



Quality of life of patients with vocal fold nodules before and after vocal therapy

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ABSTRACT

In order to produce a normal voice, the function of larynx must be coordinated, efficient and physiologically stable. Any imbalance in this delicate system affects the quality of voice. The study involved 39 respondents, 20 respondents represented the experimental group, and nodules on the vocal folds were diagnosed in all, while 19 respondents were in the control group. The age of respondents are ranged from 23 to 56 years. Subjective assessment of voice was carried out by the instrument Voice Handicap Index (VHI), which encompasses three areas: Functional, emotional and physical areas. A statistically significant difference was found between the experimental group at the beginning of the measurement and control groups on all three sub-tests as well as on the total score. Statistical significance is at the level of $p < 0.01$. After the completion of vocal therapy, there was no statistically significant difference between the experimental and control groups. Patients with vocal fold nodules can fix their voice problems using vocal therapy, and its main objective is to improve the voice quality that influences the improvement of the quality of life.

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INTRODUCTION

Vocal folds are the belt muscle - binding folds that run from the corner of the thyroid cartilage to the vocal continuation of the arytenoid cartilage. When speaking, the vocal folds contract and vibrate and produce voice that forms a word with the help of tongue, teeth and lips. If a person is exposed to a longer speech in noisy surroundings or other abuse of voice, thickenings or growths may form on them, preventing them from closing properly and resulting in hoarseness. Hoarseness is a voice disorder that indicates any deviation from its normal characteristics of height, intensity and quality and is usually caused by organic and functional changes in the larynx. Vocal nodules or nodules on the vocal folds are limited protrusions that occur on the free edge of the

vocal folds, between the anterior and middle thirds (the so-called Frenkel points) of both vocal folds are usually benign changes of the vocal folds. Nodules may interfere with the professional activities of the patient and should be treated as any further strain of the voice organ of patient with vocal nodules further damages vocal folds (Poplašen, 2014).

Hoarseness may affect communication and social integration, and this will make the quality of life of people worse (Kasper et al., 2011). Although it is not easy to define the concept of quality of life, the literature provides a number of attempts to define this subjective expression.

The quality of life implies the fulfillment of social and cultural conditions related to material security, social status and psychological well-being (Houser et al., 2001). In the last few years, dysphonic patients have conducted self-perception of their own voice and it represents an important medical parameter (Billante et al., 2001).

The Voice Handicap Index (VHI) is a questionnaire

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Table 1. Sample structure.

Gender	Frequency	Percentage
Male	7	35.0
Feminine	13	65.0
Smoking status		
Smoker	11	55.0
Non-smoker	9	45.0
Education		
High School	6	30.0
VSS more	14	70.0
Interest		
Professor	7	35.0
Trader	5	25.0
Nursery governess	2	10.0
Singer	2	10.0
Housewife	2	10.0
Economist	2	10.0
Place of living		
The countryside	9	45.0
City	11	55.0

developed by (Jacobson et al., 1997), and provides us with adequate information on the impact of vocal therapy and the degree of speech difficulty experienced by the patient himself.

The vocal therapy is an effective method that is applied in voice disorders and seeks to change the way of producing a voice (Branski and Murray, 2008). An important initial step of the vocal therapy is a vocal hygiene (Huang et al., 2012).

MATERIALS AND METHODS

Sample

In this study 39 respondents participated; 20 respondents represented the experimental group and vocal fold nodules were diagnosed in all, while 19 respondents were in the control group. There were 13 female respondents and 7 male respondents in the experimental group. The age of respondents ranged from 23 to 56 years. The survey was conducted in the Clinical Hospital "Sveti Vračevi" in Bijeljina in the period from December 2014 to April 2016. All respondents were first examined by ENT specialist by the method of indirect laryngoscopy. Vocal fold nodules were diagnosed in all patients. The respondents were sent to speech therapy clinic where the vocal therapy was conducted twice a week for 30 to 45 min by a speech therapist - a vocal therapist. During the vocal therapy, the patients were given educational guidelines for vocal use and hygiene of voice.

Instruments and procedures

The subjective analysis of the voice in this study is based on the VHI scale (Jacobson et al., 1997) which encompasses three areas: functional, emotional and physical. Each area contains 10 questions - 5 - Likert choices (0-4). This instrument is able to demonstrate the efficacy of vocal therapy and evaluate the difficulty of voice problem experienced by the patient himself. This is a method of self-assessment of voice. The applicants had the task of selecting the offered answer for each of the above questions, presenting their current opinion about the experience of their voice and speech.

The respondents in the experimental group were filling in the VHI questionnaire first time when they came to the speech therapy clinic and the second time after they finished the speech therapy. Time of completing the questionnaire was not restricted. Each respondent was explained the procedure of the research before the beginning of the survey.

Data analysis

Of the measures of descriptive statistics, the arithmetic mean was used with accompanying standard deviation, as well as minimum and maximum. The frequency and percentages were used. Differences among groups were determined by *t* test for large independent samples and the *t* test for paired samples. The Pearson correlation coefficient was used for the testing of two continuous variables. Statistical significance was defined at the level of probability of the null hypothesis of $p \leq 0.05$ to $p < 0.01$. Statistical processing and analysis were done in the computer program SPSS ver 20 (Statistical Package for the Social Sciences).

RESULTS

The study involved 39 respondents, 20 respondents represented the experimental group and 19 respondents were in the control group. There were 13 female respondents and 7 male respondents in the experimental group, as shown in the Table 1. The most represented respondents were vocal professionals. The respondents came from both city and rural areas, and they were mainly with college and university degrees.

The age of respondents ranged from 23 to 56 years, while the average age is 40.05 years, the Table 2. The smoking duration ranges from 5 to 24 years, while the average is 14.6 years. Length of treatment varies from 1 to 2 months; the average treatment duration is 1.6 months.

The *t* test for paired samples was used to examine whether there was a change in the results of the

Table 2. Respondents age, smoking duration and length of treatment.

	N	Min	Max	AS	SD
Age	20	23.00	56.00	40.05	9.45
Smoking duration (years)	11	5.00	24.00	14.63	6.32
The length of time (months)	20	1.00	2.00	1.67	0.37

N, Number of respondents; **Min**, minimum; **Max**, maksimum; **AS**, arithmetic mean (middle value); **SD**, standard deviation.

Table 3. Difference in VHI scale before and after treatment, the experimental group.

	Mean	N	SD	t	df	p
Physical subscale-before	34.45	20	6.12	20.73	19	0.00
Physical subscale-after	1	20	2.27			
Emotional subscale -before	24.85	20	10.42	10.29	19	0.00
Emotional subscale -after	0.25	20	0.91			
Functional subscale -before	20.3	20	5.79	14.81	19	0.00
Functional subscale -after	0.2	20	0.61			
Total score -before	85.1	20	22.81	15.34	19	0.00
Total score -after	1.45	20	3.64			

Table 4. Voice handicap index scale control group.

Sub-scale	Voice disorder categories	Frequency	Percentage
Physical sub-scale	Mild	19	100.0
	Moderate	0	0
	Heavy	0	0
Emotional sub-scale	Mild	19	100.0
	Moderate	0	0
	Heavy	0	0
Functional sub-scale	Mild	19	100.0
	Moderate	0	0
	Heavy	0	0
Total score	Mild	19	100.0
	Moderate	0	0
	Heavy	0	0

respondents measured by the VHI scale. On all three subtests as well as the total score, it has been shown that there has been a change in the result, the Table 3. The statistical significance is below the threshold of 0.05, and we have concluded that there has been a statistically significant change between the two measurements. When observing the mean value (AS), we see that there has been a decline in the score at the VHI scale between the two measurements.

The Table 4 presents the results of the control group and shows that this group of respondents belongs to the group of mild voice disorder. The t test for large

independent samples was used to examine whether there has been a statistically significant difference between the experimental group at the beginning of the measurement and control group and between the experimental group at the end of the measurement and control group (Table 5).

A statistically significant difference was found between the experimental group at the beginning of the measurement and the control group on all three subtests as well as the total score. The statistical significance is at the 0.01 level. When we observe the mean values (AS), we see that the average value is higher in the

Table 5. The difference between the experimental and control groups.

	Group	AS	SD	t	p
Physical subscale-before	Experimental	34.4500	6.12566	24.342	0.000
	Control	0.1579	0.37463		
Emotional subscale-before	Experimental	24.8500	10.42908	10.379	0.000
	Control	0.0000	0.00000		
Functional subscale-before	Experimental	20.3000	5.79564	15.257	0.000
	Control	0.0000	0.00000		
Total score-before	Experimental	85.1000	22.81020	16.219	0.000
	Control	0.1579	0.37463		
Physical subscale-after	Experimental	1.0000	2.27110	1.595	0.119
	Control	0.1579	0.37463		
Emotional subscale-after	Experimental	0.2500	0.91047	1.196	0.239
	Control	0.0000	0.00000		
Functional subscale-after	Experimental	0.2000	0.61559	1.415	0.165
	Control	0.0000	0.00000		
Totalscore-after	Experimental	1.4500	3.64872	1.535	0.133
	Control	0.1579	0.37463		

experimental group at the beginning of measurement than the control group.

DISCUSSION

Vocal nodules are whitish, head of pin-like growths which occur at the free edge of the vocal folds. They most commonly occur in children and vocal professionals, but also among the people that it is their primary occupation. Site for the creation of vocal fold nodules is the border between the anterior and middle thirds of the vocal folds. They cause hoarseness of voice of varying intensity, which affects the physical, social and emotional functions of the patient. The aim of vocal therapy is to restore the voice of the patients in such a way that they are able to use it appropriately for their social and professional needs, and to improve their quality of life.

In this research study, respondents were mostly female, which is in line with previous research (Werning et al., 2007; Bunijevac et al., 2016). VHI is an instrument that describes well the voice quality before and after the vocal therapy (Niebudek-Bogusz et al., 2008; Cantarella et al., 2010). In recent years, it is often used in practice, both in combination with objective methods and independently (Costa et al., 2013).

The results obtained before the vocal therapy, this study showed that nodules on the vocal folds affect the patient's physiological functioning, social adaptability and emotional state. These results are consistent with previous studies, where it was confirmed that dysphonia may cause psychological and emotional problems, affect social integration, and it makes the quality of life of

people worse (Kasper et al., 2011; Huang et al., 2012).

After the completion of vocal therapy in this study there was no statistically significant difference between the experimental and control groups, which means that vocal therapy and providing educational guidance gave positive results in improving the voice, that is, the elimination of nodules on the vocal folds of these respondents. The study of Pizolato et al. (2013) also had a positive outcome of vocal therapy and implementation of educational guidelines for vocal hygiene on the quality of life of patients with dysphonia. The study of Mathur et al. (2015) showed positive impact of vocal therapy on voice quality of vocal professionals. Many studies have shown that vocal therapy can lead to an improved voice quality and voice survivability of patients with dysphonia (Spector et al., 2001; Pizolato et al., 2013; Mathur et al., 2015; Bunijevac et al., 2016).

The vocal therapy in this study was focused on mastering the technique of proper breathing, tension removal in the neck and shoulders, adopting and mastering the vocal hygiene guidelines, and in some patients it was about eliminating hard attacks. Voice therapy enables the decrease of unnecessary tension of muscles of larynx and neck and proper airflow through the glottis.

Therefore, the subjective assessment of voice is not a substitute for medical history or objective research. The previous study lists the harmony between objective measurements and subjective assessment of votes, that is, the results obtained by the objective measurement of the voice disorder are more or less coincident with the results of the subjective assessment of the voice (Kandağan et al., 2009; Lin et al., 2014; Alam et al.,

2015).

The results of this study showed that nodules on the vocal folds affect the functional, social and emotional state of patients, but also the vocal therapy has a significant effect in improving voice disorders and improving the quality of life of these respondents.

Conclusion

The results of this study showed that patients with vocal fold nodules can fix their voice problems using vocal therapy, and its primary goal is to restore the voice of the patient to such a way and that they are able to adequately use it for their social and professional needs, and therefore to improve the quality of their lives.

VHI is an instrument that has been used frequently in the world over the past year in clinics and hospitals on patients with voice disorders. It is used as an instrument that can demonstrate the effectiveness of vocal therapy, assess the severity of voice problems and assess the quality of life of these patients. The quality of life is currently most often measured in various written questionnaires by which we obtain data on how much the patient is able to perform everyday activities through which we observe his physical, emotional and functional condition, as well as the patient's satisfaction with the degree of functioning and control of his illness.

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