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# THE INVESTIGATION OF VOICE HANDICAP INDEX IN TEACHERS WITH AND WITHOUT SELF-RATED VOICE DISORDERS

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**Abstract.** *Voice disorders restrict daily activity and impact the quality of life. The purpose of the study was to find out the impact of voice disorders on functional, physical and emotional condition of teachers with and without self-reported voice disorders. Two hundred thirty-five teachers with self-reported voice problems (Voice disorder group) and 174 teachers with no voice problems (Control group) in anamnesis completed Latvian version of Voice Handicap Index-30 (VHI-30). Teachers with voice disorders demonstrated higher median scores in VHI-30 total scale and functional, physical, and emotional subscales ( $P < 0.001$ ). In teachers, voice disorders have a more significant impact on their physical comfort and have a smaller impact on their emotional sphere. 76.4 % of the voice disorder group respondents acquired the total score within 12 to 33 points. In the control group, 75.3 % of teachers had the VHI score of up to 17 points. Conclusions: In teacher population of Latvia mild voice disorders are encountered more often. Activity and participation in everyday life situations are limited in teachers with voice disorders. Voice disorders mostly impact physical comfort in teachers*

**Keywords:** *Voice Handicap Index-30, teachers, voice disorders.*

## Introduction

Verbal communication is an essential part of daily life. Well functioning voice is a crucial factor in communication.

Voice disorders affect not only the voice quality but can also contribute to psychological and social problems, altering the patients quality of life (Xu et al., 2010). Any limitation or restricted participation in daily activities may result in deterioration in quality of life (Ma & Yiu, 2001). Individuals with voice disorders have more severe functional, physical and emotional restrictions than individuals without voice problems (Guimaraes & Abberton, 2004).

The teaching profession is vocally demanding, and consequently, teachers have a higher risk of voice disorders than other professionals. Teachers are considered occupational voice users, and therefore have the expected result of a heightened perception of handicap due to their voice use, which may make them more susceptible to voice disorders (Albustan et al., 2017).

There are several tools investigating voice related quality of life. One of the more widely used tools is Voice Handicap Index-30 (VHI-30). The VHI-30 is psychometrically validated tool for measuring the psycho-social handicapping effects of voice disorders. The VHI can be used to assess the patient's judgment about the relative impact of his or her voice disorder upon daily activities (Jacobson et al., 1997). The VHI-30 determines individual's handicap in three domains – functional, physical, and emotional. The Latvian version of the VHI-30 was validated in 2014 (Trinite & Sokolovs, 2014).

Teachers with voice disorders estimated their own voice problems as a moderate or severe disability. Results of the total VHI score and each of its subscales: functional, emotional and physical was significantly worse in teachers than in non-teachers (Niebudek-Bogusz et al., 2007). Teachers with voice complaints have a higher perception of voice handicap and lower quality of life than teachers without voice problems (Batista da Costa et al., 2013; Marie et al., 2014; Aparecida Cielo & Veis Ribeiro et al., 2015).

The purpose of the study was to find out the impact of voice disorders on functional, physical and emotional condition of teachers with and without self-reported voice disorders.

## **Material and methods**

The study had a cross-sectional survey design. The stratified sampling methodology was used, and teachers of 24 general education schools from all regions of Latvia were invited to participate in the study. Teachers from urban and rural schools, as well as teachers from primary and secondary schools, participated in the study.

Teachers were requested to complete a short questionnaire with the purpose to determine the presence of voice problems. Before filling in the questionnaires, the respondents were introduced to the concept of voice problems within the purpose of this study “we consider a voice problem to be any time your voice does not work, perform, or sound as you feel it normally should, so that it interferes with your communication” (Roy et al., 2004). Two questions were included in the survey: (1) “Have you ever had problems with your voice?” with possible responses – *yes/no*, (2) “Are you suffering from voice problems?” with possible response options – *at present, during the last nine months, during the teaching career*.

Two teachers groups were formed. The voice disorder group included teachers who had voice problems at the time of questionnaire completion and/or they had had voice problems during the last nine months (i.e., they had actual voice problems or problems during the preceding school year). 235 teachers with a mean age of 44 years, SD = 10 years, the mean number of 20 years teaching,

SD = 10 years, as well as 54 (23 %) smokers, were included in the voice disorder group.

The control group included teachers who had never had any voice problems. There were 174 teachers in this group with a mean age of 42 years; SD = 10 years, the mean number of 19 year teaching years, SD = 10 years, and 32 (18.4 %) were smokers.

Teachers were requested to complete the VHI-30 (Latvian language version). The Voice Handicap Index is made of 30 statements divided into three subscales characterizing functional, physical, and emotional aspects of voice disorders. Each subscale has 10 statements (30 statements in total). Respondents were asked to rate each statement with a score between 0 (never) and 4 (always). The minimum total acquired points – 0, maximum – 120 points. The more severe teacher perceived their voice handicap, the higher should be score on the VHI. Additionally, subjects were asked to self-evaluate the degree of voice problems according to the following scale – no problems, mild, moderate or severe problems. Allocated time for filling out the Voice Handicap Index is 5-10 minutes.

The descriptive statistics, as well as Kolmogorov-Smirnov test, Chi-square test, and Mann-Whitney test were used for data analysis. The SPSS 16.0 package (SPSS Inc., Chicago, IL) was used for statistical data processing.

## **Results**

The objective of the study was to find out to what extent voice disorders impact teacher's emotional and physical comfort, as well as their functionality, i.e., their ability to use their voice. The VHI-30 forms of 235 teachers with voice disorders (VD group) and 174 teachers without voice disorders (Control group) were analysed. The psycho-social handicapping effects of voice disorders in teachers were judged by the scores of Voice Handicap Index total scale and subscales. Since scores to be analysed were not normally distributed (Kolmogorov–Smirnov test,  $p < 0.001$ ), non-parametric statistical methods were used.

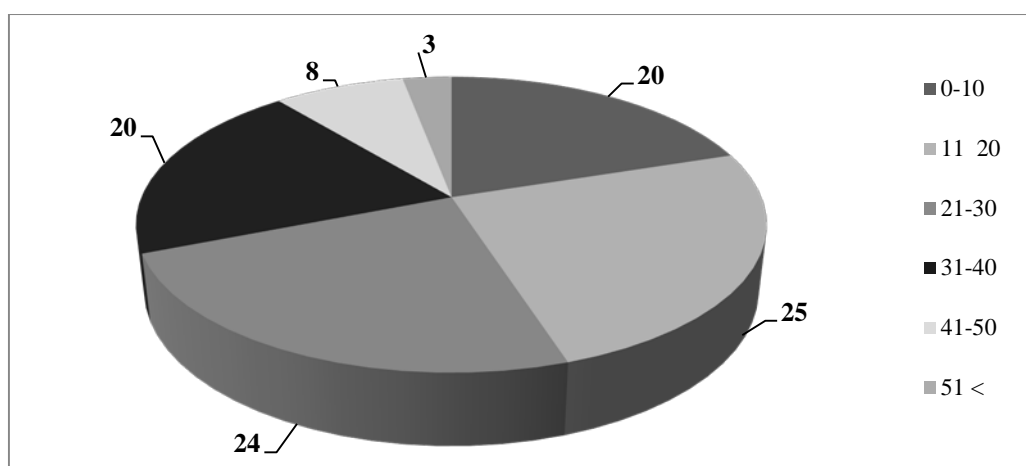
In order to evaluate the hypothesis that the VHI total scale and subscale score in the control group are lower than the VHI results in the voice disorder group, the Mann-Whitney test was used. Test results showed statistically significant ( $P < 0.001$ ) difference between the results acquired by both groups (Table 1).

The median value of the VHI total scale in the voice disorder group was 23 (12; 33). The range of VHI total scale score was from 0 to 77 in the voice disorder group. Median value in the VHI functional scale was 7 (4; 10), the physical scale was 10 (6; 15), the emotional scale median value was 5 (2; 10) in the voice disorder group.

**Table 1 Median values and minimal and maximal score values for the VHI total scale and subscales in the voice disorder and the control group (P<0.001)**

Scale	Group	N	Me(Q <sub>1</sub> ; Q <sub>3</sub> )	Min, Max
Functional	Control	174	4 (2; 7)	0; 20
	VD	235	7 (4; 10)	0; 24
Physical	Control	174	4 (2; 7)	0; 20
	VD	235	10 (6;15)	0; 30
Emotional	Control	174	2 (0; 4)	0; 20
	VD	235	5 (2;10)	0; 24
Total	Control	174	10 (5; 17)	0; 60
	VD	235	23 (12; 33)	0; 77

In the voice disorder group, 20 % of respondents acquired 0 to 10 points, 25 % of respondents acquired points between 11 to 20 and almost the same percentage – 24 % acquired points between 21 to 30 in the total score of VHI. 68.5 % of respondents in the voice disorder group acquired up to 30 points in the VHI total score (Figure 1).



**Figure 1. Distribution of the VHI scores (%) in the voice disorder group**

Each of the three VHI subscales consisted of ten statements that characterise consequences of voice disorders on a specific area of life – functional, physical, and emotional. Respondents had to evaluate to what extent each statement refers to their experience. In order to check the correlation between each specific item and voice problems in the teacher group, the Chi-square test was used (Tables 2, 3, 4).

**Table 2 Distribution of the Functional scale answers (%) in the control group (N = 174) and the voice disorder group (N = 235)**

(0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always)

Statement	Group	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	$\chi^2$	<i>f</i>	<i>P</i>																																																																																																																																												
F1. My voice makes it difficult for people to hear me	Control	44	35	21	1	0	8.77	3	0.032																																																																																																																																												
	VD	31	39	29	2	0				F3. People have difficulty understanding me in a noisy room	Control	30	35	31	3	1	3.71	4	0.447	VD	25	32	38	6	0	F5. My family has difficulty hearing me when I call them throughout the house	Control	44	36	16	3	1	11.74	4	0.019	VD	32	38	28	3	0	F6. I use the phones less often than I would like to	Control	55	24	19	2	0	10.68	4	0.03	VD	42	34	19	3	2	F8. I tend to avoid groups of people because of my voice	Control	81	14	5	0	0	7.33	2	0.026	VD	70	24	6	0	0	F11. I speak with friend, neighbours, or relatives less often because of my voice	Control	90	8	2	0	0	27.87	3	<0.001	VD	68	27	6	0	0	F12. People ask me to repeat myself when speaking face-to-face	Control	60	30	10	0	0	12.17	2	0.002	VD	43	42	15	0	0	F16. My voice difficulties restrict personal and social life	Control	84	14	2	1	0	42.12	3	<0.001	VD	55	30	15	0	0	F19. I feel left out of conversation because of my voice	Control	76	17	6	0	0	14.95	3	0.002	VD	59	31	9	1	0	F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001	VD	55
F3. People have difficulty understanding me in a noisy room	Control	30	35	31	3	1	3.71	4	0.447																																																																																																																																												
	VD	25	32	38	6	0				F5. My family has difficulty hearing me when I call them throughout the house	Control	44	36	16	3	1	11.74	4	0.019	VD	32	38	28	3	0	F6. I use the phones less often than I would like to	Control	55	24	19	2	0	10.68	4	0.03	VD	42	34	19	3	2	F8. I tend to avoid groups of people because of my voice	Control	81	14	5	0	0	7.33	2	0.026	VD	70	24	6	0	0	F11. I speak with friend, neighbours, or relatives less often because of my voice	Control	90	8	2	0	0	27.87	3	<0.001	VD	68	27	6	0	0	F12. People ask me to repeat myself when speaking face-to-face	Control	60	30	10	0	0	12.17	2	0.002	VD	43	42	15	0	0	F16. My voice difficulties restrict personal and social life	Control	84	14	2	1	0	42.12	3	<0.001	VD	55	30	15	0	0	F19. I feel left out of conversation because of my voice	Control	76	17	6	0	0	14.95	3	0.002	VD	59	31	9	1	0	F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001	VD	55	27	17	0	0												
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	VD	68	27	6	0	0				F12. People ask me to repeat myself when speaking face-to-face	Control	60	30	10	0	0	12.17	2	0.002	VD	43	42	15	0	0	F16. My voice difficulties restrict personal and social life	Control	84	14	2	1	0	42.12	3	<0.001	VD	55	30	15	0	0	F19. I feel left out of conversation because of my voice	Control	76	17	6	0	0	14.95	3	0.002	VD	59	31	9	1	0	F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001	VD	55	27	17	0	0																																																																												
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	VD	43	42	15	0	0				F16. My voice difficulties restrict personal and social life	Control	84	14	2	1	0	42.12	3	<0.001	VD	55	30	15	0	0	F19. I feel left out of conversation because of my voice	Control	76	17	6	0	0	14.95	3	0.002	VD	59	31	9	1	0	F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001	VD	55	27	17	0	0																																																																																												
F16. My voice difficulties restrict personal and social life	Control	84	14	2	1	0	42.12	3	<0.001																																																																																																																																												
	VD	55	30	15	0	0				F19. I feel left out of conversation because of my voice	Control	76	17	6	0	0	14.95	3	0.002	VD	59	31	9	1	0	F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001	VD	55	27	17	0	0																																																																																																												
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F22. My voice problem causes me to lose income	Control	84	14	1	1	0	44.29	3	<0.001																																																																																																																																												
	VD	55	27	17	0	0																																																																																																																																															

**Table 3 Distribution of the Physical scale answers (%) in the control group (N = 174) and the study group (N = 235)**

(0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always)

Statement	Group	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	$\chi^2$	<i>f</i>	<i>P</i>
P2. I run out of air when I talk	Control	69	23	8	1	0	32.43	3	<0.001
	VD	43	32	25	0	0			
P4. The sound of my voice varies throughout the day	Control	21	29	38	10	2	26.14	4	<0.001
	VD	7	23	48	19	4			
P10. People ask, "What's wrong with your voice?"	Control	70	25	5	1	0	87.01	4	<0.001
	VD	29	32	39	0	0			
P13. My voice sounds creaky and dry	Control	74	20	6	0	0	45.99	3	<0.001
	VD	43	28	28	1	0			
P14. I feel as though I have to strain to produce voice	Control	79	16	5	1	0	50.85	3	<0.001
	VD	46	26	26	2	0			
P17. The clarity of my voice is unpredictable	Control	70	23	7	0	0	32.32	3	<0.001
	VD	46	34	20	2	0			
P18. I try to change my voice to sound different	Control	62	25	14	0	0	10.88	3	0.012
	VD	48	27	24	1	0			
P20. I use a great deal of effort to speak	Control	81	16	4	0	0	46.73	3	<0.001
	VD	50	26	23	2	0			
P21. My voice is worse in the evening	Control	58	28	14	0	0	62.92	4	<0.001
	VD	26	26	40	7	2			
P26. My voice "gives out" on me in the middle of speaking	Control	67	28	5	0	0	82.10	3	<0.001
	VD	29	32	39	1	0			

**Table 4 Distribution of the Emotional scale answers (%) in the control group (N = 174) and the study group (N = 235)**

(0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always)

Statement	Group	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	$\chi^2$	<i>f</i>	<i>P</i>
E7. I am tense when talking to others because of my voice	Control	70	21	9	1	0	13.69	3	0.003
	VD	52	31	16	1	0			
E9. People seem irritated with my voice	Control	67	24	9	1	0	13.00	3	0.005
	VD	50	37	13	0	0			
E15. I find other people don't understand my voice problems	Control	86	10	4	0	0	36.96	3	<0.001
	VD	58	24	16	2	0			
E23. My voice problems upsets me	Control	77	17	6	0	1	31.11	4	<0.001
	VD	28	25	39	6	2			
E24. I am less outgoing because of my voice problem	Control	82	14	4	0	0	33.82	3	<0.001
	VD	56	27	16	1	0			
E25. My voice makes me feel handicapped	Control	87	10	3	0	0	16.49	4	0.002
	VD	70	21	7	1	0			
E27. I feel annoyed when people ask me to repeat	Control	65	25	9	1	0	13.45	4	0.009
	VD	49	31	15	3	2			
E28. I feel embarrassed when people ask me to repeat	Control	72	21	6	0	0	14.30	4	0.006
	VD	56	30	13	1	0			
E29. My voice makes me feel incompetent	Control	86	12	2	0	0	12.40	2	0.002
	VD	72	23	6	0	0			
E30. I am ashamed of my voice problem	Control	92	6	2	0	0	32.35	3	<0.001
	VD	69	26	5	0	0			

## Discussion

The study results established how and to what extent voice disorders impact teacher's physical and emotional comfort, as well as their functionality. The physical scale of the VHI represents subjective feelings caused by the larynx discomfort, the Emotional subscale characterises the affective reactions caused by voice disorders, and the Functional scale includes statements that describe voice disorder impact on performing everyday activities (Jacobson et al., 1997).

Activity and participation limitations caused by voice disorders correlate with the vocal symptom scale, i.e., the extent of voice disorders. Upon the increase

of vocal symptoms, the extent of voice disorders and activity and participation limitations caused by voice disorders increase; that is considered to be the direct consequences of voice disorders in physical, functional, and emotional domains.

It was established that the median score of the VHI total scale is higher in teachers with voice disorders than in teachers without voice disorders. There were considerably higher results also in the functional, physical, and emotional subscales in the voice disorder group when compared to the control group. It means that teachers with self-evaluated voice problems feel more limited in their daily activities, they suffer from affective reactions caused by voice disorders more often, and they feel voice discomfort more often. During the study, we established that voice disorders in teachers have a more significant impact on their physical comfort and have a smaller impact on their emotional sphere. Teachers more often relate their voice disorders to the acoustically detectable changes in their voice sound and unpleasant feelings in the larynx during speech. Teachers with voice disorders believe that they have fewer job opportunities because of the voice problems, that voice difficulty limits their personal and social life, as well as they, limit their communication with friends, neighbours, and relatives. Voice problems are noticeable to other people around us. Teachers with voice problems have more often heard a question addressed to them “What is wrong with your voice?” Physical handicapping of voice problems – cracking of voice in the middle of the speech, failing of voice in the evening, the necessity to strain to produce voice, and use of a great deal of effort to speak – have been marked by teachers in the voice disorder group more often than in the control group. Voice problems impact the psycho-emotional condition of teachers. Teachers in the voice disorder group believe that other people do not understand their voice problems more often, that they are less outgoing due to their voice problems. They are ashamed of their voice problems.

The VHI result provides indications about the degree of voice disorder. The VHI within 0 to 30 points corresponds to light or early voice problems and the resulting minimal participation limitations, 30 to 60 points indicate moderate voice problems and average participation limitations, and 61 to 120 points indicate severe voice problems and significant, severe participation limitations (Niebudek-Bogusz et al., 2007; Fairfield & Richards, 2007). The relation between the degree of voice problems and the VHI total scale results is relative. The closer the VHI score gets to 0, the less explicit the voice problem is (Jacobson et al., 1997). In the voice disorder group the VHI total scale score has concentrated within 12 to 33 points, i.e., 76.4 % of the voice disorder group respondents acquired the total number of points within 12 to 33 points, i.e., 76.4 % of the voice disorder group respondents had up to 33 points. In the control group, 75.3 % of teachers had the VHI score of up to 17 points. The acquired results allow a conclusion that the scores acquired in the control group are closer to zero marks



and can be interpreted as absence of the voice problems, whereas in the voice disorder group the VHI scores dispersion testify of mild voice disorder presence.

The study results show that mild voice disorders impacting physical comfort are more often present in teachers. Our study conclusion - that teachers with voice disorders have higher VHI values corresponds to study results by another author (Guimarães & Abberton, 2004; Kooijman et al., 2007; Thomas et al., 2007; Fairfield & Richards, 2007; Kuzanska et al., 2009).

The acquired results indicate higher activity and participation limitation in teachers with voice disorders when compared to the teachers without voice complaints.

Every daily activity limitation impacts the quality of life (Ma & Yiu, 2001). Changes in the quality of life impact the quality of work (Chen et al., 2010). Before filling out the VHI people often do not realise their voice problems. Upon understanding that voice problems impact their daily life people will start changing their habits and externals that impact their voice (Jacobson et al., 1997). Identification of consequences caused by voice problems could allow people to evaluate their attitude towards their voice health.

### **Conclusions**

1. A mild degree of voice disorders is encountered more often in teachers' population of Latvia.
2. Teachers with self-reported voice disorders have a higher median score of the VHI total scale than teachers without self-reported voice disorders.
3. Teachers with self-reported voice disorders have higher median score in each VHI subscale (physical, emotional, functional) to compared with teachers without self-reported voice disorders, which leads to conclusion that teachers with voice problems are more limited in their daily activities, they suffer from physical voice discomfort, as well as has adverse emotional reactions related to voice production.
4. Voice disorders mostly affect physical comfort in teachers with voice disorders.

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