Do tinnitus characteristics have an impact on its subjective experience?

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Background

Tinnitus is a common symptom that can affect the quality of life1. However, there is little agreement on the relationship between the audiological characteristics of tinnitus and its subjective impact. In addition, tinnitus is often accompanied by hyperacusis, but the relationship between both is still obscure. The purpose of this study was to evaluate the relation between tinnitus characteristics, hyperacusis and its subjective impact.

Methods

• Subjects
54 males and 27 females between 18-73 years (mean 47.64 years, SD 14.4 years) with tinnitus as their primary complaint were included. Tinnitus was referred as unilateral in 45.6% of the cases (16% in the right ear, 29.6% in the left ear) and as bilateral in 54.4% of the cases. Therefore, out of a total of 81 subjects, there were 125 ears with tinnitus in the data set.

• Procedures
All patients underwent a medical history and otological examination by an otolaryngologist. The audiological investigations consisted of the measurement of hearing status, tinnitus pitch, loudness, and maskability (using white noise), as well as loudness discomfort levels (LDLs). Furthermore, all patients completed the Tinnitus Handicap Inventory (THI)2 and Hyperacusis questionnaire (HQ)3 pertaining to the subjective impact of tinnitus and hyperacusis.

Results

• In 61.6%, tinnitus was associated with hearing loss.
• Tinnitus was mostly observed bilaterally with a high pitch and a loudness from 0 to 5 dB SL (Table 1).

<table>
<thead>
<tr>
<th>Factors</th>
<th>N (%)</th>
</tr>
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<tbody>
<tr>
<td>Tinnitus Pitch</td>
<td></td>
</tr>
<tr>
<td>Low frequency</td>
<td>11 (8.8%)</td>
</tr>
<tr>
<td>Medium frequency</td>
<td>35 (28%)</td>
</tr>
<tr>
<td>High frequency</td>
<td>79 (63.2%)</td>
</tr>
<tr>
<td>Tinnitus Loudness</td>
<td></td>
</tr>
<tr>
<td>0-5 dB SL</td>
<td>66 (52.8%)</td>
</tr>
<tr>
<td>5-10 dB SL</td>
<td>46 (36.8%)</td>
</tr>
<tr>
<td>10-15 dB SL</td>
<td>7 (5.6%)</td>
</tr>
<tr>
<td>&gt;15 dB SL</td>
<td>4 (3.2%)</td>
</tr>
<tr>
<td>Not determined</td>
<td>2 (1.6%)</td>
</tr>
</tbody>
</table>

Table 1: Percentages of tinnitus pitch and loudness.

• A weak but significant correlation was found between the total THI score and tinnitus pitch ($r=0.20; p<0.05$) and loudness ($r=0.28; p<0.01$), as well as decreased sound tolerance ($r=0.23; p<0.01$).
• The minimum masking level for white noise had a mean of 18.9 dB SL (SD 13.33; 1 – 65 dB SL). No significant impact of tinnitus maskability on tinnitus severity ($r=0.05. p>0.05$) was found.
• Based on the LDLs, 73.5% of the ears had a decreased sound tolerance using the criteria of Goldstein and Shulman (1995)4.
• A significant relation was found between the subjective impact of tinnitus determined through THI and the subjective impact of hyperacusis determined through HQ ($r=0.69; p<0.001$) (Figure 1).

Discussion

• Several studies tried to investigate the relation between the audiological characteristics of tinnitus and its subjective impact4-6, but the majority of these studies could not find a significant association between these characteristics. This may be due to differences in the methods used.
• The results of this study indicated that the perceived severity of tinnitus is determined by several factors. Besides the pitch and loudness of tinnitus, the presence of decreased sound tolerance has a clear impact on tinnitus severity.
• The maskability of tinnitus does not affect tinnitus severity, but can be useful to decide if a patient is a good candidate for masking therapy.

Conclusion

The results of this study indicate the importance of measuring tinnitus pitch and loudness, tinnitus maskability, and LDLs in combination with questionnaires to evaluate the subjective impact of tinnitus. The use of the THI can give more information about the subjective impact of both tinnitus and hyperacusis in tinnitus patients.

References