Effect of aging in snoring prevalence

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Objectives: To determine the effect of aging in snoring prevalence. Cross-sectional epidemiological study.

Methods: Three different districts of Denizli, Turkey were randomly chosen to constitute the study group. Demographic information (age, gender) and whether snoring was present (classified as “never”, “sometimes”, or “often” [4-5 days a week], and “everyday”), and information on any treatment they received for snoring was presented through a questionnaire. The questionnaire was applied to equal numbers of volunteers from each district. All respondents were interviewed at their homes.

Results: A total of 2959 questionnaires were evaluated. The prevalence of habitual snoring was found to be as follows: 3.6% in children between ages 0-6 (males: 5.3%, females: 2.0%), 3.9% between ages 7-12 (males: 3.8%, females: 4.1%), 2.9% between ages 13-18 (males: 5.0%, females: 0.6%) and 10% in adults (males: 27.1%, females: 7.4%). Even though snoring is encountered more often in males than females regardless of age, no statistical significance was found between sex in age groups 0-6 and 7-12. But snoring prevalence is statistically more frequent in males then females in age groups 13-18 and 18 above (for adolescent group p=0.02, p<0.05, for adults p=0.0001, p<0.05). Snoring statistically increases above 30 years in males and above 40 years in females.

Conclusion: Human being begins snoring at the first years of life and snoring prevalence increases along the life. Snoring prevalence significantly increases in third decade in men and in forth decade in women. Beginning from the adolescence snoring is significantly more frequent in men than women.

Key Words: Snoring, prevalence, epidemiology.
Introduction
Snoring is a vibratory sound produced during sleep which results from some degree of upper airway obstruction. Snoring is a symptom which can be seen in all age groups. Habitual snoring can be a manifestation of obstructive sleep apnea syndrome. On the other hand severe snoring may be a social problem among adults. For this reason every alternatives treatment modalities are to be applied by ENT surgeons are on due.

Even though snoring is a commonly seen disorder, data on snoring prevalence is limited. Data in the literature belongs to epidemiological studies that are done through different age groups and populations. In our study we aimed to evaluate the snoring prevalence between ages 0-70, and the change in prevalence by aging.

Materials and Methods
A cross-sectional epidemiological study was planned to determine the prevalence of snoring between ages of 0-70 (mean ages 31.5±17.1). Demographic information (age, gender), whether snoring was present (classified as “never”, “sometimes”, “often” [4-5 days a week], and “everyday”), and information on any treatment they received for snoring was asked through a questionnaire (appendix 1). Three different districts (upper, middle and lower socioeconomic classes) were chosen and equal numbers of volunteers were decided to be covered from each district. All respondents were interviewed at their homes. Information about children was taken from parents. 3000 persons were intended to be reached. In the process of evaluating, “sometimes” and “never” snorers were classified as non-snorers, and “often” and “everyday” snorers were classified as habitual snorers. Those who received treatment for snoring (one male) and who had undergone tonsillectomy (6 children) in age group 0-12, were excluded from the study. The results were evaluated by means of chi-square and p<0.05 was accepted to be significant. In order to calculate at which ages habitual snoring statistically increased, ages 0-5 was accepted as the reference and logistic regression analysis was done to calculate odds ratios (OR) and 95% confidence intervals.

Results
Poorly responded questionnaires were excluded from the study. During the statistical analysis, minors were divided into three age groups. 0-6, 7-12, and 13-18. The rational for this grouping is based on the evidence that the nasopharyngeal space is narrower between ages 0-6, an increment occurs between ages 7-12, and a slower increment happens until age 19. Eighteen and above were grouped as adults. At the end, 1394 female (0-6 ages n=101, 7-12 ages n=155, 13-18 ages n=197, adults n=1041), 1565 male (0-6 ages n=94, 7-12 ages n=131, 13-18 ages n=159, adults n=1565), a total of 2959 questionnaires were evaluated. Answers were summarized in Table 1. Snoring prevalence in four age groups are shown in Table 2. Habitual snoring is more frequent among adult population, than children and teenagers (p<0.05, p=0.0001). When age groups under 18 are compared, no statistical difference between groups were found (p>0.05, p=0.468). According to gender habitual snoring were statistically more frequent among male adults (p<0.05, p=0.0001). Considering children and teenagers no significance between genders were found in age groups 0-6 (p>0.05, p=0.194) and 7-12 (p>0.05, p=0.583), but in age group 13-18 as in adults (p<0.05, p=0.020). As all data were evaluated in age 5 year intervals, it was seen that habitual snoring increased with age (Figure 1). By means of regression analysis, a significant increment was detected after 30 years in males and after 40 years in females (Table 3).
Discussion

Snoring is a symptom that can appear at all ages. In previous studies, habitual snoring has been reported in 3.2-34.5% of children. Our results were 3.9% in ages 0-5 and 3.3% in ages 6-10 (Table 2). The most frequent cause of snoring in children is adenotonsillar hypertrophy. But in puberty nasopharyngeal passage enlarges, adenotonsillar tissue regresses and habitual snoring decreases. Conversely to the childhood, septal deviations, allergic rhinitis and obesity more frequently appear as causes of snoring in adolescent. Similarly previous studies, we found that snoring prevalence in puberty was lower than childhood (Table 2). Unlike ages 0-5 and 6-12, snoring was more prominent in males at adolescent (Table 2). The reason might be the arousal of morphologic differences between genders due to the increase in sex hormones after age 13.

It is well known that unlike children, snoring is more frequent among men in adulthood. For this reason, snoring prevalence in adults are usually reported separately for males and females in the literature. Lugaresi et al. reported that among adults, snoring prevalence was 40% in males and 28% in females. Ohayon et al. reported 47.7% and 33.6% respectively based on a telephone interview survey. On the other hand, Kayukawa et al. reported 16% in males and 6.5% in females. In an Istanbul-Turkey based study, snoring prevalence found to be 24.6% in males and %12.8 in females. Our results above 18 reveal 27.1% in males and 10% in females, which are in harmony with other results from Turkey (Table 1). Some hypotheses were proposed to explain this raised tendency of snoring in male. As a result of hormonal stimulation, the male develops more bulk to the muscles than a woman. The male pattern of the fat deposition does favor the neck as opposed to the thighs and hips women. The female hormones may impart a higher resting muscle tone.

Studies on snoring reveal a broad range of prevalence both in children and in adults. One of the main reasons for that is focusing on different

<p>| Table 1. Frequency of snoring in age groups and sex was shown. |
|---|---|---|---|---|
| Sex | Frequency of snoring | Age groups | total |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0-6</th>
<th>7-12</th>
<th>13-18</th>
<th>Older than 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Never</td>
<td>95</td>
<td>92</td>
<td>144</td>
<td>711</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>4</td>
<td>1</td>
<td>10</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Every day</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>Male</td>
<td>Never</td>
<td>84</td>
<td>116</td>
<td>133</td>
<td>569</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>5</td>
<td>10</td>
<td>18</td>
<td>292</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Every day</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>252</td>
</tr>
</tbody>
</table>

<p>| Table 2. Habitual snoring prevalence in age groups. |
|---|---|---|---|</p>
<table>
<thead>
<tr>
<th>Age groups</th>
<th>Male</th>
<th>Female</th>
<th>General population</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td>5.3%</td>
<td>2.0%</td>
<td>3.6%</td>
</tr>
<tr>
<td>7-12</td>
<td>3.8%</td>
<td>4.1%</td>
<td>3.9%</td>
</tr>
<tr>
<td>13-18*</td>
<td>5.0%</td>
<td>0.6%</td>
<td>2.9%</td>
</tr>
<tr>
<td>18-70*</td>
<td>27.1%</td>
<td>7.4%</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

*Snoring was statistically more frequent in male adolescents and men (adolescents (13-18 ages), p=0.020, p<0.005 and adults p=0.0001, p<0.005)

<p>| Table 3. Results of multivariate logistic regression analysis shows statistically snoring increments at 3rd decade in males, at 4rd decade in females. |
|---|---|---|</p>
<table>
<thead>
<tr>
<th>Ages</th>
<th>Female OR (95%) CI</th>
<th>Male OR (95%) CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6-10</td>
<td>2.13 (0.18-23.98)</td>
<td>0.40 (0.09-1.76)</td>
</tr>
<tr>
<td>11-15</td>
<td>3.30 (0.36-30.16)</td>
<td>1.01 (0.31-3.32)</td>
</tr>
<tr>
<td>16-20</td>
<td>1.10 (0.09-12.33)</td>
<td>0.53 (0.15-1.82)</td>
</tr>
<tr>
<td>21-25</td>
<td>0.92 (0.08-10.35)</td>
<td>1.29 (0.45-3.63)</td>
</tr>
<tr>
<td>26-30</td>
<td>1.61 (0.16-15.82)</td>
<td>1.84(0.65-5.20)</td>
</tr>
<tr>
<td>31-35</td>
<td>4.37 (0.51-37.07)</td>
<td>*3.35 (1.23-9.14)</td>
</tr>
<tr>
<td>36-40</td>
<td>7.21 (0.89-58.14)</td>
<td>6.76 (2.54-18.04)</td>
</tr>
<tr>
<td>41-45</td>
<td>*8.03 (1.02-62.97)</td>
<td>7.40 (2.74-19.91)</td>
</tr>
<tr>
<td>46-50</td>
<td>15.18 (1.98-116.23)</td>
<td>9.46 (3.57-25.09)</td>
</tr>
<tr>
<td>51-55</td>
<td>22.94 (2.9-177.22)</td>
<td>11.31 (4.25-30.10)</td>
</tr>
<tr>
<td>56-60</td>
<td>48.59 (6.11-386.37)</td>
<td>16.17 (5.88-44.46)</td>
</tr>
<tr>
<td>66-70</td>
<td>40.49 (5.00-327.47)</td>
<td>14.81 (5.07-43.29)</td>
</tr>
</tbody>
</table>

*0-5 age group was accepted as baseline.
age groups in each study. Another reason is the used questionnaires which are not standardized. While some researchers focused on the frequency of snoring, others focused on the severity of snoring. The most frequent definitions used for classifying snoring frequency is “never”, “sometimes”, “often” (several nights a week), and “everyday”. People who snore “often” and “everyday” are classified as “habitual snoring”. Some authors used the definitions never, rarely or occasionally, sometimes or often and most nights or very often and always. The term “habitual snoring” is a commonly used quantitative parameter for snoring in the literature. On the other side, only asking “Do you snore?” and not questioning the frequency inevitably may lead to a higher prevalence than presence. On the other side when comparing the snoring prevalence from different countries, international differences that can origin from risk factors for snoring (obesity, regular alcohol consumption, and smoking) and ethnic differences may not be ignored.

Snoring increases with ages as seen in our results (Figure 1). Similar results were reported in previous studies, too. As one gets older, the soft tissues in the throat tend to thicken, the palate elongates, and the muscle tone at rest decreases. At what age does snoring become statistically different? When we evaluated our study in 5 year age steps, habitual snoring significantly increased after 30 years in males, and after 40 years in females (Table 3). Also, weight gain, alcohol consumption and smoking are considered as other risk factors for snoring in adults.

**Conclusion**

Human being begins snoring at the first years of life and snoring prevalence increases by aging. Snoring prevalence significantly increases in third decade in men and in forth decade in women. Beginning from the adolescence snoring is significantly more frequent in men than women.
References


Conflict of interest statement:
No conflicts declared.

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Appendix 1. Questionnaire.

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age:</th>
<th>Sex:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you ever had your tonsils removed?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did you have any treatment for snoring?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Do you snore?
- Never
- Sometimes
- Often
- Every day