

Verbal communication disorders in psychogenic dysphonia

Authors' Contribution:

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
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ABSTRACT:

Psychogenic dysphonia is defined as disturbances in voice and speech quality with emotional background with lack of organic changes in the larynx. Mental condition has significant impact on the process of producing voice, functioning of respiratory-phonatory-articulation mechanism and speech prosody. The aim of the study was visual, acoustic, perceptual assessment as well as self-assessment of voice and speech quality using subjective and objective methods in patients with psychogenic dysphonia. The study included 50 patients with psychogenic dysphonia diagnosed in the Department of Clinical Phonoaudiology and Logopedics, Medical University of Białystok and treated at the Foniatic Outpatient Clinic, University Hospital in Białystok in 2017–2018. The control group consisted of 30 subjects with euphonic voice. All patients underwent subjective and objective assessment of voice and speech quality. The GRBAS scale, breathing pathway assessment, respiratory-phonatory-articulation analysis, voice and speech intensity evaluation have been performed. Speech prosody has also been examined. Patient self-assessment of voice has been conducted using Voice Handicap Index (VHI). Objective evaluation of larynx included vibrations of vocal folds visualization using High Speed Digital Imaging (HSDI). Acoustic analysis of voice quality has been performed using DiagNova Technologies. The maximum phonation time (MPT) has been determined. Hyperfunctional dysphonia is the most common clinical form of psychogenic dysphonia. Abnormal breathing pathway influence the reduction of MPT and disturbance of respiratory-phonatory-articulation coordination in patients with psychogenic dysphonia. In psychogenic dysphonia intonation and speech rate disorders are observed. Results of voice self-assessment in the majority of examined patients indicates a mild voice disability.

KEYWORDS:

psychogenic dysphonia, respiratory-phonatory-articulation coordination, speech prosody, VHI, voice and speech quality

INTRODUCTION

Psychogenic dysphonia is defined as psychogenic disturbances of voice and speech quality without the existence of primary organic changes in the larynx [4]. Human psyche has a significant impact on the course of verbal communication, affecting the quality of voice and speech [21, 33]. Emotional condition significantly influence the process of voice production, the functioning of respiratory-phonatory-articulation mechanism and suprasegmental elements of speech.

The background of psychogenic disorders of voice quality may be chronic psycho-emotional-social stresses, traumatic experiences, interpersonal conflicts and mental disorders [4, 22, 23, 24, 26]. Psychogenic dysphonia most often occurs between 30 and 50 years of age in subjects with a dysregulated emotional system, mainly in women [4, 22]. In psychogenic dysphonia, the most common are voice disorders in the form of conversion dysphonia, mutation falsetto, conversion mutism, and in extreme cases in the form of psychogenic (functional, conversion) aphonia [22].

The aim of the study was visual, acoustic and perceptual assessment as well as self-assessment of voice and speech quality using subjective and objective methods in patients with psychogenic dysphonia.

MATERIAL AND METHODS

The study included group of 50 patients with psychogenic dysphonia diagnosed in the Department of Clinical Phonoaudiology and Logopedics, Medical University of Białystok and treated at the Foniatic Outpatient Clinic, University Hospital in Białystok in 2017–2018. The age of the respondents ranged from 28 to 58 years (average – 43 years). The group consisted of 39 women (78%) and 11 men (22%). The inclusion criterion was diagnosis of hyperfunctional dysphonia.

The control group included 30 subjects with euphonic voice aged between 26 and 57 years old (average – 42 years) – 24 women (80%) and 6 men (20%).

In both groups, no symptoms of chronic upper respiratory tract inflammation, gastroesophageal reflux disease or professional voice disorders have been observed.

In all subjects, subjective and objective assessment of voice and speech quality has been performed. In subjective evaluation of voice, the standardized perceptual GRBAS scale of Japanese Society of Speech Therapists and Phoniatriests considering following parameters: G – grade of hoarseness, R – roughness, B – breathiness,

A – asthenic voice and S – strain has been used [12]. The parameters have been estimated from 0-3, where 0 means physiological voice, 1 – slight intensity, 2 – moderate, 3 – severe.

Way of breathing assessment has been performed, defining it as upper costal breathing, costo-diaphragmatic breathing and abdominal breathing. Examination of respiratory-phonatory-articulation coordination as well as voice and speech intensity during phonation of the vowel „a” and during spontaneous speech has been performed. The suprasegmental elements of speech have also been assessed – accent, rhythm, intonation and speech rate.

The analysis included self-assessment of patients voice with Voice Handicap Index (VHI) questionnaire, which defines the vocal disability rate. The questionnaire consists of 30 statements regarding the impact of voice disorders on the three areas of life: functional, emotional and physical [14]. The patient marks 1 out of 5 responses with assigned point values on a scale from 0 to 4, where the answer „never” means 0 points, „almost never” – 1, „sometimes” – 2, „almost always” – 3, „always” – 4 points. The patient may obtain 0 to 120 points in VHI questionnaire. Scoring from 0 to 30 means mild voice disability, from 31 to 60 – moderate voice disability, while over 61 points – a sense of severe voice disability.

In objective evaluation of voice organ, vibrations of vocal folds have been visualized using High Speed Digital Imaging (HSDI) technique. The study has been performed using a rigid endoscope with 90° optics and high speed cameras (HS). It has been performed during the phonation of vowel „e” recording the image at 4000 frames per second.

Acoustic analysis of voice quality has been performed using DiagnoNova Technologies software. Examination has been conducted on the basis of phonation of isolated vowel „a” and the continuous linguistic text „Dziś jest ładna pogoda” („Today is nice weather”). The following acoustic parameters have been analyzed: F0 (Hz), Jitter (%), Shimmer (%), NHR (%).

The maximum phonation time (MPT) has also been determined. The result, given in seconds, was the average value obtained from 5 samples.

In the objective assessment, the course of speech intonation has been analyzed (statement, question, order) using Praat software.

Statistical analysis of obtained results has been performed using Mann-Whitney test, assuming the statistical significance level $p < 0.05$.

The research has been approved by the Bioethical Commission of Medical University of Białystok no.: R-I-002/488/2017.

RESULTS

In the study group, basing on the visualization of the larynx with HSDI, in all 50 (100%) patients hyperfunctional dysphonia has been diagnosed (Fig. 1).

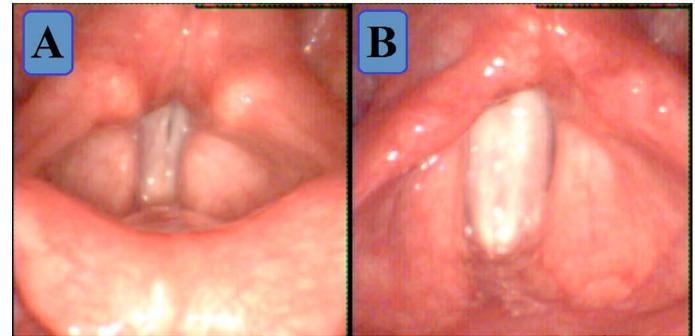


Fig. 1. Endoscopic larynx image – hyperfunctional dysphonia (HSDI) in a patient with psychogenic dysphonia (A), patient with an euphonic voice – control group (B).



Fig. 2. Acoustic parameters of voice in patient with psychogenic dysphonia (A) – study group and with euphonic voice (B) – control group.

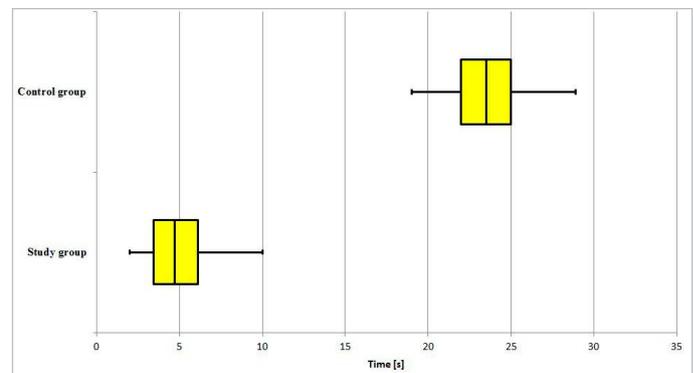


Fig. 3. MPT in examined and control group.

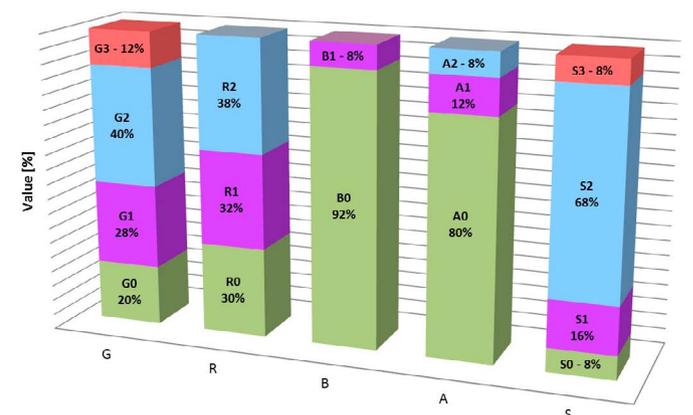


Fig. 4. Voice quality according to GRBAS scale in examined group.

Cumulative analysis of acoustic parameters of voice quality using DiagnoScope Specjalista showed elevated values of the majority of assessed parameters such as Jitter, APQ, Shimmer and NHR (Fig. 2a.) in relation to physiological values (Fig. 2b.).

Tab. I. Statistical analysis of MPT – Mann-Whitney test.

GROUP	OBSERVATIONS	MINIMUM [S]	MAXIMUM [S]	MEAN [S]	STANDARD DEVIATION
Examined	50	2	10	4,904	1,819
Control	30	19	27	23,333	2,057
MANN-WHITNEY U TEST					
U	EXPECTED VALUE	VARIANCE (U)	P-VALUE	STATISTICAL SIGNIFICANCE	
0	750	10110,997	<0,0001	0,05	

In patients with psychogenic dysphonia, the average MPT was 4.9 seconds, while in the control group – 23.3 seconds (Fig. 3., Tab. I.).

In subjective assessment of voice quality according to GRBAS scale in examined group (Fig. 4.) the greatest disturbances have been found in the parameters: G – hoarseness, R – roughness and S – strain. Only 2 patients (8%) revealed breathiness. In control group, values close to physiological have been observed: G1R1B0A0S0.

In self-assessment of voice quality using VHI questionnaire in the study group, the majority of patients – 56% (28 patients) – obtained a result indicating a slight disability of voice (Fig. 5.).

The assessment of breathing pathway in the study group (Fig. 6.) showed pathological, upper costal way of breathing in 40 patients (80%). In the control group, 43 patients (86%) revealed correct, costo-diaphragmatic way of breathing. 7 patients (14%) have been diagnosed with pathological upper costal way of breathing.

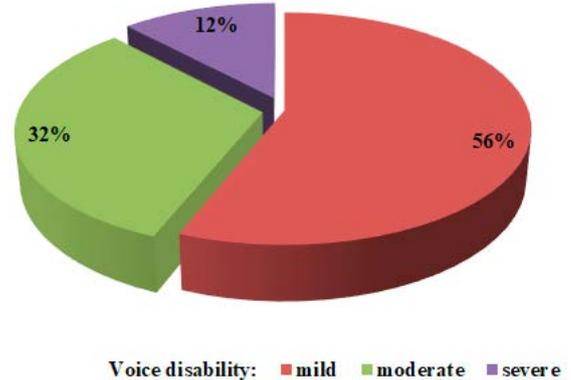
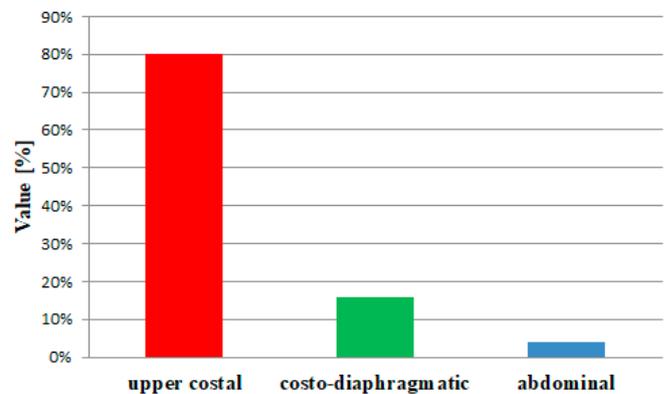
In examined group, all patients showed disturbances of respiratory-phonatory articulation coordination, while in the control group in 6 patients (20%) disorders in this area have been observed.

The rate of speech has also been analyzed, which has been estimated as rapid in 33 patients (66%) in the study group (Fig. 7.). In the control group, the majority of respondents – 26 persons (86.67%), had moderate speech rates, 3 patients (10%) – rapid, and 1 (3.33%) had slow speech rate.

Analysis of intonograms (Fig. 8.) of speech in examined group proved the incorrect course of intonation in questions in 22 (44%) patients, in statements – in 16 (32%) patients, and in 7 (14%) – in orders. Disturbances of prosodic elements of speech were evident especially in questions, where irregular, asymmetrical ascension of the intonation line of voice has been observed with an inadequate rising intonation.

DISCUSSION

Voice is the basic communication tool and plays the crucial role in expressing emotions, being the result of interaction with the environment. Its quality is conditioned by factors such as voice pathologies, prosody elements of speech and the emotional condition of the individual [30]. The quality of voice and speech also reflects the psychophysical condition of human which influences the functioning of the entire organism [3]. Due to the influence of various emotions, negative and positive, the process of producing voice and the functioning of the respiratory-phonatory-ar-

**Fig. 5.** VHI in examined group.**Fig. 6.** Way of breathing in examined group.

tication mechanism are subject to change [35]. Long-term disturbances of mental emotional and psychosocial balance, caused by anxiety, stress, depression, traumatic experiences, personality conflict or disturbances in social contacts are an important risk factor for the occurrence of voice quality disorders with psychogenic background [2, 4, 13, 22, 25, 26, 29, 34].

In own study, the inclusion criterion to examined group was the diagnosis of hyperfunctional psychogenic dysphonia. Authors of the study indicate that this is the most common form of dysphonia in patients with emotional disorders [5, 10, 16]. This is evidenced, among others authors, by the results of the study of voice quality disorders and psychological difficulties performed in the group of teachers by Fiszer et al. [10], which showed that the analyzed group was most often diagnosed with functional dysphonia. In the area of voice production, the dominant disorders were: abnormal breathing pathway, reduced phonation time, resonators dysfunction and excessive neck muscles strain during phonation. Half of the teachers referred for psychological consultation required

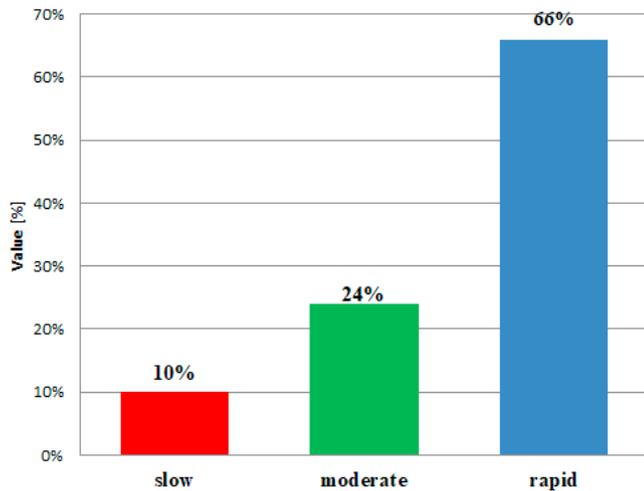


Fig. 7. Speech rate in examined group.

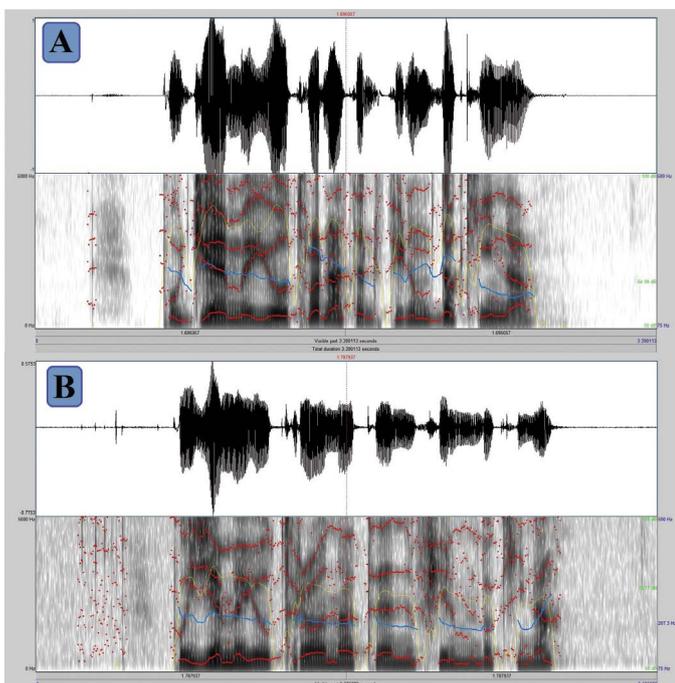


Fig. 8. Intonogram of a declarative (A) and interrogative (B) sentence in a patient with psychogenic dysphonia (Praat software).

specialistic intervention in this area. In most of the teachers, the source of stress was professional work and personal problems. Stress is an additional factor that may exacerbate existing voice quality disorders [10]. Similar results regarding voice organ concerns have been obtained by Trinite [32] who examined the group of 522 Latvian school teachers. The awareness of the possibility of voice disorders occurrence contributes to the output of burn-out syndrome in teachers [8]. According to Fiszer et al. [10] and Behlau et al. [6] patients emotionally dysregulated with coexisting voice disorders require psychological diagnostics and treatment.

The results of the assessment of breathing pathway performed in the study group also proved abnormal (upper costal) way of breathing in 80% of patients as well as increased strain of neck muscles during phonation. In addition, disturbed respiratory-phonatory-

articulation coordination has been observed in all patients in the study group. Reduced maximum phonation time (MPT) has also been recorded to 4.9 seconds in the group of patients with psychogenic dysphonia.

Teixeira et al. [30], on the basis of acoustic analysis, showed increased values of Jitter, Shimmer parameters and reduced HNR (Harmonic-to-Noise Ratio) value in a patient with psychogenic dysphonia. In own study, abnormal values of the aforementioned parameters in the study group have also been found. Thus, frequency disorders in the activity of vocal folds and the presence of noise component in the upper range of voice harmonic frequencies have been confirmed. Many authors used acoustic voice analysis in the evaluation of the severity of functional and organic dysphonia [7, 19, 20].

According to Obrębowski [28], under the influence of stress, the physiochemical properties of the mucus covering vocal folds may change, causing alteration of vibration amplitude, marginal shift or glottal closure phase, which may cause disturbances in voice quality.

In the assessment of voice quality disturbances in hyperfunctional dysphonia, the perceptual assessment with GRBAS scale is crucial. Koszyła-Hojna et al. [17] assessed voice quality parameters according to GRBAS scale in 40 patients with hyperfunctional dysphonia. 55% of patients were diagnosed with hoarseness at G3, 32.2% with – G2 and 10% – with G1 [17]. In own study, on the basis of GRBAS scale, the largest group has been diagnosed with the hoarseness on G3 level in 12% of patients, G2 – 40%, G1 in 28%, in the roughness of voice: R2 has been diagnosed in 38% patients, R1 – 32% and strain: S3 – 8%, S2 – 68%, S1 – 16% of patients. According to Jafari et al. [15] GRBAS scale and self-assessment of voice (VHI) are useful in the evaluation of voice quality of patients with hyperfunctional dysphonia. Similarly Faham et al. [9] analysed subjective concerns connected with voice pathology in Iranian teachers, comparing those results with the results of GRBAS scale, especially G (Grade) parameter – hoarseness.

Self-assessment of voice quality using VHI is one of the most important elements of comprehensive voice quality assessment, next to videostroboscopy, acoustic analysis and aerodynamic examination [11, 27]. Patient self-assessment of voice is particularly useful in the diagnosis of psychogenic disorders, in which the larynx image is often unchanged, while the VHI results indicate disturbances in voice quality [1, 27]. In addition, a VHI examination performed before and after therapeutic process may indicate the effectiveness of the therapy in the patient subjective evaluation in respect to the objective results of voice and speech quality tests.

Woźnica et al. [35] conducted study using VHI in 125 people with functional dysphonia symptoms, in which the studied group of patients achieved significantly worse results in comparison with a 100-person control group of persons with euphonic voice.

Similarly, Niebudek-Bogusz et al. [27] analyzed the results of VHI examination conducted in 45 female teachers with functional voice disorders. VHI assessment has been performed before treatment and rehabilitation, and after the end of therapy. During the study, two groups were distinguished: group I included 29 women who

received pharmacological treatment, voice therapy and voice production education, group II included 16 women who did not participate in direct voice therapy. Before the implementation of the therapeutic process, teachers from group I obtained an average score of 42.45 points in VHI questionnaire, while after the rehabilitation – 31.93 points. Subjects from group II obtained an average score of 38.75 points and 30.44 points, respectively. The results of conducted research indicate a sense of moderate voice disability [27].

In the own study, the majority of patients with functional psychogenic dysphonia – 56% (28 people) obtained a result indicating mild voice disability.

In analyzed literature, no research results on disorders in supra-segmental area of speech in patients with psychogenic dysphonia are available. On the other hand, own studies showed abnormal, rapid rate of speech in 66% of patients in the study group, and slow in 10% of patients. In the analysis of intonation its lines were disturbed, especially in questions, in which the irregularity and asymmetry of their ascension have been recorded.

In diagnostic and therapeutic procedures in psychogenic voice quality disorders, a holistic, interdisciplinary approach of a team of specialists such as otolaryngologist, phoniatriest, speech therapist,

psychologist and psychiatrist is necessary [18, 22]. In patients with psychogenic dysphonia, it is indispensable to use a comprehensive approach in the therapeutic process, including psychotherapy, cognitive-behavioral strategies, voice therapy, and often pharmacological interventions [22, 31]. It guarantees understanding of the complex, multifaceted relationship between neuropsychological, intrapsychological and interpersonal behaviors affecting patients with psychogenic dysphonia [22].

CONCLUSIONS

1. Hyperfunctional dysphonia is the most common clinical form of psychogenic dysphonia.
2. Disturbances in breathing pathway affect the reduction of maximum phonation time and disturbance of respiratory-phonatory-articulation coordination in patients with psychogenic dysphonia.
3. In psychogenic voice disorders, abnormal course of speech intonation and speech rate disorders are observed.
4. Analysis of the results of voice self-assessment in the majority of patients with psychogenic dysphonia indicates a sense of mild voice disability.

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