The Effect of Insomnia on Tinnitus

George S. Miguel¹, D.O., Kathleen Yaremchuk¹,², M.D., Christopher Drake², Ph.D., Thomas Roth², Ph.D., Ed Peterson³, Ph.D.

¹Henry Ford Hospital Department of Otolaryngology, ²Henry Ford Hospital Department of Sleep Medicine, ³Henry Ford Hospital Department of Biostatistics

Detroit, Michigan

Abstract

Objective: This study aimed to better understand the relation of insomnia and tinnitus by using the validated Tinnitus Reaction Questionnaire (TRQ) and Insomnia Severity Index (ISI) scales.

Methods: This retrospective observational study was approved by the Henry Ford Hospital Institutional Review Board. Patients with tinnitus only and patients with tinnitus and insomnia treated at our institution from January 2009-December 2011 were identified. TRQ and ISI responses were obtained through written and telephone interviews. Data were analyzed by patient group. A Pearson product moment correlation coefficient was used to determine the relationship of insomnia and tinnitus. Additional analyses identified whether TRQ scores were associated with a possible benefit from an evaluation for insomnia in tinnitus patients.

Results: A total of 117 patients were studied. A significant association was found between ISI score and TRQ severity (r=0.64; p=0.002). Severity of TRQ was shown to be a good predictor of sleep disturbance and in predicting group association, especially the "emotional" subscore component (sensitivity 96.9% and specificity 55.3% for identifying tinnitus patients with insomnia). The greater the insomnia disability as exhibited by an elevated ISI score, the more severe the patient’s complaints regarding the tinnitus. Results suggest that if the emotional score on the TRQ is ≥15, the ISI is useful in identifying patients who may benefit from treatment of their insomnia.

Conclusions: The correlation between TRQ and ISI demonstrate that patients with insomnia have increased emotional distress associated with their tinnitus. Evaluation and treatment of tinnitus patients with insomnia may result in a reduction in tinnitus severity.

Introduction

Over 36 million patients are plagued with tinnitus. Research has shown a strong association between tinnitus and various psychological disturbances. Tinnitus may be associated with worsening anxiety, depression, irritability, and sleep disturbance. An epidemiological study found an association between sleep disturbance (i.e., insomnia) and a decreased capacity for dealing with stress from pain stimuli. It was concluded that a disturbance in sleep can cause an increase in psychological disturbances.

The effect of insomnia on tinnitus has been studied in the geriatric population by correlating chronic tinnitus with sleep disturbances of sleep initiation and maintenance. Folmer and Griest concluded that the findings underscored the importance of proper identification and successful treatment of patients with tinnitus and insomnia.

Validated questionnaires have not been used to evaluate the presence and effect of insomnia on the patient’s perception of tinnitus. We used the validated Tinnitus Reaction Questionnaire (TRQ) and Insomnia Severity Index (ISI) scales to measure the severity of these disorders in tinnitus patients with and without insomnia.

Methods

This retrospective observational study was approved by the Henry Ford Hospital Institutional Review Board. Patients with tinnitus only and patients with tinnitus and insomnia treated at our institution from January 2009-December 2011 were identified. TRQ and ISI responses were obtained through written and telephone interviews.

A Pearson product moment correlation coefficient between the tinnitus score and the insomnia scores was determined for the group as a whole and for the two groups separately. The 26 questionnaire items of the TRQ were categorized into three psychometric subscales of emotional, functional, and catastrophic.

The linear relation between the TRQ and ISI was evaluated using the Pearson correlation. The estimates and its significance of the correlations was calculated for ISI and the TRQ as well as for each of the three TRQ subscales. To determine if the relationship differed between tinnitus alone and tinnitus plus insomnia, the correlations were estimated for each group. The estimates were tested for significant differences using paired area under the receiver operating characteristic (ROC) curves.

Results

A total of 117 patients were included in the study (Table 1). The TRQ and ISI demonstrated a strong statistical significance with high correlations of 0.62. The same significance was present when comparing the ISI scores to the three psychometric subscales of the TRQ with a correlation for emotional of 0.59, functional of 0.58, and catastrophic of 0.58.

Discussion

Treating patients with tinnitus is challenging. A chronic tinnitus patient presents a multidimensional clinical picture consisting of anxiety, depression, annoyance, or self-reported emotional distress. Tyler and Baker found the most frequent self-reported complaint of tinnitus patients was “getting to sleep.”

Alster was the first to assess the relation of sleep disturbance to severity of tinnitus, reporting that those who sought sleep evaluation noted a decrease in their tinnitus complaint. However, few tinnitus suffers are evaluated for their insomnia.

This data supports previous studies’ conclusions that the degree of insomnia correlates with the perception of tinnitus severity. This study shows that use of the TRQ and ISI can identify tinnitus patients with insomnia who may benefit from insomnia treatment and thereby experience a reduction in their symptoms of tinnitus.

Tinnitus is a process involving cognitive, emotional, and psychological processes. Such factors increase distress in these patients, and studies are now showing that tinnitus sufferers show maladaptive behaviors when exposed to stress/pain stimuli. Thus, sleep complaint in these patients can be the consequence of a combined effect of a decrease in their tolerance to tinnitus.

Our study demonstrates that insomnia may worsen the severity of tinnitus. Future studies can refine the patient cohort to support the argument that insomnia may interfere with the stress response of tinnitus patients and that treating the insomnia will attenuate the severity of tinnitus.

Conclusions

The presence of insomnia in patients with tinnitus showed a statistically significant increase of the functional, emotional, and catastrophic psychometric subscales. The identification and treatment of patients with insomnia may result in a decrease in severity of tinnitus experienced by these patients. The use of the ISI will help to identify these patients. This is the first objective measurement of the impact of insomnia on subjective complaints of tinnitus.

TABLE 1: Group Effect

<table>
<thead>
<tr>
<th>Group</th>
<th>VAR</th>
<th>n</th>
<th>mean</th>
<th>SD</th>
<th>VAR</th>
<th>mean</th>
<th>SD</th>
<th>corr</th>
<th>p-val</th>
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</thead>
<tbody>
<tr>
<td>Tinnitus alone</td>
<td>1st</td>
<td>32</td>
<td>17.5</td>
<td>1.7</td>
<td>TRQ</td>
<td>71.6</td>
<td>20.3</td>
<td>0.64</td>
<td>0.001</td>
</tr>
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<td></td>
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<tr>
<td></td>
<td>cmt</td>
<td>26.6</td>
<td>9.0</td>
<td>0.52</td>
<td>0.002</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>func</td>
<td>26.1</td>
<td>9.4</td>
<td>0.52</td>
<td>0.002</td>
<td></td>
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<tr>
<td></td>
<td>cata</td>
<td>18.8</td>
<td>7.0</td>
<td>0.48</td>
<td>0.005</td>
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TABLE 2: Group Membership Prediction

<table>
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<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>p-val</th>
<th>Area</th>
<th>ROC</th>
<th>func</th>
<th>cata</th>
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<tbody>
<tr>
<td>ISI</td>
<td>1.13 (1.06, 1.18)</td>
<td>0.001</td>
<td>0.727</td>
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<td>TRQ</td>
<td>1.04 (1.02, 1.06)</td>
<td>0.001</td>
<td>0.786</td>
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<tr>
<td>emotional</td>
<td>1.12 (1.07, 1.18)</td>
<td>0.001</td>
<td>0.786</td>
<td>0.016</td>
<td>0.863</td>
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<tr>
<td>functional</td>
<td>1.07 (1.03, 1.11)</td>
<td>0.001</td>
<td>0.720</td>
<td>-</td>
<td>0.122</td>
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<tr>
<td>catastrophic</td>
<td>1.14 (1.08, 1.21)</td>
<td>0.001</td>
<td>0.786</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

ROC Curve for TRQ Factors

The presence of insomnia in patients with tinnitus showed a statistically significant increase of the functional, emotional, and catastrophic psychometric subscales. The identification and treatment of patients with insomnia may result in a decrease in severity of tinnitus experienced by these patients. The use of the ISI will help to identify these patients. This is the first objective measurement of the impact of insomnia on subjective complaints of tinnitus.

References