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Prevalence of tinnitus and/or hyperacusis in children and adolescents: A systematic review

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Objective

- To systematically review studies of the epidemiology of tinnitus and hyperacusis in children and young people in order to establish the reported prevalence estimates.
- To determine factors implicated in the variability of estimates, including those deriving from definitions.
- To investigate which methodological factors may determine differences in prevalence estimates (Nemholt et al, 2015).

Introduction

Tinnitus is a symptom defined as the experience of perceiving sounds without any known audible external sound (Henry et al, 2005). Hyperacusis is often present in association with tinnitus. There are currently no consensus on the definition of hyperacusis. Hyperacusis can be defined as an abnormal toleration to environmental sounds or excessive response to sounds that are neither threatening nor uncomfortable loud to a normal person. (Andersson et al., 2002; Baguley 2003)

The prevalence of tinnitus in children has been reported, and estimates range from 3% to 58%. Available research have a wide variability in the population studied, e.g. children with hearing loss, psychological conditions and children exposed to noise, compared with children where these conditions were not present.

There is some debate whether epidemiological data for the prevalence of childhood tinnitus is reliable. Whilst indications are that the prevalence is relatively high, referral numbers for children with tinnitus are reported to be low and many of the studies have a number of methodological difficulties.

Method

A systematic review according to the PRISMA-guidelines was performed including prevalence studies of tinnitus/hyperacusis in children and adolescents aged five to 19.

Using sensitive search terms (Table 1) we searched three databases (PubMed, Scopus and Embase).

Table 1: literature search matrix

<table>
<thead>
<tr>
<th>Tinnitus/Hyperacusis</th>
<th>A N D</th>
<th>Epidemiology</th>
<th>A N D</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinnitus OR</td>
<td>Epidemiology* OR</td>
<td>Infant OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperacus* OR</td>
<td>Prevalence OR</td>
<td>Child OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperacus OR</td>
<td>Morbidity OR</td>
<td>Children OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misophonia OR</td>
<td>Occurrence OR</td>
<td>Adolescent OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phonophobia OR</td>
<td>Incidence</td>
<td>Adolescence OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Young adult</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The PubMed search used the filters: “preschool child”, “child”, “adolescents” and “young adults” instead of the third category.

Exclusion criteria: case study, children under the age of five and over the age of 19, articles not published in English, German, Swedish, Norwegian or Danish.

Potentially relevant abstracts were evaluated by the two first authors. Any disagreement was discussed and consensus was reached.

Search results

Flow chart of identified and selected studies are presented in Figure 1.

Figure 1: Flow chart of identified and selected studies

Records identified through database searching (n = 1758)
PubMed (n=539) Scopus (n=678) Embase (n=541)

Additional records identified through other sources (n = 10)

Records after duplicates removed (n = 951)

Records screened (n = 951)

Records excluded (n = 622)

Full-text articles assessed for eligibility (n = 72)

Full-text articles excluded, with reasons (n = 33)

Studies included in qualitative synthesis (n = 39)

Preliminary results

Tabel 2 and Tabel 3 shows the preliminary results of the results list of the systematic review.

Tabel 2 Result list for tinnitus prevalence

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country</th>
<th>Methodology</th>
<th>Sample</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celik et al (2009)</td>
<td>2009</td>
<td>Turkey</td>
<td>Questionnaire</td>
<td>250</td>
<td>10%</td>
</tr>
<tr>
<td>Mills et al (1984a)</td>
<td>1984</td>
<td>USA</td>
<td>Questionnaire</td>
<td>403</td>
<td>56%</td>
</tr>
<tr>
<td>Mahboubi et.al (2013)</td>
<td>2013</td>
<td>Iran</td>
<td>Questionnaire</td>
<td>2213</td>
<td>18.3%</td>
</tr>
<tr>
<td>Ladalv et al (2013)</td>
<td>2013</td>
<td>Sweden</td>
<td>Questionnaire</td>
<td>3047</td>
<td>20.3%</td>
</tr>
<tr>
<td>Baguley et al (2005)</td>
<td>2005</td>
<td>Canada</td>
<td>Questionnaire</td>
<td>111</td>
<td>95%</td>
</tr>
</tbody>
</table>

Tabel 3 Result list for hyperacusis prevalence

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country</th>
<th>Methodology</th>
<th>Sample</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drukier (1989)</td>
<td>1989</td>
<td>USA</td>
<td>Questionnaire</td>
<td>494</td>
<td>5.1%</td>
</tr>
<tr>
<td>Bradley et al (1987)</td>
<td>1987</td>
<td>USA</td>
<td>Questionnaire</td>
<td>245</td>
<td>12.4%</td>
</tr>
<tr>
<td>Mills et al (1986a)</td>
<td>1986</td>
<td>USA</td>
<td>Questionnaire</td>
<td>156</td>
<td>11.5%</td>
</tr>
<tr>
<td>Mills et al (1986b)</td>
<td>1986</td>
<td>USA</td>
<td>Questionnaire</td>
<td>2084</td>
<td>13%</td>
</tr>
<tr>
<td>Mills et al (1984b)</td>
<td>1984</td>
<td>USA</td>
<td>Questionnaire</td>
<td>6166</td>
<td>43.24%</td>
</tr>
</tbody>
</table>

Reflections

Detailed analysis awaits, but some themes emerge from initial reflections and discussions:
• Marked variability in prevalence data, possibility due to definitions including duration and severity.
• Lack of clarity between prevalence and point prevalence.
• Many studies fail to report the otological/audiological status of the subjecys.
• Marked disparity between prevalence data and the only incidence data in the literature (Baguley et al, 2013)

References