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**Jadranka M. Maksimovic, Milan
M. Vukasinovic, Hristina D. Vlajinac,
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Sergey Y. Ivanov, et al.**

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Anxiety and depression in patients with vocal fold nodules, edema and polyps

Jadranka M. Maksimovic¹ · Milan M. Vukasinovic² · Hristina D. Vlajinac¹ · Ana D. Jotic^{2,3} · Maja S. Milovanovic^{4,5} · Sergey Y. Ivanov⁶ · Milos Z. Maksimovic⁷ · Jovica P. Milovanovic^{2,3}

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Abstract

Purpose To compare the prevalence and severity of depression and anxiety among patients with vocal fold (VF) nodules, polyps and edema. At the same time the aim was to analyse association between severity of distress and the level of vocal handicap as well as to identify other factors related to severity of depression and anxiety in these patients.

Methods To all participants were given five questionnaires: (1) questionnaire on socio-demographic and some other characteristics of patient; (2) Beck's Depression Inventory (BDI); (3) State-Trait Anxiety Inventory (STAI) 1 (State Anxiety); (4) STAI 2 (Trait Anxiety); and (5) Voice Handicap Index (VHI)-10.

Results A total of 205 patients were included in this study. Mild-to-severe depression, according to BDI was present in 79 (38.6%) patients. Mild-to-severe state anxiety and trait anxiety were present in 199 (97.1%) and 200 (97.6%) patients, respectively. Only 10 patients had VHI-10 score ≤ 11 . Multivariate analyses showed that there were no significant differences in the level of depression and anxiety between patients with VF nodules, polyps and edema. The VHI-10 score was significantly higher in patients with VF edema in comparison with VF nodule patients ($p=0.001$), as well as in comparison with VF polyp patients ($p=0.001$).

Conclusion The present study identified a high prevalence of psychological and vocal distress among patients with vocal disorders. Severity of depression and anxiety did not differ between patients with VF nodules, polyps and edema, and it was not related to the level of vocal handicap.

Keywords Voice disorders · Anxiety · Depression · Voice handicap index · Quality of life

Introduction

Phonation is a function of the whole person. Emotional status plays a great role in healthy vocal behaviour. Psychological influence on the voice is one of the most important factors. At the management of voice disorder, one must look at the psycho-somatic background.

The voice disorder is a result of an event that triggers the symptom of dysphonia. This may be even simply an acute conflict situation (e.g., in the partnership, family, or workplace). Patients with organic dysphonia feel themselves not to be oriented toward other people and they see themselves as less open, more unsociable, less imaginative, and less attractive than do patients with functional dysphonia. In particular, patients with organic dysphonia evaluate their receptiveness in love affairs and their ability to give love to a partner less than do patients with functional dysphonia [1]. The neural vocal network has parallel and synchronic

✉ Jovica P. Milovanovic
jovica.milovanovic@med.bg.ac.rs

¹ Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

² Clinic of Otorhinolaryngology and Maxillofacial Surgery, Clinical Centre of Serbia, Pasterova 2, 11000 Belgrade, Serbia

³ Faculty of Medicine, University of Belgrade, Belgrade, Serbia

⁴ Institute of Mental Health, Belgrade, Serbia

⁵ Faculty for Special Education and Rehabilitation, University of Belgrade, Belgrade, Serbia

⁶ Clinic of Maxillofacial Surgery, Sechenov University, Moscow, Russian Federation

⁷ Institute of Hygiene and Medical Ecology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

processing with cortical and sub-cortical areas referred to emotional and psychological status. Auditory–vocal system has an intimate relation to the limbic system that may lead to stress reaction with other cognitive disorders [2].

In the last decade, there were several studies showing that the prevalence of depression, anxiety and/or other psychosocial distress was high in patients with voice disorders [3–9], and in two of them [7, 9] a weak correlation between distress and vocal handicap was established. In these studies were included patients with functional or various benign voice disorders.

Being interested in patients with exudative lesions of Reinke space, the aim of the present study was to compare the prevalence and severity of depression and anxiety among patients with vocal fold (VF) nodules, polyps and edema. At the same time the aim was to analyse association between severity of distress and the level of vocal handicap as well as to identify other factors related to severity of depression and anxiety in these patients.

Materials and methods

The participants in our study were patients who visited for the first time the Phoniatic Department of Communication Disorders Care Center of Clinic for Otorhinolaryngology and Maxillofacial Surgery in Clinical Center of Serbia, Belgrade, from October 2014 to March 2015.

VF nodules, polyps and edema patients were diagnosed on the basis of clinical symptoms, clinical otorhinolaryngological and phoniatic examination, and endovideolaryngostroboscopic findings. The diagnosis was established by a multidisciplinary team that consisted of two phoniaticians, two laryngologists, one clinical psychologist and two logopedics with at least 20 years of working experience in the field of communication disorders. Endovideolaryngostroboscopy was the key tool because of possibility for all members of the team to take a part in the examination at the same time. This study included patients who were more than 18 years old. All participants accepted participation in the investigation. Patients with neurological and psychiatric illness, malignant disease, severe hearing loss, transsexual conflict, professional voice that needs urgent phonosurgery, and uncured co-morbidities (reflux, allergy, thyroid disease and lung disease) were not included in the study.

All participants were given five questionnaires: (1) questionnaire on socio-demographic and some other characteristics of patient; (2) Beck's Depression Inventory (BDI) [10]; (3) State–Trait Anxiety Inventory (STAI) 1 (State Anxiety) [11]; (4) STAI 2 (Trait Anxiety) [11]; and (5) Voice Handicap Index (VHI)-10 [12], with precise explanations as to how to fill them. Comfortable conditions were met for completing the questionnaires.

Using the questionnaire on socio-demographic and some other characteristics of the patient, the following data were collected: gender, age, height and weight, marital status, educational level (elementary, secondary and high school, faculty), occupation (no/yes), type of occupation, working experience (years), exposure to occupational noise and air pollution (no/yes), additional job (no/yes), occupational voice demands (no, increased, considerable, immense), family income (low, middle, high), recreational physical activity, cigarette smoking (nonsmokers, former smoker and current smoker), alcohol consumption (ever drinker and non drinker), comorbidity, symptoms of the present voice problems and their duration in months and voice problems in the family. According to body mass index (BMI)—weight (kg) divided by height (m²)—patients were divided into three groups (normal weight, overweight, obese). A current smoker was considered a person who smoked at least one cigarette per day in the 12 months before the disease or quit smoking within that year. Former smoker was defined as a person who quit more than a year before the disease occurrence. Regarding alcohol consumption, non-drinker comprised person who in his/her life drank less than 12 alcoholic beverages [8]. Recreational physical activity comprised every kind of unprofessional physical activity for 30 min per day during the previous month. A person, who has exercised more than once per week, was considered physically active.

The BDI provides a quantitative assessment of the intensity of depression. It consists of 21 questions about how the subject has been feeling in the last week. Each question has a set of at least four possible answer choices, ranging in intensity, and the score value for each answer has four-point scale, from 0 to 4. The final score 0–9 indicates minimal depression, 10–29 mild to moderate depression, and a score of 30 and over indicates severe depression.

The STAI is a commonly used measure of state and trait anxiety. It can be used in clinical settings to diagnose anxiety and to distinguish it from depressive syndromes. State anxiety (S-anxiety) can be defined as fear, nervousness, discomfort, etc., induced by different situations that are perceived as dangerous. This type of anxiety refers more to how a person is feeling at the time of a perceived threat and is considered temporary. Trait anxiety (T-anxiety) can be defined as feelings of stress, worry, discomfort, etc., that one experiences on a day-to-day basis. This is usually perceived as how people feel across typical situations that everyone experiences on a daily basis. Each of two questionnaires has 20 separate items; the answers are rated on a scale from 1 to 4. The score under 20 means minimal or absent anxiety, 21 to 40 mild, 41 to 60 moderate and the score over 61 means severe anxiety.

VHI-10 was used as a measure of vocal function in our patients. Each of ten statements in the questionnaire has five possible responses (ranging from 0 to 4) which indicate how frequently a patient has the same experience. VHI-10

score > 11 has been considered as abnormal [13]. Validity and reliability of Serbian VHI-10 questionnaire proved to be satisfactory [14].

Statistical analysis

Continuous variables were described as means ± standard deviation (SD), and categorical variables were presented by counts and percentages. For the statistical analysis of data univariate and multivariate logistic regressions were used. All variables which were, according to univariate analysis statistically significant at the level of $p \leq 0.10$ were included in the multivariate model. A two-tailed $p < 0.05$ was considered significant. Statistical analysis was performed using the statistical package SPSS 20.

Results

A total of 205 patients were included in this study. Out of them 72 (35.12%) patients had vocal fold (VF) nodules, 63 (30.63%) had VF edema, and 70 (34.14%) patients had VF polyps.

Depression, anxiety and dysphonia in patients with vocal fold nodules, polyps and edema are presented in Table 1.

Mild-to-severe depression, according to BDI was present in 79 (38.6%) patients, the mean score being 7.89 ± 6.11 . Mild-to-severe state anxiety and trait anxiety were present in 199 (97.1%) and 200 (97.6%) patients, respectively, the mean score of STAI 1 and STAI 2 being 39.42 ± 10.75 and 41.86 ± 10.13 . Mean VHI 10 score of all patients was 20.20 ± 5.40 . Only 10 patients had VHI-10 score ≤ 11 . In comparison to VF polyp patients, depression (mild-to-moderate and severe) was more frequent in both patients with VF nodules ($p = 0.031$) and those with VF edema ($p = 0.090$). Moderate and severe state anxiety as well as trait anxiety were more frequent in VF nodule patients than in patient with VF polyps ($p = 0.030$ and $p = 0.021$ respectively) and patients with VF edema ($p = 0.008$ and $p = 0.013$ respectively). The same differences were found when depression and anxiety scores were presented as mean ± SD and included in univariate analysis as continuous variables. The mean VHI-10 score was highest in VF edema patients, significantly higher than in VF nodule patients ($p < 0.001$) and VF polyp patients ($p < 0.001$).

Beck's depression, S-anxiety, T-anxiety and VHI-10 scores which, according to univariate logistic regression analysis were related to VF nodules, polyps and/or edema at a significance level of $p \leq 0.10$, were included in a multivariate model. The model also included socio-demographic

Table 1 Depression, anxiety and dysphonia in patients with vocal fold nodules, polyps and edema

Variables	Patients with ^a				<i>p</i> value* for		
	VF nodules (n=72)	VF polyps (n=70)	VH edema (n=63)	Total (n=205)	VF nodules vs. VF polyps	VF nodules vs. VF edema	VF polyps vs VF edema
<i>BDI categories:</i>							
Minimal	42 (58.3)	51 (72.9)	51 (72.9)	126(61.5)	0.031	0.616	0.090
Mild to moderate	24 (33.3)	18 (25.7)	18 (25.7)	67 (32.7)			
Severe	6 (8.3)	1 (1.4)	1 (1.4)	12 (5.9)			
<i>STAI 1 (State anxiety) categories:</i>							
Minimal	1 (1.4)	4 (5.7)	4 (5.7)	6 (2.9)	0.030	0.008	0.741
Mild	32 (44.4)	42 (60.0)	42 (60.0)	116 (56.6)			
Moderate	31 (43.1)	23 (32.9)	23 (32.9)	72 (35.1)			
Severe	8 (11.1)	1 (1.4)	1 (1.4)	11 (5.4)			
<i>STAI 2 (Trait anxiety) categories:</i>							
Minimal	1 (1.4)	3 (4.3)	3 (4.3)	5 (2.4)	0.021	0.013	0.919
Mild	24 (33.3)	35 (50.0)	35 (50.0)	93 (45.4)			
Moderate	40 (55.6)	28 (40.0)	28 (40.0)	94 (45.9)			
Severe	7 (9.7)	4 (5.7)	4 (5.7)	13 (6.3)			
BDI score ^b	8.96 ± 6.50	5.54 ± 5.18	5.54 ± 5.18	7.89 ± 6.11	0.001	0.759	<0.001
STAI 1 (State anxiety) score ^b	42.82 ± 11.02	36.46 ± 10.64	36.46 ± 10.64	39.42 ± 10.75	0.001	0.031	0.179
STAI 2 (Trait anxiety) score ^b	44.89 ± 10.18	39.04 ± 10.44	39.04 ± 10.44	41.86 ± 10.13	0.002	0.047	0.142
VHI 10 score ^b	18.90 ± 4.77	18.74 ± 4.90	18.74 ± 4.90	20.20 ± 5.40	0.843	<0.001	<0.001

VF vocal fold, BDI Beck's Depression Inventory, STAI The State–Trait Anxiety Inventory, VHI Voice Handicap Index

^aPresented as number (%); ^bpresented as mean ± standard deviation; *according to univariate logistic regression analysis

and some other characteristics of the same patients which, according to the analysis described elsewhere [15] and presented in Table 2, independently significantly differed between compared groups.

In fact, two multivariate models were used, one with depression and anxiety score categories and the other with depression and anxiety scores as continuous variables. Multivariate analyses showed that there were no significant differences in the level of depression and anxiety between patients with VF nodules, polyps and edema. The VHI-10 score was significantly higher in patients with VF edema in comparison with VF nodule patients (odds ratio—OR 1.18, 95% confidence intervals—95% CI 1.07–1.31, $p=0.001$), as well as in comparison with VF polyp patients (OR 1.20, 95% CI 1.08–1.33, $p=0.001$).

In order to find out which factors are related to the degree of severity of depression and anxiety, distribution of socio-demographic and some other characteristics of patients, and VHI-10 scores were analysed according to BDI and STAI 1 and STAI 2 categories. Table 3 presents variables which,

according to univariate logistic regression analysis differed significantly ($p \leq 0.10$) between categories of depression and anxiety. Degree of severity of depression was related to sex, income, type of occupation, physical activity, stress in the year before the present disease, symptoms of the present disease and mean VHI-10 score. State anxiety categories differed by sex, income, smoking and stress in the year before the present disease. Trait anxiety categories differed by sex, age, income, type of occupation, noise in the working place, BMI, smoking and stress in the year before the present disease. All variables presented in Table 3 were included into three multivariate models the results of which are presented in Table 4. According to multivariate analysis, mild-to-severe depression was more frequent in women (OR 3.79, 95% CI 1.68–8.55, $p=0.001$), and it was less frequent in patients with high income (OR 0.56, 95% CI 0.31–0.99, $p=0.046$) and those who were physically active (OR 0.51, 95% CI 0.27–0.96, $p=0.037$). Moderate or severe state anxiety was also more frequent in women (OR 3.26, 95% CI 1.51–7.06, $p=0.003$), and less frequent

Table 2 Significant differences in socio-demographic and some other characteristics between patients with vocal fold nodules, polyps and edema, according to multivariate logistic regression analysis

Variables	Patients with			P value for:		
	VF nodules (n=72) No (%)	VF polyps (n=70) No (%)	VF edema (n=63) No (%)	VF nodules vs. VF polyps	VF nodules vs. VF edema	VF polyps vs. VF edema
<i>Gender:</i>						
Male	3 (4.2)	37 (52.9)	7 (11.1)	<0.001	–	<0.001
Female	69 (95.8)	33 (47.1)	56 (88.9)			
<i>Age (years):</i>						
≤40	55 (76.4)	32 (45.7)	6 (9.5)	–	<0.001	<0.001
>40	17 (23.6)	38 (54.3)	57 (90.5)			
<i>Type of occupation:</i>						
Unemployed or retired	11 (15.3)	11 (15.7)	20 (31.8)	0.006	–	–
Physical, administrative or health worker	32 (44.4)	52 (74.3)	37 (58.7)			
Singer, actor or lecturer	29 (40.3)	7 (10.0)	6 (9.5)			
<i>Occupational voice demands:</i>						
No	18 (25.0)	28 (40.0)	35 (55.5)	–	0.037	–
Increased	17 (23.6)	26 (37.1)	19 (30.2)			
Considerable	25 (34.7)	12 (17.1)	7 (11.1)			
Immense	12 (16.7)	4 (5.7)	2 (3.2)			
<i>Smoking:</i>						
Non-smoker	35 (48.6)	21 (30.0)	1 (1.6)	0.043	<0.001	<0.001
Former smoker	21 (29.2)	23 (32.9)	8 (12.7)			
Current smoker	16 (22.2)	26 (37.1)	54 (85.7)			
<i>Present disease symptoms:</i>						
Hoarseness	62 (86.1)	55 (78.6)	38 (60.3)	0.040	0.001	–
Dyspnea and other	10 (13.9)	15 (21.4)	25 (39.7)			
Voice problems in the family	11 (15.3)	8 (11.4)	18 (28.6)	–	–	0.005

VF vocal fold

Table 3 Variables significantly related to the degree of severity of depression and anxiety in patients with exudation lesions of Reinke space (vocal fold nodules, edema and polyps), according to univariate logistic regression analysis

Variables	BDI categories—No. (%)		STAI 1 (S-anxiety) categories—No. (%)		STAI 2 (T-anxiety) categories—No. (%)	
	Minimal (<i>n</i> = 126)	Mild or severe (<i>n</i> = 79)	Minimal or mild (<i>n</i> = 122)	Moderate or severe (<i>n</i> = 83)	Minimal or mild (<i>n</i> = 98)	Moderate or severe (<i>n</i> = 107)
<i>Sex:</i>						
Men	38 (30.2)	9 (11.4)	36 (29.5)	11 (13.3)	32 (32.7)	15 (14.0)
Women	88 (69.8)	70 (88.6)*	86 (70.5)	72 (86.7)*	66 (67.3)	92 (86.0)*
<i>Age (years):</i>						
≤40					37 (37.8)	56 (52.3)
40+	–	–	–	–	61 (62.2)	51 (47.7)**
<i>Income:</i>						
Low	3 (2.4)	3 (3.8)	3 (2.5)	3 (3.6)	0 (0)	6 (5.6)
Middle	70 (55.6)	54 (68.4)	64 (52.4)	60 (72.3)	56 (57.1)	68 (63.6)
High	53 (42.1)	22 (27.8)**	55 (45.1)	20 (24.1)*	42 (42.9)	33 (30.8)**
<i>Occupation:</i>						
Unemployed or retired	24 (19.0)	17 (21.5)			22 (22.4)	19 (17.8)
Physical, administrative, or health worker	82 (65.1)	40 (50.6)			63 (64.3)	59 (55.1)
Singer, actor or lecturer	20 (15.9)	22 (27.8)***	–	–	13 (13.3)	29 (27.1)**
Noise in the working place	–	–	–	–	50 (51.0)	68 (63.6)***
<i>Body mass index:</i>						
Normal weight					48 (49.0)	70 (65.4)
Overweight or obese	–	–	–	–	50 (51.0)	37 (34.6)**
<i>Smoking:</i>						
Non-smoker			28 (23.0)	29 (34.9)	19 (19.4)	38 (35.5)
Former smoker			32 (26.2)	20 (24.1)	23 (23.5)	29 (27.1)
Current smoker	–	–	62 (50.8)	34 (41.0)***	56 (57.1)	40 (37.4)*
Physically active	93 (73.8)	45 (57.0)**	–	–	–	–
Stress in a year before the present disease	67 (53.2)	53 (67.1)***	65 (53.3)	55 (66.3)***	49 (50.0)	71 (66.4)**
<i>Symptoms of the present disease:</i>						
Hoarseness	101 (80.2)	54 (68.4)				
Dyspnea and others	25 (19.8)	25 (31.6)***	–	–	–	–
VHI 10—mean ± SD	19.53 ± 5.52	21.28 ± 5.06**	–	–	–	–

Marital status, education, working experience (years), additional job, polluted air in the working place, occupational voice demands, alcohol consumption, present disease symptoms, duration of symptoms, other diseases and types of other diseases were not significantly related to either depression or anxiety

BDI Beck's Depression Inventory, STAI The State–Trait Anxiety Inventory, S State, T Trait, SD standard deviation, VHI Voice Handicap Index;

p* < 0.001; *p* < 0.05; ****p* < 0.10

in patients with high income (OR 0.39, 95% CI 0.33–0.69, *p* = 0.001). Moderate or severe trait anxiety was more frequent in women (OR 2.91, 95% CI 1.37–6.17, *p* = 0.005) and patients who had stress in the year before the present disease (OR 2.06, 95% CI 1.11–3.81, *p* = 0.022). It was less frequent in patients with high income (OR 0.43, 95% CI 0.24–0.77, *p* = 0.005), overweight or obese patients (OR 0.53, 95% CI 0.28–0.99, *p* = 0.046) and in current smokers (OR 0.39, 95% CI 0.20–0.79, *p* = 0.009).

Discussion

In the present study, 95.1% of patient had VHI-10 score > 11. Mild-to-severe depression was present in 38.6% patients and mild-to-severe state anxiety and trait anxiety were present in 97.1% and 97.6% patients, respectively. Level of depression and anxiety scores did not significantly differ between VF nodules, polyps and edema, although the level of VHI-10 scores was significantly higher in VF edema patients in

Table 4 Variables significantly related to depression and anxiety in patients with exudation lesions of Reinke space (vocal fold nodules, edema and polyps), according to multivariate logistic regression analysis

Variables	Depression (minimal/mild to severe) ^a		State anxiety (minimal or mild/moderate or severe) ^b		Trait anxiety (minimal or mild/moderate or severe) ^b	
	OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value
Sex: man/women	3.79 (1.68–8.55)	0.001	3.26 (1.51–7.06)	0.003	2.91 (1.37–6.17)	0.005
Income: low/middle/high	0.56 (0.31–0.99)	0.046	0.39 (0.22–0.69)	0.001	0.43 (0.24–0.77)	0.005
Body mass index: normal weight/overweight or obese	–	–	–	–	0.53 (0.28–0.99)	0.046
Smoking: no/former/current	–	–	–	–	0.39 (0.20–0.79)	0.009
Physically active (no/yes)	0.51 (0.27–0.96)	0.037	–	–	–	–
Stress in a year before the present disease (no/yes)	–	–	–	–	2.06 (1.11–3.81)	0.022

^a According to Beck's Depression Inventory; ^b according to the State-Trait Anxiety Inventory

comparison with nodules and polyps patients. Severity of depression and anxiety were not significantly related to VHI-10 scores. Depression was significantly related with female sex, income, and physical activity, and anxiety with female sex, income, BMI, smoking, and stress in the year before the present disease.

The prevalence of depression and anxiety among our patients with exudation lesions of Reinke space (nodules, polyps and edema) was very high especially that for anxiety. These findings were to a certain degree similar to findings in other studies of patients with voice problems. Using Hospital Anxiety and Depression Scale (HADS), Dietrich et al. [4] found depression in 31.2% of patients with common pathologies affecting voice. In the study of Siupsinskiene et al. [7], mild-to-severe HADS-Depression scores were seen in only 19.2% of patients with benign voice disorders. In a study of Misono et al. [8], about one-third (32%) of patients with voice concerns met strict case criteria for depression, anxiety, and/or somatic concerns based on the BSI-18, but only 18% for depression subdomain. The prevalence of mild-to-severe anxiety scores in the above-mentioned studies, 36.9% [4] and 42.1% [7] were more similar to the prevalence of moderate-to-severe scores of 40.5% (State anxiety) and 52.2% (Trait anxiety), than for mild-to-severe score in our study. In Misono et al. study [8], only 19% of patients met strict criteria for an anxiety subdomain of BSI-18. The possible explanations of these differences could be differences in characteristics of the study populations as well as differences in the type of depression and anxiety scales used in various studies.

If depression and anxiety have been associated with voice problems, it would be expected that they are more severe in those with higher VHI-10 scores. However, in our patients VHI-10 score was related to categories of depression only in univariate analysis. After controlling for other factors related to depression, this relationship was not significant anymore. Siupsinskiene et al. [7] found that higher psychological distress was weakly, but significantly related to higher VHI scores. Misono et al. [9] found a weak association ($r=0.13$, $p=0.003$) between severity of vocal handicap and psychological distress (including depression, anxiety and somatic symptoms) and the Perceived Stress Scale (PSS). Besides differences in the methods used, differences in the results of Siupsinskiene et al. [7] and Misono et al. [9] investigations and the present study might be explained by the fact that in Misono study, 77% of patients had VHI-10 scores above the cut of 11 (mean 19.39 ± 9.49), and in the present study 95.1% of patient had VHI-10 scores > 11 (mean 20.20 ± 5.40). It seems that the severity of depression and anxiety are more related to some other characteristic of patients than to the level of voice disorders.

Factors which were, according to multivariate analysis independently associated with severity of depression and

anxiety are the same as factors generally related to psychological distress. According to literature data, both depression and anxiety were more frequent in women [4, 16, 17], and in the study of Siupsinskiene et al. [7] higher psychological distress was significantly related to the female gender. Income has been related to the frequency of depression in many investigations [18–20], low income being an important risk factor for psychological distress. The same is true for physical inactivity. People physically inactive have a higher chance of exhibiting depression and anxiety compared with those who are physically active [21] and physical activity may alleviate depressive symptoms [22]. Inverse relationship between BMI and severity of anxiety (Trait anxiety) in our patients could be expected having in mind that in many studies BMI and anxiety were not related or their relation was an inverse one [23–25]. Niculaie and Almos [26] found a negative association between the BMI and the level of anxiety. Data on the association between smoking and anxiety are inconsistent. Although multiple studies have demonstrated an association between cigarette smoking and increased anxiety symptoms or disorders [27], a systematic review of longitudinal studies of this association showed that the results varied considerably, few studies supporting a bidirectional relationship, or reported null results [28]. The findings of Choi et al.'s investigation [29] are particularly of interest for the results of our study, namely the experiments they performed suggested that cigarette smoking perhaps relieves stress. The positive association of the level of anxiety (Trait anxiety) with the stress in the year before the occurrence of the present disease ($p=0.022$) could be expected having in mind numerous literature data on the relationship between stress and psychological disorders [30, 31].

Limitation of the study

Cross-sectional design of the present study does not enable to judge about the causal relationship between vocal disorders and psychological distress. From the study were excluded patients who reported psychiatric diseases in their personal history, but there is always the possibility that some of the patients were not willing to report psychiatric or psychological problems or thought that these are not relevant to the present disease [8]. Existing psychological disorders could be exacerbated by voice disorders.

Conclusion

The present study identified a high prevalence of psychological distress and vocal distress among patients with exudative lesions of Reinke space. Severity of depression and anxiety did not differ between patients with VF nodules, polyps and edema and it was not related to the level of vocal handicap.

Some factors associated with the occurrence of depression and anxiety were found to be also related to their severity.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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