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ETIOLOGY OF DYSPHONIA ACCORDING TO AGE, GENDER AND SEASONS

Mehmet Emre SİVRİCE [a*], Hasan YASAN [a], Mustafa TUZ [a], Erdogan OKUR [a]

Yusuf Cagdas KUMBUL [a], Fatma ERCAN [a]

[a] *Department of Oto-Rhino-Laryngology and Head&Neck Surgery, Faculty of Medicine, S.Demirel University, Isparta, Turkey*

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*Correspondence: Mehmet Emre SİVRİCE,
Department of Oto-Rhino-Laryngology and Head&Neck Surgery, Faculty of Medicine, S.Demirel University, Isparta, Turkey
e- mail: emresivrice@gmail.com

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ABSTRACT

Introduction: Children and adults can both be affected by dysphonia, but patients of different ages have different etiologies. Etiology can also change according to gender and season. We investigated patients who had dysphonia as the primary symptom at our clinic and aimed to determine their etiologies, differences between genders and seasons, and related symptoms.

Materials and Method: This retrospective analysis was conducted at our tertiary hospital between January 2019 and December 2019. Patients with dysphonia were evaluated to determine the underlying diseases, differences between genders and seasons, associated symptoms, and effect of smoking.

Results: In this study, 1160 patients with a mean age of 47.97 years were included; of these, 650 were male and 510 were female. The most common cause of dysphonia was reflux laryngitis, affecting 208 patients (17.9%). The most common season for dysphonia was autumn, accounting for 416 patients (35.9%). During autumn and winter, reflux laryngitis was predominant. During spring and summer, vocal nodules were predominant. In addition, 98.3% of patients with laryngeal malignancy had a history of smoking, and 97.93% of patients with Reinke's edema were smokers.

Conclusion: Men are more prone to have dysphonia throughout their lifetime. Seasons have preponderance on the etiology of dysphonia in our country. Reflux laryngitis is commonly seen during autumn and winter, and vocal nodules are frequent in spring and summer.

1. Introduction

Dysphonia is one of the most common symptoms encountered by family physicians, pediatricians, and otolaryngologists. Previous studies reported that 1.7%–10% of the general population presents with dysphonia; children and adults can both be affected. However, patients of different ages have different etiologies. To better understand the etiologies and symptoms associated with dysphonia, epidemiological information is essential (1-4).

Indeed, despite the fact that the literature contains numerous publications with epidemiological information on voice disorders, few studies have analyzed adults, children, and elderly patients with dysphonia together. The aims of this study were as follows: 1) to determine the overall prevalence of dysphonia in a period of 1 year, 2) to assess the prevalence of specific causes of dysphonia, 3) to evaluate the associations between dysphonia diagnoses and age, gender, and seasons, and 4) to evaluate symptoms associated with dysphonia.

2. Materials and Method

This retrospective analysis was conducted at our tertiary hospital between January 2019 and December 2019. A total of 1160 outpatients with dysphonia who visited our clinic for the first time were evaluated to determine the underlying disease. Patients were examined using videolaryngoscopy to diagnose the underlying diseases with a rigid telescope fixed at 70° or nasofibroscopy. The laryngoscopic examinations

were recorded, and diagnosis was made by the two authors. We analyzed the patients according to the following parameters: laryngeal disease, season, age, gender, vocal overuse, and smoking. The study protocol was approved by the local ethics committee of our university and informed consent was obtained from the patients. The most relevant diagnosis was considered for each patient. The diagnosis of some patients was confirmed by pathology reports. The SPSS version 21 program was used to evaluate patients' data. The results were presented in tables.

3. Results

In this study, 1160 patients with a mean age of 47.97 years were included; 650 patients were male and 510 were female. Gender and age groups are shown in Table 1. In patients aged between 1 and 9 years, 36 (64.3%) were male and 20 (35.7%) were female. In patients aged between 10 and 18 years, 12 (46.2%) of them were male and 14 (53.8%) were female. Among adults, the 40–59 age group was the most frequent group, with 460 patients; of the 460 patients, 232 (52.5%) were male and 210 (47.5%) were female.

Table1. Gender and Age groups

Age group	Male (%)	Female (%)	Total (%)
1-9 years	36 (64.3)	20 (35.7)	56 (100)
10-18 years	12 (46.2)	14 (53.8)	26 (100)
19-39 years	116 (42)	160 (58)	276 (100)
40-59 years	232 (52.5)	210 (47.5)	442 (100)
>60	254 (70.6)	106 (29.4)	360 (100)
Total	650	510	1160 (100)

In patients aged between 1 and 9 years, the most common etiologies were reflux laryngitis (28.6%) and vocal nodules (28.6%). The other common causes were acute laryngitis (14.3%) and laryngomalacia (14.3%).

In patients aged between 10 and 18 years, the most common etiologies were functional dysphonia except puberphonia (23.1%), vocal nodules (23.1%), and acute laryngitis (23.1%). Puberphonia (15.4%) was the second most common etiology.

In the 19–39 age group, the most common etiology was vocal nodules (16.7%). The other common causes were reflux laryngitis (15.9%), sinonasal pathologies (15.9%), and acute laryngitis (13%).

Table 2. Etiology in Genders

Diagnoses	Male	Female	Total (%)
Functional	66	40	106 (9.1)
Vocal nodules	86	90	176 (15.2)
Vocal Polyp	50	22	72 (6.2)
Reflux laryngitis	110	98	208 (17.9)
Reinke's edema	22	26	48 (4.1)
Bilateral Paralysis	20	20	40 (3.4)
Right Paralysis	30	46	76 (6.6)
Left Paralysis	28	26	54 (4.7)
Presbyphonia	24	10	34 (2.9)
Vocal sulcus	8	2	10 (0.9)
Dysplasia	42	6	48 (4.1)
Acute laryngitis	42	48	90 (7.8)
Non spesific-Chronic laryngitis	18	2	20 (1.7)
Laryngeal Malig-nancy	56	4	60 (5.2)
Granuloma	12	0	12 (1)
Puberphonia	4	0	4 (0.3)
Sinonasal patologies	16	58	74 (6.4)
Laryngomalacia	10	0	10 (0.9)
Laryngeal tubercu-losis	2	0	2 (0.2)
Papillomatosis	4	0	4 (0.3)
Vocal Cyst	0	10	10 (0.9)
Neurogenic tumors	0	2	2 (0.2)
Total	650	510	1160 (100)

In the 40–59 age group, the most common etiologies were vocal nodules (18.1%) and reflux laryngitis (18.1%). The other common cause was vocal cord paralysis. Right cord paralysis, left cord paralysis, and bilateral paralysis accounted for 10%, 5%, and 2.3% of cases, respectively.

Among patients aged >60 years, the most common etiology was reflux laryngitis (18.9%), followed by presbyphonia (11.1%) and laryngeal malignancies (11.1%).

Etiology according to gender is shown in Table 2. The most common cause was reflux laryngitis, accounting

for 208 (17.9%) patients; of these patients, 110 were male and 98 were female. The other common causes were vocal nodules, which accounted for 176 (15.2%) patients (86 were male and 90 were female), followed by functional dysphonia, which accounted for 106 (9.1%) patients (66 were male and 40 were female).

In Table 3, the number of patients according to season is summarized. Dysphonia was most common during autumn, accounting for 416 (35.9%) patients.

Table 3. Number of patients according to season

Season	Number of patients	Percent (%)
Autumn	416	35.9
Winter	208	17.9
Spring	258	22.2
Summer	278	24.0
Total	1160	100

Etiology according to season is shown in Table 4. During autumn and winter, reflux laryngitis predominated. During spring and summer, vocal nodules predominated.

Additionally, 98.3% of patients with laryngeal malignancy had a history of smoking. Among the male patients, 97.6% had a history of smoking, but among the female patients, six were nonsmokers. However, five of these six patients had a history of passive smoking. Additionally, 97.93% of patients with Reinke's edema were smokers. Smoking was not correlated with other diseases.

Vocal overuse was associated with vocal nodules at a rate of 96.5% and was not correlated with other diseases.

Table 4. Etiology in seasons. (*Seasonal difference were evaluated according to the beginning of dysphonia complaint, not to the admission of patient*

Diagnoses	Autumn (%)	Winter (%)	Spring (%)	Summer (%)
Functional	48 (11.5)	18 (8.7)	10 (3.9)	30 (10.8)
Vocal nodules	54 (13)	28 (13.5)	50 (19.4)	44 (15.8)
Vocal Polyp	24 (5.8)	6 (2.9)	14 (5.4)	28 (10.1)
Reflux laryngitis	72 (17.3)	50 (24)	48 (18.6)	38 (13.7)
Reinke's edema	18 (4.3)	4 (1.9)	8 (3.1)	18 (6.5)
Bilateral Paralysis	10 (2.4)	10 (4.8)	8 (3.1)	12 (4.3)
Right Paralysis	38 (9.1)	10 (4.8)	16 (6.2)	12 (4.3)
Left Paralysis	12 (2.9)	18 (8.7)	18 (7)	6 (2.2)
Presbyphonia	12 (2.9)	10 (4.8)	6 (2.3)	6 (2.2)
Vocal sulcus	4 (1)	2 (1)	4 (1.6)	0 (0)
Dysplasia	8 (3.8)	6 (2.9)	16 (6.2)	10 (3.6)
Acute laryngitis	56 (13.5)	4 (1.9)	10 (3.9)	20 (7.2)
Sinonasal patologies	4 (1)	10 (4.8)	4 (1.6)	2 (0.7)
Laryngeal malignancy	24 (5.8)	6 (2.9)	16 (6.2)	14 (5)
Granuloma	4 (1)	2 (1)	4 (1.6)	2 (0.7)
Puberphonia	0 (0)	0 (0)	2 (0.8)	2 (0.7)
Upper airway infections	12 (2.9)	16 (7.7)	20 (7.8)	26 (9.4)
Laryngomalacia	4 (1)	2 (1)	0 (0)	4 (1.4)
Laryngeal tuberculosis	2 (0.5)	0 (0)	0 (0)	0 (0)
Papillomatosis	0 (0)	2 (1)	0 (0)	2 (0.7)
Vocal Cyst	2 (0.5)	4 (1.9)	2 (0.8)	2 (0.7)
Neurogenic tumors	0 (0)	0 (0)	2 (0.8)	0 (0)
Total	416 (100)	208 (100)	258 (100)	278 (100)

4. Discussion

Dysphonia is a common symptom in hospital admissions. Dysphonia affects nearly one-third of the population throughout their lifetime and can affect all age groups.

Cohen et al indicated that in general, acute laryngitis, nonspecific causes of dysphonia, benign vocal fold lesions, and chronic laryngitis were the most common

dysphonia diagnoses (5). Keyvan et al determined that vocal nodules and Reinke's edema were among the most common causes of organic dysphonia (6). We found that in general, reflux laryngitis is the most common diagnosis.

Cohen et al reported that males had a higher prevalence in the 1–9 years age group and females had a higher prevalence starting from puberty and persisting until over 70 years (5). In our study, male gender was found to be predominant in children aged 1–9years, which is in agreement with the findings of previous studies (1-3, 7). In children aged 10–18 years, both genders have almost the same results. Adult patients in the 40–59 years age group is the most frequent group, accounting for 460 patients; of these patients, 232 (52.5%) were male and 210 (47.5%) were female. The second most frequent age group was those aged >60 years, and male gender predominated (70.6%) in this group. Our results are different from those reported by Martins et al and Roy et al (7, 8). These dissimilar results originate from the fact that the mentioned studies were performed in different countries and communities. In our opinion, epidemiological studies should be conducted in multiple countries and communities to better understand the etiologies and related symptoms of dysphonia. It should also be considered that Martins et al evaluated 2019 patients over a period of 10 years, but we evaluated 1160 patients in 1 year, which may have led to the observed differences.

Both laryngopharyngeal and gastroesophageal reflux can be responsible for reflux laryngitis. Complications of the stomach and esophagus can be the reason for food and acid reflux through the pharynx and larynx. Sleeping with a full stomach is the most significant contributing factor of this condition. Human vocal folds are sensitive against stomach acid, and acid reflux chemically irritates the tissues and causes damage to the vocal folds. Furthermore, damage to the vocal folds creates distortion in sound quality. We diagnosed all the patients according to hyperemia and pachydermia findings in the interarytenoid region, which are prominent findings, using laryngoscopy. We observed that in the 1–9, 40–59, and >60 years age groups, reflux laryngitis was the most common etiology. Considering the gender, the most common cause was reflux laryngitis, which accounted for 208 (17.9%) patients, of which 110 were male and 98 were female. We conclude that both genders are equally affected. Martins et al found that reflux laryngitis accounted for 9.96% in both genders, and 80 were male and 121 were female. In their study, reflux laryngitis was not the most common etiology in any age group. Notably, Kiakojoury et al identified reflux laryngitis in only 1 of 191 patients (6-7). This can be explained by the eating and sleeping habits of the people from our country. In terms of seasons, reflux laryngitis was predominant during autumn and winter; therefore, we think that short daytime during these seasons is the reason why people sleep with a full stomach. In our country, sleeping with a full stomach is a very common habit, and we have to instruct or enlighten patients to change this habit.

Vocal overuse and high-intensity speaking with effort are common factors that cause vocal nodules. These factors are common in children and in some occupations. Adduction of the vocal folds has a considerable impact and may cause trauma. For this reason, edema, microvascular injuries, and mucosal thickness appear, and resulting in nodule formation (9). We observed that in the 1–9 years (equal with reflux laryngitis), 10–18 years(equal with functional dysphonia except puberphonia and acute laryngitis), 19–39 years, and 40–59 years age groups (equal with reflux laryngitis), vocal nodules were the most common etiology. According to gender, vocal nodules

were the second most common etiology, accounting for 86 male and 90 female. Vocal nodules predominated during spring and summer. Martins et al found that vocal nodules predominated in patients aged 1–18 years and in females (7). In a 2008 study by Lopez et al, 579 teachers were selected as patients, and 326 were selected as the control group. The second most common cause of dysphonia was vocal nodules, accounting for 14%, and it was higher in women than in men (10). According to a study by Silverman, 6%–23% of school-age children with dysphonia due to vocal nodules were reported in most cases (11). Our findings were similar with those of the abovementioned study, but in adult groups, we observed vocal nodules at a higher rate. Furthermore, we observed no differences between the genders. This can be explained by the fact that vocal overuse is more common in our country at all ages. We also found that no difference in vocal overuse between males and females.

In 2017, Benninger et al reported acute laryngitis was the most frequent diagnosis in patients with dysphonia. According to our results, acute laryngitis was the third most common etiology in the 1–9 years, 10–18 years, and 19–38 years age groups. Martins et al found that acute laryngitis in the 1–18 years age group was the third most common etiology, which is similar to our results. Benninger et al used the Commercial and Medicare MarketScan databases to investigate the etiology of dysphonia (4, 7). Our study was performed at a tertiary hospital, which might be a reason why acute laryngitis was less common in our study than in Benninger et al's study.

We found a high incidence rate of laryngomalacia (14.3%), but we concluded that this might be a result of the fact that this study was performed at a tertiary hospital and a lot of children consulted our clinic from pediatric department.

This study has some limitations. First, this study was performed at a tertiary hospital, so it may not reflect all hospital references. Second, this was a retrospective study, and there may be some nuances during recording and during follow-up periods.

5. Conclusion:

Dysphonia is one of the most common symptoms encountered by family physicians, pediatricians, and otolaryngologists. To better understand the etiologies and related symptoms of dysphonia, epidemiological information is vital, and epidemiological studies should be conducted in different countries and communities.

In our study males are more prone to have dysphonia throughout their lifetime. Seasons have preponderance on the etiology of dysphonia in our country. Reflux laryngitis is most commonly occurs during autumn and winter, and vocal nodules are frequent during spring and summer.

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