, floral therapy, TMD therapy, and ozone therapy. Participants also suggested referrals to other professionals.

**Table 2.** Procedures, techniques, and methods used in the assessment and intervention of tinnitus by professionals in Brazil.

VARIABLE	EVALUATION PROCEDURES			
	NO		YES	
Specific tinnitus anamnesis	26	17.1	126	82.9
Audiometry	35	23.0	117	77.0
Physical exam	46	30.3	106	69.7
Tinnitus Handicap Inventory	52	34.2	100	65.8
Visual Analogue Scale - EVA	52	34.2	100	65.8
Immittance audiometry	54	35.5	98	64.5
Acuphenometry	66	43.4	86	56.6
Otoacoustic emissions	83	54.6	69	45.4
<b>ABR</b>	<b>87</b>	<b>57.2</b>	<b>65</b>	<b>42.8</b>
Anxiety and/or depression questionnaires	90	59.2	62	40.8
Imaging exams	101	66.4	51	33.6
Bloodtests	104	68.4	48	31.6
	INTERVENTION PROCEDURES			
Hearing aid	62	40.8	90	59.2
Sound therapy	66	43.4	86	56.6
Medication	79	52.0	73	48.0
Cognitive behavioral therapy	113	74.3	39	25.7
Acupuncture	113	74.3	39	25.7
Photobiomodulation	113	74.3	39	25.7
Auriculotherapy	116	76.3	36	23.7
Mindfulness	114	75.0	38	25.0
Psychotherapy	121	79.6	31	20.4
tDCS	137	90.1	15	9.9
Transcranial Magnetic Stimulation	145	95.4	7	4.6

Caption: ABR – Brainstem Auditory Evoked Potential; tDCS - Transcranial Direct Current Stimulation.  
Source: Research data





Tables 3 to 7 contain data related to the procedures, techniques, and methods most frequently used in the assessment and intervention of tinnitus,

and their relationship with the education, region, and experience of professionals attending to patients with tinnitus complaints in Brazil.

**Table 3.** Relationship between type of education, region of practice, and aspects related to the professional experience of professionals involved in the care of patients with tinnitus complaints in Brazil.

Variables	ACADEMIC TITLE						p-value	
	DENTISTRY	PHYSIO	SLP	ACUMP	ENT	PSI		
ACTING REGION	North East	3 60.0%	13 35.1%	19 27.9%	2 100.0%	3 7.9%	2 100.0%	0.012*
	North	0 0.0%	0 0.0%	7 10.3%	0 0.0%	2 5.3%	0 0.0%	
	Midwest	0 0.0%	0 0.0%	2 2.9%	0 0.0%	1 2.6%	0 0.0%	
	Southeast	1 20.0%	17 45.9%	23 33.8%	0 0.0%	26 68.4%	0 0.0%	
	South	1 20.0%	7 18.9%	17 25.0%	0 0.0%	6 15.8%	0 0.0%	
	Up to 5	4 80.0%	28 75.7%	24 35.3%	2 100.0%	9 23.7%	2 100.0%	
TRAINING TIME (years)	5 to 10	0 0.0%	5 13.5%	15 22.1%	0 0.0%	10 26.3%	0 0.0%	0.0001*
	More than 10	1 20.0%	4 10.8%	29 42.6%	0 0.0%	19 50.0%	0 0.0%	
	Free course	0 0.0%	29 78.4%	44 64.7%	0 0.0%	21 55.3%	0 0.0%	
TRAINING	Specialization	0 0.0%	0 0.0%	2 2.9%	0 0.0%	1 2.6%	0 0.0%	0.065
	Graduation	0 0.0%	0 0.0%	1 1.5%	0 0.0%	0 0.0%	0 0.0%	
	Research Group	0 0.0%	3 8.1%	1 1.5%	0 0.0%	0 0.0%	0 0.0%	
	No	5 100.0%	5 13.5%	18 26.5%	2 100.0%	16 42.1%	2 100.0%	
	Extension	0 0.0%	0 0.0%	1 1.5%	0 0.0%	0 0.0%	0 0.0%	
	Supervision	0 0.0%	0 0.0%	1 1.5%	0 0.0%	0 0.0%	0 0.0%	

Caption: PHYSIO – Physiotherapy; SLP- speech language pathologist; ACUMP – Acupuncture; ENT – Otorhinolaryngology; PSI – Psychology.  
Source: Research data

Dentists and acupuncturists who participated were concentrated in the Northeast region, while other professionals were in the Southeast. Audiologists and otorhinolaryngologists were found to be the professionals with the longest experience, whereas dentists, physiotherapists, psychologists, and acupuncturists had started assisting with tinnitus more recently, with this time difference being

statistically significant ( $p=0.0001$ ) (Table 3). Regarding professional development in the field, all dentists, acupuncturists, and psychologists reported not having undertaken any further training, while the majority of audiologists, physiotherapists, and otorhinolaryngologists reported having taken free courses primarily (Table 3).

**Table 4.** Relationship between type of education and assessment procedures used by professionals involved in the care of patients with tinnitus complaints in Brazil.

Variables		ACADEMIC TITLE						p-value
		DENTISTRY	FISIO	DENTISTRY	ACUMP	DENTISTRY	PSI	
Specific anamnesis	NO	3	6	9	0	6	2	0.004*
		60.0%	16.2%	13.2%	0.0%	15.8%	100.0%	
	YES	2	31	59	2	32	0	
		40.0%	83.8%	86.8%	100.0%	84.2%	0.0%	
Physical exam	NO	3	3	37	0	1	2	0.0001*
		60.0%	8.1%	54.4%	0.0%	2.6%	100.0%	
	YES	2	34	31	2	37	0	
		40.0%	91.9%	45.6%	100.0%	97.4%	0.0%	
Audiometry	NO	5	25	2	0	3	0	0.0001*
		100.0%	67.6%	2.9%	0.0%	7.9%	0.0%	
	YES	0	12	66	2	35	2	
		0.0%	32.4%	97.1%	100.0%	92.1%	100.0%	
Immitantiometry	NO	5	32	14	0	3	0	0.0001*
		100.0%	86.5%	20.6%	0.0%	7.9%	0.0%	
	YES	0	5	54	2	35	2	
		0.0%	13.5%	79.4%	100.0%	92.1%	100.0%	
EOA	NO	5	31	38	0	9	0	0.0001*
		100.0%	83.8%	55.9%	0.0%	23.7%	0.0%	
	YES	0	6	30	2	29	2	
		0.0%	16.2%	44.1%	100.0%	76.3%	100.0%	
ABR	NO	5	33	39	0	10	0	0.0001*
		100.0%	89.2%	57.4%	0.0%	26.3%	0.0%	
	YES	0	4	29	2	28	2	
		0.0%	10.8%	42.6%	100.0%	73.7%	100.0%	
Tinnitus Handicap Inventory	NO	5	10	16	0	19	2	0.0001*
		100.0%	27.0%	23.5%	0.0%	50.0%	100.0%	
	YES	0	27	52	2	19	0	
		0.0%	73.0%	76.5%	100.0%	50.0%	0.0%	
Blood test	NO	5	29	55	2	11	2	0.0001*
		100.0%	78.4%	80.9%	100.0%	28.9%	100.0%	
	YES	0	8	13	0	27	0	
		0.0%	21.6%	19.1%	0.0%	71.1%	0.0%	
Imaging Exams	NO	2	25	59	2	11	2	0.0001*
		40.0%	67.6%	86.8%	100.0%	28.9%	100.0%	
	YES	3	12	9	0	27	0	
		60.0%	32.4%	13.2%	0.0%	71.1%	0.0%	
Questionnaires Anxiety and Depression	NO	4	12	49	0	24	1	0.001*
		80.0%	32.4%	72.1%	0.0%	63.2%	50.0%	
	YES	1	25	19	2	14	1	
		20.0%	67.6%	27.9%	100.0%	36.8%	50.0%	
VAS	NO	4	5	25	0	16	2	0.189
		80.0%	13.5%	36.8%	0.0%	42.1%	100.0%	
	YES	1	32	43	2	22	0	
		20.0%	86.5%	63.2%	100.0%	57.9%	0.0%	
Acuphenometry	NO	5	31	13	0	15	2	0.0001*
		100.0%	83.8%	19.1%	0.0%	39.5%	100.0%	
	YES	0	6	55	2	23	0	
		0.0%	16.2%	80.9%	100.0%	60.5%	0.0%	

Caption: PHYSIO – Physiotherapy; SLP- speech language pathologist; ACUMP – Acupuncture; ENT – Otorhinolaryngology; PSI – Psychology. OAE – Otoacoustic Emissions; ABR – Brainstem Auditory Evoked Potential; VAS – Visual Analog Scale. Fisher's Exact Test; significance  $p < 0.05^*$ .

Source: Research data.







When investigating the assessment procedures performed by each professional group, a statistically significant difference was observed for all exams except for the VAS. This indicates that the frequency and type of procedures performed vary by professional group.

According to the data presented in Table 4, most dentists and psychologists reported not performing any of the listed assessment exams, with image exams being more recurrent in dental practice.

Groups of physiotherapists, audiologists, acupuncturists, and otorhinolaryngologists frequently reported performing most of the procedures listed in Table 2, with physiotherapists typically not requesting audiological exams, whereas audiologists and otorhinolaryngologists requested a complete audiological evaluation (Table 4). Self-assessment using the VAS was the most frequently cited evaluation step by most professionals, regardless of their background.

**Table 5.** Relationship between type of education and intervention procedures used by professionals involved in the care of patients with tinnitus complaints in Brazil.

Variables		ACADEMIC TITLE						p-value
		DENTISTRY	FISIO	DENTISTRY	ACUMP	DENTISTRY	PSI	
Medication	NO	2	26	47	0	2	2	0.0001
		40.0%	70.3%	69.1%	0.0%	5.3%	100.0%	
	YES	3	11	21	2	36	0	
		60.0%	29.7%	30.9%	100.0%	94.7%	0.0%	
Sound Therapy	NO	4	25	24	0	11	0	0.001
		80.0%	67.6%	35.3%	0.0%	28.9%	0.0%	
	YES	1	12	44	2	27	2	
		20.0%	32.4%	64.7%	100.0%	71.1%	100.0%	
Cognitive behavioral therapy	NO	5	30	53	0	25	0	0.007
		100.0%	81.1%	77.9%	0.0%	65.8%	0.0%	
	YES	0	7	15	2	13	2	
		0.0%	18.9%	22.1%	100.0%	34.2%	100.0%	
hearing aids	NO	5	32	15	0	10	0	0.0001
		100.0%	86.5%	22.1%	0.0%	26.3%	0.0%	
	YES	0	5	53	2	28	2	
		0.0%	13.5%	77.9%	100.0%	73.7%	100.0%	
Mindfulness	NO	5	23	56	0	28	2	0.018
		100.0%	62.2%	82.4%	0.0%	73.7%	100.0%	
	YES	0	14	12	2	10	0	
		0.0%	37.8%	17.6%	100.0%	26.3%	0.0%	
tDCS	NO	5	30	63	0	37	2	0.0001
		100.0%	81.1%	92.6%	0.0%	97.4%	100.0%	
	YES	0	7	5	2	1	0	
		0.0%	18.9%	7.4%	100.0%	2.6%	0.0%	
Transcranial Magnetic Stimulation	NO	5	34	67	0	37	2	0.0001
		100.0%	91.9%	98.5%	0.0%	97.4%	100.0%	
	YES	0	3	1	2	1	0	
		0.0%	8.1%	1.5%	100.0%	2.6%	0.0%	
Photobiomodulation	NO	4	12	58	0	37	2	0.0001
		80.0%	32.4%	85.3%	0.0%	97.4%	100.0%	
	YES	1	25	10	2	1	0	
		20.0%	67.6%	11.5%	2	2.6%	0.0%	

Variables		ACADEMIC TITLE						p-value
		DENTISTRY	FISIO	DENTISTRY	ACUMP	DENTISTRY	PSI	
Acupuncture	NO	5	19	59	100.0%	28	2	0.0001
		100.0%	51.4%	86.8%	0.0%	73.7%	100.0%	
	YES	0	18	9	2	10	0	
		0.0%	48.6%	13.2%	100.0%	26.3%	0.0%	
Psychotherapy	NO	5	30	60	0	24	2	0.002
		100.0%	81.1%	88.2%	0.0%	63.2%	100.0%	
	YES	0	7	8	2	14	0	
		0.0%	18.9%	11.8%	100.0%	36.8%	0.0%	
Auriculotherapy	NO	4	18	57	0	35	2	0.0001
		80.0%	48.6%	83.8%	0.0%	92.1%	100.0%	
	YES	1	19	11	2	3	0	
		20.0%	51.4%	16.2%	100.0%	7.9%	0.0%	

Caption: PHYSIO – Physiotherapy; SLP- speech language pathologist; ACUMP – Acupuncture; ENT – Otorhinolaryngology; PSI – Psychology. tDCS - Transcranial Direct Current Stimulation.. Fisher's Exact Test; significance  $p < 0.05^*$ . Source: Research data.

Therapeutic procedures for tinnitus differ according to the professional's background, considering that the frequencies and types of interventions were statistically different for all the interventions listed in Table 5.

Photobiomodulation and auriculotherapy were frequent practices among dentists and physiotherapists. Audiologists frequently mentioned the fitting of hearing aid and sound therapy. Physicians emphasized medication therapy, hearing aid fitting, and sound therapy, respectively. Psychologists listed cognitive-behavioral therapy and hearing aid fitting (Table 6).

When examining the assessment and intervention procedures for tinnitus cases performed by professionals in different regions of Brazil, it was observed that practices were similar across the five Brazilian regions. This means that regardless of where the patient is or will be treated, the assessment and therapeutic practices adopted are similar, therefore, the relationship between the region of practice and the procedures used did not show significance.

The length of time in practice was associated with the performance of some assessment procedures (Table 7). Professionals with longer experience in the field (more than 10 years) tend to perform a more comprehensive audiological investigation during the assessment, as they significantly more often requested the following exams: audiometry, immittance audiometry, Otoacoustic Emissions, Brainstem Auditory Evoked Potentials, and tinnitus pitch matching, compared to those who had been practicing for a maximum of five years (Table 6).

When investigating the relationship between therapeutic procedures for tinnitus and the length of professional experience, it was observed that those who graduated more recently more frequently recommended sound therapy, hearing aid, and especially photobiomodulation than those who graduated longer ago. The recommendation of other intervention procedures was not associated with the length of professional experience (Table 7).



**Table 6.** Relationship between length of time in practice and assessment procedures used by professionals involved in the care of patients with tinnitus complaints in Brazil.

VARIABLES		ACTING TIME			p-value
		5 TO 10 YEARS	UP TO 5 YEARS	MORE THAN 10 YEARS	
Specific anamnesis	NO	6 20.0%	13 18.8%	7 13.2%	0.640
	YES	24 80.0%	56 81.2%	46 86.8%	
Physical exam	NO	10 33.3%	20 29.0%	16 30.2%	0.911
	YES	20 66.7%	49 71.0%	37 69.8%	
Audiometry	NO	4 13.3%	25 36.2%	6 11.3%	0.002*
	YES	26 86.7%	44 63.8%	47 88.7%	
Immitantometry	NO	6 20.0%	37 53.6%	11 20.8%	0.0001*
	YES	24 80.0%	32 46.4%	42 79.2%	
EOA	NO	12 40.0%	47 68.1%	24 45.3%	0.009*
	YES	18 60.0%	22 31.9%	29 54.7%	
ABR	NO	13 43.3%	52 75.4%	22 41.5%	0.0001*
	YES	17 56.7%	17 24.6%	31 58.5%	
Tinnitus Handicap Inventory	NO	12 40.0%	26 37.7%	14 26.4%	0.325
	YES	18 60.0%	43 62.3%	39 73.6%	
Blood test	NO	17 56.7%	53 76.8%	34 64.2%	0.100
	YES	13 43.3%	16 23.2%	19 35.8%	
Imaging Exams	NO	16 53.3%	49 71.0%	36 67.9%	0.222
	YES	14 46.7%	20 29.0%	17 32.1%	
Questionnaires Anxiety and Depression	NO	19 63.3%	39 56.5%	32 60.4%	0.799
	YES	11 36.7%	30 43.5%	21 39.6%	
VAS	NO	10 33.3%	23 33.3%	19 35.8%	0.953
	YES	20 66.7%	46 66.7%	34 64.2%	
Acuphenometry	NO	11 36.7%	41 59.4%	14 26.4%	0.001*
	YES	19 63.3%	28 40.6%	39 73.6%	

Caption: OAE – Otoacoustic Emissions; ABR – Brainstem Auditory Evoked Potential; VAS – Visual Analog Scale. Fisher’s Exact Test; significance  $p < 0.05^*$ .  
Source: Research data.

**Table 7.** Relationship between length of time in practice and intervention procedures used by professionals involved in the care of patients with tinnitus complaints in Brazil.

VARIABLES		ACTING TIME			p-value
		5 TO 10 YEARS	UP TO 5 YEARS	MORE THAN 10 YEARS	
Medication	NO	15 50.0%	40 58.0%	24 45.3%	0.369
	YES	15 50.0%	29 42.0%	29 54.7%	
Sound Therapy	NO	8 26.7%	40 58.0%	18 34.0%	0.004*
	YES	22 73.3%	29 42.0%	35 66.0%	
Cognitive behavioral therapy	NO	19 63.3%	54 78.3%	40 75.5%	0.287
	YES	11 36.7%	15 21.7%	13 24.5%	
hearing aids	NO	6 20.0%	37 53.6%	19 35.8%	0.005*
	YES	24 80.0%	32 46.4%	34 64.2%	
Mindfulness	NO	24 80.0%	49 71.0%	41 77.4%	0.556
	YES	6 20.0%	20 29.0%	12 22.6%	
tDCS	NO	28 93.3%	58 84.1%	51 96.2%	0.067
	YES	2 6.7%	11 15.9%	2 3.8%	
Transcranial Magnetic Stimulation	NO	29 96.7%	64 92.8%	52 98.1%	0.350
	YES	1 3.3%	5 7.2%	1 1.9%	
Photobiomodulation	NO	23 76.7%	43 62.3%	47 88.7%	0.004*
	YES	7 23.3%	26 37.7%	6 11.3%	
Acupuncture	NO	21 70.0%	52 75.4%	40 75.5%	0.831
	YES	9 30.0%	17 24.6%	13 24.5%	
Psychotherapy	NO	21 70.0%	60 87.0%	40 75.5%	0.102
	YES	9 30.0%	9 13.0%	13 24.5%	
Auriculotherapy	NO	23 76.7%	51 73.9%	42 79.2%	0.789
	YES	7 23.3%	18 26.1%	11 20.8%	

Caption: tDCS - Transcranial Direct Current Stimulation. Fisher's Exact Test; significance  $p < 0.05^*$ .  
Source: Research data.



## Discussion

The overall number of professionals demonstrates a figure still far from ideal, especially when considering the incidence of tinnitus cases in Brazil<sup>7</sup>. It also shows that there is a significant shortage of professionals in the Northern region, which has only three professionals working with tinnitus for an area that is considered the largest territorial extension in the country. Being the least assisted region, it presents five states that do not include professionals in this research, indicating an absence of tinnitus professionals in Acre, Amapá, Mato Grosso do Sul, Rondônia, Roraima, and Tocantins. It is noteworthy that these data correspond to the professionals located through this research; it is possible that there are others who have not been identified or who, for some reason, did not want to participate.

Regarding the distribution of professionals, a significant discrepancy is noted between the Southeast and Northeast regions compared to the others, considering that their sum presents more than twice the number of professionals than the rest of the country. This difference can be justified from postgraduate programs, which initially occurred in the Southeast region and expanded in the 1960s, especially those in medical fields. It is known that postgraduate courses and programs are essential for the training of researchers and professionals, fostering scientific development and ensuring that the population closer to them has more access to assistance than in other regions. Another relevant issue in postgraduate programs is the integration between different areas, which enables, for example, the sharing of knowledge among professionals, crucial for the discussion of various topics, especially tinnitus, given its complexity<sup>16</sup>. However, it was noticed in this study that the evaluative and therapeutic conduct is determined by the professional's training, regardless of the region of service.

The fact that most of the professionals work in the private sector, some in both sectors, and only 10 exclusively in the public sector, demonstrates an evident lack of assistance in the latter, which is often the most sought after, considering that tinnitus is considered a significant public health issue<sup>12</sup>. In fact, the reality of hearing aid recommendation prevails within the professional's own service sector, as most operate in the private sector, which

likely reflects a more prevalent scenario in private practice as well.

Even with its prevalence in the population, tinnitus is a symptom that is not addressed in the reality of primary care. Despite the existing demand, the speech therapist, who is qualified to address hearing-related complaints, is not always present in the context of public health. This gap reinforces the need for a support network with the presence of a multidisciplinary team, including the speech therapist, to enable a comprehensive care process for the individual<sup>22,23</sup>.

More than half of the professionals work within a multidisciplinary team, indicating a higher engagement in the topic, possibly due to the increased scientific publications in the field, likely attributed to the constant reports from individuals living with this symptom.

The present research demonstrates that professionals directly dealing with auditory issues (speech therapists and otolaryngologists) are the ones most involved in tinnitus in Brazil, which aligns with the reality of clinical practice, where they are also the first professionals sought by individuals affected by tinnitus and often, through them, referred to other professionals. This fact corroborates with the literature indicating hearing loss as the main cause of tinnitus, being related in about 85 to 95% of cases, demonstrating that only a minimal percentage of people with tinnitus have normal hearing<sup>2</sup>.

The relationship between tinnitus and hearing loss is well documented in the literature, as damage to the inner ear and the vestibulocochlear nerve can be generators of tinnitus<sup>20,21</sup>. A widely observed and relevant fact in clinical practice is the performance of audiological evaluation in individuals with tinnitus complaints. A study defines a comprehensive audiological evaluation as a fundamental step in the tinnitus evaluation process, including high-frequency audiometry in cases of tinnitus with normal hearing and assessment of discomfort threshold in cases of sensitivity and intolerance to sounds<sup>28</sup>.

It was observed in the present research that audiological evaluation is most commonly requested by speech therapists and otolaryngologists, as well as by those who have been treating tinnitus cases for longer periods (over 10 years), highlighting the need for other professionals to pay attention to this referral. Physiotherapy was the third profession most mentioned in this study as involved in tinnitus.





Somatosensory tinnitus justifies physiotherapists' involvement in the field. In the state of Pernambuco, for example, the profession that stands out the most is physiotherapy. The literature also associates tinnitus with cervical issues, stating that tinnitus can be influenced by musculoskeletal factors of the head and neck, both in the generation of tinnitus and in worsening the symptom<sup>18</sup>.

This study showed that speech therapists and otolaryngologists are the most experienced professionals in tinnitus, working in the field for a longer time, having specialized training, and showing more interest in undergoing further education. On the other hand, most dentists and psychologists report not having specialized training in the area, which highlights the need, for example, for the inclusion of relevant disciplines in their undergraduate courses, considering the association of tinnitus with temporomandibular disorders (TMD)<sup>17</sup> and, especially, emotional issues<sup>4</sup>.

The Visual Analog Scale (VAS) appears as the most commonly used evaluative measure, probably because it is a practical and quick self-assessment measure. It consists of a graphic-visual form to determine the discomfort generated by tinnitus, according to the patient's perception. The VAS is used to quantify chronic pain on a scale ranging from 0 to 10. In the case of tinnitus, it is related to discomfort and intensity, showing more reliability in results when correlated with the Tinnitus Handicap Inventory (THI), a self-report measure aiming to quantify the impact of tinnitus on daily life<sup>5</sup>, also frequently used according to the results of this research.

Regarding innovative alternatives for tinnitus, therapies such as Cognitive-Behavioral Therapy (CBT) have been increasingly utilized in clinical practice in recent years, well-cited in this research and strongly recommended in studies based on scientific evidence, photobiomodulation when tinnitus is related to TMD, physiotherapy for somatosensory tinnitus, acupuncture, auriculotherapy, Transcranial Direct Current Stimulation (tDCS); Tinnitus Retraining Therapy (TRT), sound therapy (with hearing aids considered a separate category), Transcranial Magnetic Stimulation (TMS), hearing aid adaptation, and medication administration, with the latter two being frequently indicated by professionals according to this study<sup>24,25,26,27,28</sup>. It is evident that new possibilities are being studied,

thereby increasing the chances of treatment options that can be offered to this population.

The main limitation of this study concerns the recruitment of participants. Professionals affiliated with the databases used in the search for researchers involved with the topic were initially invited to participate. Therefore, it is possible that professionals working in clinical settings may not have been identified. Thus, the snowball technique was employed. However, it is possible that there are more professionals in this area who were not found. Therefore, this study may not fully represent the national reality of the healthcare network for patients with tinnitus complaints.

## Conclusion

It was possible to verify that the greater presence of professionals working in tinnitus patient care in Brazil is in the Southeast and Northeast regions, especially in the state of São Paulo, with a significant disparity compared to other regions. The Northern region appeared to be the most underserved, as only two out of its seven states have professionals working in this area, according to the data from this research.

The majority of professionals involved with tinnitus and who participated in this study are speech therapists, otolaryngologists, and physiotherapists. There is a similarity in the assessment and treatment methods used in cases of tinnitus, especially among speech therapists and otolaryngologists, as well as among professionals who have been working in the field for a longer time.

The VAS is the most used assessment method for tinnitus, regardless of the professional's background. Similarly, hearing aid adaptation, sound therapy, and medication are the most used forms of intervention. The public sector was the most lacking in professionals working in the field of tinnitus.

We emphasize the importance of comprehensive care for tinnitus patients, considering that this will contribute to the quality of life of these patients, as well as to the services that cater to this population, within which these professionals are inserted, ensuring better assistance in the field to minimize the impact of tinnitus on the daily lives of these individuals.





## References

1. De Ridder D, Schlee W, Vanneste S, Londero A, Weisz N, Kleinjung T, et al. Tinnitus and tinnitus disorder: Theoretical and operational definitions (an international multidisciplinary proposal). *Prog Brain Res.* 2021 Jan 1; 260:1-25.
2. Sanchez TG, Medeiros ÍR, Levy CP, Ramalho JD, Bento RF. Zumbido em pacientes com audiometria normal: caracterização clínica e repercussões. *Rev Bras Otorrinolaringol.* 2005; 71: 427-31.
3. Lewis JE, Stephens SD, McKenna L. Tinnitus and Suicide. *Clin Otolaryngol Allied Sci.* 1994 Feb.
4. Bauer CA, Brozoski TJ. Tinnitus Assessment and Treatment: Integrating Clinical Experience with the Basic Science of Tinnitus. In: Salvi, Wei Sun and Lobarinas. *Seminars in Hearing, Tinnitus Part Two.* 2008.
5. Newman CW, Jacobson GP, Spitzer JB. Development of the Tinnitus Handicap Inventory. *Arch Otolaryngol Head Neck Surg.* 1996 Feb; 122(2): 143-8.
6. Henry JA, Dennis KC, Schechter MA. General Review of Tinnitus. *J Speech Lang Hear Res.* 2005 Oct; 48(5): 12-35.
7. Seidman MD, Jacobson GP. Update on tinnitus. *Otolaryngol. clin.* 1996.
8. Oiticica J, Bittar RS. Prevalência do zumbido na cidade de São Paulo. *Braz J Otorhinolaryngol.* 2015; 81(2): 167-76.
9. Pinto PC, Sanchez TG, Tomita S. Avaliação da relação entre severidade do zumbido e perda auditiva, sexo e idade do paciente. *Braz J Otorhinolaryngol.* 2010; 76(1): 18-24.
10. Knobel KA, Sanchez TG. Atuação dos fonoaudiólogos do estado de São Paulo na avaliação do paciente com zumbido e/ou hipersensibilidade a sons. *Pro-Fono.* 2002;14(2):215-24.
11. Person OC, Féres MC, Barcelos CE, de Mendonça RR, Marone MR, Rapoport PB. Zumbido: aspectos etiológicos, fisiopatológicos e descrição de um protocolo de investigação. *Arq Med ABC.* 2005 Dec 15; 30(2).
12. Baguley D, McFerran D, Hall D. Tinnitus. *The Lancet.* 2013;1600-7.
13. Kreuzer PM, Vielsmeier V, Langguth B. Chronic tinnitus: an interdisciplinary challenge. *Dtsch Arztebl Int.* 2013 Apr;278-84.
14. Cima RF, Maes IH, Joore MA, Scheyen DJ, El Refaie A, Baguley DM, et al. Specialized treatment based on cognitive behavior therapy versus usual care for tinnitus: a randomized controlled trial. *The Lancet.* 2012 May 26; 379(9830): 1951-9.
15. Mazurek B. Tinnitus: from basic principles to therapy. *HNO.* 2015 Apr; 253-7.
16. Oliveira FB. Origem e evolução dos cursos de pós-graduação lato sensu no Brasil. *Rev Adm Pública.* 1995; 29(1): 19-33.
17. Chole RA, Parker WS. Tinnitus and vertigo in patients with temporomandibular disorder. *Arch Otolaryngol.* 1992.
18. Biesinger E. C2 and C3 cervical nerve root syndrome: the influence of cervical spine dysfunction on ENT symptoms. *Manual Medicine.* 1997; 35:12-9.
19. Figueiredo RR, Azevedo AA, Mello P. Correlation analysis of the visual-analogue scale and the Tinnitus Handicap Inventory in tinnitus patients. *Rev Bras Otorrinolaringol.* 2009 Feb; 75(1): 76-9.
20. Azevedo AA, Oliveira PM, Siqueira AG, Figueiredo RR. Análise crítica dos métodos de mensuração do zumbido. *Rev Bras Otorrinolaringol.* 2007.
21. Ryan D, Bauer CA. Neuroscience of Tinnitus. *Neuroimaging Clin N Am.* 2016.
22. Paro CA, Vianna NG, Lima MC. Investigando a adesão ao atendimento fonoaudiológico no contexto da atenção básica. *Rev CEFAC.* 2013 Oct.
23. Miranda GM, Mendes AC, Silva AL, Rodrigues M. Assistência fonoaudiológica no SUS: a ampliação do acesso e o desafio de superação das desigualdades. *Rev CEFAC.* 2015 Feb.
24. Phillips JS, McFerran D. Neurophysiological model-based treatments for tinnitus. *Cochrane Database Syst Rev.* 2010 Jan.
25. Baldo P, Doree C, Molin P, McFerran D, Cecco S. Antidepressants for patients with tinnitus. *Cochrane Database Syst Rev.* 2012.
26. Hoekstra CE, Rynja SP, van Zanten GA, Rovers MM. Anticonvulsants for tinnitus. *Cochrane Database Syst Rev.* 2011.
27. Hoare DJ, Edmondson-Jones M, Sereda M, Akeroyd MA, Hall D. Amplification with hearing aids for patients with tinnitus and co-existing hearing loss. *Cochrane Database Syst Rev.* 2014.
28. Cima RF, Mazurek B, Haider H, Kikidis D, Lapira A, Noreña A, et al. A multidisciplinary European guideline for tinnitus: diagnostics, assessment, and treatment. *HNO.* 2019 Mar.



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