The effectiveness of psychological interventions among tinnitus sufferers: A review

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SUMMARY

Introduction: The aim of this article was to review the types of psychological interventions for patients with tinnitus, professionals involved in giving the intervention, the effectiveness of each method of interventions and comparisons with non-psychological approaches in treating tinnitus.

Materials and Methods: PubMed database searched.

Results: Twenty one articles that employed randomized controlled trials design were included. Cognitive behavioural therapy (CBT) was the most common intervention conducted by the researchers. Clinical psychologists and trainee psychologists were the most professionals involved in the therapy. The length of therapy ranged from six weeks to three months.

Discussion: Psychological interventions were more effective in reducing psychological impacts of tinnitus than non-psychological interventions such as the use of tinnitus maskers. Nevertheless, the combination of the treatments yielded more superior outcomes.

Conclusion: A simplified version of psychological intervention that can be implemented by other clinical professionals should be developed to treat tinnitus holistically to overcome the shortage number of clinical psychologists.

KEY WORDS:
Psychological intervention, tinnitus, clinical psychologist, cognitive behavioural therapy

INTRODUCTION

Ringing noise in the ear or "tinnitus" represents one of the most common symptoms in a wide range of otological pathologies. As reported by Nondahl, Cruickshanks,[1] prevalence of tinnitus among adults aged 21-84 years old was 10.6%. It is perceived as a meaningless sound either tonal or complex sound, typically described as ringing, whistling, buzzing, cricket like, hissing or humming sound.[2] It is not a disease but a symptom of otological problem commonly associated with noise exposure, aging and ear pathology. Ototoxic medications, vascular and cerebrovascular diseases also could cause the tinnitus. Even though its exact mechanism is controversial, Zenner and Pfister's[7] suggested that tinnitus originates anywhere between the peripheral ear and central auditory pathways.[6, 8]

Untreated tinnitus may lead to various somatic and psychological disorders which could interfere with the quality of life of the tinnitus sufferers. The most common effects of tinnitus are sleeping problems, disturbance, difficult to understand speech, despair or depression, annoyance and poor concentration.[9-11] McKenna, Hallam[12] reported that 45% of tinnitus patients with some otological problems, were diagnosed as requiring psychological treatment. There are many options which have been proven effective in reducing the tinnitus severity including tinnitus maskers,[13, 14] sound therapies,[15, 16] hearing aids,[17-19] cochlear implants,[20, 21] anti-depressant medications,[22] gingko biloba,[23] transcranial magnetic stimulation,[24] low-level laser therapy,[25] tinnitus retraining therapy (TRT)[26] and psychological interventions.[27] The use of devices (e.g. hearing aids and tinnitus maskers) in treating tinnitus seems to be straightforward and require short consultations. In contrast, psychological interventions require more time and frequent visits for consultations. Cognitive behavioral therapy (CBT),[28] biofeedback,[29, 30] relaxation,[31] psychoeducation/information,[32] hypnosis[33] and the latest psychological intervention known as acceptance and commitment therapy (ACT),[34, 35] are types of psychological interventions frequently conducted by mental health professionals to treat tinnitus.

Consistent with the advancement in technology and clinical research efforts, many options of treatments are now available in managing patients with tinnitus. This article, therefore, aims to provide readers with a literature review regarding types of psychological interventions, effectiveness of therapies, therapists' involvement and some comparison between psychological and non-psychological approaches in relation to management of tinnitus.

MATERIALS AND METHODS

This review article adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[36]

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Search Strategy
A database searched without publication date restriction was conducted in December 2012 until January 2013 by using Pubmed. The search terms used were as follows; i) tinnitus AND psychological, ii) tinnitus AND educational counselling, iii) tinnitus AND cognitive, iv)tinnitus AND behaviour, and v) tinnitus AND counselling. The search was expanded to other search engines including Springerlink, Sage Journal Online, ScienceDirect and Wiley Online Library.

Study selection
Articles were selected and screened by two researchers (Wan Husain WS and Zakaria MN) according to the study aim and PICOS criteria. [37] The PICOS criteria include; Participants- patient with complaint of tinnitus, Intervention- psychologically, Comparisons- no treatment or other type of intervention, Outcome measures – the effectiveness of treatment and Study design – randomized control trials. Randomized control trials (RCT) design was used as a filter to assure even subject distribution between intervention and control group, quantitative, comparative hence lower the risk of bias. [38]

RESULTS

In total, 112 articles were gathered; 109 articles through Pubmed and 3 articles from other search engines. Out of 112 articles, 46 of them were duplicates, as 37 articles were not related to the topic searched, 5 articles were only available in German language, 5 articles were not accessible and one article was merely a follow-up journal. Accordingly, a total of 21 articles were included in this review. The searched result is summarized in Figure 1 (Fig 1).

Out of 21 studies, employed CBT as the main intervention for managing patients with tinnitus. [39-54] The methods of intervention were individual therapy, [39, 40] group therapy, [41-45, 47, 54] internet-based therapy, [44, 46, 49, 50, 53] bibliotherapy or self-help intervention [44, 48, 51] and combination of individual and group therapy. [52]

Meanwhile, Kröner-Herwig and his colleagues [42, 43, 45] applied tinnitus coping training (TCT) as an intervention. TCT is a specific problem-targeted program for group intervention whereby a patient is trained in group to change negative cognitions about tinnitus to a positive event.

Several studies have applied ACT as the intervention method for tinnitus. Westin, Östergren and Andersson [55] compared ACT with thought suppression in reducing tinnitus perception. Later, Westin with Schulin, Hesser, Karlsson and Noe [56] compared ACT with TRT method. In a recent study by Hesser and his collegues, [53] the performance of internet-based CBT was compared with that of internet-based ACT.

Modifications of TRT as intervention are also found in some studies. Henry, Loovis, Montero, Kaelin and Anselmi [57] modified the TRT strategies by providing counselling component without sound therapy as the treatment. On the other hand, Seydel, Haupt, Heidemarie, Agnieszka, Burghard, and Mazurek [58] added several new elements in TRT approach including psychosomatic treatment, cognitive-behavioral elements and training in relaxation techniques.

Dineen, Doyle and Bench [59] conducted a study to determine the general progress of the subjects after attending tinnitus management training for three months. Specifically, four intervention groups were studied: i) participants who received information only, ii) participants who received information with long-term white-noise therapy, iii) participants who received information with relaxation techniques (as cognitive and behavioural management), and iv) those who received the combination of information, long-term white-noise therapy and relaxation techniques.

DISCUSSION

Types of psychological interventions and their effectiveness
Cognitive Behavioral Therapy (CBT)
CBT was developed by Dr Aaron T. Beck in early 1960s. [28] The main objectives of the therapy are to coach patients to replace distorted thinking, unhealthy behaviours, negative feelings and unrealistic cognitive appraisals with more realistic and adaptive appraisals. [60] Dr Aaron T. Beck in Whitfield and Davidson [60] defines cognitive therapy as "an active, directive, time-limited, structured approach used to treat a variety of psychiatric disorders". During the early stage of therapy programme, both parties (clinician and patient) should decide on the problems to be discussed. They will then plan the content for each session in a structured manner to modify the maladaptive behaviours and thoughts through cognitive restructuring. CBT is primarily developed to deal depression, after 40 years, CBT has gone through ongoing modifications in treating various psychological problems, [60] including tinnitus due to its promising outcomes.[61, 62] The success of CBT depends on active and directive involvement between patients and therapists in identifying maladaptive behaviours and thoughts.

CBT technique has many elements and the common ones for treating tinnitus were self-monitoring, cognitive restructuring, relaxation therapy and diary keeping. [60] In managing tinnitus, Andersson, Porsaeus [47] employed CBT method that consisted of applied relaxation, cognitive restructuring, behavioural activation and positive imagery. As an effort to effectively manage patients with tinnitus, they also provided educational counselling regarding tinnitus, sound enrichment (by using environmental sounds) whenever appropriate, advice regarding hyperacusis, hearing tactics and relapse prevention in their intervention.

It has been documented that CBT intervention could significantly reduce tinnitus-related distress and anxiety (within three months after treatment) in many studies. [39, 41, 44, 45, 47, 48, 50, 51, 53] The researchers suggested that CBT has helped individuals reduce tinnitus-related distress while focusing less on tinnitus and consequently, tinnitus is perceived as less loud. [39, 49, 50] Better improvement in tinnitus-related distress was also found in CBT as compared to the use of masker therapy only. However, the effectiveness of intervention was even better if both treatments (CBT and masker therapy) were combined. [41] Surprisingly, CBT has also improved personal relationship in general. [50] This is probably because the restructuring process in CBT has changed patients' perception towards tinnitus and altered their negative behaviour.

Table I : Summary of articles reviewed

No	Author	Year	Type of Intervention	Number of subjects (n)	Mean age group (SD)	Mean duration of tinnitus (SD)	Length of Intervention	Result
1	Scott et. al.	1985	CBT Waiting list control	12 12	Male 50.6 years old Female 54.2 years old	9.4 years	10 sessions (one-hour per sessions) in 2 – 3 weeks	- CBT treatment was significantly effective in reducing subjective tinnitus loudness and depression in the treatment group, - The finding was consistent when thewaiting-list control group was given the same treatment.
2	Jakes et. al.	1986	Individually Progresive Muscle Relaxation (PMR) Individually PMR + attention switching (PMRAS)	12 12	55 years old	5.3 years	5 sessions (weekly for 30min) 5 sessions (weekly for 10min)	- Tinnitus distress and disablity was unchanged throughout the treatment, - Insomnia and interference with daily activities remained steady during the baseline but change rapidly once therapy was introduced
3	Lindberg et. al.	1989	Relaxation + exposure to tinnitus Relaxation + distraction as self control Untreated control subjects	9 10 8	55.3 years old (16.0)	10.8 years (9.4)	2 – 3 weeks for for 10 session (1 hour per session)	- Behavioral method (relaxation + exposure) showed similar effect with cognitive method (relaxation + distraction), - Both treatment groups show improvements in control of tinnitus and coping behaviors, this is the main factor in tinnitus adaptation.
4	Jakes et. al.	1992	Aural Masker (AM) Placebo Masker (PM) Group Cognitive Therapy (GCT) GCT+AM Waiting list (WL)	12 14 30 14 14	58.2 years old 69.3 years old 59.2 years old 59.7 years old 54.2 years old	<2 yrs -39% 3-10 – 43% >10 – 18%	5 weeks. 5 weeks 5 weeks Treatment was given 7 weeks after treatment group started.	- Aural masker (AM) was effective in relieving emotional distress but it was not maintained until 3 months follow-up. - GCT showed significant improvement at 3 months follow up in emotional distress and irrational belief. The benefit was enlarged among group GCT+AM. - Cognitive therapy was the most promising in reducing tinnitus related distress and more helpful therapy as compared to other therapy (AM and PM).
5	Krøner-herwig et al	1995	TCT1 TCT2 Yoga Waiting list control (WLC)	7 8 9 19	44.7 years old(7.8) 48.4 (10.3) 47.6 (14.6) 48.4 (10.7)	29.3 months (22.7) 46.1 (39.5) 60.2 (69.1) 63.7 (63.9)	10 sessions (2 hours /session) 10 sessions No Treatment	- TCT treatment was more effective in enhancing participant's confidence to control their tinnitus and ignore it, - In general, TCT was the most satisfied treatment fo tinnitus compared to yoga.

Table I : Summary of articles reviewed (continue)

No	Author	Year	Type of Intervention	Number of subjects (n)	Mean age group (SD)	Mean duration of tinnitus (SD)	Length of Intervention	Result
6	Krøner-Herwig et. al.	2003	TCT	43	44.7 (12.7)	55.4 months (51.5)	11 sessions (90-120min)	- Coping technique give significant improvements in self efficacy, use of relaxation, distraction and encouragement and reduction of catastrophizing tendencies towards tinnitus, - In the MC-relaxation group, the training helped them to reduce tinnitus disability and psychopathology - Participants in MC-education group claimed that they gained more subjective control of tinnitus and improved general well-being.
			MC- education	16	48.5 (10.6)	64.2 (44.5)	2 sessions (in 4 weeks)	
			MC- relaxation	16	50 (12.6)	111.7 (125.4)	4 sessions (in 4 weeks)	
			Control group (n=20)	20	47.3 (7.9)	57.4 (44.9)	Waiting list and no treatment	
7	Dineen et. al.	1997	Information only (I)	28	Overall 53.57 years old (15.0)	11.94 years	All groups received 2 sessions (3 hours /session) For ID and IDR group, received white noise generator and was adviced to use min 6 hours/day	- Majority of subjects in all treatment groups improved their problem-solving ability and reduced reliance on social support in management of their tinnitus - All treatments used in this study were equall effective in facilitating habituation to tinnitus
			Information + Relaxation (IR)	28				
			Information + Low tone wide noise (LTWN) (ID)	20				
			Information + R + LTWN (IDR)	20				
8	Andersson et.al.	2002	Internet CBT	53	48.5 years old (12.3)	6.2 years (5.6)	6 weeks (10 components in 6 modules) Therapist contact through email or webpages	- Participants utilized internet CBT showed improvements in tinnitus related distress, depression, anxiety, anxiety sensitivity and diary ratings of annoyance caused by tinnitus
			Control group – waitinglist	64	47.2 (15)	47.2 (15)		
9	Andersson et. al.	2005	CBT	12	Overall 70.1 years old (3.9)	13 years (12.5)	6 weeks (2 hours/session) Group session	- About half of CBT group showed clinically significant reduction in tinnnitus distress and anxiety up to three months of post-treatment
			Control	11				
10	Zachriat et. al.	2004	TCT	27	53.8 years old (11.8)	68.5 months (61.9)	11 sessions (90-120 min)	- TCT and HT are comparable in efficacy regarding annoyance, loudness, and awareness of tinnitus. - Reduction of catastrophic thinking is maintained until follow up in TCT and not among HT group.
			HT	30	51.6 (11.0)	65.4 (64.3)	5 sessions (90-120 min)	
			Education group	20	56.1 (10.6)	90.2 (79.0)	1. session	
11	Henry et. al.	2007	Educational counseling	94	62.1 years old (8.9)	< 1 year – 4% 1-5 – 11% 5-10 – 15%	4 sessions (1.5 hours/ session)	- Educational counseling was enough to provide significant benefit until 12 months follow up compared to traditional support and control group.
			Traditional support	84 >10 – 70%	60.8 (9.5)			
			Control group	91	62.0 (11.3)			

Table I : Summary of articles reviewed (continue)

No	Author	Year	Type of Intervention	Number of subjects (n)	Mean age group (SD)	Mean duration of tinnitus (SD)	Length of Intervention	Result
12	Kaldo et.al.	2007	Self-help book CBT Control group –	34 38	45.9 years old (13) 48.5 (15.7)	8.6 years (8.4) 12.4 years (11.7)	6 weeks waiting list with 7 weekly phone calls	- 32% of subjects in the treatment group showed significant reduction in tinnitus distress immediately after treatment and this improvement sustained until a year of follow up - The effectiveness of therapy was contributed by frequent contacts from therapist.
13	Kaldo et. al.	2008	Internet CBT Group CBT	26 25	47.4 years old (12.9) 45.0 (12.8)	9.9 years (13.5) 5.6 (6.1)	6 weekly segments (email contact) 2 hours session for 7 weeks	- Both treatments were equally effective in reducing tinnitus distress - Internet based CBT was rated as less credible
14	Westin et. al.	2008	ACT Thought supression Control	16 16 15	Overall 50.5 years old (12.0)	6.3 years (8.2)	20-30 min (verbal instruction with different content)	- Participants in the ACT group were able to focus on imagery task for a longer period compared to the control group - It was concluded that ACT was effective in improving attention control of tinnitus but not for a long term
15	Abbott et. al.	2009	Internet CBT Internet Information only	32 24	50.5 years old (9.5) 48.7 (8.6)	140 months (115.3) 60.3 (53.8)	6 weeks 6 modules with 10 components (email contact)	- There were no significant differences in effectiveness between the two groups - Those who completed the programme felt lower tinnitus distress and improved personal relationship.
16	Seydel et. al.	2010	Modified TRT Control	192 45	51 years old	<2 – 38% 2-10 – 42% ≥10 -20%	7 days	- Severity of tinnitus and depression was significantly reduced among TRT group after 3 months and continued until 1 year of follow-up - Subjects with higher preliminary depession score showed more rapid decrease - Worries and tension decreased significantly after 1 year
17	Malouff et. al.	2010	Self-help book CBT Control group	84 78	57.3 years old (13.7) 57.8 (13.3)	Not mentioned	2 months with no therapist contact (emails were sent to participants as reminder)	- The book significantly helped participants to reduce tinnitus related distress and general distress, regardless of reading percentage
18	Westin et. al.	2011	ACT TRT Waiting list (control)	21 20 22	53.5 years old (12.8) 48.95 (14.5) 49.6 (11.9)	6.8 years (5.9) 9.2 (6.6) 7.1 (7.7)	10 weeks to 18 months	- ACT was more effective that TRT in reducing tinnitus impact, immediately after session was completed. This was mediated by changes in tinnitus acceptence. - For TRT, significant improvement was seen at 18 months after treatment completed.

Table I : Summary of articles reviewed (continue)

No	Author	Year	Type of Intervention	Number of subjects (n)	Mean age group (SD)	Mean duration of tinnitus (SD)	Length of Intervention	Result
19	Nyenhius et.al.	2012	Internet CBT	79	47.8 years old (12.5)	3.2 months (1.9)	3 months	- Internet CBT and group CBT showed significant reduced tinnitus distress at post intervention compared to the control group - In follow-up analysis, group CBT condition showed consistent reduction in tinnitus distress and depressive symptoms compared to the control group
			Bibliotherapy CBT	77	45.8 (12.1)	3.0 (2.0)	3 months	
			Group CBT	71	50.1 (13.2)	3.3 (1.9)	4 weekly sessions (2 hours/ session) with homework	
			Information only as control group (no contact between therapist and participants)	77	50.4 (13.2)	3.2 (1.8)		
20	Hesser et.al.	2012	Internet CBT	32	48.8 years old (13.4)	8.9 months (5.5)	8 weeks	- ACT and CBT were effective as psychological treatment for tinnitus, it could gave treatment for tinnitus, it could gave follow up. - For internet ACT group, significant improvements were also seen in depression and stress score.
			Internet ACT	35	50.1 (16.4)	9.7 (9.5)	2 hours per-week	
			Control (therapist contact)	32	48.4 (14.2)	9.0 (9.2)		
21	Cima et. al.	2012	Specialised Care (CBT + TRT)	245	54.6 years old (12.0)	<1 year – 30% 1-5 – 39%	Stepped approach for both groups Step 1 – 8/12 Stop for 4/12 Step 2 – 12/52	- Stepped aproach with multidiciplinary involvement in therapy was more effective in reducing tinnitus severity and impairment - It also improved health-related quality of life and the effect was sustained until 12 months period
			Usual care (sound focused)	247	53.7 (11.1)	>5 years – 31%		

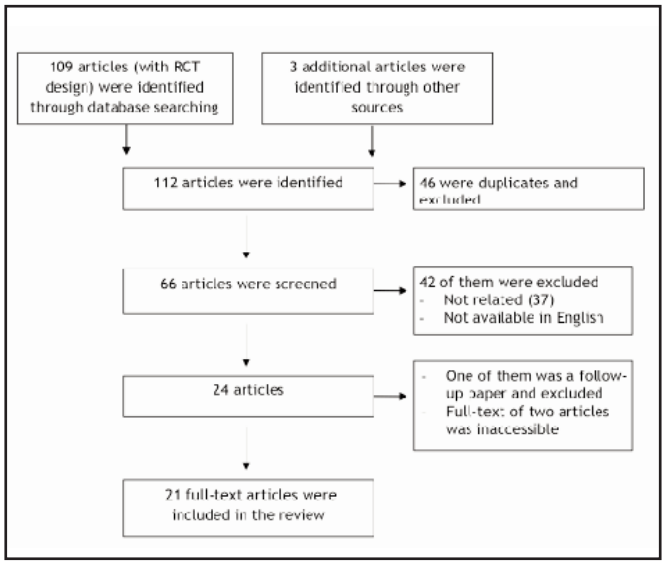

Fig. 1: Flowchart of literature search.

The application of CBT requires active and directive involvement between patients and therapists. However, the number of mental health professionals specializing in CBT is limited. [49, 50] To accommodate the limited services and in line with the development of current technology, internet-based intervention is then developed. The content of internet-based intervention is made similar to the conventional CBT. [46, 47] This method needs researchers and participants to communicate through an online communication. All participants are required to do homework assignments for each module and send their weekly progression report through web pages. [53] It was found that the internet-based CBT was able to reduce tinnitus-related distress, depression and tinnitus annoyance but not to sleep problem. [41, 44, 46, 49, 50, 53] Moreover, internet-based CBT was reported to be more cost effective and more accessible to the treatment. [49] On the other hand, its effectiveness in reducing tinnitus distress at post-treatment and follow-up was not as good as using the conventional CBT. [44, 49]

Bibliotherapy (self-help book) is another method of intervention commonly used in a variety of psychological problems. Patients are provided with self-help book and advised to follow every stage in the book accordingly. Similar to the internet-based intervention, bibliotherapy does not require the patients to travel to hospital or clinic frequently. Hence, they could save their time, travelling cost and prominently, they will not feel embarrassed in seeing their therapists as the result of frequent visits. The use of bibliotherapy may change the patients' thoughts, behaviour and situation in regard to their problem. In fact, the effectiveness of this self-help book was even better if it was recommended by the problem-related professionals. This intervention was found to be clinically significant in reducing tinnitus distress [44, 48, 51] and revealed a greater treatment satisfactory than providing information only to the tinnitus sufferers. The effectiveness of this type therapy is nearly the same with therapist contact, as suggested by Green and Malouff. [63] However, it was reported to be less satisfactory compared to group and internet-based therapy. [44]

Acceptance and Commitment Therapy (ACT)

Acceptance and Commitment Therapy (ACT) is the third generation of psychological intervention or psychotherapy, invented by Steven Hayes in 1986. [64] It is conducted to deal with many psychological problems, such as depression, anxiety, psychosis, substance use disorders and chronic illness. [34] The goal of ACT is not to reduce the symptom but to promote health and behavior change in accepting unavoidable pain that goes with it. [53, 65]

In a study by Hesser and colleagues, [53] no significant difference was found in terms of the efficacy to treat tinnitus-related distress between ACT and CBT interventions. It was reported that this insignificant difference was due to the same nature of these two interventions, i.e., psychotherapy. [53] However, there is a probability that the participants in ACT regain tinnitus-distressed symptoms in a shorter term period than those in CBT. The equal performance of ACT and CBT in reducing anxiety is in line with a study by Westin, Östergren and Andersson. [55] In this study, three intervention types were compared in patients with chronic tinnitus: ACT (specific acceptance instruction with positive imagery) group, CBT (thought suppression instruction with positive imagery) group and the control group (that received general information only). They found that both ACT and CBT were equally effective in reducing tinnitus annoyance. On the other hand, when ACT was compared with TRT, ACT was found to be superior in decreasing tinnitus impact and improving sleep problem among tinnitus sufferers. [56]

Tinnitus Retraining Therapy (TRT)

TRT is another popular tinnitus intervention that aims at helping tinnitus patients to achieve habituation in tinnitus perception. It is introduced by Pawel Jastreboff, [66] based on two properties of the brain; its plasticity and its natural tendency to habituate reactions to irrelevant stimuli. Once negative thoughts of tinnitus signal is removed, gradual habituation will take place. [67] TRT consists of educational counselling (a series of individual follow-up visits to facilitate habituation of reaction to tinnitus) and sound therapy (to habituate of tinnitus perception). After a period of treatment, tinnitus will be seen as something neutral or mild negative signal. [67]

After several years, modifications have been done on TRT. Seydel and his collegues [58] has added progressive muscle relaxation in the TRT module. Moreover, the therapy was conducted in groups instead of individual therapy. In performing TRT, Henry *et. al* [57] used only counselling as the treatment. Although both studies have different approaches in implementing the TRT, their findings were almost similar. The severity index was significantly reduced immediately after the treatment and consistently remained the same in the follow-up after one year. It is believed that the education component may have an impact in reducing tinnitus severity in both studies. Through education, tinnitus sufferers are able to gain knowledge about tinnitus and are able to cope with it. [68] Nevertheless, the effectiveness of an intervention could be improved if progressive muscle relaxation is included in the treatment.

Tinnitus Coping Technique (TCT)
TCT is adapted by Kröner-Herwig *et. al* [43] from CBT principles and conducted in groups rather than individually. TCT training manual includes education on tinnitus, relaxation training, dysfunctional and functional thoughts, attention and distraction, habituation exercises, learning about factors of tinnitus exacerbation, coping strategies, problem solving and attitudes toward illness and health. In a study by Kröner-Herwig *et. al,* [42] TCT was able to enhance patients' confidence to control their tinnitus. In another study, TCT was compared with minimal contact of interventions. [43] The participants in the TCT group showed a significant improvement in self-confidence and self-encouragement as well as an increase in relaxation training activity. This accordingly would lead to a decrease in tinnitus-related distress.

Length of therapy
Length of therapy is an important factor that could influence the effectiveness of a therapy. Each intervention applied in this review paper used different approaches and periods of implementation. Majority of interventions were carried out in groups within one day, [55] one week, [58] two to three weeks of period, [39, 54, 59] four weeks, [43, 44, 57] five weeks, [40, 41] six weeks[47] and ten weeks. [42] Internet-based intervention[44, 46, 49, 50, 53] and bibliotherapy[44, 48, 51] had longer length of therapy which ranged from six weeks to three months.

Perhaps the longest therapy period was the one implemented by Cima *et. al.* [52] In this study, a new specialised care treatment with stepped approach (a combination of tinnitus retraining counselling and CBT) was designed. The stepped approach employed a two-step intervention. Step one was to be completed in eight months and followed by a no-contact period for four months. Step two was a 12-week group treatment after step one ended. The total length of therapy was fifteen months but not all subjects were required to go through all the steps. The stepped care approach was proven effective than the usual care approach in improving health-related quality of life, reduction of tinnitus severity and impairment, improvement of general negative emotional states, tinnitus-related catastrophic thinking and tinnitus-related fear. [52]

Psychological treatments do play an important role in treating tinnitus as they target on specific psychological domains. From the articles reviewed, majority of subjects are able to cope with tinnitus with the provided interventions. Additionally, the loudness of tinnitus is reduced after therapy, even though it is not the main objective of the intervention. In this regard, psychological interventions might have altered their cognitive adaptation and behavioural response towards tinnitus and consequently helped them to control the perception of tinnitus. [69]

Comparison with non-psychological approaches
Non-psychological approaches for tinnitus management might include tinnitus masker, low-level laser therapy, medications, hearing aids, electrical stimulations and surgical approaches. In this review, tinnitus masker is the most frequently used intervention when compared with psychological approaches. The main objective of using tinnitus masker is to reduce or eliminate tinnitus perception. Nevertheless, Hobson, Chisholm [15] found that the sound therapy had no effect to tinnitus loudness or overall tinnitus severity. As pointed out by Jakes, Hallam, [41] even though masker therapy helped to relieve emotional distress among the tinnitus sufferers, the effectiveness of the therapy would decline with time. On the other hand, CBT technique was found to be more effective in reducing tinnitus distress as compared to the use of device alone. [59] However, the best outcomes were achieved when treatments were combined. [59] Zachriat and Kröner-Herwig [45] compared TCT with the habituation therapy. Both treatments showed equal performance in improving tinnitus-related disability and general wellbeing. The TCT group, however, showed greater adaptive behaviour than the habituation group.

Clinical Professional
It is well-comprehended that psychological interventions should be conducted by professionals with knowledge and skills in psychology. In this review, it was found that the professionals who commonly conducted CBT, ACT and TCT, were trainee clinical psychologists who were under the supervision of certified clinical psychologists; those who either have some training in the above-mentioned three interventions or have experience in conducting the interventions to patients. [41-53, 55] There was one study where the intervention was carried out by a psychologist who worked with an Otorhinolaryngology (ORL) specialist. [40] For studies that utilized informational counselling, the interventions were conducted by trained audiologists. [57] Seydel, Haupt [58] and Cima, Maes [52] employed multidisciplinary professionals including ORL specialists, clinical psychologists, physiotherapists, audiology assistants and social workers in tinnitus management.

In internet-based and bibliotherapy interventions, therapists involved were those with knowledge and skills in psychology. By making phone calls or sending messages through emails, evaluating treatment progress, providing continuous advice throughout the program, giving general feedback on the progress and answering questions posted by participants about their treatment, may all decrease the sufferers' tinnitus perception. [46, 53] In line with this, Kaldo, Cars [48] showed that self-management with therapist involvement had greater effect than without therapist involvement in tinnitus treatment.

CONCLUSION

Psychological intervention has significant benefit in reducing psychological symptoms related to tinnitus and consequently reduces the tinnitus loudness. Indeed, only a few patients with tinnitus were referred to clinical psychologists, the majority of them were referred to audiology centres. [70] The restrictions are limited access to psychological services and insufficient number of clinical psychologists with knowledge about tinnitus management. This could pose some difficulties in clinical management of tinnitus cases.

A combination of approaches consisting of otological, audiological and psychological is more holistic for tinnitus management. About 73% of tinnitus sufferers need psychological treatment only and the other 38% need hearing aids. [71] Nevertheless, those patients with troublesome

tinnitus even without need for hearing aids, still have some degree of peripheral auditory system malfunction and those who were treated with hearing aids still require counselling on hearing tactics, as well as steps to control tinnitus perception after hearing aid fittings.[72] Thus, a combination of treatments such as CBT along with other non-psychological interventions in treating tinnitus enables a more comprehensive treatment and perhaps better clinical management.

By considering this situation, developing a simplified version of a CBT module that can be used by non-psychology professionals such as audiologists might be useful. The short and simple training provided in this module, for instance, can be beneficial to clinicians who deal with tinnitus patients on a regular basis. Consequently, patients with tinnitus can be treated more holistically to improve their quality of life.

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