Identification of teachers at risk for phonotrauma using ambulatory monitoring of speaking fundamental frequency

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Excessive mechanical stress
→ partially related to speaking fundamental frequency (f₀)
→ vocal folds tissue damage (i.e. phonotrauma)
→ risk factor for voice disorders in professional voice users

Study aim: to evaluate several individual factors to determine whether they can predict teachers’ speaking f₀ and help to identify those who are most at risk of phonotrauma.

Data acquisition

f₀ monitored in real-life situations during 1 workweek

f₀ extracted every 200 ms during 5 days/participant
Total: 431 days (4,479 h)

Autocorrelation algorithm.

Participants: 87 teachers without pathology

<table>
<thead>
<tr>
<th>Teaching level</th>
<th>Female</th>
<th>Male</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten (K)</td>
<td>21</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Elementary (E)</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Secondary (S)</td>
<td>20</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td>University (U)</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

Individual factors (questionnaire)
- Gender (66 females, 21 males)
- Age (mean = 40 ± 9.5 y.)
- Teaching experience (mean = 15.2 ± 8.5 y.)
- Teaching level
- Nonoccupational voice activity (20 yes; 67 no)
- Voice education (22 yes; 65 no)
- Past voice problems (29 yes; 58 no)
- Voice Handicap Index (mean = 11.6 ± 10.2)
- Tobacco consumption (10 yes; 77 no)
- Gastro-esophageal problems (15 yes; 72 no)

Results

Conclusion: Prevention and early detection should be offered primarily to individuals at risk of phonotrauma due to higher f₀, namely females, and specifically those teaching at the kindergarten and elementary levels. Self-assessment questionnaires such as the Voice Handicap Index could help to detect individuals with potentially harmful f₀ patterns. The lower f₀ of teachers who engage in nonprofessional voice activities may suggest acute inflammation or muscle fatigue due to voice overload.