Internal Consistency of the Inventory of Hyperacusis Symptoms

Hashir Aazh[1], Ali A. Danesh[2], Brian C. J. Moore[3]

[1] Audiology Department, Royal Surrey NHS Foundation Trust, Egerton Road, Guildford, GU2 7XX, UK

Correspondence: *hashir.aazh@nhs.net*

[2]Department of Communication Sciences & Disorders, Florida Atlantic University, 777 Glades RD, Boca Raton, FL 33431, USA

[3]Department of Psychology, University of Cambridge, Downing Street, Cambridge CB2 3EB, UK

Introduction

The aim of the study was to assess the internal consistency of a new questionnaire for hyperacusis, the Inventory of Hyperacusis Symptoms (IHS) (Greenberg & Carlos, 2018) using a clinical population. Another goal was to assess whether the proposed cut off IHS score of 69 for diagnosing hyperacusis gives outcomes that are consistent with the cut off scores for other tests used to diagnose hyperacusis (Aazh & Moore 2017).

Methods

This was a retrospective study. Data were gathered from records of 100 consecutive patients who sought help for tinnitus and/or hyperacusis from an audiology clinic in the UK and completed the IHS. A Receiver Operating Characteristic (ROC) is a plot of correct positive diagnoses of hyperacusis (corresponding to sensitivity) against false positive diagnoses of hyperacusis (where no hyperacusis is present, corresponding to specificity) for different cut off values of the IHS. Khalfa's Hyperacusis Questionnaire (HQ) scores were used as a reference for calculating sensitivity and specificity for the IHS.

The area under the ROC curve (AUC) indicates the overall accuracy of the diagnostic tool and is between 0.5 and 1.0. The closer the value is to 1.0, the more accurate is the diagnosis. The cut off value for the IHS yielding the highest overall accuracy, i.e. the highest percentage of patients classified correctly, was taken as the optimal cut off score indicating hyperacusis for clinical use.

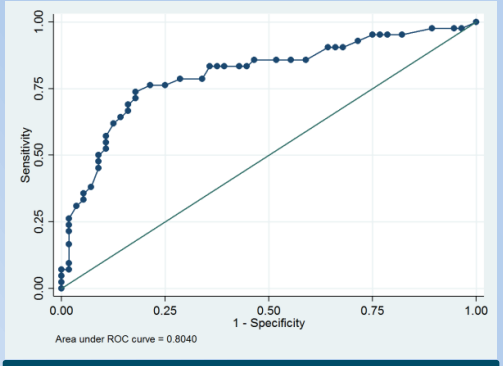

Figure 1. Results of ROC analysis of the IHS using the HQ scores as a reference.

Results

To determine levels of internal consistency of the IHS Cronbach's alpha was calculated for the whole questionnaire and the five individual factors. The results of which can be seen in Table 1. Overall, the values are high for both individual factors and the whole questionnaire indicating good internal consistency.

The total score on the IHS was significantly correlated with the scores on the HQ demonstrating convergent validity between the IHS and HQ.

The ROC analysis for the IHS, using HQ scores as a reference, is shown in Figure 1. The AUC was 0.80 (95% CI: 0.71-0.89), indicating good accuracy of the IHS to discriminate patients with hyperacusis from those without hyperacusis. The cut-off score for the IHS yielding the highest percentage of patients classified correctly (79%) was 56/100. The cut off score of 69 recommended by Greenberg and Carlos (2018) had a lower percentage of specificity (48%) compared to the threshold of 56/100 (82%).

Table 1. Cronbach's alpha values for each of the five factors and the overall questionnaire as a whole. Scale reliability coefficient was calculated for Factor 5 as it only had two items in the IHS.

Factor		Cronbach's Alpha
Factor 1	General Loudness	0.81
Factor 2	Emotional arousal	0.89
Factor 3	Psychosocial	0.92
Factor 4	Functional Impact	0.89
Factor 5	Communication	0.89
Overall questionnaire		0.96

Conclusions

As shown by the high Cronbach's alpha value the IHS has high levels of internal consistency for the overall scores and the five sub-categories.

The ROC analysis indicated higher sensitivity in a lower cut off value for the IHS than that as recommended by Greenberg and Carlos (2018). We propose an IHS cut-off value of 56 instead of 69 for diagnosing hyperacusis. We suggest that the Greenberg and Carlos (2018) categories of hyperacusis based on IHS score should be modified to: <56 no hyperacusis; between 56 and 79 mild-moderate hyperacusis; between 80 and 88 severe hyperacusis; ≥89 very severe hyperacusis. More research is needed to assess these proposed categories (Aazh et al 2020).

References

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