

# Gender Differences in the Prevalence of Vocal Symptoms in Smokers

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**Summary: Objectives.** The purpose of the present study was to explore possible gender differences in the occurrence of vocal symptoms in smokers.

**Methods.** A total of 1728 respondents, 68% women and 32% men completed a “Speech, language and voice” questionnaire. The questions concerning six vocal symptoms along with questions concerning smoking habits were used as the main data source for the present study.

**Results.** About 24% of the men and 22% of the women were smokers. Male smokers did not differ from male nonsmokers in reporting vocal symptoms. In contrast, female smokers were more likely than female nonsmokers to report having vocal symptoms. Smoking seemed to have a significant effect on four of the six vocal symptoms in the female smokers.

**Conclusions.** There appears to be a difference in the effects of smoking between men and women. The female vocal folds may be more vulnerable to cigarette smoke, probably due to anatomical and physiological differences. Nevertheless, it is yet to be demonstrated that the vocal symptoms in female smokers are causally related to smoking. It could be meaningful to use gender specific strategies when informing smokers about the risks for voice problems.

**Key Words:** Vocal symptoms—Smoking—Gender differences.

## INTRODUCTION

Smoking has generally been seen as a primary cause for voice disorders. It is well documented that smoking adversely affects the epithelium of the vocal folds<sup>1–5</sup> and causes several kinds of lesions in the airways (for a review, see Dye and Adler).<sup>6</sup> It is also a central factor in the etiology of laryngeal cancer<sup>7</sup> and Reinke’s edema.<sup>8,9</sup> Smoking causes increased irregularity in the vibration of the vocal folds in otherwise healthy persons.<sup>1,2,10–12</sup> The results of several studies show that smoking strongly affects fundamental frequency (F0) with lowered values in smokers.<sup>2,11–15</sup>

Awan and Morrow<sup>1</sup> studied young female smokers and nonsmokers and the results showed that the smokers had edema and erythema on their vocal folds even if they probably had been smoking a relatively short time since their mean age was about 20 years. These female smokers also had significantly more abnormal laryngeal color and an increased glottal gap size compared with the nonsmokers. The results of a study by Awan and Alphonso<sup>16</sup> showed that young female smokers also had reduced vital capacity and lowered maximum phonation time compared with nonsmokers. These results indicate that smoking even for a short time might have a negative effect on the voice.

In general, women seem to have more voice problems than men.<sup>17–20</sup> Some studies have explored possible differences in the voices of female and male smokers. Sorensen and Horii<sup>15</sup> studied changes in F0 in 40 smokers and 40 nonsmokers, mean age 35–40 years. When making comparisons between the female and male participants, the results showed that F0 was significantly lower in male smokers compared with non-

smokers, although there was no significant difference between female smokers and nonsmokers. Gonzales and Carpi<sup>11</sup> compared the voices of 91 smokers and 68 nonsmokers, mean age about 22 years. The results of their study showed that F0 parameters were affected by smoking, especially in women, with lower values for smokers compared to nonsmokers. The difference was significant for women but not for men.<sup>11</sup> The diverse results from the two studies might be due to methodological differences and differences in the age of the participants. Also, the groups were quite small in both studies, which may have increased the likelihood of chance effects.

Although the detrimental effects of smoking on voice are well known, it still is common. The results of several studies show that also persons working in voice demanding occupations are reported to smoke.<sup>20–24</sup> Smoking seems to be usual also in those studying for such occupations.<sup>19,25–27</sup> The results of some studies show that smokers do not perceive voice changes<sup>1,10</sup> and that there does not seem to be any correlation between frequency of vocal symptoms and smoking.<sup>28,29</sup> In three studies involving large population groups, smokers have even reported less voice problems than nonsmokers.<sup>20,29,30</sup> The results of these studies seem to indicate that smokers do not experience vocal symptoms or that they understate them.

The purpose of the present study was to explore possible gender differences in the occurrence of vocal symptoms in smokers.

## METHODS

### Participants

A total of 1728 twins, 68% women and 32% men, born between 1961 and 1989, completed a “Speech, language and voice” questionnaire. The participants, 254 twin pairs and 1220 single twins, were part of a twin cohort including twins born between 1961 and 1989 contacted for an unrelated study on sexual behavior followed by a questionnaire on voice.<sup>31</sup> The questionnaire from which the measures analyzed in the present study derive was

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**TABLE 1.**  
**Number of Frequently Occurring Vocal Symptoms**  
**Occurring During the Past Year in Male Smokers and**  
**Nonsmokers (n = 479)**

Smoking habits	No symptoms		One symptom		Two symptoms or more	
	n	%	n	%	n	%
Regular smokers	88	77.2	9	7.9	17	14.9
Nonsmokers	257	70.4	60	16.4	48	13.2

originally designed for a study on genetics and voice,<sup>32</sup> mainly by the first author of the present study. The questionnaires for both the unrelated study and the study on genetics and voice were distributed by the Centre of Excellence for Behavior Genetics at Åbo Akademi University. The questionnaire was self-explanatory and it is possible that the term occasional smoker could have been understood in various ways. Therefore, the results for only regular smokers (n = 334) and nonsmokers (n = 1168) will be reported here.

### Questionnaire

In all, the questionnaire consisted of 60 questions concerning speech, language, and voice. The questionnaire also included health-related question and questions about occupation. The questions concerning vocal symptoms along with questions concerning smoking habits were used as the main data source for the present study. The six vocal symptoms presented were *The voice get strained or tires*, *The voice gets low or hoarse*, *Throat clearing or coughing while talking*, *Voice breaks while talking*, *A sensation of tension or lump in throat*, and *Difficulty in being heard*. These questions have been used in several earlier studies on various populations.<sup>19,32–35</sup> The participants were requested to report how frequently they had experienced each symptom during the past year by selecting one of the four alternatives: daily, weekly, more seldom, and never. The participants were requested to answer if they smoked and if so, how frequently they did that. The alternatives for responding were regular smoker, occasional smoker, or nonsmoker.

### Data analyses

The number of frequently occurring symptoms in male and female smokers and nonsmokers was explored. Frequently occurring symptoms were defined as symptoms experienced every week or every day during the past year. The reports of the number of frequently occurring vocal symptoms in smokers and nonsmokers and the individual symptoms during the past year and possible gender differences were calculated.

Male smokers and nonsmokers were compared regarding prevalence of vocal symptoms. The same comparisons were performed on the female participants. IBM SPSS Statistics 20 (Armonk, NY) was used for the statistical analyses. Since the data were on a nominal level, the nonparametric Chi-square test was chosen. The significance level was set to  $P < 0.05$ .

### RESULTS

In this study, 23.8% of the men and 21.5% of the women were smokers. The difference in smoking habits between men and women was not significant. This is in line with the smoking habits in Finland according to a large population-based survey study. In 2006, when the data for the present study were gathered, 24% of men and 19% of women in Finland were smokers.<sup>36</sup>

Next, we analyzed the possible effects of smoking on vocal symptoms separately for the male and female participants. The results showed no significant differences in the number of frequently occurring symptoms in the different smoking groups among the male participants (Table 1). Additionally, the smoking habits did not seem to have significant effects on any of the individual vocal symptoms occurring during the past year among the male participants (Table 2).

Women who smoked reported significantly more frequently occurring symptoms during the past year than female nonsmokers (Table 3). As to the individual symptoms, there were significant differences among the female smokers and nonsmokers with the smokers reporting more of the symptoms *The voice becomes low or hoarse*, *The voice gets strained or tires*, *Voice breaks while talking*, and *Throat clearing or coughing while talking* (Table 4). For the other two symptoms, the differences were not significant.

**TABLE 2.**  
**The Occurrence of Individual Vocal Symptoms (%) During the Past Year in Male Smokers and Nonsmokers (n = 477–479)**

Vocal symptoms	Regular smoker	Nonsmoker	$\chi^2$	P
The voice gets strained or tires	2.6	4.7	0.89	n.s.
The voice gets low or hoarse	7.9	5.8	0.68	n.s.
Voice breaks while talking	2.6	5.0	1.12	n.s.
Difficulty in being heard	8.0	9.1	0.13	n.s.
Throat clearing or coughing while talking	18.4	22.2	0.74	n.s.
A sensation of muscle tension or lump in the throat	9.6	9.6	0.00	n.s.

Note. n.s.= not significant.

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