

## **Management of subjective tinnitus by clinical professionals in Malaysia: A cross-sectional survey study**

Wan SW Husain, MSc<sup>1</sup>, Mohd N Zakaria, MCLinAud, PhD<sup>2</sup>, Nik AN Othman, MD, MMed(ORL-HNS)<sup>3</sup>, Azizah Othman, DPsych<sup>4</sup>, Cheu L Aw, MCLinAud<sup>2</sup> and Wan NW Mohamad, MCLinAud, PhD<sup>2</sup>

<sup>1</sup>Department of Otorhinolaryngology, Hospital Sultanah Nur Zahirah, Jalan Sultan Mahmud, Kuala Terengganu, Terengganu, <sup>2</sup>Audiology and Speech Pathology Programme, School of Health Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, <sup>3</sup>Department of Otorhinolaryngology, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan <sup>4</sup>Department of Pediatrics, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

(This article has been published in International Journal on Disability and Human Development 18(2):189-202, 2019)

**Abstract:** Tinnitus (“ringing noise in the ear”) is a common symptom among patients with ear and hearing problems. Appropriate assessments and management by clinical professionals are vital to minimize the negative consequences of tinnitus. As such, the aim of the present study was to determine the status of tinnitus assessment and management by hearing healthcare professionals in Malaysian hospitals. In this cross-sectional study, validated self-administered questionnaires were mailed to otorhinolaryngology (ORL) department in the state hospitals in Malaysia. Of 220 questionnaires, 110 (51.8% response rate) were returned. History taking, otoscopic examination and audiological evaluations were the most common assessments performed by the respondents. For audiologists, pure tone audiometry (PTA) and tympanometry were the most reported audiological evaluations on patients with tinnitus. Meanwhile, 76% of ORL specialists and 63% of medical officers managed patients with tinnitus by themselves and most of them offered pharmacotherapy for tinnitus treatment. For audiologists, 44% preferred to treat patients with tinnitus by themselves and 46% offered hearing aid management as the treatment for tinnitus. For outcome measurement, 50% of the respondents preferred to conduct only the interview and only 12% used questionnaires. It is worth noting that the majority of respondents were unsatisfied with the current practice in managing patients with tinnitus. To conclude, the current management of subjective tinnitus needs to be improved. In this regard, the multidisciplinary approach with a standard guideline is recommended to enhance the effectiveness of tinnitus management among clinical professionals in Malaysia.

**Keywords:** Tinnitus, survey, management, otorhinolaryngology, audiologist

**Correspondence:** Nik AN Othman, MD, MMed(ORL-HNS), Senior Lecturer, Department of Otorhinolaryngology, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia. Email: adilahkk@usm.my.

**Submitted:** July 20, 2019. **Revised:** August 18, 2019. **Accepted:** August 21, 2019.

## **Introduction**

Tinnitus is a perception of sound without an external sound stimulation. It is commonly reported as ringing, humming, buzzing and roaring sound. It can be heard in one ear, both ears or in the head. In terms of frequency, it can be of constant, intermittent, pulsatile or steady type. Even though the exact pathophysiological of tinnitus is still debatable, two hypotheses have been proposed including cochlear hypothesis (i.e. discordant damage to outer and inner hair cells) and neural hypothesis (i.e. derangement of the spontaneous resting activity of primary auditory nerve fibres and cross talk between adjacent nerve fibres) (1-3).

The prevalence of tinnitus among adults ranged from 10.6%-19.9%, with the highest prevalence was noted for older adults (more than 55 years of age) (4-6). The prevalence was also higher in men than in women (5,7). Tinnitus is a common complaint among adults with ear and hearing problems (4,5,8-10). It also occurs among people with medical health problems such as arthritis, hypertension, varicose veins, as well as those who are daily smokers (5,11,12).

The severity of tinnitus is characterized by its impact on sufferers' health condition, quality of life and the extent of the tinnitus-related problems such as depression, stress or anxiety (13-15). Collectively, it is imperative to properly assess and treat patients with tinnitus to minimize its negative consequences. Complete otological and audiological examinations are important to identify the underlying physical pathologies. Depending on the cases, tinnitus could be treated conveniently with medication and/or surgery. Nevertheless, in most of cases, audiological or psychological management is required to provide relief and reduce the tinnitus related-distress symptoms (16,17). This multidisciplinary approach is always recommended to give the best treatment outcomes (16,18).

In Malaysia, to date, no research has been conducted to determine how patients with tinnitus are treated and managed. The majority of tinnitus sufferers are referred to otorhinolaryngology (ORL) clinics but how they are managed is still unknown. Therefore, the present study aimed to determine the status of tinnitus management provided by three hearing healthcare professionals (ORL specialists, audiologists and medical officers) in local hospitals in Malaysia.

## **Methods**

The present cross-sectional study was conducted in two phases. The first phase was about the development of a valid questionnaire. In the second phase, the questionnaires were mailed and administered to respective respondents.

### **Development of questionnaire (first phase)**

The questionnaire was developed based on the guidelines for designing and conducting a research survey (19,20). The lists of potential items were obtained through extensive review from the previous studies and discussions among relevant experts. The appropriate items were then compiled and grouped into several main topics.

After much consideration, the questionnaire was composed of 28 items divided into five major domains; i) referral pathway, ii) routine assessment, iii) treatment and outcome measure, iv) satisfaction towards current practice and v) clinical opinion. The respondents would be required to answer the questions by ticking the provided box, giving numerical responses for Likert scale items and answering open-ended questions. Self-estimation of the number of patients with tinnitus consulted in the past one month, list of guidelines used when managing patients with tinnitus and opinion about the current practice for patients with tinnitus were the examples of open-ended questions.

To determine whether the questionnaire had adequate construct validity, the questionnaire was pre-tested among a group of ORL specialists and audiologists to justify the

design of the questionnaire, identify and amend any problematic questions, as well as to ensure that the list of response categories were available for respondents to answer. After the validation exercise, only minimal modifications were needed with no major changes to the meaning of each question. After performing the required amendments, the questionnaire was now ready to be used in the main study (second phase).

### **Administration of questionnaire (second phase)**

The non-probability sampling technique was used to recruit the participants to ensure that all ORL specialists, medical officers and audiologists in the hospital in each state were included. Sixteen state hospitals were involved and chosen because they are the centre of referral for all ear, nose, throat, head and neck (including tinnitus) cases from general practitioners, other specialist clinics and district hospitals.

In this phase, 212 questionnaires were mailed the ORL clinic in each of state hospitals. A return envelope with stamp, cover letter with research instruction and ethics approval letter were included with the questionnaire. One representative from each hospital was assigned to receive the questionnaires, distribute them to the respondents and collect them before sending them back to the researcher. As an effort to obtain a high response rate, one phone call (a week after the questionnaire was sent) and one short message (two weeks after the phone call) were made to “remind” the representatives.

### **Data analysis**

The data analysis was carried out according to the job category (ORL specialists, medical officers and audiologists). Information such as distribution of gender, age group, types of assessments conducted to patients with tinnitus, types of treatments given, types of outcome measures used to evaluate the treatment outcomes, satisfaction on the current practice and clinical opinion on specific matters was analyzed descriptively [i.e. in percentage, range, mean and standard deviation (SD)]. The answers given by the respondents for open-ended questions were analysed using thematic analysis as outlined by Braun and Clarke (21).

## **Results**

Of 220 questionnaires, 110 (51.8% response rate) were returned from 15 hospitals. One of 110 questionnaires was excluded from the data analysis because of incomplete information. Accordingly, 109 responses were included in the analysis which consisted of 24 ORL specialists, 52 audiologists and 33 medical officers. Medical officers participated in this survey were those who were working in ORL departments either as resident medical officers or as postgraduate students.

### Table 1

#### **Demographic of respondents**

Table 1 shows the demographic information of respondents according to the job title. As revealed, 68% of respondents were females and audiologist had the biggest number of female respondents. The majority of respondents (97% of medical officers, 90% of audiologists) aged between 24 and 34 years. For ORL specialists, most of them (79%) aged between 34 and 44 years.

The mean years of working for ORL specialists and audiologists were 5.21 years (SD=3.52) and 4.94 years (SD=3.44), respectively. For medical officers, the mean years of working was 2.35 years (SD=2.11).

#### **Referral pathway**

All respondents reported that they received patients with complaint of tinnitus. The number

of patients they had seen in a month was between 2-70 patients. Medical officers saw the highest number of patients in a month with mean of 19.25 (SD=16.53) patients. For audiologists, the mean patients they saw in a month was 17.7 (SD=13.17) patients and for ORL specialists, the mean was 11.18 (SD=11.87) patients.

For ORL specialists, 54% of tinnitus cases that they received were referred by medical officers, 29% by general practitioners (GPs) and 8% by family medicine specialists (8%). For medical officers, 61% of tinnitus cases that they managed were referred by medical officers and 6% of referrals were from audiologists.

As for audiologists, the main source of referral for tinnitus cases was from ORL specialists (52%) and 39% from medical officers. Moreover, 6% of referrals came from audiologists either from audiologists in the same department with less experience in managing tinnitus or those from the nearest hospitals with limited facilities to assess and manage patients with tinnitus.

Figure 1

### **Assessment**

In this study, each professional was asked to report the assessments they frequently applied to patients with complaint of tinnitus. As illustrated in figure 1, history taking, otoscopic examination and audiological evaluations were the most common assessments performed by the professionals. For audiologists, 29% of them used questionnaire to assess patients with tinnitus and Tinnitus Handicap Inventory (THI) was the common choice. In 'Others' category, some audiologists reported that they performed electrophysiological assessments such as brainstem evoked response (BSER) and otoacoustic emission test (OAE) on the patients. On the other hand, some ORL specialists carried out lipid profile and blood investigations to investigate patients' complaint.

Further questions were asked to audiologists about the specific audiological assessments that were routinely performed on patients with complaint of tinnitus. In this regard, it was found that all audiologists performed pure tone audiometry (PTA) and tympanometry on all patients with tinnitus. Some of them conducted acoustic reflex (48.1%), while very few of them performed tinnitus matching (28.8%). Only 4% of them used specific guidelines in assessing patients with tinnitus.

Figure 2

### **Treatment**

More than half of ORL specialists and medical officers did manage the patients with tinnitus by themselves. As illustrated in figure 2, pharmacotherapy was the most preferred treatment offered. For audiologists, 44% of them managed the patients by themselves and the main treatment that they offered was hearing aid fitting. The other 56% of audiologists (who did not manage tinnitus cases by themselves) referred the patients to other professionals. Nevertheless, 32.7% of them did give in-house counselling for reassurance.

For respondents who preferred not to manage the patients, the patients were then referred to other professionals for further treatment and follow-up. Surprisingly, the referrals were done within the ORL department only. For ORL specialists, they would directly refer the patients to audiologists (20%) or to more experienced ORL specialists (4%) for further management. For medical officers, 24% of them referred the cases to audiologists and 18% to ORL specialists for further management. For audiologists, 54% of them referred their patients to ORL specialists and 4% referred to more experienced audiologists for further management.

Figure 3

### **Outcome measure**

Figure 3 shows the outcome measures performed by the respondents. In the questionnaire, each respondent was asked to choose two out of five outcome measures listed that they commonly used in their practice. All respondents had chosen interview and audiological evaluations as their routine outcome measures for the treatment given. Only a few of them followed guidelines or specific methods in treating patients with tinnitus. The guidelines in which they referred to were tinnitus retraining therapy (TRT) module, cognitive behavioural therapy (CBT) technique, department's standard operating procedure, and textbook or guidance from experienced ORL specialists.

Figure 4

### **Satisfaction on the current practice**

The satisfaction on the current practice in providing treatment to patients with tinnitus among ORL specialists, audiologists and medical officers was another area of interest. As shown in figure 4, 54.2% ORL specialists were not satisfied with their current practice. Among audiologists, 23.1% of them were not satisfied with the current practice, 9.6% were satisfied and 13.5% were unsure. Whereas, for medical officers, 30.3% of them were not satisfied while 33.3% were satisfied with the current practice in providing services to patients with tinnitus, and 12.1% were unsure.

### **Clinical opinion**

At present, the standard guideline in assessing and managing patients with tinnitus is not available in the majority of Malaysian hospitals. Even though some hospitals did develop a standard operating procedure for tinnitus management, the usage is limited. In this regard, most of the respondents strongly agreed or agreed on the establishment of a standard guideline of assessment for patients with tinnitus and the intervention module should be developed in accordance to Malaysian context. Moreover, the majority of respondents strongly agreed or agreed with the multidisciplinary involvement in managing patients with tinnitus.

To date, no intensive training or course on tinnitus management for professionals has been conducted in Malaysia. In this survey, the respondents were asked whether the tinnitus management should be taken as a subspecialty course and offered at a post graduate level. From the responses received, each professional formed different opinions on the tinnitus management training. In particular, more than half of ORL specialists (54.1%) and audiologists (82.7%) strongly agreed and agreed with this suggestion, while 45.5% of medical officers were unsure on the credibility of the suggestion.

There are several general hospitals in Malaysia that have started providing tinnitus service without having any expertise in their clinic. In this regard, the availability of trained professionals in tinnitus management is important to ensure the effectiveness of treatment. The majority of ORL specialists (83.3%) and medical officers (78.8%) strongly agreed and agreed on the availability of trained professionals in this matter. For audiologists, 94.2% of them strongly agreed and agreed with this suggestion.

A specialized tinnitus centre is a centre that locates professionals from different subspecialties, has one standard guideline of assessment, owns different types of intervention modules, and provides choices of sound enrichment devices for patients with tinnitus. In relation to this, 54.2% of ORL specialists, 72.7% of medical officers and 82.7% of audiologists strongly agreed and agreed with this suggestion.

Figure 5

As illustrated in figure 5, the thematic analysis revealed that the most reported difficulties in managing patients with tinnitus were lack of training about tinnitus management (23%) and no guidelines to follow (22%). There was one respondent who reported no difficulty in managing patients with tinnitus and one respondent who was not interested to manage patients with tinnitus. As shown in figure 6, the majority of respondents agreed to have one standard guideline in order to improve their current practice in tinnitus management (35%), besides having tinnitus centre/clinic (26%) and having specific training in tinnitus management (17%).

Figure 6

## **Discussion**

Recall that the present study was conducted to shed light on how patients with tinnitus were managed by hearing healthcare professionals in Malaysia. Overall, the response rate obtained was 51.8% and this value was considered adequate. This response rate was indeed higher when compared to that of previous studies (22,23).

### **Referral pathway**

Effective tinnitus management is important for patients with complaint of tinnitus, especially those with high level of tinnitus distress. All professionals who deal with tinnitus patients should understand that tinnitus is a preventable and treatable problem. By telling patients that “nothing could be done, you have to learn to live with it” sends wrong information that could exacerbate the problem. Appropriate referral is crucial for patients to enable the process of assessment and treatment choice to reduce tinnitus related distress. It is also important to note that there are patients with tinnitus who are not annoyed by tinnitus but they still need some reassurance about the sound they are having. Those patients still have to be referred to appropriate professionals for getting help.

From this survey, general practitioners (GPs) and medical officers were the most professionals who referred tinnitus cases to ORL departments. This scenario was similar to the situations in the US and European countries (18,23,24). The most common reported referral routes for tinnitus patients were started from GPs (18). More recently, audiologists became known as the experts in managing hearing and other related auditory problems including tinnitus cases. They receive referrals not only from ORL departments but also from other departments in hospitals, health clinics and GPs. Other professionals who referred patients with complaint of tinnitus were family medicine specialists either to ORL specialists or medical officers. In this survey, none of the professionals had received referrals or referred patients with tinnitus to clinical psychologists or other mental health professionals

### **Assessment**

Since each individual has unique health psychological and social history, complete and reliable assessments for tinnitus are therefore important for diagnosis. It could help clinicians to plan proper intervention strategies and prevent additional disability (10). The recommended assessments are otological and audiological evaluations. Each evaluation begins with a comprehensive case history including time of onset, course of progression, description of tinnitus, location of tinnitus, perceived cause, extent to which tinnitus most bothered, exacerbating factors, history of noise exposure, medications, familial history of hearing loss or tinnitus, effect on sleep and effect on personal/social/occupational relationships.

As revealed, the ORL specialists and medical officers commonly performed otoscopic examination, nasal examination and tuning fork test to patients with tinnitus. Some ORL

specialists conducted lipid profile and blood investigation. The otological evaluation is important to identify abnormalities in the cochleovestibular system, head and neck, which might exist as the result of tinnitus complaint. Radiological and/or laboratory testing are also needed if there is a possible chance to treat causes of tinnitus (17).

The psychoacoustic assessments have little importance in the tinnitus treatment since these assessments fail to provide information on the severity of tinnitus faced by the patients (25). In this regard, detailed interview, pure tone audiometry and loudness discomfort level (LDL) are enough for the diagnosis. However, the psychoacoustic results are still useful for four major reasons; i) to inform patients and their family members that the tinnitus is a real phenomenon, ii) to monitor changes in the magnitude of the tinnitus before and after treatment, iii) to provide insight into the possible mechanism, and iv) to aid in the fitting of a noise generator if needed (26).

In regard to the findings in the present study, audiologists did play their part by assessing patients with tinnitus. As revealed, all of them performed history taking, otoscopic examination and audiological evaluations. Some of them conducted the questionnaire administration (using Tinnitus Handicap Inventory, THI). In line with this, Hoare et al. (22) found that the audiological evaluation was the most common diagnostic assessment conducted on patients with tinnitus, besides structured interview and questionnaire administration. Moreover, Hoare et al. (22) suggested the use of THI as the direct measure of tinnitus severity and as an indicator of depression or anxiety co-morbidities. On the other hand, the number of audiologists who conducted tinnitus matching was low (28.8%). This is perhaps because they were not aware on the importance of tinnitus matching result, did not have experience or enough training to conduct it with confidence.

## **Treatment**

There is no absolute cure for most cases of tinnitus but there are many treatment options with various degree of success reported. It is not ethically right to inform patients that nothing could be done about their tinnitus. All clinicians should have at least basic knowledge about tinnitus and its effect, basic counselling technique and simple acoustic therapies to minimize the negative impact of tinnitus. This survey found that each professional has done their role in treating tinnitus. All of them have managed the tinnitus cases either by themselves or by referring them to other professionals. The professionals who they commonly referred to were those within the ORL department.

The majority of the ORL specialists and medical officers preferred to prescribe medications. This finding is consistent with the study of Hall et al. (24), in which the majority of acute and chronic tinnitus patients were treated with the medications. Anti-vertigo product or corticosteroid was the most common medication prescribed by ORL specialists and GPs in Italy and Spain. Even though these drugs are not specifically made to treat tinnitus, they could help in relieving the impacts of tinnitus. To date, no drug has been approved by FDA (Food and Drug Administration) to treat tinnitus. Many clinical trials have been performed to determine the effectiveness of drugs to relieve tinnitus but the results are not clinically significant. The drugs seem to be only effective for treating psychological problems such as severe distress and anxiety. Besides the medication, Hall et al. (24) also found that the ORL specialists and GPs preferred to treat acute and chronic tinnitus cases with acoustic device and/or psychological treatment. For patients with chronic tinnitus, they offered tinnitus retraining therapy (TRT) (24).

In line with study of Hoare et al (22), the present study found that hearing aid fitting was another choice of treatment offered by the majority of audiologists. Since most patients with tinnitus have aidable hearing loss, hearing aids are the preferable devices (instead of tinnitus masker). Hearing aids fitting helps people with tinnitus in at least two ways; i) for

providing amplification (to help them to hear better) and ii) for promoting habituation to the tinnitus perception. Bilateral hearing aids fitting are more beneficial than unilateral hearing aid (27).

This survey also revealed the in-house counselling as the second choice of treatment given by audiologists. Even though audiologists are not trained to treat anxiety and depression, they are trained and competent to perform counselling related to hearing loss and the related consequences including psychological, social and emotional aspects. Counselling for hearing impaired person and their family members is a common practice as an audiologist and the same method is applied when dealing with patients with tinnitus.

### **Outcome measure**

The effectiveness of treatment in patients with tinnitus should be assessed. Outcome measures reveal how a particular treatment helps patients to reduce the impacts of tinnitus on their quality of life. There are many ways to measure the treatment outcomes such as psychoacoustic measurements, rating scales, global measures of treatment-related improvement, and self-report questionnaires (28). Results from the outcome measures would guide clinicians to apply a further treatment as necessary.

This survey found that each professional had performed detailed outcome measures to evaluate the effectiveness of the treatment given. The most popular outcome measures used were interview (unstructured interview on patients' problem and improvement in managing their tinnitus) and audiological evaluations.

In many ORL departments in Malaysia, there is no standardization in the tinnitus management and no questionnaires are available to properly evaluate patients with tinnitus. The clinical professionals are also not well trained to manage tinnitus patients in a holistic way. Nevertheless, they did show an effort to help those patients with tinnitus.

Audiological evaluations (pure tone audiometry, tympanometry, tinnitus pitch matching and tinnitus loudness matching) were also used as the outcome measures. As revealed, it was quite interesting that the ORL and medical officers claimed that they did the audiological evaluations. In this regard, even though ORL specialists and medical officers did not perform the audiological evaluations, perhaps due to their contribution (e.g. immediate referral to audiologists for audiological testing), they chose it as one of their routine treatment outcome assessments. Notwithstanding this, some of the professionals did not perform any outcome measures, which is possibly due to the lack of knowledge on the methods of outcome measures.

Psychoacoustic measurements for tinnitus have been used since 1940s as the outcome measures. There are four recommended standard battery; i) pitch match, ii) loudness match, iii) minimum masking level, and iv) residual inhibition. While loudness match and minimum masking level have been proven to be the most useful outcome measures, they are not comparable to the subjective measures (28).

Functional and emotional effects of tinnitus on individuals are difficult to measure without using self-reported questionnaires. In other countries, the commonly used self-reported questionnaires for tinnitus are Tinnitus Questionnaire, Tinnitus Handicap Questionnaire, Tinnitus Severity Scale, Tinnitus Severity Index and Tinnitus Handicap Inventory. They have been translated and validated in many languages but the Malay version is not yet available. In this survey, 12% of professionals used questionnaires to evaluate the treatment outcome and most of them were audiologists. The questionnaire that they mostly used was Tinnitus Handicap Inventory (THI).



### **Satisfaction on the current practice**

As shown, more than half of respondents in this survey were not satisfied with their current practice in managing patients with tinnitus. This 'low satisfaction' report is actually in line with the study of Hall et al (24). That is, according to Hall et al (24), the reasons for 'low satisfaction' to the current practice among GPs and ORL specialists were limited option for treatment and not having enough knowledge and experience in handling the tinnitus cases.

### **Clinical opinion**

Treating patients with chronic tinnitus can be challenging. Having a standard guideline in managing tinnitus cases can be useful for clinical professionals in assessing, diagnosing and treating tinnitus cases in a systematic manner. This is also to ensure the equity of care to all tinnitus cases in different centres. This survey revealed that all professionals agreed that one standard guideline with Malaysian context is urgently needed.

Chronic tinnitus represents a symptom located in between a multitude of different specialties and its diagnostic and therapeutic management requires a multidisciplinary approach. The multidisciplinary team is more effective in managing patients with tinnitus, which may consist of ORL specialists, audiologists, mental health professionals (clinical psychologist, psychiatrist, psychologist), radiologists, counselors, occupational therapists and others depending on patients' problems and needs (29). Each professional involved should have knowledge and training about tinnitus and steps to manage the patients with complaint of tinnitus (30).

The need of standardization in the assessment and treatment has been discussed in many studies. It is important to ensure equity, consistency, conformity and uniformity in delivering treatment to patients with tinnitus. Hoare and Hall (31) outlined the importance of standardization in the practice, that is, (a) to find out the best practice for tinnitus or the most effective forms of management, (b) to facilitate clinical audit (quality or cost-benefit), (c) to define equal patient access to treatments, and (d) to perform meta-analyses and quantitatively compare new management strategies before their adoption into clinical practice (to provide high-level evidence of efficacy).

### **Conclusions**

This survey provides an insight into the current tinnitus assessment and management by ORL specialists, audiologists and medical officers in Malaysian hospitals. Even though each of the hearing healthcare professionals has performed specific roles, most of them are not satisfied with their current practice. The multidisciplinary approach with a standard clinical guideline appears to be the best way to ensure the effectiveness of tinnitus management. Additionally, ongoing seminars, workshops and training should be provided to equip the clinicians with enhanced knowledge and skills in managing tinnitus cases.

### **Acknowledgements**

The authors have stated all possible conflicts of interest within this work. The authors have stated all sources of funding for this work. If this work involved human participants, informed consent was received from each individual. If this work involved human participants, it was conducted in accordance with the 1964 Declaration of Helsinki. If this work involved experiments with humans or animals, it was conducted in accordance with the related institutions' research ethics guidelines.

## References

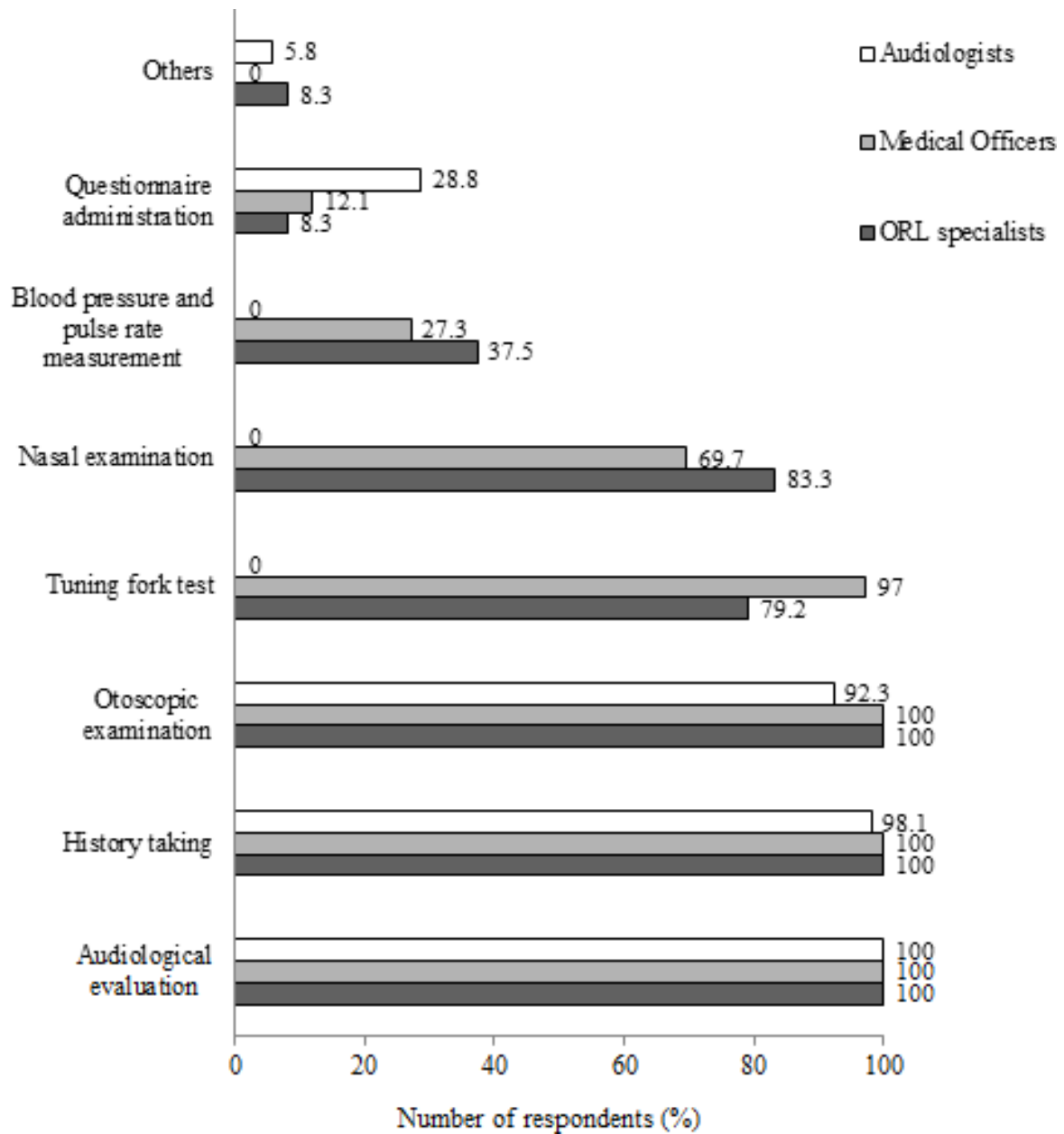
1. Luxon LM. Tinnitus: Its causes, diagnosis, and treatment. *BMJ* 1993;306(6891):1490-1.
2. Møller AR. Pathophysiology of tinnitus. *Otolaryngol Clin North Am* 2003;36(2):249-66.
3. Baguley DM. Mechanisms of tinnitus. *Br Med Bull* 2002;63:195-212.
4. Nondahl DM, Cruickshanks KJ, Huang GH, Klein BE, Klein R, Nieto FJ, et al. Tinnitus and its risk factors in the Beaver Dam offspring study. *Int J Audiol* 2011;50(5):313-20.
5. Fujii K, Nagata C, Nakamura K, Kawachi T, Takatsuka N, Oba S, et al. Prevalence of tinnitus in community-dwelling Japanese adults. *J Epidemiol* 2011;21(4):299-304.
6. Noor Hashim I, Rampal K. Prevalence of hearing loss and hearing impairment among rural males in Selangor, 1993. *Med J Malaysia* 1994;49(1):78-85.
7. Sindhusake D, Mitchell P, Newall P, Golding M, Rochtchina E, Rubin G. Prevalence and characteristics of tinnitus in older adults: The Blue Mountains Hearing Study. *Int J Audiol* 2003;42(5):289-94.
8. Nondahl DM, Cruickshanks KJ, Wiley TL, Klein BE, Klein R, Chappell R, et al. The ten-year incidence of tinnitus among older adults. *Int J Audiol* 2010;49(8):580-5.
9. Han BI, Lee HW, Kim TY, Lim JS, Shin KS. Tinnitus: Characteristics, causes, mechanisms, and treatments. *J Clin Neurol* 2009;5(1):11-9.
10. Lockwood AH, Salvi RJ, Burkard RF. Tinnitus. *N Engl J Med* 2002; 347:904-10.
11. Dobie R. Overview: suffering from tinnitus. In: Snow Jr JB, ed. *Tinnitus: Theory and management*. Lewiston, NY: BC Decker, 2004:1-7.
12. Hoffman HJ, Reed GW. Epidemiology of tinnitus. In: Snow Jr JB, ed. *Tinnitus: Theory and Management*. Lewiston, NY: BC Decker, 2004:16-41.
13. Meikle MB. A conceptual framework to aid the diagnosis and treatment of severe tinnitus. *Aust New Zeal J Audiol* 2002;24(2):59-67.
14. Hiller W, Goebel G. Factors influencing tinnitus loudness and annoyance. *Arch Otolaryngol Head Neck Surg* 2006;132(12):1323-30.
15. Wallhäusser-Franke E, Brade J, Balkenhol T, D'Amelio R, Seegmüller A, Delb W. Tinnitus: distinguishing between subjectively perceived loudness and tinnitus-related distress. *PLoS One* 2012;7(4):e34583.
16. Kreuzer PM, Vielsmeier V, Langguth B. Chronic tinnitus: an interdisciplinary challenge. *Dtsch Arztebl Int* 2013;110(16):278-84.
17. Perry B, Gantz B. Medical and surgical evaluation and management of tinnitus. In: Tyler RS, ed. *Tinnitus handbook*. San Diego, CA: Singular Thomson Learning, 2000:221-41.
18. Gander PE, Hoare DJ, Collins L, Smith S, Hall DA. Tinnitus referral pathways within the National Health Service in England: a survey of their perceived effectiveness among audiology staff. *BMC Health Serv Res* 2011;11(1):162.
19. Kelley K, Clark B, Brown V, Sitzia J. Good practice in the conduct and reporting of survey research. *Int J Qual Health Care* 2003;15(3):261-6.
20. Burns KE, Duffett M, Kho ME, Meade MO, Adhikari NK, Sinuff T, et al. A guide for the design and conduct of self-administered surveys of clinicians. *CMAJ* 2008;179(3):245-52.
21. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3(2):77-101.
22. Hoare DJ, Gander PE, Collins L, Smith S, Hall DA. Management of tinnitus in English NHS Audiology Departments: an evaluation of current practice. *J Eval Clin Pract* 2012;18(2):326-34.
23. El-Shunnar SK, Hoare DJ, Smith S, Gander PE, Kang S, Fackrell K, et al. Primary

care for tinnitus: practice and opinion among GPs in England. *J Eval Clin Pract* 2011;17(4):684-92.

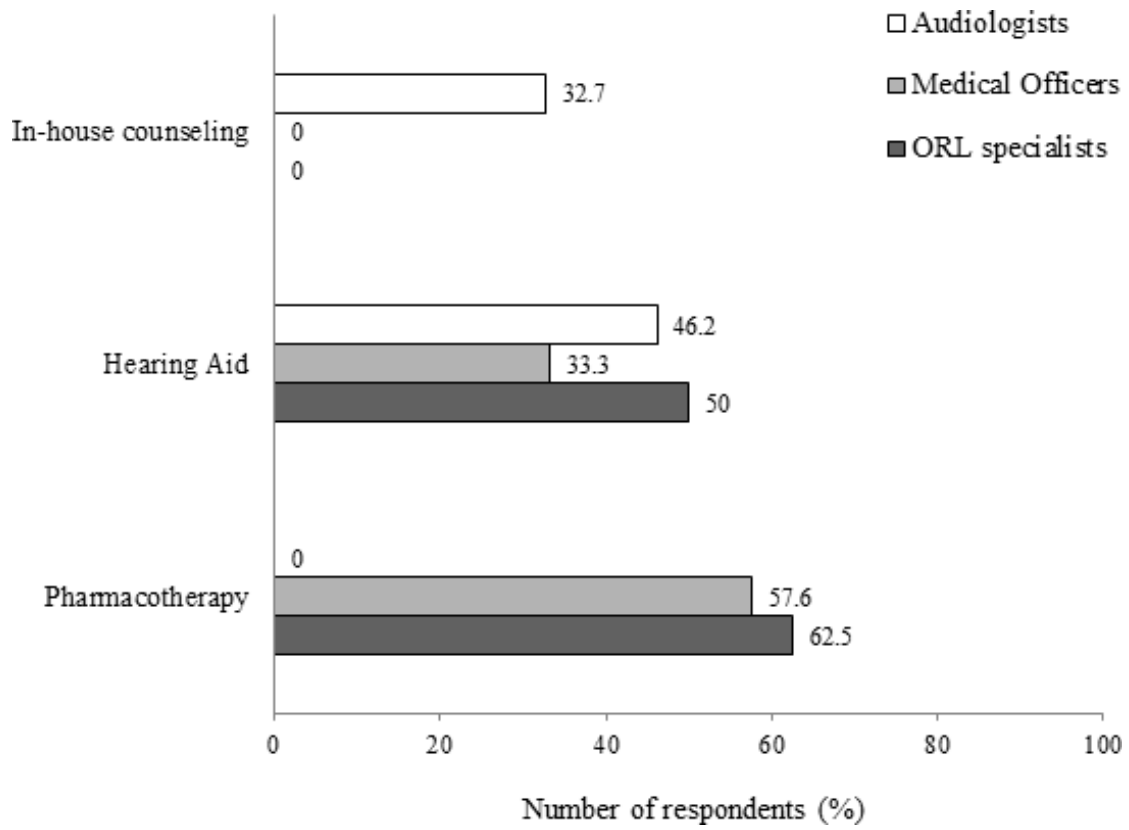
24. Hall DA, Láinez MJ, Newman CW, Sanchez TG, Egler M, Tennigkeit F, et al. Treatment options for subjective tinnitus: Self reports from a sample of general practitioners and ENT physicians within Europe and the USA. *BMC Health Serv Res* 2011;11(1):302.
25. Jastreboff PJ, Hazell JWP. *Tinnitus retraining therapy: Implementing the neurophysiological model*. Cambridge: Cambridge University Press, 2004.
26. Tyler RS, Haskell GB, Gogel SA, Gehringer AK. Establishing a tinnitus clinic in your practice. *Am J Audiol* 2008;17(1):25-37.
27. Sheldrake JB, Jastreboff M. Role of hearing aids in management of tinnitus. In: Snow Jr JB, ed. *Tinnitus: Theory and Management*. Lewiston, NY: BC Decker, 2004:310-313.
28. Meikle MB, Stewart BJ, Griest SE, Henry JA. Tinnitus outcomes assessment. *Trends Amplif* 2008;12(3):223-35.
29. Schaaf H, Eichenberg C, Kastellis G, Hesse G. Treatment of tinnitus needs a combined neurootological and psychosomatic approach. *Otolaryngol Pol* 2010;64(2):78-82.
30. Henry JA, Schechter MA, Loovis CL, Zaugg TL, Kaelin C, Montero M. Clinical management of tinnitus using a "progressive intervention" approach. *J Rehabil Res Dev* 2005;42:95-116.
31. Hoare DJ, Hall DA. Clinical guidelines and practice: a commentary on the complexity of tinnitus management. *Eval Health Prof* 2011;34(4):413-20.

**Table 1. Demographic information of the respondents**

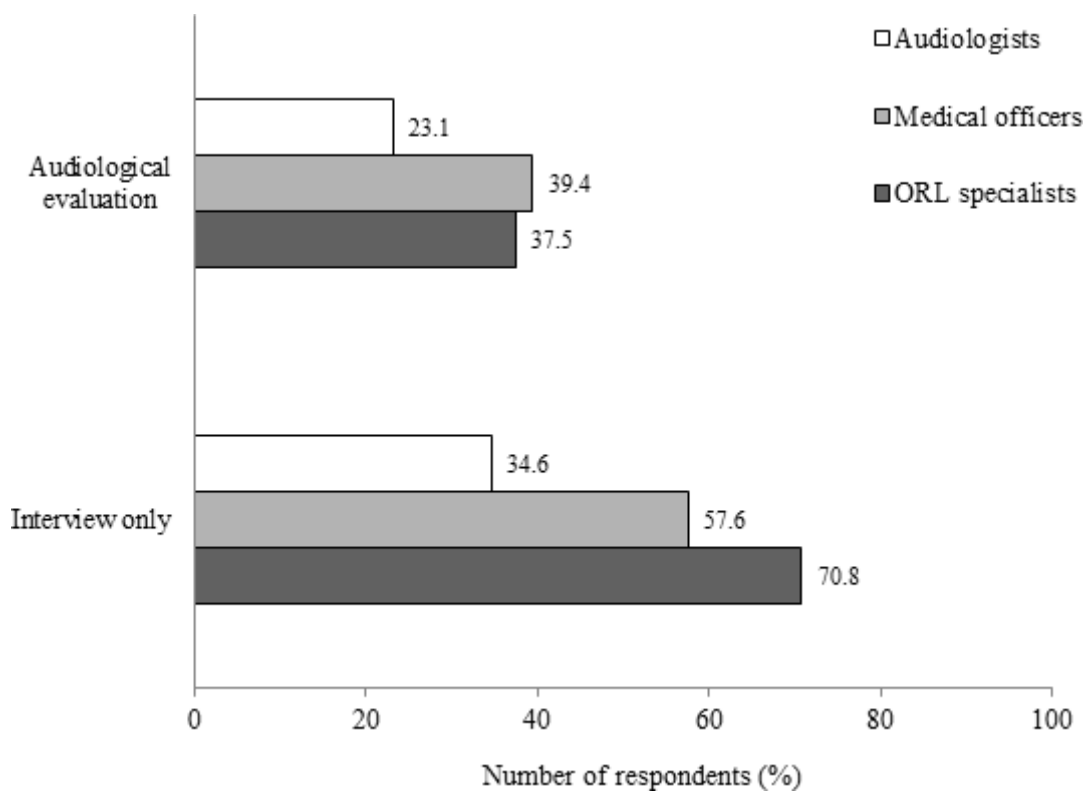
	<b>ORL specialists (%)</b>	<b>Medical Officers (%)</b>	<b>Audiologists (%)</b>
Number of respondents	24 (22)	33(30)	52 (48)
Gender			
Male	12 (50)	12 (36)	6 (12)
Female	10 (42)	19 (58)	45 (86)
Not stated	2 (8)	2 (6)	1 (2)
Age group (years)			
24 - 34	2 (8)	32 (97)	47 (90)
34 – 44	19 (79)	1 (3)	5 (10)
44 - 54	3 (13)	0	0
Working experience (years)			
Mean (SD)	5.21 (3.52)	2.35 (2.11)	4.94 (3.44)
Range	1 – 12	0.2 – 10	1 – 12



**Figure 1. Types of assessments performed on patients with complaint of tinnitus by each professional**

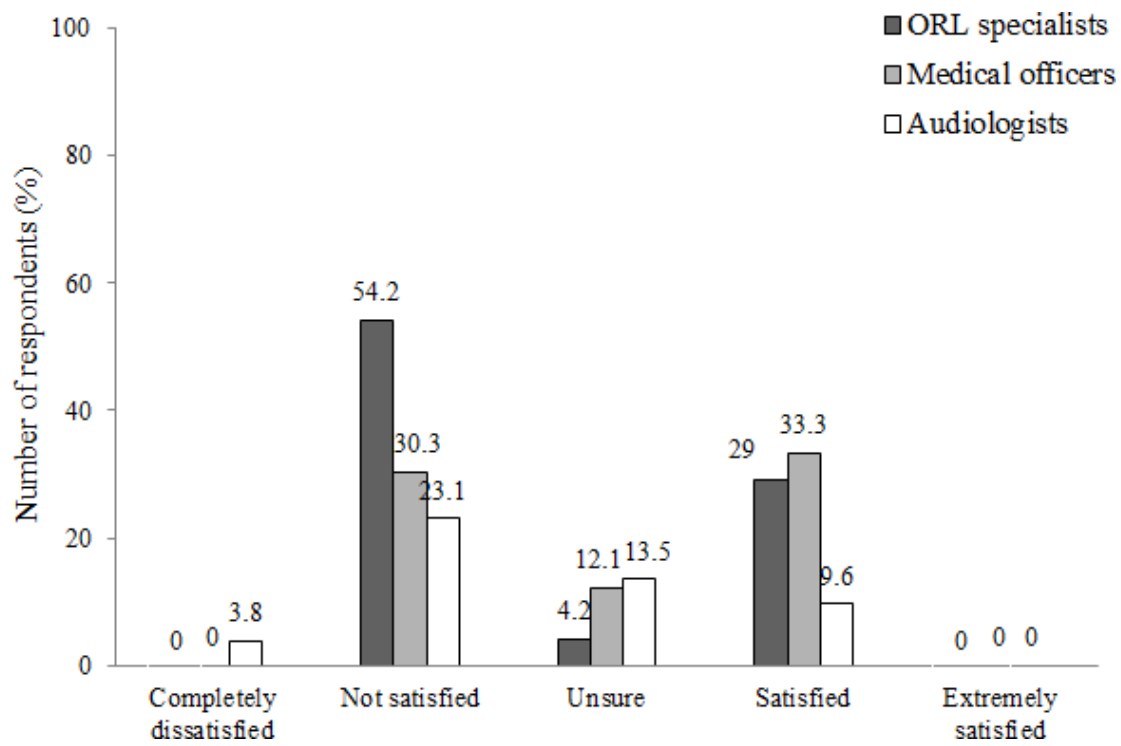


**Figure 2. Types of treatments conducted by each professional**

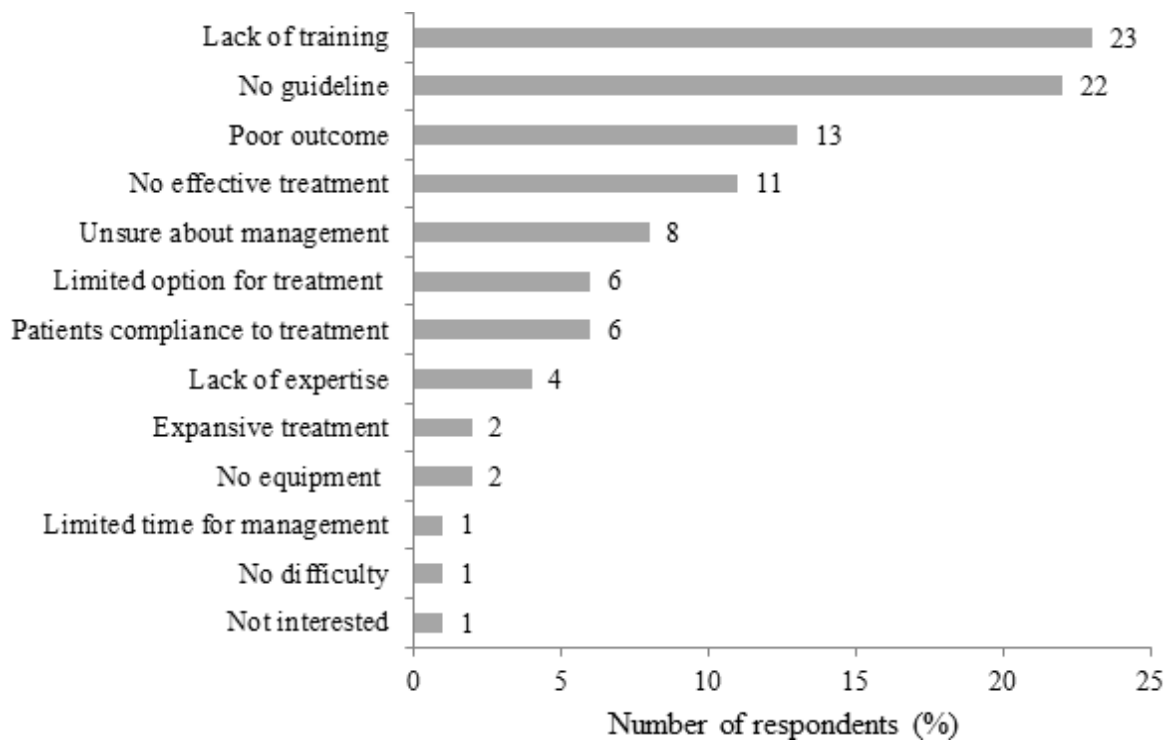


**Figure 3. Types of outcome measures performed by each professional**

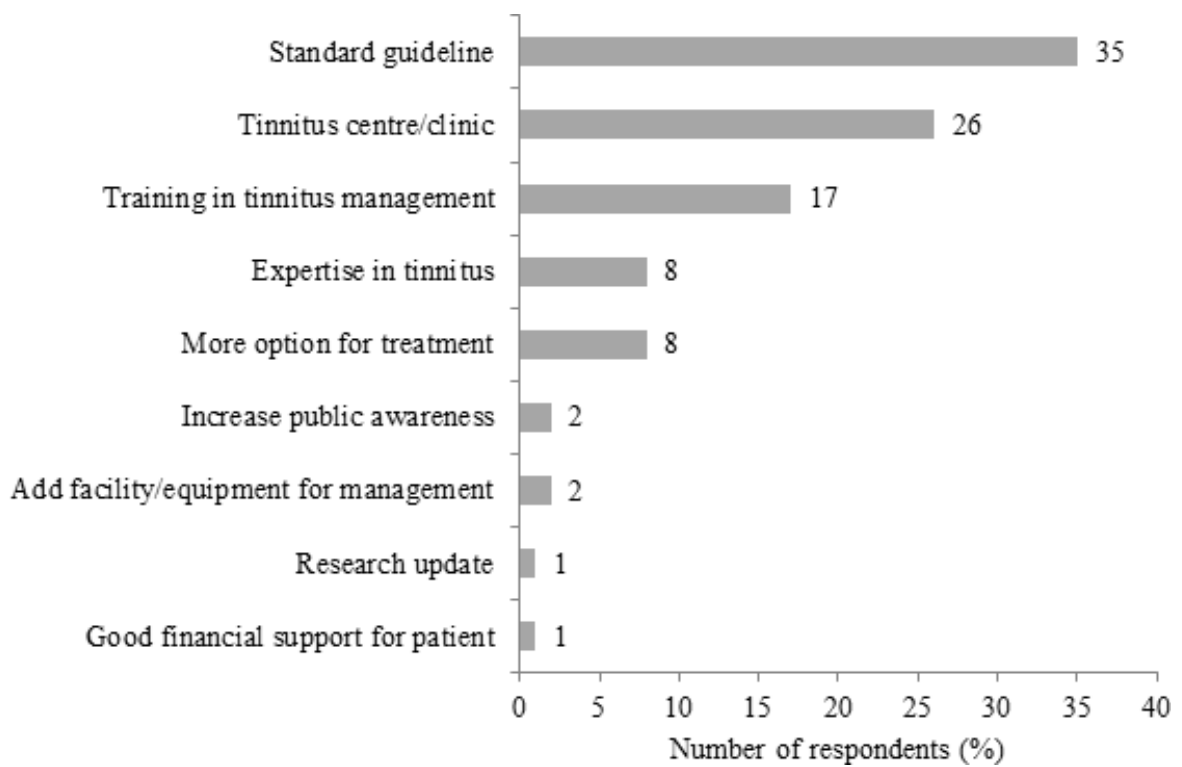




**Figure 4. Respondents' satisfaction on the current practice**



**Figure 5. Main difficulties in managing patients with tinnitus**



**Figure 6. Suggestions for improving the current tinnitus management**