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ENVIRONMENTAL FACTORS ASSOCIATED WITH DYSPHONIA IN PROFESSIONAL VOICE USERS

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Abstract

Gastro-Esophageal Reflux Disease (GERD) seems to be frequently associated with laryngeal lesions and the occurrence of disphonia. The aim of the study was to evaluate the environmental factors associated with dysphonia in professional voice users. We prospective studied 50 intense voice users' subjects (actors, singers, teachers, priests) with dysphonia in order to identify the environmental factors which may be involved in the alteration of voice. We demonstrated the importance of the risk factors (environmental and biologic factors) in the occurrence of dysphonia.

Key words: dysphonia, environmental factors, gastro esophageal reflux, intense voice users

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1. Introduction

Data on the Gastro-Esophageal Reflux Disease (GERD) implication in the genesis of the laryngeal lesions and the occurrence of disphonia are extensively presented in the recent medical literature. Approximately 4-10% of patients with Ear, Nose and Throat (ENT) diseases may have symptoms induced by reflux (Ahmed et al., 2006). GERD is widely spread in the general population. As much as 15-20% of the population may present at least once a week symptoms evoking gastro-esophageal reflux (Stanciu et al., 2001). Among the patients with laryngitis and dysphonia, symptoms of reflux are extremely frequent. Thus, 73% of those patients may show symptoms of GERD and 50% may have pathologic pH measurements (Cobzeanu et al., 2012; Drug et al., 2005). That represents a much higher incidence of reflux symptoms than in the general population. Additionally, a recent study made in patients with GERD indicated a prevalence of symptoms suggesting concomitant laryngeal diseases in 10.4% of cases (5). Moreover, evidence in favor of the implication of GERD in the appearance of laryngitis at certain patients is also proved by therapeutic trial, that is, an improvement in the ENT condition after administration of proton pump inhibitors (Sataloff et al., 2010).

The treatment of reflux in those patients also improves the objective parameters of the voice (Sataloff et al., 2010). A particular aspect is represented by voice alteration in patients with professions requiring high vocal strain, such as, actors, priests and even professional singers (Voineag et al., 2011).

The purpose of the present paper is to evaluate factors predisposing to Gastro-Esophageal Reflux Disease (GERD) associated to occupational laryngeal lesions and the occurrence of disphonia in a group of professional voice users.

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2. Relevance of behavioral and environmental factors in the prevalence of professional voice disorders

Some risk factors are determining, conditioning and influencing the laryngeal modifications induced by GERD (Cobzeanu, 2012; Roy et al., 2005).

Genetic factors

Genetic involvement may exist in the development of GERD, exerting influence beyond of any familial environmental factors (Mohammed et al., 2003).

Behavioral factors

Some behavioral factors are demonstrated to be trigger for the gastro esophageal reflux. Usually three factors could be identified: smoking, alcohol intake and coffee consumption (Cobzeanu et al., 2012; Dent, 2004).

Environmental factors

Atmospheric temperature, humidity or inhaled substances may be involved in laryngeal symptoms associated with GERD (El-Serag et al., 2008). There were also studies about the concomitance between consumption of trigger foods (onions, citrus fruits, chocolate, spices) and GERD (Cobzeanu et al., 2012; Terry et al., 2000). Increased use of anticholinergic nitrates, oral steroids, contraceptives drugs is associated with higher prevalence of GER and dysphonia (EL- Serag et al., 2008).

The diagnosis of laryngopharingeal reflux (LPR) (the extra esophageal variant of GERD) may be made by any combination of history, physical examination and 24-hour pH probe testing (Koufman et al., 2000). The LPR treatment can include combinations of behavioral change, pharmacotherapy based on selected medications, and surgery. Moreover, weight reduction, avoidance of fats in food, of caffeine and increasing of the head of the bed are considered in behavior adjustment.

Persons with GERD and LPR usually respond well to medications that reduce the acid content of the refluxed materials (H2-blockers/proton pump inhibitors). They do not, however, respond well to traditional anti-reflux therapy.

3. Material and methods

A number of 50 subjects (age 43 +/- 11.5, 26 males – 52% and 24 females - 48%) professional voice users (teachers, actors, singers, priests) with disphonia were prospectively included between 1st January 2012 -1st October 2012 based on referral to ENT Department of University Hospital "St. Spiridon" from the general practitioner (GP) doctor.

A standardized questionnaire was delivered in order to reveal the presence of other ENT symptoms and also of gastro esophageal reflux and respiratory symptoms. The predisposing factors which may influence the appearance of dysphonia, vocal abuse during physical exercise, the presence of environmental and individual factors associated with gastro esophageal reflux were also investigated in the questionnaire.

Including criteria in the study were the following:

- vocal professionals (teachers, actors, singers, priests);
- dysphonia for at least 3 months (chronic dysphonia);
- absence of laryngeal benign or malignant tumors;
- no pharmaceutical treatment that could alter the esophageal motor function or the acid secretion (anticholinergic, sedatives, prostaglandins, calcium channel blockers, potassium, antibiotics, non-steroid anti-inflammatory drugs (NSAIDs).

Patients with the following criteria were excluded:

- upper airways infections during the last month (before being included in the research study);
- prior history of anti-reflux surgery.

All patients were examined by an ENT surgeon and included a laryngoscope examination.

In order to check the relevance of our study we used data specific parametric and non-parametric tests. We used SPSS software for statistical analysis. Data are presented as Mean +-SD and percentage. We used multivariate analysis ANOVA to investigate multiple correlations.

4. Results and discussions

The study included 50 cases (10 actors, 40 singers, 10 teachers and 10 priests (Fig. 1) with demographic data presented in Figs. 2 and 3.

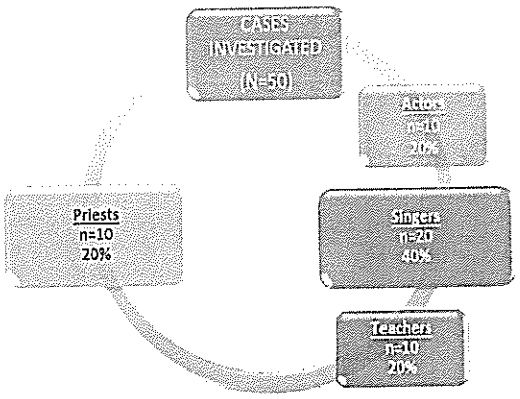

Fig. 1. Type of professional voice users

Patient's ENT, digestive and respiratory symptomatology is presented in Table 1 and Fig 4. Patients included in the study presented more often heartburn (70%) or regurgitation (24%) suggesting that GERD is more often present in patients with dysphonia than in the general population.

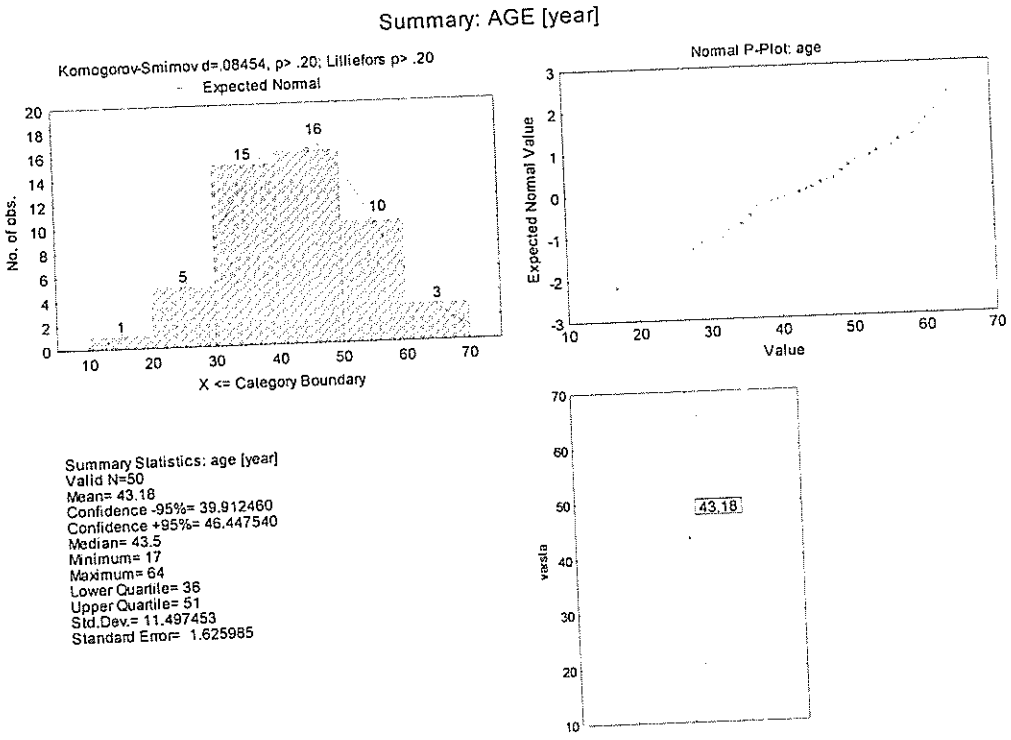

Fig. 2. Distribution of age

Table 1. Distribution of cases according to symptoms

	Symptoms	*Number of cases*	*%*
GERD	Heartburn	35	70%
	Regurgitation	12	24%
ENT Symptoms	Globus Histericus	12	24%
	Foreign body sensation	15	30%
	Hoarseness	50	100%
	Fonasteny	17	34%
RESPIRATORY Symptoms	Irritating cough	45	90%
	Total cases	50	

Also, almost all (90%) of patients with dysphonia had respiratory symptoms (irritating cough).

Our results are consistent with recent data, however showing a higher association between dysphonia, GERD and respiratory symptoms. As shown in Fig. 4, between 90% and 100% of the patients with gastro esophageal reflux have symptoms like hoarseness and irritating cough, while only 4 % of the case has regurgitation as a symptom.

Results on the laryngoscopy examination are presented Fig 5. Congestion of vocal cords and edema of posterior commissure was the most prevalent lesion (66%). Reincke edema (16%), leukoplakia (8%) interarytenoid pachydermy (6%) and granuloma (4%) was often frequent present.

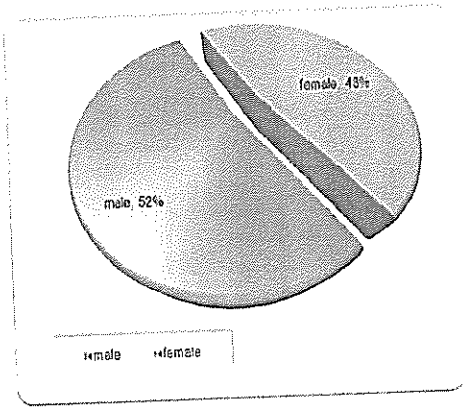

Fig. 3. Distribution of gender

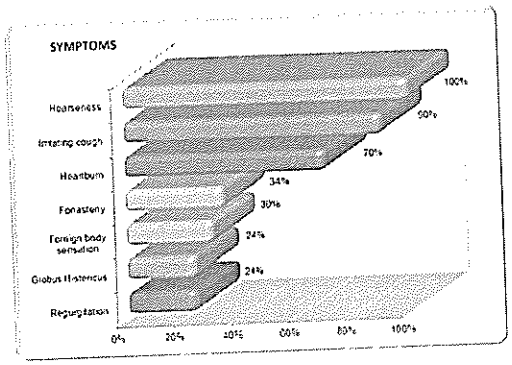

Fig. 4. Distribution of cases according to symptoms

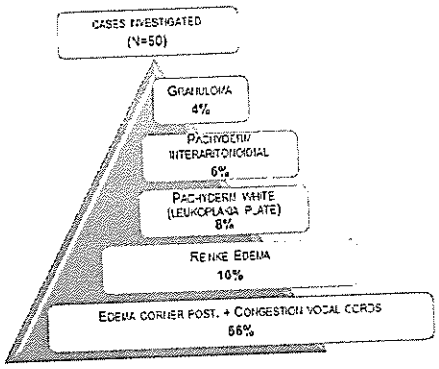

Fig. 5. Laryngeal lesions

Age may influence the type of laryngeal lesions present in these patients according to data presented in Fig. 6. However no statistical difference was evident between the mean ages for each laryngeal lesion.

Tables 2-4 generate a pattern which could determine the influence of different co-variables (predictive factors) in the appearance of the laryngeal lesions responsible for causing disphonia in professional voice users. In order to achieve this, 6 factors were included in the study (smoking, alcohol, age, coffee, gender, spices).

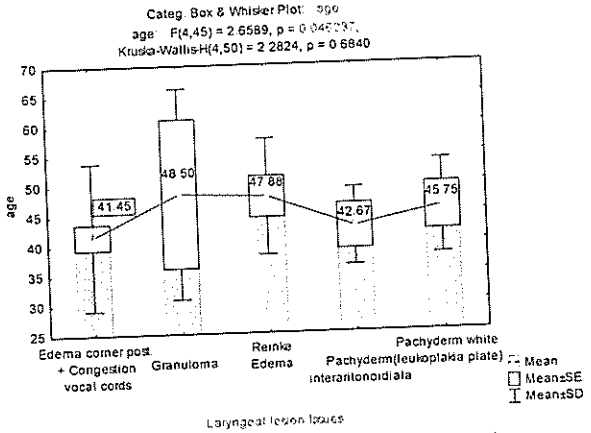

Fig. 6. Distribution of cases based on Laryngeal lesions

Table 2. Partial correlation coefficients regarding multiple correlations

Multiple correlations	*Estimated value*
Multiple correlation coefficient	0.56598
Multiple R^2	0.3203334
F	11.044100
p (95%CI)	0.0410636
Std. Err. of Estimate	1.336667

Table 3. Coefficient of multiple correlations between the risk factors and the laryngeal lesion aspects

Partial correlation laryngeal lesions vs.	*Coefficient correlation (Beta)*	*Std. Err. (Beta)*	*B*	*Std. Err. B*	*t(135)*	*p 95% interval confidence*
Intercept			-0.049032	1.437483	-0.034109	0.972948
Smoking	2.292841	0.171074	0.583952	0.004904	3.711780	0.009414
Alcohol	2.141565	0.148643	0.431650	0.017328	2.952378	0.034622
Age	1.145309	0.208269	0.358741	0.008419	2.397699	0.048912
Coffee	-0.139261	0.233156	-0.003662	0.006131	-0.597287	0.553448
Gender	0.083683	0.160985	0.222238	0.427533	0.519815	0.605858
Spices	-0.094598	0.241612	-0.002881	0.007359	-0.391530	0.697339

Table 4. Estimated parameters in the assessment report on matters chance of contributing factors laryngeal lesion

Larynx lesions	*Param. β*	*Std. Err*	*-95.00% - Cnf.Lmt*	*+95.00% - Cnf.Lmt*	*Beta (β)*	*St.Err.β*	*-95.00% - Cnf.Lmt*	*+95.00% - Cnf.Lmt*
Intercept	-0.049032	1.437483	-2.94799	2.849930				
Smoking	0.583952	0.004904	0.10150	0.618285	2.292841	0.171074	1.052163	3.637845
Alcohol	0.431650	0.017328	0.10184	0.651447	2.141565	0.148643	1.158203	3.441333
Age	0.358741	0.008419	0.01211	0.522853	1.145309	0.208269	1.274706	3.565324
Coffee	-0.003662	0.006131	-0.01603	0.008702	-0.139261	0.233156	-0.609464	0.330943
Gender	0.222238	0.427533	-0.63997	1.084442	0.083683	0.160985	-0.240975	0.408341
Spices	-0.002881	0.007359	-0.01772	0.011959	-0.094598	0.241612	-0.581856	0.392659

5. Conclusions

Professional voice users with dysphonia often may present gastro esophageal reflux symptoms and also respiratory complains. A correct diagnostic and therapeutic attitude in these patients involves a multidisciplinary team (including otolaryngologist, gastroenterologist and pneumologist).

This study demonstrates the connection between GERD and secondary laryngitis on one hand, and the generating environmental and biologic factors on the other hand. Thus, inappropriate feeding habits (spicy food, alcohol intake, coffee consumption) and other behavioral factors (smoking) are resulting in GERD with heartburn and regurgitation. Moreover, these modifications are statistic significant correlated with the laryngeal lesions that finally will lead to hoarseness, foreign body sensation and globus histericus.

All of the investigated groups (actors, priests, singers, and teachers) due to the specificity of their profession (intense voice use, physical effort during speech in some cases) and the association with different behavioral and environmental factors, presented a high rate of GERD related inflammatory laryngeal lesions.

The positive diagnostic requires modern and accurate investigations: flexible endoscopic laryngoscopy, pH monitoring, esophageal impedance study, upper gastro intestinal endoscopy (UGIE). The laryngoscopy even is an operator dependent investigation, is the first investigation used for LPR diagnosis.

The edema and erythema of the vocal folds, the edema of the interarytenoid area are the most frequent laryngeal changes that demonstrate, with statistical significance, that the gastro-esophageal reflux is involved in the laryngeal pathology.

Pyrosis (heartburn) is highly specific for gastro esophageal reflux. In the absence of symptoms, upper gastrointestinal endoscopy may reveal esophagitis as a complication of GERD. In the absence of esophagitis pH-impedance has clear indication and it is considered to be gold standard for the diagnostic of GERD.

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