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■ CLINICAL RESEARCH

Assessment of Hyperacusis: The Self-Rating Questionnaire on Hypersensitivity to Sound

C. Herráiz,[a,b] *G. de los Santos,*[a] *I. Diges,*[a] *R. Díez,*[a] *and J.M. Aparicio*[a]
[a]Unidad de Otorrinolaringología, Fundación Hospital Alcorcón, Alarcón (Madrid), Spain
[b]Unidad de Acúfenos, Instituto ORL Antolí-Candela, Madrid, Spain

Abstract: *Introduction*: Hyperacusis is an abnormal reduction in tolerance to ambient noise. Sound discomfort levels and their associated degrees of handicap must be measured as part of the audiological examination. To this purpose, we decided to use the Spanish language adaptation of the German questionnaire on hypersensitivity to sound. *Objective*: To update the concept of hyperacusis and evaluate the associated degree of disability using a Spanish adaptation of the *Geräuschüberempfindlichkeit* (GÜF). *Patient sample:* Forty patients referred to our Tinnitus and Hyperacusis unit in the University Hospital, between October 2004 and February 2005. *Evaluation Measures:* The Spanish version of the THS-GÜF was used after it had been translated from German into Spanish and then back again and its internal consistency and reliability had been established. *Results:* The Spanish adaptation of the THS-GÜF and its subscales (cognitive, somatic behavior, and emotional reaction) show high reliability and internal consistency (Cronbach's alpha: 0.9007). Higher GÜF scores were recorded for hyperacusis patients who also suffered from hearing loss ($P<.05$), or tinnitus ($P<.05$). *Conclusions:* The Spanish adaptation of the THS-GÜF is valid and reliable and can be used in clinical evaluations to quantify the impact of hyperacusis on a patient's quality of life.

Key words: Hyperacusis. Algyacusis. Tinnitus. Questionnaire. Phonophobia.

Evaluación de la hiperacusia: test de hipersensibilidad al sonido

Resumen: *Introducción:* La hiperacusia es la reducción anormal de la tolerancia a los sonidos ambientales. La exploración audiológica debe incluir la medida de los niveles de disconfort al sonido así como su incapacidad, para lo cual procedemos a la adaptación española del test alemán de hipersensibilidad al sonido. *Objetivo*: Exposición del protocolo de evaluación de la hiperacusia y adaptación al español del *Test de Hipersensibilidad al sonido (THS) / Geräuschüberempfindlichkeit* (GÜF). *Muestra*: Cuarenta pacientes remitidos a la Unidad de Acúfenos e Hiperacusia de un Hospital Universitario, entre los meses octubre 2004 y febrero de 2005. *Medidas de evaluación:* Administración de la versión española del THS-GÜF tras traducción y retrotraducción, y establecimiento de su fiabilidad y consistencia interna. *Resultados*: La adaptación española del THS-GÜF y sus subescalas (cognitiva, comportamiento somático y reacción emocional) muestran una fiabilidad y consistencia interna elevada (alfa de Cronbach de 0,9007). Se obtuvieron valores más elevados del GÜF en los pacientes que además presentaban hipoacusia ($p<0,05$) o acúfenos ($p<0,05$). *Conclusión*: La adaptación del THS-GÜF al idioma español es válida, fiable y puede ser utilizada en la evaluación clínica para cuantificar el impacto de la hiperacusia en la calidad de vida del paciente.

Palabras clave: Hiperacusia. Algiacusia. Acúfeno. Cuestionario. Fonofobia.

INTRODUCTION

Hyperacusis sufferers have a reduced tolerance to ambient sounds and respond in an exaggerated or inappropriate manner to noises that would not trouble the general population.

This symptom is not quantifiable by means of objective methods, for which reason its evaluation requires the use of two types of parameter. The first is a psycho-acoustic method defined by the discomfort or intolerance to sound threshold. This threshold is established at the sound intensity that causes such discomfort that the patient can only bear

Correspondence: C. Herráiz.
Unidad de Otorrinolaringología.
Fundación Hospital Alcorcón.
Budapest, 1. 28922 Alcorcón (Madrid). España.
E-mail: cherraizp@seorl.org

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Tabla 1. Activities That the Patient Avoids Doing Due to Their Hyperacusis

Concerts	Socializing	Sporting Events
Restaurants	Going to church	Housework
Cinema	Work	Child care
Going shopping	Driving	Others

Tabla 2. Degrees of Hyperacusis According to Nelting's Test for Hypersensitivity to Sound[21]

Degree of Incapacity	*Values of the THS*	*Degree*
Slight incapacity	1-10	I
Moderate incapacity	11-17	II
Severe incapacity	18-25	III
Very severe incapacity	26-45	IV

it for a few seconds, though without it reaching the pain threshold. Above 90 dB HL is considered to be normal.

The second method is the subjective assessment of hyperacusis and the degree of incapacity that it generates in the patient. We can use several parameters for this purpose:

– The visual analogue scale (VAS). We used a scale of 0 (no hyperacusis) to 10 (unbearable), which the patients mark according to their self-assessment.

– The number of activities affected by this symptom out of a list of eleven. There is also a blank space for any other activities the patient wishes to add (Table 1).

– The questionnaires relating to the degree of handicap associated to hyperacusis such as those proposed by Khalfa[1] or by Nelting[2] (Test for Hypersensitivity to Sound or THS).

Nelting's test for hypersensitivity to sound or, in German, *Geräuschüberempfindlichkeit* (GÜF), is a questionnaire based on fifteen questions that evaluate three dimensions or subscales: cognitive behavior in relation to hyperacusis, somatic behavior or reactions linked to specific situations, and finally, emotional reactions. Each question has four possible responses: never (0 points), occasionally (1 point), frequently (2 points) and always (3 points). The maximum possible score is 45 points (15x3) and according to the score obtained, four degrees of incapacity have been defined (Table 2).

Our objective is to adapt and validate a Spanish version of this questionnaire with a view to its being utilized as an essential tool in the evaluation of hyperacusis. We have evaluated possible factors that could result in greater degrees of incapacity secondary to this symptom.

MATERIAL AND METHOD

Adaptation of the Questionnaire to the Spanish Language

We obtained the questionnaire described in the article by Nelting and Rienhoff[2] from the literature. We then had the questionnaire translated from German (the original language) into Spanish and from Spanish back into German[3] by certified bilingual translators. The final version of the validated translation of the adapted THS questionnaire is presented in the appendix of this publication (Appendix 1).

Sample of Patients

The sample consisted of 40 patients who were referred to the Tinnitus Unit after presenting hyperacusis. All consecutive patients that came to the clinic during the study period (between the months of October 2004 and February 2005) were selected.

Statistical Validation Procedure

We recorded the statistical figures (mean, median, range, and standard deviation) for each section, factor and subscale (cognitive, somatic behavior, and emotional reaction), and the total score for the adapted THS. Viability of the questionnaire: simplicity of presentation, clarity of the questions, ease of correction, and marking. Reliability: assessment of internal consistency which is defined as the degree of homogeneity between the different questions that measure the same attribute and the subscales into which they are divided. We followed Cronbach's alpha model, with values between 0 (no internal consistency) and 1 (high internal consistency), using the statistical package SPSS, version 11. This coefficient is based on the mean correlation of each item of a subscale with the total of the same, and on the number of items that this subscale contains, with values greater than 0.7 considered sufficient for comparison. When a questionnaire is composed of various subscales and each one measures a different dimension of the phenomenon, the internal consistency of each one of them must also be evaluated.

To evaluate the factors that could increase the total score of the THS, the following statistical tests were considered: correlation for quantitative variables, Student *t* test for the qualitative dichotic variables and ANOVA for the non-dichotic qualitative variables.

RESULTS

In this series of 40 patients there were 28 women and 12 men. The average age was 48 (11) years (range, 27-68).

With respect to the adapted Spanish THS, the viability of the questionnaire was assessed as being simple, clear and easy to complete by 97% of those who completed the survey. Furthermore, the percentage of patients that did not answer all the questions was 1.4%.

With respect to the analysis of internal consistency, following Cronbach's alpha model the global outcome was 0.9007, very close to 1 (high internal consistency). Cronbach's alpha values were also obtained for each subscale; these were 0.78 for cognitive behavior, 0.77 for somatic behavior, and 0.80 for emotional reaction to hyperacusis. Finally, removing any one of the questions did not significantly improve the internal consistency of either the scale or the subscales.

In studying the factors that could be correlated to a greater severity in the THS, no significant relation was obtained

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Appendix 1: Adaptation into Spanish of the Hypersensitivity Test

Mark the Corresponding Box With an X	Never or it's Not True	On Occasion	Frequently	Always
1. Certain noises that did not bother me before now scare me				
2. I am worried by the idea that I am never going to be able to get used to these loud and disagreeable sounds				
3. Whenever there are loud or disagreeable noises around me I cannot listen or pay attention				
4. I have problems with my partner or my family due to my great sensitivity to sound				
5. In the presence of certain sounds I feel the need to show or tell others (about the discomfort I feel)				
6. I am very frightened by loud noises				
7. I think that my hypersensitivity to noise has ruined my life				
8. When there is a lot of noise around me I cannot hear or understand anything				
9. Some people avoid me because I cannot tolerate loud or disagreeable noises				
10. Loud or disagreeable noises make me feel angry				
11. I experience pain in my ears when there is loud or unpleasant noise				
12. I think that I'm going to be incapable of facing daily life if my hypersensitivity to noise continues				
13. Whenever there are loud or unpleasant noises, I immediately withdraw or back away				
14. I am scared that loud or unpleasant noises are damaging my hearing				
15. Since I've had this hypersensitivity to noise I cannot enjoy music				

between the questionnaire score and the sex, age, diagnosis, time of evolution, or discomfort threshold of the subjects. A higher score in the THS was related to a higher VAS score (P=.004) and a higher number of activities affected by the hyperacusis (P=.011). More than 77% (31 cases) presented hearing loss. The presence of hearing loss was correlated to a higher THS score (P=.04), but a higher degree of hearing loss, according to the audiometry, did not predict a higher THS score. Ninety percent of patients (36 cases) also complained of tinnitus. The presence of tinnitus, the greater the intensity according to the score of the tinnitus VAS and a greater incapacity according to the Tinnitus Handicap Inventory (THI),[5] were also correlated to higher THS values (P=.000, P=.026, and P=.004 respectively).

DISCUSSION

In our unit, we have witnessed a progressive increase in the number of patients reporting hypersensitivity to sound over the last few years. The high association of hyperacusis to the presence of tinnitus (90% in our series), the fact that our country is the second noisiest after Japan, and the existence of greater attention on the part of doctors to hearing loss in recent years can explain the increase in its incidence. The need to assess this symptom motivated us to search for, and validate, a simple, standardized and psychometrically robust questionnaire. The THS/GÜF is a tool that allows us to grade the incapacity provoked by the patient's symptom, and complements other means of self-assessment (VAS, list of activities affected) as well as audiological assessment (sound discomfort threshold). In accordance with these parameters we will be able to design therapeutic strategies adapted to the severity of each case.

The Spanish adaptation of the THS/GÜF shows an internal consistency similar to that of the original German version (0.89 in German as compared with 0.90 in Spanish). The consistency in each subscale is also similar, (cognitive behavior 0.78 in Spanish as compared with 0.80 in German;

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somatic behavior 0.77 compared with 0.82, and emotional reaction 0.80 compared with 0.79).

The development of questionnaires for the evaluation of the severity of the hyperacusis was uncommon until the end of the nineties, but we now have various options. Jastreboff and Hazell use a list of activities that can be affected by this symptom, which we included in our department's protocol. Daumann uses a broader list of activities, giving a score form 0 to 10 for each one of them according to the degree of severity. This multiple-activity scale for hyperacusis, known as MASH, allows hyperacusis to be classified into four degrees: mild if ≤3, moderate if 3.1-5, serious if 5.1-7, and severe if ≥7.[7] Khalfa has published a 14 part questionnaire, selected from the findings of a study of 201 patients. This questionnaire is centered around attentional, social and emotional factors.[1] Nelting's questionnaire based on 226 patients, and which we have validated, represents a step forward in the assessment of these patients.[2] The considerable usefulness of this questionnaire justifies its status as a necessary and protocolized tool in the assessment of hyperacusis in our unit.

CONCLUSION

The Spanish version of the Test of Hypersensitivity to Sound (THS/GÜF) shows a correct equivalence to the original German version taking into account the levels of consistency and reproducibility obtained. It thus represents, at the present time, a tool for assessing incapacity associated with hyperacusis that can be used by the Spanish-speaking population.

REFERENCES

1. Khalfa S, Dubal S, Veuillet E, Pérez-Díaz F, Jouvent R, Collet L. Psychometric normalization of a hyperacusis questionnaire. ORL J Otorhinolaryngol Relat Spec 2002;64:436-42.
2. Nelting M, Rienhoff NK, Hesse G, Lamparter U. Die Erfassung des subjektiven Leidens unter Hyperakusis mit einem Selbstbeurteilungsbogen zur Geräuschüberempfindlichkeit (GÜF). Laryngo-Rhi-no-Otol 2002;81:327-334.
3. Badia X. Sobre la adaptación transcultural de medidas de calidad de vida relacionada con la salud para uso en España. Med Clin (Barc) 1995;105:56-58.
4. Argimon Pallás JM, Jiménez Villa J. Métodos de investigación clínica y epidemiológica. 2ª ed. Madrid: Harcourt; 2000; pp. 167-175.
5. Herraiz C, Hernández Calvín FJ, Plaza G et al. Evaluación de la incapacidad en los pacientes con acúfenos. Acta Otorrinolaringol Esp 2001; 52: 142-145.
6. Jastreboff PJ, Jastreboff M. Tinnitus Retraining Therapy (TRT) as a method for treatment of tinnitus and hyperacusis patients. J Am Acad Audiol 2000;11:162-177.
7. Daumann R, Bouscau-Faure F. Assessment and amelioration of hyperacusis in tinnitus patients. Acta Oto-Laryngol 2005;125:503-9.