

Effectiveness of Counseling and Sound Therapies, Including Mobile Applications and Quran Therapy, in Managing Subjective Tinnitus: randomized controlled trial study

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KEYWORDS

Subjective tinnitus, counseling therapy, sound therapy, mobile applications, Quran therapy, tinnitus management, Maqam Al-Bayati.

ABSTRACT

Introduction: Subjective tinnitus, the perception of sound without an external source, affects approximately 15% of the global population. Despite its non-life-threatening nature, tinnitus significantly impacts the quality of life, causing distress, sleep disturbances, anxiety, and depression.

Objectives: This study assesses the effectiveness of counseling therapy combined with two sound therapy modalities; mobile applications and Quran therapy in managing tinnitus symptoms.

Methods: This randomized controlled trial study involved 270 participants with subjective tinnitus, recruited from a medical center and a private audiology clinic in Sulaymaniyah, Iraq. Participants were divided into two groups: one receiving counseling therapy and sound therapy via mobile applications (ReSound Tinnitus Relief and Beltone Tinnitus Calmer), and the other receiving counseling therapy combined with Quran therapy (Quranic recitation in Maqam Al-Bayati style). Tinnitus severity and its impact on quality of life were measured using the Tinnitus Primary Function Questionnaire (TPFQ-CK) and the Tinnitus Handicap Questionnaire (THQ-CK) before and six months after the intervention.

Results: Both therapy groups showed significant improvements in tinnitus severity and quality of life. The TPFQ-CK total scores decreased from 38.18 to 14.99 in the Quran therapy group and from 38.34 to 17.82 in the mobile application group. The THQ-CK total scores decreased from 43.46 to 22.99 in the Quran therapy group and from 43.74 to 25.25 in the mobile application group. Significant reductions were also observed in tinnitus annoyance and loudness levels.

Conclusions: Counseling therapy combined with sound therapy, whether through mobile applications or Quranic recitation, effectively reduces tinnitus severity and improves the quality of life for individuals with subjective tinnitus. Quran therapy, leveraging spiritual and cultural practices, showed a slight edge in effectiveness over mobile applications, suggesting that culturally relevant and accessible sound therapy options can enhance tinnitus management.

1. Introduction

Subjective tinnitus, the perception of sound in the absence of an external source. The prevalence of this condition is considerable in the overall population, but it demonstrates notable variability among various studies. An estimated 15% of the whole population is affected by tinnitus, and among these persons, 20% experience considerable suffering and actively seek medical treatment [1]. This phantom auditory sensation can manifest in various ways, from ringing, buzzing, and hissing to whistling, clicking, or even musical tunes. Individuals suffering from tinnitus perceive a sound perception originating from either one or both ears or within their head [2]. While not life-threatening, tinnitus can significantly impact quality of life, causing distress, sleep disturbances, anxiety, depression, and difficulty concentrating [3]. According to recent research by the World Health Organisation, there is an expected rise in the number of people suffering from tinnitus, leading to an increased need for effective therapies. [4].

Managing subjective tinnitus remains a complex challenge due to its diverse etiologies and lack of a definitive cure. Current approaches aim to alleviate symptoms and improve overall well-being, focusing on habituation techniques, sound therapies, and psychological interventions [5]. Currently, there are no officially approved pharmacological treatments available for tinnitus. As a result, patients commonly turn to medications that are not specifically approved for this condition, such as anti-vertigo medicines, antidepressants, sedatives, and ginkgo-biloba extract. Hall et al. demonstrated that a majority of general practitioners and ENT specialists, specifically over 60%, expressed dissatisfaction with the existing pharmacological therapies [6]. Tinnitus management strategies aim

towards stimulation of the habituation process by reducing stress, anxiety, negative emotional responses, and dysfunctional cognitions on one hand, and by enhancing coping resources on the other hand [7].

The main goal in the treatment of tinnitus is to reduce its impact. A number of therapies can be employed towards managing tinnitus ranging from counseling, sound therapy and the utilization of hearing aids. Hence, doing a thorough assessment of the influence of tinnitus on patients is a crucial component of tinnitus therapy [8]. Among these, counseling therapy and sound therapy have emerged as promising non-invasive options with growing evidence supporting their efficacy.

Counseling Therapy for Tinnitus Management

Presently if there is no evidence of organic disease, the typical approach in healthcare is to offer the patient sound therapies, cognitive-behavioral therapy, or relaxation therapy. [9]. Counseling therapy, encompassing various approaches such as cognitive-behavioral therapy (CBT) and acceptance and commitment therapy (ACT), addresses the psychological and emotional aspects of tinnitus. The underlying rationale suggests that tinnitus perception is not solely an auditory phenomenon but is influenced by one's thoughts, beliefs, and emotional responses [5, 7].

CBT, for instance, equips individuals with strategies to identify and modify negative thought patterns and emotional reactions associated with tinnitus. By challenging unhelpful beliefs and developing coping mechanisms, individuals can learn to manage their emotional distress and reduce the impact of tinnitus on their daily lives [10].

ACT, on the other hand, emphasizes psychological acceptance of tinnitus and promotes values-based behavior. It cultivates mindfulness techniques to help individuals observe and detach from intrusive thoughts and emotions related to tinnitus, allowing them to live a meaningful life despite the presence of the sensation [11, 12].

Sound Therapy: A Promising Intervention for Tinnitus

Sound therapy, a diverse range of techniques utilizing external sounds, has shown promising results in mitigating tinnitus symptoms. These techniques aim to mask or distract from the tinnitus perception, thereby reducing its salience and overall annoyance [13].

Furthermore, sound therapy is frequently utilised as a self-help method to alleviate the bothersome symptoms of tinnitus, either for an extended period of time through habituation or temporarily through masking. Sound therapy is a broad word that can be applied in several contexts. The American Tinnitus Association defines acoustic neuromodulation as the utilisation of an external auditory signal to alter the experience of tinnitus or an individual's response to it [14]. While this therapy does not provide a cure for tinnitus, it can effectively diminish the annoyance and adverse responses associated with it [7].

There are four distinct processes of sound therapy: masking, distraction, habituation, and neuromodulation [15]. One common form of sound therapy involves tinnitus masking devices, which generate low-level background sounds, such as white noise, nature sounds, or music. These external sounds compete with the tinnitus perception, effectively masking it and making it less noticeable. Studies have demonstrated the effectiveness of masking devices in reducing tinnitus loudness and improving sleep quality in individuals with subjective tinnitus [16].

Tinnitus retraining therapy (TRT) is a habituation-based treatment in sound therapy that follows the neurophysiological concept of tinnitus. Its objective is to minimise the impact of tinnitus on the individual's quality of life. Tinnitus retraining therapy is a treatment that involves a combination of educational counselling focused on tinnitus, which is also known as directive counselling, and the use of low-level broadband sound therapy. The fundamental concept is to activate the auditory system and encourage neuronal reorganisation, finally habituating the individual to the presence of tinnitus and reducing its perceived loudness and annoyance and improve the patient's quality of life [17, 18].

The current clinical approach focusses on habituation to tinnitus, which involves using an external signal to redefine tinnitus as a trivial sound that the patient should subconsciously neglect. Sound treatment employs a range of technologies such as sound generators, broadband noise generators, and hearing aids [4].

Presently, sound therapy devices often take the form of either in-the-ear or behind-the-ear (BTE) devices. They have the capability to produce a wide range of white noise or they can be adjusted to match the frequency range of the patient's tinnitus. They can be integrated with a hearing aid to enhance a patient's hearing capabilities. Sound therapy devices can also be in the form of CDs and audio cassettes that play similar white noise or music, but through conventional stereophonic equipment [16].

Using mobile applications for sound therapy

Mobile apps are software programs that are installed on mobile phones and function in a similar manner to traditional generators. All mobile application creators assert that these tools fulfil their objectives. Unfortunately, there is few researches indicating their effectiveness [19-21].

At the beginning of this research in April 2022, there were over 341 tinnitus applications accessible on both the "Google Play" and "App Store" platforms. Consequently, we selected two smartphone applications, ReSound Tinnitus Relief and Beltone Tinnitus Calmer, that are both well-designed and typical of sound treatment for tinnitus.

Another factor to consider is that if the focus is on the sound itself rather than the devices producing it, it may be assumed that sound therapy utilising mobile applications would be similarly effective as using a traditional sound generator. Furthermore, the results obtained from one application can be valuable for improving others [16, 22].

Quran therapy

Music, a tradition observed in all cultures and civilisations, is considered a potent stimulus that evokes strong emotional reactions [23]. Music and rhythm have been found to elicit a sense of pleasantness in the majority if not all, of individuals [24]. Music and rhythm have been observed to coexist with humans in diverse cultures and civilisations. They have been utilised as a form of alternative medicine and as a technique in meditation to induce tranquilly and relaxation [25]. Solanki et al. [26] found that music therapy could be a potent therapeutic approach for treating neurological and mental illnesses, including Alzheimer's disease and anxiety disorders. Meanwhile, within Muslim culture, the Quran has consistently served as a primary resource for alternative medicine among Islamic practitioners, who utilise certain verses from the Quran [27].

The different modalities of meditation encompass not just specific spiritual and religious rituals, but also encompass a wide range of non-spiritual techniques aimed at cultivating a state of calmness and relaxation, as well as alleviating feelings of depression and anxiety [28]. Two examples of meditation-like systems that incorporate music and rhythm in their practices are the Christian chorale and the Quranic recitation, specifically the Tarannum style [29]. Linguistically, Tarannum is classified as a song. From a Quranic study terminology standpoint, the term "beautify voice" pertains to the rules governing pitch, rhythm, and cadence. Tarannum is a component of Quranic studies that focusses on enhancing the beauty and melodiousness of Quran recitation [30]. Therefore, it can be asserted that music and rhythm have the ability to create a calming impact on human daily lives, as evidenced by their efficacy in alternative therapy and meditative techniques.

We explored alternative approaches rooted in cultural and spiritual traditions has gained attention. Among these, Quran therapy, particularly utilizing Maqam Al-Bayati, holds promise as a holistic remedy for tinnitus sufferers. Quran therapy, rooted in Islamic traditions, involves the recitation and listening to verses from the Quran for spiritual healing and well-being [31]. Maqam Al-Bayati, a prominent musical mode in Middle Eastern music and Quranic recitation, is believed to possess

unique therapeutic properties. Maqam Al-Bayati is characterized by its tranquil, soothing melodies, often associated with feelings of peace and serenity [32]. When applied as a form of sound therapy for tinnitus, listening to Quranic recitations in Maqam Al-Bayati may offer relief by diverting attention from the perceived noise and inducing a state of relaxation.

Researches have been conducted to examine the neural process underlying the impact of listening to recitations of the Holy Quran, namely by utilising EEG to measure the associated brainwaves. Nevertheless, existing information suggests that the process of listening to verses from the Holy Quran stimulates the same areas of the brain and produces similar therapeutic effects, such as inducing a calm cognitive and spiritual state, as music rhythmic treatment [33-36]. Reciting and listening to the Quran can be utilised as an effective nonpharmacological intervention to alleviate symptoms of anxiety, stress, and depression [37, 38]. According to these findings, we utilise Quran therapy as a form of sound treatment to manage tinnitus.

Objectives

The objective of the current study was to assess effectiveness of counselling therapy and sound therapy on the tinnitus over half a year. Mobile applications (ReSound Tinnitus Relief and Beltone Tinnitus calmer) and Quran therapy (Quranic recitation in Maqam Al-Bayati style) used as sound therapy.

2. Methodology

Study design

This randomized controlled trial study encompassed a total of 279 participants, spanning from April 2022 to April 2023. The Sulaymaniyah University Research Ethics Board provided ethical permission before recruiting participants (Ethical code was approved on April 18, 2022 with code: 7/29-4758). All participants were required to provide informed consent before data collection commenced. The study was conducted in compliance with the criteria of the Helsinki declaration. Both THQ-CK and TPFQ-CK applied to the participants before and 6 months after management.

Participants

To determine the sample size, we utilized the minimal number of persons per variable, which was 10 [39, 40]. We have concluded that a sufficient number of participants for our study would be 279 in total. Out of the total, nine participants were removed from the study for reasons such as incomplete data, withdrawal of app usage before the study had ended, and loss of contact. The study comprised 270 participants who self-reported experiencing subjective tinnitus for at least 3 months. The participants were selected from a government-funded medical center in Sulaymaniyah-Iraq, as well as a private audiology outpatient clinic. The THQ and Tinnitus Primary Function Questionnaire (TPFQ) were given to individuals experiencing tinnitus. Also Visual Analogue Scale obtained for the level of tinnitus annoyance and the level of tinnitus loudness. In addition, the Pure Tone Audiogram was obtained. After filling the questionnaire counseling therapy done and we put the plan for the sessions of counseling therapy. We use sound therapy in combination counseling therapy. Mobile applications (ReSound Tinnitus Relief and Beltone Tinnitus calmer) and Quran therapy (Quranic recitation in Maqam Al-Bayati style) used as sound therapy.

Each participant completed each questionnaire within a time frame of 15-20 minutes. The patients reported a clear comprehension of the questionnaire items without any difficulty and expressed their opinion that the questionnaire covered crucial issues about tinnitus. The researchers were present during the completion of the questionnaires by the customers and assisted in answering any inquiries the clients may have had regarding its elements.

We divided our clients randomly into two groups:

Group one: consist of 135 clients managed by counseling therapy and sound therapy by using Mobile

applications (ReSound Tinnitus Relief and Beltone Tinnitus calmer).

Group two: consist of 135 clients managed by counseling therapy and Quran therapy (Quranic recitation in Maqam Al-Bayati style) used as sound therapy.

Inclusion criteria: Individuals who are adults and have subjective tinnitus. Individuals who possess the physical and mental capability to independently complete the questions, and who own a mobile phone running on either the Android or iOS operating system.

The exclusion criteria: encompassed those with cognitive or linguistic impairments, objective tinnitus, any identifiable medical etiology, Minors and individuals below the age of 18 Individuals with severe or profound hearing loss who do not have any devices that allow them to use applications or sound treatment, and who have a disability that prevents them from completing the questionnaires themselves.

Counseling therapy

Tinnitus can significantly impact a person's quality of life. While there's no cure, counseling therapy offers effective strategies for managing the emotional and psychological distress associated with tinnitus. Counseling therapy unfolded over two sessions:

Session 1: Assessment and Psychoeducation

We Establishes rapport and gathers information about the tinnitus, including its characteristics, duration, and impact on daily life. Explores the patient's emotional response (anxiety, frustration, etc.) and any sleep disturbances.

Psychoeducation: The tinnitus was explained, emphasizing it's not a sign of mental illness. They discuss the connection between tinnitus and the auditory system, addressing any misconceptions.

Cognitive Restructuring: The patient helped to identify negative thoughts associated with tinnitus (e.g., "I'll never sleep again"). Through discussion, they challenge these thoughts and develop more balanced perspectives.

Setting Goals: Collaborative goal setting focuses on improving coping skills and reducing tinnitus's negative impact. Examples include managing stress or improving sleep hygiene.

Sound Therapy: sound therapy was introduced in first visit by using a tinnitus masker, which emits external sounds to mask the tinnitus and promote habituation for next session.

Session 2: Building Skills and Habituation

Relaxation Techniques: The relaxation techniques were introduced, like deep breathing or progressive muscle relaxation to manage stress and anxiety, which can worsen tinnitus perception.

Mindfulness Techniques: Mindfulness exercises can help patients focus on the present moment rather than fixating on tinnitus sounds.

Progress Review and Moving Forward: progress towards goals reviewed and any challenges explored. we suggest further sessions or provide resources for ongoing self-management.

Sound Therapy

Two types of sound therapy used.

Beltone Tinnitus Calmer and ReSound Tinnitus Relief mobile applications:

Using the Tinnitus key word, 390 applications were found in both Google Play Store and iOS. We include only applications that provide sound therapy in both android and iOS, which were 16 applications, only 10 of them are free or In-app purchase. In this way, 10 applications were selected: Starkey Relax, Tinnitracks, ReSound Tinnitus Relief, SimplyNoise, Beltone Tinnitus Calmer, Tinnitus Balance App, Tinnitus Aid, Widex Zenc, Relax Melodies, myNoise.

We try to use two applications which were nearly similar in their content and easy applicable (if one of them not working properly the client can use another one) and free. Another reason of choosing these applications is that; these are used previously [41].

The (ReSound Tinnitus Relief version 5.2.5) developed by ReSound and (Beltone Tinnitus Calmer application version 5.2.5) developed by GN Hearing were selected [42, 43]. The main purpose of ReSound and Beltone Calmer is to assist patients by diminishing the disparity between perceived tinnitus and surrounding sounds, hence mitigating its severity. This is performed by utilising an extensive library of sounds, from which the patient selects appropriate ones as stimuli. Sounds can be classified into three distinct categories: environmental sounds, music, and therapeutic sounds.

The participants were provided with the following therapeutic advice regarding the usage of the application:

- Sound selection: the participants were responsible for choosing the sounds they wanted to hear.
- Duration: The participants were given the autonomy to determine the timing and duration of their usage of the application, with a minimum requirement of 30 minutes per day. The patient only modified the timing of usage to accommodate their specific routines. They were instructed to utilise the program during episodes of severe and intrusive tinnitus, in quiet surroundings, and prior to going to sleep.
- The method of perceiving sounds: typically, they are listened to through the phone's loudspeaker in an open space, but headphones may be utilised if needed. The noises should generate an acoustic background, meaning they should be played in a spatial manner, similar to bedside generators.
- The volume of the played signal: the noises emitted should not totally overpower the patient's tinnitus but should be slightly less loud. The purpose of the sounds was to enhance the auditory environment, rather than conceal the tinnitus. In such a situation, tinnitus will break through the acoustic background and be audible, but the contrast between the tinnitus and the acoustic background is small. When tinnitus is present with other background noise, it ceases to be the primary acoustic stimulus for the brain. This accelerates the progress of habituation to tinnitus [22, 44, 45].

Every individual included in the study had the capability to communicate with us by telephone.

Quran therapy (Quranic recitation in Maqam Al-Bayati style) used as sound therapy.

Quran therapy, rooted in Islamic traditions, involves the recitation and listening to verses from the Quran for spiritual healing and well-being. Maqam Al-Bayati, a prominent musical mode in Middle Eastern music and Quranic recitation, is believed to possess unique therapeutic properties.

We searched in google for the reciters of the holy Quran who recites it in Maqam Al-Bayat style, we found 37 famous reciters who recite it in Maqam Al-Bayat style, we use iPhone sound analyzer to determine the sound of any these reciters were more stable and there was no dissonance and discordance in it. We found that the sound of reciter (Qāri') Hazza Al Balushi contains these criteria, and more stable than others. So, we decided to use his musical sound as sound therapy.

The participants were provided with the following therapeutic recommendations on how to utilise Quran therapy:

- Surah selection: the participants were responsible for choosing the surah they wanted to listen to.
- Timing: The participants were responsible for determining the specific time and duration for

listening to the Quran, with a minimum need of 30 minutes per day. The patient only modified the usage schedule to accommodate their personal activities. They were instructed to listen to the Quran when tinnitus was too loud and interfering with their daily activities when they were in a quiet setting and prior to going to sleep.

- The preferred method of listening to the Quran is typically through the phone's loudspeaker in an open space. However, if needed, headphones can be utilised. The sounds should generate acoustic backgrounds, meaning they should be played spatially, similar to bedside generators.
- The intensity of the delivered signal should be such that it does not entirely overpower the patient's tinnitus, but should be slightly quieter. The purpose of the sounds was to enhance the acoustic background rather than to cover up the tinnitus. In such a situation, tinnitus will break through the acoustic background and be audible, but the contrast between the tinnitus and the acoustic background is small. When tinnitus is present with other background noise, it ceases to be the primary acoustic stimulus for the brain. This accelerates the progress of habituation to tinnitus [22, 44, 45].

Measures

The therapy's effects were assessed using standardised questionnaires:

The Tinnitus Primary Functional Questionnaire (TPFQ): is a survey that is utilised to evaluate the impact of treatment on tinnitus and to measure its overall severity [46]. The questionnaire has 20 items and assesses the patient's performance across four subscales: Concentration, Emotion, Hearing, and Sleep. The scores for each question span from 0 to 100. The patient can get a maximum score of 100 points, where a higher score indicates a more severe condition. According to In-Ki Jin and Richard S. Tyler 2022, a clinically significant improvement in tinnitus severity is indicated by a decrease of 13 points or more of the total score [47].

The Kurdish iteration of the TPFQ questionnaire was obtained under licence from The Sulaymaniyah University Research Ethics Board, which granted ethical approval prior to participant recruitment (Ethical code: 7/29-4758, approved on April 18, 2022). The psychometric properties of the adapted version were found to be similar to those of the original form. The internal consistency is very high, with a Cronbach's alpha coefficient of 0.933. Additionally, it was demonstrated a high concordance correlation coefficient (CCC=0.999), as well as confirmed convergent and discriminant validities.

Tinnitus Handicap Questionnaire (THQ): The Tinnitus Handicap Questionnaire (THQ) is a self-reported measure designed to assess the impact of tinnitus on the daily living. The Tinnitus Handicap Questionnaire is a comprehensive assessment tool consisting of 27 elements. Factor 1 evaluates the impact of tinnitus on a person's physical, emotional, and social well-being. In addition, it measures the extent to which tinnitus affects the patient's hearing ability (factor 2) and the patient's personal perception of tinnitus (factor 3) [48].

The scores ranged from 0 to 100. The participants were instructed to assign a score to a single number, with 0 indicating complete disagreement and 100 indicating perfect agreement. The examiner offered further clarification and explication of the questionnaire items for certain participants who have a limited educational background or illiterate. According to Newmann et al 1995, an improvement of 21 points or more in total score is treated as a clinically important change in tinnitus severity [49].

The psychometric features of the Kurdish version of the THQ have been recorded. The adapted version's psychometric properties were similar to those of the original version, as its factor structure has been validated. The internal consistency of the THQ-CK total score and its factors was assessed using Cronbach's alpha. The Cronbach's alpha for the total scores was 0.833, while the factors had Cronbach's alpha values of 0.949, 0.959, and 0.960. Demonstrates excellent consistency and reliability, and its convergent validity has been established through a robust correlation ($r=0.757$)

with another tinnitus questionnaire the (TPFQ).

Procedure for assessing patients

The research was carried out in accordance with the specified protocol. Sound therapy clarified in the first visit, but Counseling therapy unfolded over two sessions.

First session Assessment and Psychoeducation done;

We get information about the patient's tinnitus, including characteristics, duration, and daily life affect. Assesses the patient's sleep and mental state (anxiety, frustration, etc.). Psychoeducation: Tinnitus was explained as not a mental disorder. Tinnitus and the auditory system are discussed, clearing any misunderstandings. Cognitive Restructuring: The patient identified tinnitus-related negative thoughts such as "I'll never sleep again". Through discussion, they challenge these thoughts and develop more balanced perspectives. Setting Goals: Collaborative goal setting focuses on improving coping skills and reducing tinnitus's negative impact. Examples include managing stress or improving sleep hygiene.

Patient recruited during the first visit seeking for help about his/her tinnitus. The research's nature and goal were described, and the informed consent form was signed. Completion of TPFQ-CK and THQ-CK done. Participants got information about sound therapy by using both mobile application and Quran therapy by listening to the Quran recitation and how it can affect auditory function the capabilities of the sound therapy and the way it operates. Installation of the mobile applications (ReSound and Beltone Tinnitus Calmer) or downloading Quran Recitation records on the patient's mobile phone.

Second session: Building Skills and Habituation, scheduled between two weeks to one month following the initial visit. Relaxation Techniques: Deep breathing and progressive muscular relaxation were used to reduce stress and anxiety, which can increase tinnitus. Mindfulness: Mindfulness activities help sufferers focus on the present rather than tinnitus sounds. Progress Review and Moving Forward: goals evaluated and obstacles discussed. We recommend more sessions or self-management resources.

After initiating the usage of the program, 6 months later the participants were administered another set of TPFQ and THQ questionnaires either through phone or direct sessions. The patients were instructed to complete the questionnaires independently or with our team's assistance.

Statistical analysis

Analyses were performed to provide descriptive statistics for THQ-CK and TPFQ-CK scores. In order to assess variations in the reported severity of tinnitus among the patients, 11 key factors were compared at two different measurement points: baseline and after 6 months. Mean and Standard Deviation of the variables obtained. Paired sample T-test and Paired differences of TPFQ-CK and THQ-CK variables before and after 6 months of counseling therapy plus Music or Quran therapy were obtained, 8 histograms obtained and showed in 2 figures to show the TPFQ-CK and THQ-CK total scores before music or Quran therapy and counseling therapy intervention, and TPFQ-CK, THQ-CK total scores 6 months after music or Quran therapy and counseling therapy intervention. The p-level used was <0.005 . For statistical analysis, IBM SPSS Statistics v. 26 software was used.

3. Results and discussion

Mean age was (48.5) years, male (52%) and female (48%). About (56.3%) located in the city center and (47.7%) from periphery. Regarding the level of education, (56.6%) of them were illiterate or graduated from primary school, (19.7%) were graduated from high school. Only (23.7%) graduated from institutions or universities. Regarding the present occupation of the participants; (34.4%) of them are earner, (32.6%) of them are house wives, Table 1 shows the details about their occupation. Regarding their previous occupation; (43.7%) were worked in noisy area. Table 2 shows the details

about their previous occupations.

Table 1: shows the occupations of the participants.

Occupation		
	Frequency	Percent
Earner	96	34.4
house wife	91	32.6
Teacher	24	8.6
Employee	22	7.9
Military	17	6.1
Retired	12	4.3
Worker	1	.4
Engineer	2	.7
Driver	7	2.5
other works	7	2.5
Total	279	100.0

Table 2: shows the previous occupations of the participants.

PreviousOccupation		
	Frequency	Percent
Driver	3	1.1
work in the Bazaar	26	9.3
work in the Factory	14	5.0
serve in the Mosque	1	.4
serve in the military	15	5.4
work in the noisy area	122	43.7
other works	98	35.1
Total	279	100.0

Tinnitus characteristics showed in Table 3, tinnitus sound like ringing in (40.9%), whooshing (25.5%). Tinnitus was continuous in (65.9%) of them. Tinnitus increases in silent area in (61.3%) of them. Other features were showing in Table 3.

Counseling Therapy and Quran Therapy Group

Number of participants were 135 participants, mean of age was (47.36 years). Number of males were 69 which was (51.1%) of the participants and number of females were 66 which was equal to (48.9%) of the participants.

Mean and standard deviations of TPFQ-CK total scores and its factors before and after 6 months of counseling therapy and Quran therapy were showed in Table 4. Mean of the TPFQ-CK total scores pre intervention was (38.18) and mean of the total scores six months after intervention was (14.99). Mean and standard deviation of concentration, emotion, hearing and sleep sub scales pre and 6 months after intervention were revealed in Table 4.

Audiological assessment done for all participants, the mean of the decibels of hearing loss of both ears, right ear and left ear were 23.48, 21.37 and 22.59 decibels respectively.

Paired differences of TPFQ-CK before and after 6 months of counseling therapy and Quran therapy obtained by paired sample T-test. Mean difference of TPFQ-CK total score pre and post treatment was (23.18), mean difference of (concentration, emotion, hearing and sleep) subscales pre and post intervention were revealed in Table 5.

Table 3: Frequency table about Tinnitus characteristics

Characteristics		Frequency	%
Tinnitus present in	right ear	88	31.5
	left ear	91	32.6
	Both	90	32.3
	Within the head	10	3.6
Tinnitus Sound like	Ringling	114	40.9
	Roaring	10	3.6
	Whooshing	71	25.4
	Whistling	2	.7
	Hissing	14	5.0
	Buzzing	15	5.4
	Clicking	3	1.1
	Pulsing	16	5.7
	Screeching	6	2.2
	Wind	8	2.9
	running engine of car	12	4.3
	Other	8	2.9
Tinnitus increases at	silent area	171	61.3
	noisy area	35	12.5
	Both	73	26.2
Continuity of Tinnitus	Temporary	95	34.1
	Continuous	184	65.9
Duration of Tinnitus	< 1 year	104	37.3
	1-2 yrs.	70	25.1
	3-5 yrs.	51	18.3
	6-10 yrs.	25	9.0
	11-20 yrs.	21	7.5
	> 20 yrs.	8	2.9

Table 4: Mean and standard deviations of TPFQ-CK total scores and its factors before and after 6 months of counseling therapy and Quran therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Concentration pre intervention	42.2637	135	22.98968	1.97864
Concentration post intervention	15.7852	135	20.31483	1.74842
Emotion pre intervention	40.9126	135	25.27932	2.17570
Emotion post intervention	17.5526	135	22.14193	1.90567
Hearing pre intervention	37.7822	135	29.28669	2.52060
Hearing post intervention	14.7185	135	23.15994	1.99329
Sleep pre intervention	31.7630	135	26.26507	2.26054
Sleep post intervention	11.9407	135	18.79972	1.61802
TPFQ-CK total score pre intervention	38.1804	135	23.29584	2.00499

TPFQ-CK total score post intervention	14.9993	135	19.89608	1.71238
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Table 5: Paired differences of TPFQ-CK before and after 6 months of counseling therapy and Quran therapy

Paired Samples Test							
	Paired Differences					df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Concentration pre and post treatment	26.47852	23.13740	1.99135	22.53997	30.41706	134	.000
Emotion pre and post treatment	23.36000	21.17667	1.82260	19.75522	26.96478	134	.000
Hearing pre and post treatment	23.06370	24.64207	2.12085	18.86903	27.25838	134	.000
sleep pre and post treatment	19.82222	22.41097	1.92883	16.00733	23.63711	134	.000
TPFQ-CK total score pre and post treatment	23.18111	20.51424	1.76558	19.68909	26.67313	134	.000

Mean and standard deviations of THQ-CK total scores and its factors before and after 6 months of counseling therapy and Quran therapy were showed in Table 6. Mean of the THQ-CK total scores pre intervention was (43.46) and mean of the total scores six months after intervention was (22.99). Mean and standard deviation of (factor 1, factor 2 and factor 3) pre and 6 months after intervention were revealed in Table 6.

Paired differences of THQ-CK before and after 6 months of counseling therapy and Quran therapy obtained by paired sample T-test. Mean difference of THQ-CK total score pre and post treatment was (20.46), mean difference of (factor 1, factor 2 and factor 3) subscales pre and post intervention were revealed in Table 7.

Table 6: Mean and standard deviations of THQ-CK total scores and its factors before and after 6 months of counseling therapy and Quran therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Factor 1 pre intervention	45.6272	135	28.28726	2.43458
Factor 1 post intervention	18.2277	135	24.56749	2.11443
Factor 2 pre intervention	32.1417	135	26.68428	2.29662
Factor 2 post intervention	13.4333	135	19.61386	1.68809
Factor 3 pre intervention	57.9815	135	20.29401	1.74663
Factor 3 post intervention	60.0185	135	16.24066	1.39777
THQ-CK total score pre intervention	43.4617	135	23.76770	2.04560
THQ-CK total score post intervention	22.9984	135	20.46210	1.76110

Table 7: Paired differences of THQ-CK before and after 6 months of counseling therapy and Quran therapy.

Paired Samples Test							
	Paired Differences					df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Factor 1 pre and post treatment	27.39951	25.95595	2.23393	22.98118	31.81784	134	.000

Factor 2 pre and post treatment	18.70833	21.61563	1.86038	15.02883	22.38783	134	.000
Factor 3 pre and post treatment	-2.03704	20.54058	1.76785	-5.53354	1.45947	134	.251
THQ-CK total score pre and post treatment	20.46337	21.27482	1.83105	16.84189	24.08486	134	.000

Mean and standard deviations of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Quran therapy. Mean of Level of Tinnitus Annoyance was (74.04%), after 6 months of counseling therapy and Quran therapy changed to (35.77%). Details present in Table 8.

Paired differences of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Quran therapy obtained by paired sample T-test. Mean difference of Level of Tinnitus Annoyance score pre and post treatment was (38.25%), Mean difference of Level of Tinnitus Loudness score pre and post treatment was (32.37%). Details present in Table 9.

Table 8: Mean and standard deviations of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Quran therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Level of Tinnitus Annoyance	74.04	135	29.184	2.512
Level of Tinnitus Annoyance After 6 months	35.7778	135	32.97368	2.83792
Level of Tinnitus Loudness	63.70	135	27.724	2.386
Level of Tinnitus Loudness After 6 months	31.3333	135	29.87661	2.57137

Table 9: Paired differences of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Quran therapy.

Paired Samples Test							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		df	Sig. (2-tailed)
				Lower	Upper		
Level of Tinnitus Annoyance before and after 6 months	38.25926	29.11197	2.50556	33.30370	43.21482	134	.000
Level of Tinnitus Loudness before and after 6 months	32.37037	25.50117	2.19479	28.02946	36.71128	134	.000

Counseling Therapy and Music Therapy Group

Number of participants were 135 participants, mean of age was (49.97 years). Number of males were (71) which was (52.6%) of the participants and number of females were (64) which was equal to (47.4%) of the participants.

Mean and standard deviations of TPFQ-CK total scores and its factors before and after 6 months of counseling therapy and Music therapy were showed in Table 10. Mean of the TPFQ-CK total scores pre intervention was (38.33) and mean of the total scores six months after intervention was (17.82).

Mean and standard deviation of (concentration, emotion, hearing and sleep) sub scales pre and 6 months after intervention were revealed in Table 10.

Audiological assessment done for all participants, the mean of the decibels of hearing loss of both ears, right ear and left ear were 23.11, 20.97 and 21.89 decibels respectively.

Paired differences of TPFQ-CK before and after 6 months of counseling therapy and Music therapy obtained by paired sample T-test. Mean difference of TPFQ-CK total score pre and post treatment was (20.51), mean difference of (concentration, emotion, hearing and sleep) subscales pre and post intervention were revealed in Table 11.

Table 10: Mean and standard deviations of TPFQ-CK total scores and its factors before and after 6 months of counseling therapy and music therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Concentration pre	36.5037	135	14.50531	1.24842
Concentration post	19.1481	135	23.91013	2.05786
Emotion pre	39.7748	135	25.56177	2.20001
Emotion post	19.9852	135	23.48005	2.02084
Hearing pre	37.7452	135	30.43841	2.61972
Hearing post	17.7556	135	24.71765	2.12736
Sleep pre	32.5941	135	27.69618	2.38371
Sleep post	14.4148	135	21.59235	1.85837
TPFQ-CK total score pre	38.3389	135	24.77070	2.13192
TPFQ-CK total score post	17.8259	135	22.14311	1.90578

Mean and standard deviations of THQ-CK total scores and its factors before and after 6 months of counseling therapy and Music therapy were showed in Table 12. Mean of the THQ-CK total scores pre intervention was (43.74) and mean of the total scores six months after intervention was (25.25). Mean and standard deviation of (factor 1, factor 2 and factor 3) pre and 6 months after intervention were revealed in Table 12.

Paired differences of THQ-CK before and after 6 months of counseling therapy and Music therapy obtained by paired sample T-test. Mean difference of THQ-CK total score pre and post

treatment was (18.48), mean difference of (factor 1, factor 2 and factor 3) subscales pre and post intervention were revealed in Table 13.

Table 11: Paired differences of TPFQ-CK before and after 6 months of counseling therapy and music therapy

Paired Samples Test							
	Paired Differences					df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Concentration pre and post treatment	17.35556	20.73272	1.78439	13.82635	20.88477	134	.000
Emotion pre and post treatment	19.78963	20.25776	1.74351	16.34127	23.23799	134	.000

Hearing pre and post treatment	19.98963	23.91477	2.05826	15.91876	24.06050	134	.000
sleep pre and post treatment	18.17926	22.61214	1.94614	14.33013	22.02839	134	.000
TPFQ-CK total score pre and post treatment	20.51296	20.23880	1.74188	17.06783	23.95809	134	.000

Table 12: Mean and standard deviations of THQ-CK total scores and its factors before and after 6 months of counseling therapy and music therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Factor 1 pre intervention	47.5101	135	28.13576	2.42154
Factor 1 post intervention	21.5383	135	26.34485	2.26740
Factor 2 pre intervention	29.3759	135	25.25992	2.17403
Factor 2 post intervention	14.3426	135	19.99013	1.72048
Factor 3 pre intervention	58.3463	135	21.42616	1.84407
Factor 3 post intervention	61.0389	135	17.30730	1.48958
THQ-CK total score pre intervention	43.7424	135	23.15842	1.99316
THQ-CK total score post intervention	25.2582	135	21.57916	1.85724

Table 13: Paired differences of THQ-CK before and after 6 months of counseling therapy and music therapy.

Paired Samples Test							
	Paired Differences					df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Factor 1 pre and post treatment	25.9718	23.6512	2.0355	21.9458	29.9978	134	.000
Factor 2 pre and post treatment	15.0333	18.0837	1.5564	11.9550	18.1116	134	.000
Factor 3 pre and post treatment	-2.6925	21.3524	1.8377	-6.3273	0.9421	134	.145
THQ-CK total score pre and post treatment	18.4842	19.0383	1.6385	15.2434	21.7250	134	.000

Mean and standard deviations of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Music therapy. Mean of Level of Tinnitus Annoyance was (74%), after 6 months of counseling therapy and Music therapy changed to (34.14%). Details present in Table 14.

Paired differences of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and Music therapy obtained by paired sample T-test. Mean difference of Level of Tinnitus Annoyance score pre and post treatment was (38.25%), Mean difference of Level of Tinnitus Loudness score pre and post treatment was (32.37%). Details present in Table 15.

Table 14: Mean and standard deviations of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and music therapy.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Level of Tinnitus Annoyance	74.00	135	28.454	2.449
Level of Tinnitus Annoyance After 6 months	40.0222	135	34.03454	2.92923
Level of Tinnitus Loudness	64.78	135	27.228	2.343
Level of Tinnitus Loudness After 6 months	34.1481	135	30.69798	2.64206

Table 15: Paired differences of Level of Tinnitus Annoyance scores and Level of Tinnitus Loudness before and after 6 months of counseling therapy and music therapy.

Paired Samples Test							
	Paired Differences					df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Level of Tinnitus Annoyance before and after 6 months	33.97778	28.97669	2.49392	29.04525	38.91031	134	.000
Level of Tinnitus Loudness before and after 6 months	30.62963	26.28368	2.26214	26.15551	35.10375	134	.000

We compare the obtained results of TPFQ-CK total scores before and after Quran and counseling therapy intervention which were (38.18) and (14.99) compared with TPFQ-CK total scores before and after music and counseling therapy intervention which was (38.34) and (17.82). In (Figure 1) these correlations were showed in Bar chart.

Both groups show a significant reduction in the total TPFQ-CK scores after the interventions, indicating an overall improvement in tinnitus-related quality of life. The Quran Therapy group experienced a greater reduction in the total TPFQ-CK score (23.19) compared to the Music Therapy group (20.51).

We compare the obtained results of THQ-CK total scores before and after Quran and counseling therapy intervention which were (43.46) and (22.99) compared with THQ-CK total scores before and after music and counseling therapy intervention which was (43.74) and (25.25). In (Figure 2) these correlations were showed in Bar chart.

Both groups show a reduction in the total THQ-CK scores after the interventions, indicating an improvement in tinnitus handicap. The Quran Therapy group had a slightly larger reduction in the total THQ-CK score (20.47) compared to the Music Therapy group (18.49).

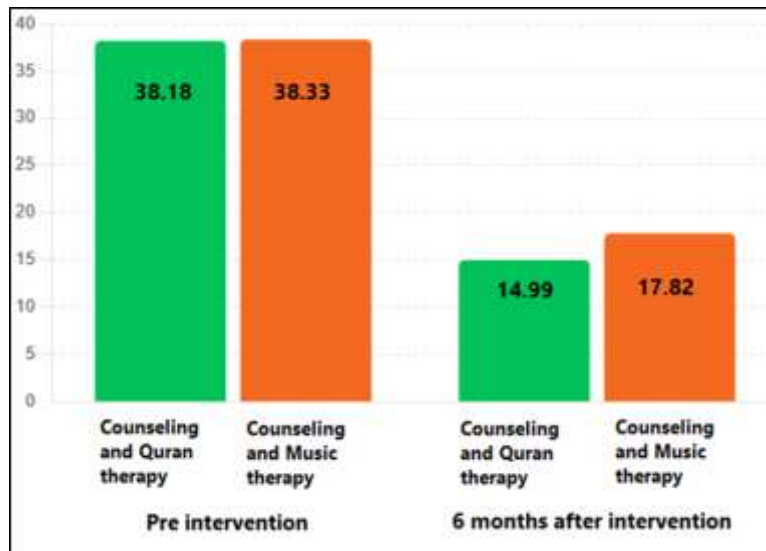


Figure-1: Bar chart showing a comparison between TPFQ-CK total scores obtained before and 6 months after both intervention (Counseling and Quran therapy) and (Counseling and Music therapy).

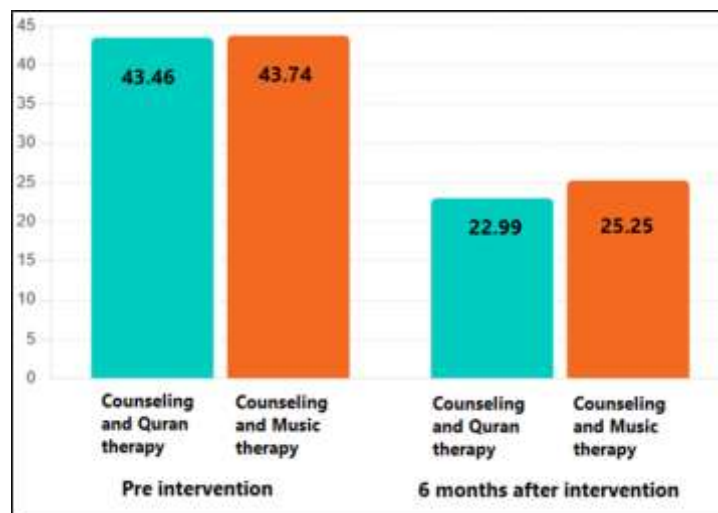


Figure-2: Bar chart showing a comparison between THQ-CK total scores obtained before and 6 months after both intervention (Counseling and Quran therapy) and (Counseling and Music therapy).

Discussion

This study assessed the effectiveness of counseling therapy combined with two distinct sound therapy modalities—mobile applications (ReSound Tinnitus Relief and Beltone Tinnitus Calmer) and Quran therapy (Quranic recitation in Maqam Al-Bayati style)—in managing subjective tinnitus. The results indicated significant improvements in tinnitus severity and quality of life in both intervention groups, with Quran therapy showing a slight edge in effectiveness over mobile application-based sound therapy. This discussion elaborates on these findings, contextualizes them within existing literature, and explores potential mechanisms and implications for clinical practice.

Efficacy of Counseling Therapy:

Counseling therapy, which included cognitive-behavioral therapy (CBT) and acceptance and commitment therapy (ACT), provided a robust foundation for tinnitus management. These approaches address the psychological and emotional dimensions of tinnitus, helping individuals reframe negative thoughts and develop coping strategies. CBT equips individuals with strategies to

identify and modify negative thought patterns and emotional reactions associated with tinnitus. This approach has been shown to reduce emotional distress and improve coping mechanisms. Previous studies have underscored the effectiveness of CBT in managing tinnitus distress and enhancing quality of life [50, 51].

ACT emphasizes psychological acceptance of tinnitus and promotes values-based behavior, cultivating mindfulness techniques to help individuals observe and detach from intrusive thoughts and emotions related to tinnitus [52]. The significant reductions in TPFQ-CK and THQ-CK scores observed in this study further validate the efficacy of counseling therapy in enhancing tinnitus-related quality of life. These findings align with existing literature, highlighting the importance of psychological interventions in mitigating tinnitus distress [53, 54].

Mobile Application-Based Sound Therapy:

The use of mobile applications for sound therapy offers a convenient and accessible approach for managing tinnitus. Participants using ReSound Tinnitus Relief and Beltone Tinnitus Calmer applications experienced significant improvements in their TPFQ-CK and THQ-CK scores. These findings align with existing literature supporting the use of sound therapy for tinnitus relief [16, 21].

Sound therapy through mobile applications allows for personalized sound selection, which can effectively mask tinnitus and facilitate habituation. Though it doesn't cure tinnitus, this therapy can minimise its annoyance and discomfort [55]. The flexibility and user-friendly nature of mobile applications make them a practical option for many patients. Previous studies have shown that sound therapy can reduce tinnitus loudness and improve sleep quality in individuals with subjective tinnitus [15].

Quran Therapy and Cultural Relevance:

Quran therapy, particularly using Maqam Al-Bayati, emerged as a slightly more effective intervention compared to mobile applications. The spiritual and cultural significance of Quranic recitation likely enhances the therapeutic experience, providing not only auditory relief but also spiritual comfort. Previous studies have shown that spiritual practices can have profound psychological and physiological benefits [56, 57].

Quranic recitation, characterized by its tranquil, soothing melodies, is often associated with feelings of peace and serenity. This aligns with findings that spiritual and religious practices can induce a state of relaxation and reduce stress, anxiety, and depression [58, 59]. The significant reduction in tinnitus severity and improved quality of life in the Quran therapy group underscores the potential of culturally tailored interventions in tinnitus management.

Studies investigating the neural mechanisms of listening to Quranic recitations have indicated activation of brain regions associated with relaxation and emotional regulation, similar to those activated during music therapy [31, 38]. This supports the hypothesis that Quran therapy can provide a dual benefit of auditory distraction and spiritual healing.

Comparison of Interventions:

Both interventions demonstrated substantial reductions in tinnitus severity and associated distress. The TPFQ-CK total scores decreased from 38.18 to 14.99 in the Quran therapy group and from 38.34 to 17.82 in the mobile application group. Similarly, the THQ-CK total scores decreased from 43.46 to

22.99 in the Quran therapy group and from 43.74 to 25.25 in the mobile application group. The mean differences in tinnitus annoyance and loudness levels also reflected significant improvements in both groups.

The slight advantage observed in the Quran therapy group may be attributed to the holistic nature of Quranic recitation, which encompasses both sound therapy and spiritual healing. This dual effect likely contributed to the greater reductions in tinnitus severity and distress observed in this group. The specific characteristics of Maqam Al-Bayati, with its calming and serene melodies, may also play a role in its effectiveness as a sound therapy modality [60].

Mechanisms of Action:

The mechanisms through which sound therapy exerts its effects can be categorized into four main processes: masking, distraction, habituation, and neuromodulation [16, 61].

Masking: Sound therapy can mask tinnitus by providing an external sound that competes with the internal perception of tinnitus. This can reduce the prominence of tinnitus and make it less noticeable, Henry et al 2005 support this [55].

Distraction: External sounds can divert attention away from tinnitus, reducing its perceived loudness and associated distress, this was indicated by Hobson et al 2012 [16].

Habituation: Repeated exposure to external sounds can facilitate habituation to tinnitus, helping individuals classify tinnitus as an insignificant sound that does not require attention, this revealed by Jastreboff, 1990 [61].

Neuromodulation: Sound therapy can stimulate the auditory system and promote neural reorganization, potentially reducing the perceived loudness and annoyance of tinnitus, as indicated by Hoare et al., 2014 [15].

These mechanisms are supported by the results of the present study, which demonstrated significant improvements in tinnitus severity and quality of life with both sound therapy modalities.

Implications for Clinical Practice: The findings of this study have significant implications for clinical practice. Incorporating culturally relevant and accessible sound therapy options, such as Quran therapy, can enhance tinnitus management and provide holistic relief for sufferers. Healthcare providers should consider the cultural and spiritual context of their patients when recommending tinnitus management strategies.

Moreover, the use of mobile applications for sound therapy offers a practical and scalable solution for tinnitus management. These applications provide a flexible and user-friendly approach that can be easily integrated into patients' daily routines. Given the widespread availability of smartphones, mobile applications can reach a broad audience and offer personalized sound therapy options.

By integrating psychological and sound-based interventions, healthcare providers can offer comprehensive support to individuals experiencing subjective tinnitus, ultimately improving their well-being and quality of life.

Limitations and Future Research

While the study provides valuable insights into the efficacy of counseling and sound therapies for

tinnitus management, certain limitations must be acknowledged. The study relied on self-reported measures, which may be subject to bias. Additionally, the generalizability of the findings may be limited by the specific cultural context of the participants.

Future research should explore the long-term effects of these interventions and investigate the underlying mechanisms that contribute to their efficacy. Comparative studies involving diverse populations and additional sound therapy modalities could further enhance our understanding of optimal tinnitus management strategies. Additionally, randomized controlled trials with larger sample sizes and objective outcome measures, such as neuroimaging or physiological assessments, could provide more robust evidence for the effectiveness of these interventions.

4. Conclusion

This study demonstrated that counseling therapy combined with sound therapy, whether through mobile applications or Quranic recitation, effectively reduces tinnitus severity and improves the quality of life for individuals with subjective tinnitus. Quran therapy, leveraging spiritual and cultural practices, showed a slight edge in effectiveness over mobile applications. These findings suggest that incorporating culturally relevant and accessible sound therapy options can enhance tinnitus management and provide holistic relief for sufferers.

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