V-RQOL as a tool for assessing the impact of voice disorders on the quality of life in occupational voice users

Kwestionariusz V-RQOL jako narzędzie oceniające wpływ zawodowych zaburzeń głosu na jakość życia

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Wprowadzenie. Zawodowe choroby narządu głosu stają się coraz bardziej istotnym problemem zdrowotnym. Według wytycznych Europejskiego Towarzystwa Laryngologów diagnostyka zaburzeń głosu powinna być kompleksowa, uwzględniająca samoocenę jakości życia zależnej od głosu.

Cel pracy. Celem pracy było wprowadzenie polskiej wersji kwestionariusza Jakości Życia Zależnej od Głosu (V-RQOL) do diagnostyki foniatrycznej i logopedycznej oraz pilotażowa ocena wyników badań w grupach osób z zaburzeniami zawodowymi głosu i bez takich zaburzeń.

Materiał i metody. Grupa badana składała się z 26 kobiet z zaburzeniami głosu o podłożu zawodowym. Grupę kontrolną stanowiło 26 eufonicznych kobiet, których praca nie wymagała wysiłku głosowego. Uczestniczki badania zostały poddane badaniu kwestionariuszowemu V-RQOL. Do celów porównawczych wykorzystano kwestionariusz niepełnosprawności głosu (VHI).

Wyniki. W grupie badanej najczęstszym rozpoznaniem była niedomykalność głośni (11 przypadków), rzadziej dysfonia hyperfunkcjonalna (7) i guzki głosowe (6). Wyniki V-RQOL wykazały, że jakość życia zależna od głosu była istotnie gorsza w grupie badanej niż w kontrolnej (62,4 vs 88,8 punktów).

Wnioski. Wyniki pilotażowych badań sugerują, że polska wersja V-RQOL jest obiecującym narzędziem samooceny jakości życia zależnej od głosu, które może znaleźć zastosowanie w badaniach przesiewowych u osób pracujących głosem.

Słowa kluczowe: *jakość życia – ocena głosu, zawodowe zaburzenia głosu, badania przesiewowe głosu, subiektywna ocena głosu*

Introduction. In recent years occupational voice disorders have become a pressing occupational health issue. According to European Laryngological Society guidelines, evaluation of voice disorders should be a complex process including patients' selfreported quality of life.

Aim. The aim of the study was introducing the Polish version of Voice-Related Quality Of Life (V-RQOL) questionnaire to phoniatric and speech therapy diagnostics, and a pilot evaluation of research results in groups of subjects with and without occupational voice disorders.

Material and methods. 26 female occupational voice users with voice disorders and 26 normophonic controls were qualified for the study. Translated version of V-RQOL was administered to all participants. A self – assessment test Voice Handicap Index (VHI) was used for comparison purposes.

Results. In the study group most frequently detected disorder was glottal insufficiency (11 cases), less frequently hyperfunctional dysphonia (7) and vocal nodules (6). The V-RQOL results showed that quality of life in dysphonic subjects was lower than in control group (62.4 vs 88.8 points).

Conclusions. The findings suggest that the Polish V-RQOL measure seems to be a promising quality of life assessment screening tool to detect occupational voice disorders.

Key words: *voice-related quality of life, occupational voice disorders, occupational voice, subjective voice assessment, screening voice tests*

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INTRODUCTION

In modern society a demand for oral communication is increasing in many professions. "Occupational voice" is a term coined to refer to professions in which voice constitutes a major work tool and is an essential part of the work task, paramount to the performance of the job itself [1,2]. It is estimated that nearly one-third of work force in the developed world relies on their voice to perform their jobs [3]. Due to the fact that voice has assumed such an important role in occupational activities, occupational voice disorders are a multifold problem which involves social, economic and public health aspects. Voice problems pose a threat to careers of numerous professional voice users as well as to reduction of profits of the employers [1,4,5]. The problem has been investigated in the USA and in the European Union countries. For instance, the statistical data in the USA shows that voice disorders in employees incur $ 2.5 billion loss for the budget. In the United Kingdom, more than 5 million workers are reported to be affected by voice loss annually, which burdens the budget with an approximate annual cost of £200 million [3,6]. As of yet no such data is available for Poland. However, given that Poland is part of the developed world where the service sector continues to grow and the society is more and more dependent on verbal communication, it could be assumed that the number of occupational voice disorders is still growing. A multi-center clinical trial conducted in Poland proved that occupational voice disorders in teachers occurred three times more frequently than in non-teachers [7]. What is more, in the last decade occupational voice diseases in Poland account for over 10-20% of all registered occupational diseases [8]. As a result, occupational voice disorders are an urgent issue of Occupational Safety and Health (OSH).

Vocal demands vary between different voice and speech professions to a great extent. Professional voice users work in a wide range of disciplines and genres [4,9]. According to the American Medical Association (AMA), we can divide jobs into four groups regarding the vocal load involved:

1st group – vocal performers (singers, actors),

2nd group – spoken voice professions (teachers, call-center workers, interpreters, trainers),

3rd group – jobs with some tasks in voice,

4th group – jobs with no tasks in voice.

The term vocal load refers to the amount of voice a person uses for his job in his working time. This is not dependent on one's attitude to whether they are more or less talkative [1].

There is a growing number of jobs in which communication skills and voice play a key role, for instance: sales and related occupations, customer service representatives, telemarketers to name but a few. In all groups of professional voice users early identification and treatment of voice problems is thought to reduce their severity and the time needed to recover from them. It should be stressed that voice disorders undermine the quality of life of those directly affected, and this is particularly true in case of voice professionals.

Evaluation of quality of life is primarily conducted by means of questionnaires, a great many of which have been developed in English. They are tools which elicit reports or ratings from patients. These reports/ratings are often descriptions of vocal behaviour or of symptoms and feelings [10-13]. For these instruments to be used successfully in other languages, they must be translated and should be adapted according to international guidelines and adjusted to a specific cultural context. They should then be submitted to tests to prove their validity, reliability and responsiveness. It is also important that these instruments should be able to evaluate specific populations, in this case a population of subjects relying on their voice for work [2,5].

Two voice-related questionnaires most widely used in clinical practice worldwide are the Voice Handicap index (VHI) and the Voice-Related Quality of Life (V-RQOL). In Poland the VHI has been applied in clinical practice for many years, whereas the V-RQOL has not yet been used by Polish clinicians managing voice disorders. Both these instruments exhibit strong psychometric properties and may yield valuable information [14].

Therefore, the aim of this pilot study was to perform the Polish V-RQOL version in voice professionals suffering from dysphonia, compare it with the commonly used voice self-assessment tool – VHI, and to demonstrate measurement properties of V-RQOL so that it can be used as an instrument to evaluate the quality of life of Polish patients with voice problems, as well as a screening tool for detecting voice disorders in occupational voice users.

MATERIALS AND METHODS

Subjects

Overall, there were 56 subjects who took part in the study. The study group consisted of 30 professional voice users, all females, who were referred to the Department of Audiology and Phoniatrics of the Nofer Institute of Occupational Medicine in Lodz for an examination due to vocal problems. The patients had various professional experience acquired

and various vocal loading required for their jobs. 30 of 30 subjects in the study group returned the completed VHI and V-RQOL forms, which provides a response rate of 100%. Four subjects were excluded because they did not fill in the questionnaires correctly, therefore the study group comprised 26 subjects. The participants in the study group ranged in age from 25 to 60, mean age 45. The control group comprised 26 females (mean age 43) performing mainly clerical jobs with little vocal loading, who had not reported any voice complaints. The exclusion criterium was previous phoniatric evaluation and a diagnosis of a voice disorder. The participants in the control group were all volunteers who agreed to take part in the study. Demographic characteristics were very similar between groups (Tab. I).

Table I. Demographic data for all subjects

Subject characteristics	Study group n=26	Control group n=26
Age range (yr)	25-60	21-60
Mean age (yr)	45	43
Median age (yr)	47	45

Methods

The subjects from the study group and the control group made a self-assessment of voice by means of 2 questionnaires, V-RQOL and VHI. Subsequently, they underwent a medical examination conducted by a phoniatrician, during which laryngovideostroboscopy was carried out.

V-RQOL is a self-administered measuring tool developed by Hogikyan and Sethuraman [10]. In this pilot study a Polish translation of the questionnaire was used (Appendix 1a). The test consists of 10 questions in total which can be further divided into two domains: six questions on physical functioning in the past two weeks (items 1, 2, 3, 6, 7, 9), and four questions on mental functioning in the past two weeks (items 4, 5, 8, 10). Physical functioning relates to trouble while speaking, using the telephone or during work. Mental functioning refers to symptoms of anxiety and depression, as well as to withdrawal from social life and friends. Each statement is scored on a five point scale to rate to which extent an aspect of functioning is a problem, where 1 = not a problem, 2 = a small amount, 3 = a big amount, 4 = a lot, 5 = problem is as bad as it can be. A sum score ranging from 10 to 50 is calculated and subsequently calculated from zero to 100, using the algorithm:

$$100 - \frac{\text{Raw Score - \# items in domain or total}}{\text{Highest Possible Raw Score - \# items}} \times 100$$

which yields lower numerical values to reflect reduced quality of life related to voice. As illustrated in Fig. 1, higher raw scores imply worse function of voice, and thus worse quality of life.

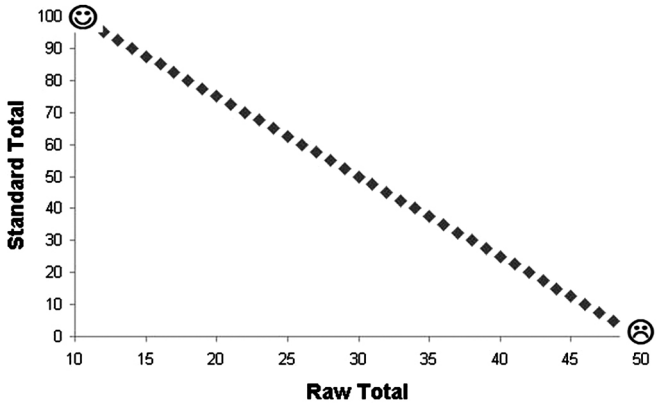

Fig. 1. The relation of the raw total scores to the standard total scores of the V-RQOL

Additionally, each patient also gives a self-rating of their voice quality using a Likert Scale with 4 items: bad, average, good, very good (Appendix 1b). This instrument has been successfully used in clinical practice abroad and its validity, reliability and responsiveness have been demonstrated in numerous studies [12,15-20]. So far such tests have not been carried out in Poland.

The Polish translation of the V-RQOL was performed by a sworn translator and a bilingual speech therapist. The back translation was done by an English teacher, the owner of the leading English Language School in Łódź, who had not participated in the previous stage. All the three translators were given information about the objective and the procedure of the research. The final version of the survey was revised by a committee of 2 speech therapists and an ENT - phoniatrician. The translated version of the questionnaire (Appendix 1) was given to the subjects to complete along with the existing Polish version of VHI questionnaire for comparison purposes.

VHI is a patient self-assessment test first introduced by Jacobson et al. in 1998 [21]. It consists of 30 items in three domains: emotional, physical and functional aspects. VHI was originally developed to help patients and clinicians quantify the amount of disability that a voice disorder is causing. Points from the questions can be combined to assign a total score, or they can be combined by subscale. The higher the number, the greater the amount of disability noted due to a voice-related problem [15,16,21,22].

Patients were asked to complete the V-RQOL and the VHI in a single sitting prior to medical evaluation. The questionnaires were handed face-to-face to the participants who completed them on their own. The patients completed the questionnaires immediately before the clinical examination, without prior information regarding the nature of their voice disorders. The average time needed for completing both questionnaires was 20 minutes. For each patient the following information was obtained and stored in a database: score on V-RQOL, score on VHI, medical history, information on the course of professional career and voice loading. Diagnoses were established by a phoniatrician on the basis of a case story review, perceptual voice assessment and lanyngovideostroboscopy. Voice training was recommended and scheduled in a number of cases.

Subsequently, the results for the VHI and V-RQOL were calculated for both groups and a comparative analysis of the VHI and V-RQOL was carried out. Taking into consideration small samples of both groups and the violation of the normality assumption (especially in control group) nonparametric Mann-Whitney U test (for independent samples) was used. Spearman's rank correlation coefficient (Spearman's rho) was applied to assess statistical dependence between the variables.

All the patients comprising the study group underwent a phoniatric examination with laryngovideostroboscopy.

RESULTS

The results of the phoniatric examination

The most common voice disorder detected during laryngovideostroboscopy within the research group was glottal insufficiency – 11 cases. 7 patients were diagnosed with hyperfunctional dysphonia, 6 with vocal nodules and there were also 2 cases of vocal fold paresis.

The comparison of the V-RQOL scores in the study group and the control group

Comparison of total V-RQOL results between the study and control groups showed significant differences (Fig. 2) ($p<\alpha$; $\alpha=0,05$). The statistical analysis of the results indicates considerably lower total V-RQOL scores in the study group than in the control group, which implies a better status of the voice apparatus in the control group (people with no voice disorders). The average total V-RQOL score for the study group is 62.42 points (SD 19.33). Half of the subjects in this group present scores not higher than 65. For comparison, the average total V-RQOL score in the control group is 88.75 points (SD 12.63) with the median score 92.5.

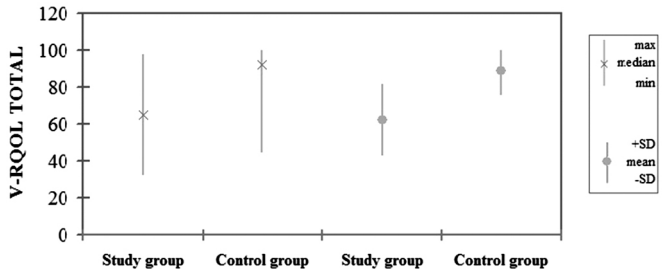

Fig. 2. The comparison of the V-RQOL scores in the study group and the control group

The comparison of the VHI scores in the study group and the control group

As shown in Figure 3, the results in control group differ significantly from the study group ($p<\alpha$) in that the total VHI score is substantially lower in the control group. The mean VHI total score in the study group reaches 47.9 points (SD 18) with half of the subjects reached the scores not lower than 52. In the control group, in turn, the scores are much lower with the mean results of the total VHI scores on 11.7 point level. The diversity of the results in this group is considerable (SD 12.80).

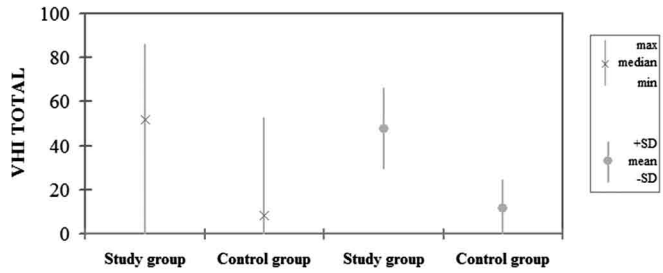

Fig. 3. The comparison of the VHI scores in the study group and the control group

Correlation of the VHI and V-RQOL

There is a statistically significant relation between the V-RQOL scale and the VHI both in the study group and the control group. Spearman's rank correlation coefficient is -0.813 and -0.712 for the groups respectively. It should be underlined that these correlations are negative, that is subjects with high score of voice handicap assessed by means of VHI reach lower (worse) results of quality of life measured with the use of V-RQOL. Data presented in Figure 4 confirm a negative but strong correlation between V-RQOL and the VHI, stronger in the study group where the actual course of the V-RQOL is parallel with the VHI.

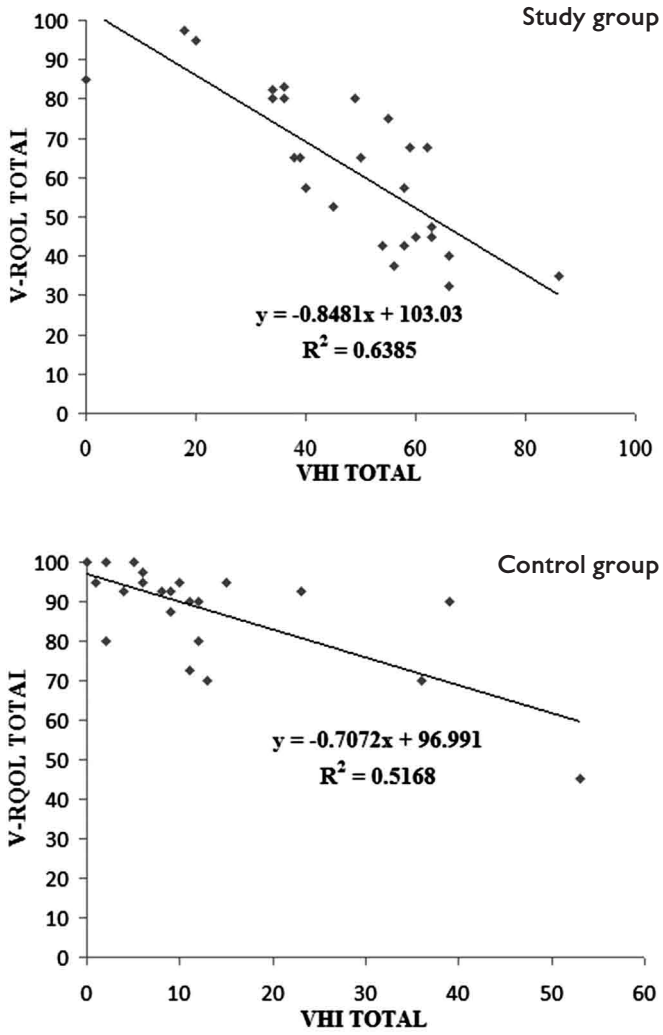

Fig. 4. Scatter plot of the scores from V-RQOL and VHI for the subjects from the study group and control group

y – Linear trend line

R2 – coefficient of determination

DISCUSSION

In the communication era of the 21st century where the world's economy is more and more dependent on communication-based employment, the society should direct its resources to a strategy of preventive medicine and medical care. Communication disorders, including occupational dysphonia, should be an important public health concern, because untreated, they adversely affect the economic well-being of the society [23]. Therefore, improved Occupational Health and Safety (OSH) arrangements for professional voice users are an urgent issue [4]. A revised approach to occupational voice disorders should be a compound one, incorporating patients' self-assessment of their voice-related quality of life.

Holistic approach to management of voice disorders

Clinical evaluation of voice disorders is a complex process requiring multidimensional considerations. Both objective and subjective methods of assessment are taken into account.

Objective evaluations do not show the individual's point of view of his/her psycho-emotional, social and professional problems that may be related to the changes in health [24]. Therefore, in recent years more and more attention has been paid to supplemental methods of evaluation which aim at quantifying self-perception of quality of life resulting from voice problems [14]. The principle of holistic approaches to patients, as outlined in the health-concept of World Health Organization (WHO) has led to an increase in use of quality of life measurements in the form of self-report scales as an important assessment method [20]. Quality of life is defined by WHO as the individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [5,25]. It is also underlined that the ultimate goal of health care is to maintain or improve the quality of life of people [26].

The degree to which a voice disorder impacts a person's functional, physical, emotional and social well-being is highly variable and dependent on a number of factors which are unique to the individual. Social functioning, the ability of the individual to interact in a normal or usual way in society, can be severely impeded by voice disorders. Individuals with voice disorders may experience social isolation, depression as well as absenteeism from work [27]. Thus, assessing the impact a voice disorder has on an overall quality of life of a patient is an extremely useful part of the evaluation and may also serve as a guideline for choosing the right kind of treatment [28]. Most voice disorders do not pose a direct threat to a person's life, and treatment is usually elective. The nature and intensity of the treatment are most often based on the magnitude of the voice-related problems experienced by patients in their daily activities, and the importance that patients themselves place on these problems [6]. In other words, the choice of treatment is dependent on the impact that a voice problem has upon the patient's V-RQOL.

The V-RQOL as a new, simpler tool for assessing voice-related quality of life

The conducted research investigated the potential utility of V-RQOL, as it is an instrument developed specifically to assess the impact of a voice disorder on the individual's quality of life.

Appendix 1

Data badania:.....

V-RQOL Voice- Related Quality Of Life
KWESTIONARIUSZ OCENY JAKOŚCI ŻYCIA ZALEŻNEJ OD GŁOSU

Imię i nazwisko:.....
Data urodzenia:.....

Staramy się dowiedzieć więcej na temat tego, w jaki sposób problemy z głosem wpływają na wykonywanie codziennych czynności. W poniższym kwestionariuszu znajdzie Pan/Pani listę możliwych problemów związanych z głosem. Proszę odpowiedzieć na wszystkie pytania w oparciu o ocenę stanu własnego głosu w przeciągu ostatnich 2 tygodni. Nie ma „poprawnych" ani „błędnych" odpowiedzi.
A).Biorąc pod uwagę zarówno dotkliwość problemu w przypadku jego wystąpienia, jak również częstotliwość jego występowania, proszę ocenić jak „dokuczliwa" (w znaczeniu stopnia nasilenia) jest każda z wyszczególnionych niżej dolegliwości. Aby ocenić stopień nasilenia problemu, proszę zastosować następującą skalę: *1 – nie stanowi żadnego problemu; 2 – w niewielkim stopniu; 3 – w umiarkowanym stopniu; 4 – w dużym stopniu; 5 – gorzej być nie może*.

	Z powodu mojego głosu:	Stopień nasilenia problemu				
1.	Głośne mówienie i bycie słyszanym/ą w głośnym otoczeniu sprawiają mi trudność.	1	2	3	4	5
2.	Podczas mówienia brakuje mi powietrza i muszę często brać oddech.	1	2	3	4	5
3.	Czasami nie jestem w stanie przewidzieć jak będzie brzmiał mój głos, gdy zaczynam mówić.	1	2	3	4	5
4.	Czasami odczuwam zdenerwowanie i frustrację.	1	2	3	4	5
5.	Czasami jestem przygnębiony/a.	1	2	3	4	5
6.	Rozmowa przez telefon sprawia mi trudność.	1	2	3	4	5
7*.	Czuję się mniej kompetentny/a zawodowo.	1	2	3	4	5
8.	Unikam spotkań towarzyskich.	1	2	3	4	5
9.	Muszę powtarzać wypowiedź, aby być zrozumianym/ą.	1	2	3	4	5
10.	Stałem/am się mniej towarzyski/a.	1	2	3	4	5

* - Jeśli niemożliwe jest udzielenie odpowiedzi w odniesieniu do obecnej pracy i życia zawodowego, proszę wziąć pod uwagę wykonywanie zwykłych codziennych czynności.

B). Jak ocenia Pan/ Pani jakość swojego głosu? (proszę zakreślić właściwą odpowiedź)

zła	przeciętna	dobra	bardzo dobra

The Polish version of the V-RQOL performed well in both the research and control groups. Mean V-RQOL score in the study group was 62.4. The results obtained in our research regarding the applicability of the V-RQOL in complex assessment of voice disorders seem to be in accordance with the results from other institutions abroad. For comparison, in the study conducted by Aaby and Heimdal in Norway, the mean V-RQOL score was 74.5, and in the study by Hogikyan and Sethuraman who developed the instrument, the value was lower, 53.5 [20]. The low mean score seen in the study group of this pilot study may result from the fact that all the subjects who reported to the clinic demonstrated self-reported vocal complaints which were clinically confirmed by an instrumental examination (laryngovideostroboscopy). What is more, all subjects in this group were professional voice users. People who rely on their voice for work tend to pay greater attention to its characteristics, quality and the way its disorders affect the overall quality of life. The findings of our research seem to confirm that the proposed new measuring instrument V-RQOL can serve as a valuable and reliable tool for the identification of voice disorders, especially for use in screenings.

Given that the V-RQOL questionnaire consists of ten items only, it is less time consuming than other diagnostic tools assessing patients' self-perception, like the VHI. It takes less than 5 minutes to complete and so it is easy to apply in clinical practice and may be regarded as 'economical'. In the study carried out by Hogikyan and Sethuraman, most patients completed the V-RQOL form within five minutes [17]. It can be assumed that this is also applicable to the Polish version, given that it took 20 minutes on average for the patients in our study to complete two questionnaires (V-RQOL and VHI).

The VHI survey, which was originally developed to assess treatment outcomes, was administered among the patients in the study group and control group with the sole purpose of comparing it with the new V-RQOL measure and testing the possibility of limiting patient self-reported quality of life measure to one short and reliable tool only. In accordance with our expectations, the results in the total VHI scores were high in the study group, confirming self-reported voice problems, and low in the control group of subjects with no vocal complaints. Moreover, our research confirmed the

results of the previous study in which the cutting-off point for distinguishing between subjects with voice dysfunction and normophonic subjects reached its maximal value (98%) was 12 points [29]. In the current study the mean score in the control group was less than 12, with half of the subjects reaching the total VHI score of 8.5 points. Literature data on the subject of comparison of the VHI and the V-RQOL reveals a strong correlation between the two tools [15,28,30,31] and the investigation of the validity of the V-RQOL using the VHI as the "gold standard" for determining voice disability has shown a correlation of 0.89 [4,30]. In our study, this Spearman correlation coefficient between the VHI and the V-RQOL was -0.813 for the occupational voice users with voice problems and -0.712 for the control group of normophonic subjects with no vocal loading required in their jobs. These findings show that the correlation between the Voice Handicap Index and the Voice-Related Quality Of Life in the described pilot study is less robust than that described in literature. The discrepancy may be the result of a small sample size in this study. Further research on a larger population is necessary to determine the exact values.

The overall findings of this research seem to support the argument that a shorter assessment instrument like V-RQOL may provide an efficient measure of the influence of voice disorders on quality of life [28]. Even though treatment of voice disorders varies depending on the cause, most voice problems can be successfully treated when diagnosed early. It should be stressed that the V-RQOL questionnaire could play a pivotal role in the development of informed therapeutic decision, as well as lend insight into expectations regarding patients' quality of life following treatment [22]. Moreover early detection of voice disorders in occupational voice users is extremely important, and because of the prolonged vocal overload, these career groups should be given extra care and prevention.

Therefore, based on our preliminary research, there are solid grounds for the application of the V-RQOL as a tool for early detection of voice disorders in professional voice users.

CONCLUSIONS

This study has revealed that voice disorders negatively influence the quality of life of professional voice users. These data are in accordance with those reported in the literature. Since the overall diagnosis of voice disorders should include both objective and subjective assessment methods, the Polish V-RQOL can be proposed as a useful instrument to evaluate the quality of life of dysphonic patients, although its screening value is to be confirmed by further studies. If successfully applied, the new screening instrument for detecting voice disorders in occupational voice users, the V-RQOL, may benefit the society in a number of ways.

Although the V-RQOL questionnaire has proved to be a promising diagnostic tool, there are no recommendations on how to grade the score. Future research will involve studies on larger populations and will focus on assessment and comparison of voice-related quality of life in subjects in different career groups requiring different vocal loading, as well and on developing applicable grading guidelines.

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