Int. Adv. Otol. 2010; 6:(2) 183-187

ORIGINAL ARTICLE

Result Analysis of Tinnitus Handicap Inventory in 60 Patients with Chronic Tinnitus

Xiangli Zeng, Jintian Cen, Zhicheng Li, Peng Li, Shufang Wang, Gehua Zhang

Department of Otolaryngology and Head Surgery, Third Hospital Affiliated to Sun Yat-sen University, Guangzhou 510630, China

Objective: To identify the purpose of patients with chronic tinnitus seeking for medical help repeatedly and their major emotional problems.

Materials and Methods: After mutual English/Chinese translation of the Tinnitus Handicap Inventory (THI) repeatedly, the final Chinese version was used for evaluation in 60 patients with chronic tinnitus (30 men and 30 women) and the following aspects were analyzed: 1) the score rank for 25 questions in the questionnaire; 2) score comparison among the catastrophic, emotional and functional questions.

Results: 1) Among the total, male and female groups, the question ranking the top was C19, which referred to “Do you feel that you have no control over your tinnitus?";

2) Among the questions with the total scores among the top five in the total, male and female groups, the shared questions were "C19, C23, E16, namely, anxiety, confusion and aversion for tinnitus ".Among the questions scoring the last five, the shared questions were "F2, F9, E17", indicating that tinnitus had almost no impact on patients’ hearing, social and family life;

3) The score rank on the three subscales of questions was catastrophic > emotional > functional subscales. The differences in the catastrophic and functional subscales of questions between the total group and the female group were statistically significant.

Conclusions: The functional impacts of chronic tinnitus on patients were far less than suffering from anxiety and aversion Anxiety, disappointment, aversion and other emotional disorders were the fundamental causes for patients with chronic tinnitus repeatedly seeking for medical help. In addition to tinnitus retraining therapy (TRT), there needs sufficient attention and effective management to emotional disorders in patients. As THI is a subjective self-test completed by patients and requires the patients to correctly understand the purpose of testing and each issue involved in THI, the education level of subjects may bring some restriction, which may lead to selection bias and need to be improved in future studies.

Submitted : 06 October 2009 *Revised : 11 January 2010* *Accepted : 15 February 2010*

Introduction

Tinnitus is a subjective feeling of patients, who are often bothered by tinnitus in clinical setting, but tinnitus loudness obtained by tinnitus matching is usually very low. Therefore, it has become the primary task in chronic tinnitus treatment to identify the most concerned and annoying questions for patients with chronic tinnitus, so as to reduce the annoyance of patients on tinnitus. In this present study, a questionnaire assessment with Tinnitus Handicap Inventory (THI) was performed on 60 patients with chronic tinnitus, and scores of 25 questions were analyzed to provide references for selection of clinical treatments on chronic tinnitus.

Materials and Methods

Subjects

Patients with chronic tinnitus presented in the Clinical Hearing Center of our hospital from December 2005 to June 2009 were treated by the grading management mode previously reported by the authors [1]. One hundred and seventy-two patients were enrolled into level 3 management. Sixty patients that had education level above high school, were able to understand and speak Mandarin Chinese and could accurately understand the purpose of the survey and the significance of the questionnaire, were randomly selected. There were 30 men and 30 women. The males aged 19 to 58 years, with an average age of 41 years and the females aged 22-56 years, with an average age of 42.5 years. All the enrolled patients had repeatedly sought for medical treatment with the chief complaint of tinnitus for more than 1 year. In the grading management procedure, all the enrolled patients received a routine ear examination and consultation on tinnitus-related issues in level 1

Corresponding address:
Xiangli Zeng,
Department of Otolaryngology and Head Surgery, Third Hospital Affiliated to Sun Yat-sen University, NO 600,Tianhe Road, Tianhe District,Guangzhou 521630; China.
Phone: +8620-85253232; Fax: +8620-85253336; Email: zengxl_2002@yahoo.com.cn

management, educational counseling about the knowledge of tinnitus in level 2, as well as in-depth assessment of auditory function and tinnitus frequency and intensity in level 3 management. The results showed that of the 60 cases enrolled, 55 had cochlear hearing loss, 3 had mixed hearing loss, and 2 had tinnitus after head trauma, with normal pure-tone hearing thresholds.

Research Methods

After mutual English/Chinese translation repeatedly, the final Chinese version of THI was used to score 60 patients enrolled into level 3 management, and scores of 25 questions in the THI were collected for statistical analysis. The following issues were investigated: 1) score rank of the 25 questions to identify the most serious problems requiring to be addressed in patients with chronic tinnitus; 2) comparison between scores of the emotional, functional, as well as catastrophic subscales of questions. The context of THI is as follows: the emotional questions: E3) Does your tinnitus make you angry? E6) Do you complain a great deal about your tinnitus? E10) Because of your tinnitus, do you feel frustrated? E16) Does your tinnitus make you upset? E17) Do you feel that your tinnitus has placed stress on your relationships with members of your family and friends? E21) Because of your tinnitus, do you feel depressed? E22) Does your tinnitus make you feel anxious? E25) Does your tinnitus make you feel insecure? The functional questions: F1) Because of your tinnitus is it difficult for you to concentrate? F2) Does the loudness of your tinnitus make it difficult for you to hear people? F4) Does your tinnitus make you confused? F7) Because of your tinnitus do you have trouble falling to sleep at night? F9) Does your tinnitus interfere with your ability to enjoy social activities (such as going out to dinner, to the cinema? F12) Does your tinnitus make it difficult to enjoy life? F13) Does your tinnitus interfere with your job or household? F14) Because of your tinnitus do you find that you are often irritable? F15) Because of your tinnitus is it difficult for you to read? F18) Do you find it difficult to focus your attention away from your tinnitus and on to other things? F20) Because of your tinnitus do you often feel tired? F24) Does your tinnitus get worse when you are under stress? The catastrophic questions: C5) Because of your tinnitus are you desperate? C8) Do you feel as though you cannot escape your tinnitus? C11) Because of your tinnitus do you feel that you have a terrible disease? C19) Do you feel that you have no control over your tinnitus? C23) Do you feel you can no longer cope with your tinnitus?

Results

Score rank of the 25 questions

Results of score rank of the 25 questions are shown in Figures 1-3, in which C, E, F represents the catastrophic, emotional and functional subscales of questions in the THI, and the scores were the total scores of 60 cases (Figure 1) or 30 cases (Figures 2, 3).

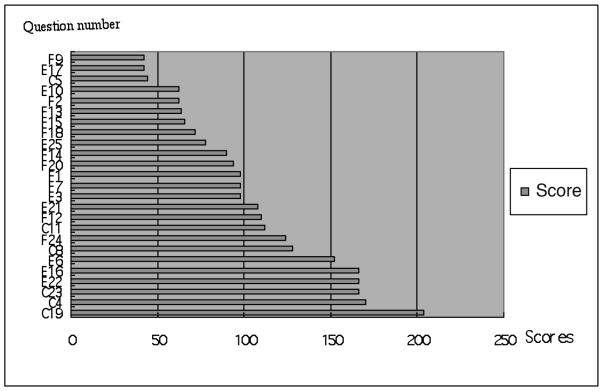

Figure 1. THI scoring results of the total 60 cases

The questions scored the top five were: C19-C4-C23-E22-E16; and the questions scored the last five were: F9-E17-C5-E10-F2.

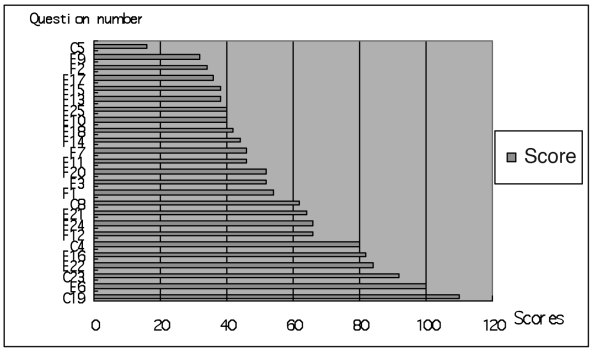

Figure 2. THI scoring results of 30 men

The questions scored the top five were: C19-E6-C23-E22-E16; and the questions scored the last five were: C5-F9-F2-E17-F15.

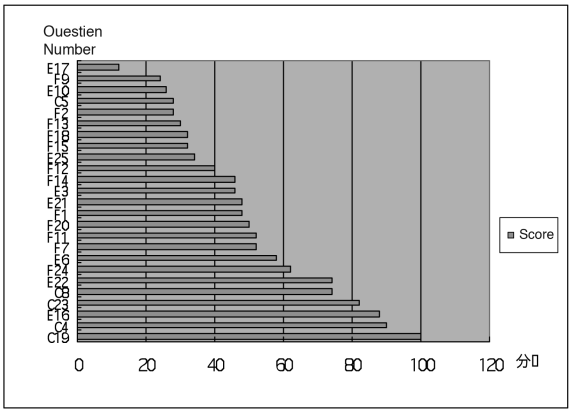

Figure 3. THI scoring results of 30 cases women

The questions scored the top five were: C19-C4-E16-C23-C8; and the questions scored the last five were: E17-F9-E10-C5-F2.

Comparison on scores of the catastrophic, emotional and functional questions

Scores of the catastrophic, emotional and functional questions were compared, and the results are shown in Table 1. As the 25 questions in THI included 5 items of catastrophic subscale, 8 of emotional subscale and 12 of functional subscale, which means that the three subscales of questions in the questionnaire accounted differently in the total scores, thus their scores could not be directly compared. Therefore, this study conducted a statistical analysis on the scores of each question in the catastrophic, emotional and functional subscales. Setting the total 60 cases as an example, the calculation method was that the catastrophic subscale = overall score of the catastrophic questions in the 60 cases/5 (items); the emotional subscale = overall score of the emotional questions in the 60 cases/8 (items); the functional subscale = overall score of the functional questions in the 60 cases/12 (items). The other groups followed this method. Data were input into Excel software, and t test was performed.

Discussion

Since proposed by Jastreboff, the tinnitus retraining therapy (TRT) has become the main treatment method of chronic tinnitus, and clinical practice has confirmed that some patients could benefit from TRT. However, significant efficacy of TRT typically appears 6 to 18 months after treatment or longer. The purpose of some patients repeatedly seeking for medical help due to tinnitus is to wish solve the bothering tinnitus as soon as possible. They can not accept such a long course of TRT treatment, and they are skeptical about the effect of TRT. The authors of this paper found from the THI scoring in patients enrolled into level 3 management based on the grading management mode [1] that all patients responded positively to the No.19 question "Do you feel that you have no control over your tinnitus?", indicating that despite after an initial assessment, counseling and treatment in level 1 and educational counseling about the knowledge of tinnitus in level 2 management, all patients still pessimistically considered that they had no control over their tinnitus. Therefore, the first important problem required to be resolved in treatment is anxiety of patients with chronic tinnitus. In each group, the top five questions were as follows: for the total 60 cases, C19-C4-C23-E22-E16; for 30 women, C19-C4-E16-C23-C8; for 30 men, C19-E6-C23-E22-E16, and the shared questions in each group were "C19, C23, E16, namely, anxiety, confusion, aversion". Among the top five questions, in the total group the catastrophic subscale of questions accounted for 3/5,and the emotional questions accounted for 2/5; in the 30 men group the emotional subscale of questions accounted for 3/5, and the catastrophic questions accounted for 2/5;while in the 30 women group, the catastrophic subscale of questions accounted for 4/5,and the emotional questions accounted for 1/5. There were no functional questions in each group of the top five

Table 1. Comparison between scores of the three subscales of questions among the total group, male group and female group (x ± s)

	Catastrophic	Emotional	Functional
Total	137.33±57.17*	109.00±48.00	83.63±24.32
30 men	67.67±34.17	62.00±24.45	46.73±12.17
30 women	71.00±26.62**	48.25±24.94	40.36±12.06
p value for the male and female groups	0.825	0.0007	0.0002

*Note: * comparison between the catastrophic and functional subscales in the total 60 cases, $p < 0.05$; ** comparison between the catastrophic and functional subscales in the 30 women, $p < 0.01$*

questions. The results fully demonstrated that anxiety, disappointment, aversion and other emotional disorders were the fundamental causes for patients with chronic tinnitus repeatedly seeking for medical help.

The last five shared questions in each group were F2, F9 and E17, suggesting that tinnitus had almost no impact on patients' hearing, social and family life.

The results of comparison between the catastrophic, emotional and functional subscales of questions showed that the difference between the scores of the catastrophic and emotional questions in the total 60 cases and 30 women was statistically significant. It was further verified that the functional impacts of chronic tinnitus on patients were far less than anxiety and aversion, suggesting that in addition to TRT, emotional disorders in patients with chronic tinnitus need sufficient attention and effective management. The male group scored higher in emotional and functional subscales of questions than the female group, and the female group scored higher in catastrophic subscales of questions than the male group. The difference was statistically significant, suggesting that for tinnitus, an annoying negative stimulus, the women fell more helpless in anxiety and fear, while the men experience more annoyance due to interferes with their work and life by tinnitus. Such difference may be due to the role orientation of women as a social vulnerable group, indicating that when offering psychological counseling to patients with chronic tinnitus, it should lay emphasis on the different experience between men and women.

Several neuromodulatory systems exist [2]. The sites with neuromodulatory function include the nucleus basalis (acetylcholine system), the locus ceruleus (noradrenergic system), the ventral tegmentum (dopamine system), and the raphe nuclei (serotonin system). The functions of these regions are associated with arousal, emotions and injury. Evidences demonstrate that these systems are involved in expression of tinnitus perception related with emotion, and associated with the feeling of fear, depression and phonophobia [3-6]. Metabolic activities from animals with tinnitus and gene expression in early stage suggest that amygdala and locus ceruleus are related to tinnitus, that is, the amygdala and locus ceruleus are regulatory sites for attention and emotion [7-9]. Increasing clinical practice and experimental results have verified that 5-HT system dysfunction is involved in the central mechanisms in chronic tinnitus [10]. Analysis of the impacts of these widely-distributed modulating systems on the treatment of tinnitus and its emotional performance will facilitate improving the prognosis of tinnitus. In the treatment of tinnitus, direct or indirect manipulation on the neuromodulatory systems may be attempted. A variety of antidepressants such as 5-HT reuptake inhibitors were reported to be used on chronic tinnitus, obtaining satisfactory effects [11], indicating an encouraging prospect for drug treatment on chronic tinnitus. But these treatments require more verification from clinical practice, and normalization in dosage, course of treatment and efficacy assessments, etc.

As THI is a subjective test and self-administered by patients, the subjects should be firstly required to correctly understand the purpose of this test, and secondly required to get familiar with and understand each question in the THI, so as to reflect their true status. Accordingly, in this study, the education level of subjects was restricted, which leads to selection bias and needs to be improved in future studies. But as subjects represent different careers such as physical and brain workers, housewives and retirees, it still has a strong representation.

In summary, the results of this study clearly suggest that anxiety and aversion to tinnitus were the fundamental causes for patients with chronic tinnitus repeatedly seeking for medical help. Combined with existing clinical practice and experimental research, it is considered that the above emotional disorders are closely related to neuromodulatory system, thereby direct or indirect manipulation of neuromodulatory system is expected to become a new direction for the treatment of chronic tinnitus. In addition to TRT treatment, intervention by using appropriate anxiolytics, antidepressants is expected to yield even more satisfactory results.

Acknowledgments

We greatly appreciate Dr. Qianglin Duan, a skilled English proofreader from Tongji University, for English usage and paper revision.

References

1. Zeng XL, Gong SS, Li P, Li Y. Chronic tinnitus: a grading management mode study. Nati Med J China 2009, 89:114-16.

2. Gu Q. Neuromodulatory transmitter systems in the cortex and their role in cortical plasticity. Neuroscience 2002; 111:815-35.

3. Cacace AT. Expanding the biological basis of tinnitus;crossmodal origins and the role of neuroplasticity. Hear Res 2003; 175:112-32.

4. Møller AR. Pathophysiology of tinnitus. Otolaryngol Clin North Am 2003; 36: 249-66.

5. Møller AR, Møller MB, Yokata M. Some forms of tinnitus may involve the extralemniscal pathway. Laryngoscope 1992; 102:1165-71.

6. Møller AR, Rollins PR. The non-classical auditory pathways are involved in hearing in children but not in adults. Neurosci Lett 2002; 319: 41-4.

7. Wallhaeusser-Franke E, Braun S, Langner G. Salicylate alters 2-DG uptake in the auditory system: a model for tinnitus? Neuroreport 1996; 7:1585-88.

8. Wallhäusser-Franke E, Mahlke C, Oliva R, Braun S, Wenz G, Langner G. expression of c-fos in auditory and non-auditory brain regions of the gerbil after manipulations that induce tinnitus. Exp Brain Res 2003; 153:649–54.

9. Zhang JS, Kaltenbach JA, Wang J, Kim SA. Fos-like immunoreactivity in auditory and nonauditory brain structures of hamsters previously exposed to intense sound. Exp Brain Res 2003; 153:655–60.

10. Simpson JJ,Davies WE.A review of evidence in support of a role for 5-HT in the perception of tinnitus. Hear Res 2000; 145:1-7

11. Robinson SK, Viirre ES, Stein MB. Antidepressant therapy in tinnitus. Hear Res, 2007; 226:221-31.