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A comparative study of the voice-related quality of life among Egyptian elderly with and without voice complaints

Nesreen Fathi Mahmoud^{1*} , Huda Zahran² and Sherif Abdelmonam³

Abstract

Background: This study focuses on the self-perception of the voice in the elderly as assessed by the Voice-Related Quality of Life (V-RQOL) questionnaire. This work aimed to compare differences in the voice-related quality of life outcomes between (1) elderly with and without voice disorders, (2) female and male elderly with voice disorders, and (3) different types of voice disorders, and to explore the correlation between the V-RQOL and perceptual analysis done by the clinician. Forty-three dysphonic and 44 non-dysphonic elderly filled out the Voice-Related Quality of Life (V-RQOL) protocol that analyzes the impact of dysphonia on life quality. Vocal perceptual assessment of each subject with dysphonia was made by three voice therapists, followed by a flexible nasofibrolaryngoscope.

Results: A significant statistical difference was found between the means of total V-RQOL scores and its subdomains for each group (dysphonic and non-dysphonic). No significant differences were found between male and female elderly with dysphonia. The statistical analysis showed a significant correlation with the vocal assessment made by the clinicians and the V-RQOL self-assessment made by the subjects.

Conclusions: This study provides valuable information regarding the risk factors that contribute to vocal quality in the elderly population. Our results revealed that different types of voice disorders are common among the elderly population with significant negative effects on quality of life. It was observed that the poorest score on the V-RQOL was for functional voice disorders, followed by neoplastic lesions, whereas MAPLs had the best score on the V-RQOL.

Keywords: Voice, Quality of life, Voice disorders, Elderly, Voice complaints

Background

Egypt is the most densely populated country in the Middle East and the third-most populous on the African continent (after Nigeria and Ethiopia). Egyptian population increased gradually throughout the past few decades in the absolute and relative numbers of older people. The percentage of elderly whom ages exceed 60 years of age and more was 4.4% in 1976, 5.66% in 1986, 5.75% in 1996, and rising to 6.27% in 2006, to be 7.2% in 2013.

The percentage is expected to be 9.2% in 2021 and may reach 20.8% in 2050. The main distinctive features for the elderly population around the world are rapidly expanding and predominance of females over males [1]. With an increasing elderly population over the next years, there is a growing demand for greater attention to the health conditions that affect this population [2].

Age-related changes play account for voice disorders in some elderly individuals and negatively affect communication. The prevalence of voice disorders in general population ranges from 19 to 29% [3–8] and is highest among the elderly [9–11].

Although voice problems are not life-threatening, they may affect an individual's quality of life. Several methods

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had been used to assess the voice-related quality of life in clinical practice, such as the Voice-Related Quality of Life (V-RQOL) measure [12]. Quality of life is a broadly defined concept as it is considering the patient's perspective and includes an individual's perception of physical, psychological, and social status. The World Health Organization (WHO) defined quality of life as "the individual's perception about his/her position in life, in the context of culture and system of values in which he/she lives and in relation to his/her objectives, expectations, standards and worries" (The WHOQOL Group, 1995) [13].

Little has been known about the unfavorable effects of voice changes on the quality of life in the elderly. However, these negative effects may cause social gathering avoidance and a decline of self-esteem [14].

According to the European Laryngological Society recommendations [15], voice assessment involves self-perception of voice changes together with laryngeal morphology and voice function.

Objectives

Thus, this study aimed to compare differences in the voice-related quality of life between (1) elderly with and without voice disorders, (2) female and male elderly with voice disorders, and (3) different types of voice disorders, and to investigate the relation between the V-RQOL and perceptual analysis done by clinicians.

Methods

Study design

A cross-sectional study was carried out.

Study setting

The study setting was on Phoniatics and Otolaryngology outpatient clinics.

Sample size

The sample size is a conducted convenient sample of 43 dysphonic elderly (cases) seeking treatment for a voice complaint and 44 individuals without a history of voice problems (healthy non-dysphonic controls). All participants were Arabic-speakers ≥ 65 years of age and met the following criteria: self-reported normal speech and language, no history of formal voice training or phono surgery, no history of head and neck cancer or previous radiotherapy, no history of central neurological disorders, normal cognitive function, and ability to follow directions (confirmed via direct observation). All participants completed a set of V-RQOL questionnaire items

Procedure

All cases underwent the following items:

- (1) Subject's interview: age, address, and occupation. Important attention is given to the analysis of the patients' vocal environmental demands, special habits including smoking and alcohol, and history of chronic illness, allergy, or breathing problems
- (2) Auditory perceptual analysis (APA): Modified GRBAS [16] scale is used to subjectively assess the degree and quality of hoarseness by physicians and speech pathologists. The following voice parameters were measured: Overall grade, character, pitch, register, loudness, glottal attacks, and associated laryngeal functions, evaluated and tabulated according to the modified GRBAS scale which gives scores of 0, 1, 2, or 3 for the grade of hoarseness, roughness, breathiness, asthenia, and strain, where 0 is normal, 1 is a slight degree, 2 is a medium degree, and 3 is a high degree. The assessment was done in an acoustically favorable environment and based on approximately 5 min of spontaneous speech, describing the vocal complaint, number counting from 1 to 20, and prolonged /a/. Each judgment was performed by two certified examiners specializing in voice disorders expert in vocal evaluation and rehabilitation with more than 10 years of experience and familiarity with the

Table 1 Demographic data of elderly group with voice complaints

Variable	Patients group (N)
Age	
Mean (SD)	70 \pm 6
Gender	
Male, N (%)	27 (62.8%)
Female, N (%)	16 (37.2%)
Voice disorder	
Vocal fold paralysis, N (%)	6 (14%)
Vocal fold paresis, N (%)	2 (4.6%)
Hyperfunctional dysphonia, N (%)	4 (9.3%)
Ventricular dysphonia, N (%)	2 (4.7%)
Presbylaryngis, N (%)	5 (11.6%)
Vocal fold cyst, N (%)	4 (9.3%)
Vocal fold polyp, N (%)	8 (18.6%)
Vocal fold leukoplakia, N (%)	9 (20.9%)
Supra-glottic mass, N (%)	1 (2.3%)
Mixed glottis and supraglottic mass, N (%)	2 (4.7%)
Dysphonia grade	
Normal (grade 0)	0 (0.0%)
Mild (grade 1)	4 (9.3%)
Moderate (grade 2)	27 (62.8%)
Severe (grade 3)	12 (27.9%)

Table 2 Self-reported symptoms in the elderly group with voice complains

	Voice complaints						
	Change in voice	Reduced vocal range	Frequent attempts to clear throat	Sticky secretions of the throat	Throat dryness	Throat soreness	Feeling of tightness
No. of elderly, %	43, 100.0%	35, 81.4%	39, 90.7%	39, 90.7%	33, 76.7%	23, 53.5%	13, 30.2%

modified GRBAS scale, without knowing the identity of the subject. To assess intra-rater and inter-rater reliability, all subjects and their voice samples were re-evaluated by each examiner individually two days apart.

- (3) Visualization of the glottis: All dysphonic participants underwent nasofibrolaryngoscopy performed by the same doctors using a flexible nasopharyngoscope (laryngo fiberscope, with a length of 30 cm, diameter of 3.5 mm, KARL STORZ GmbH & Co. KG, Tuttlingen, Germany, 11101RP) for the assessment of vocal fold structure, configuration, and gross mobility.
- (4) Voice-Related Quality of Life questionnaire [12] was translated and adapted into Arabic which analyzes the impact of dysphonia on the subject’s quality of life. V-RQOL consists of a 10-item questionnaire that measures the impact of voice disorders. Each item is rated from 1 to 5 (from 1 = not a problem up to 5 = worst problem imaginable). Responses are summed up to determine the total score (0–50), and an algorithm is used for summary scores, so that sum scores and subscale scores range between 0 and 100, where 0 is poor and 100 is optimal. The total score is provided by the sum of all answers. The social-emotional control is presented on questions 4, 5, 8, and 10, and the domain of physical functionality is presented on questions 1, 2, 3, 6, 7, and 9. Each item is graded on a 5-point Likert scale. The illiterate individual asked to fulfill the questionnaire with the help of clinicians

Statistical analysis

Data was recorded using Microsoft Excel 2013, and the Statistical Package for Social Science (SPSS version 24) was used for data analysis. Simple descriptive statistics (arithmetic mean and standard deviation) were used for

the summary of normal quantitative data and frequencies were used for qualitative data. The bivariate relationship was displayed in cross-tabulations, and a comparison of proportions was performed using the chi-square and Fisher’s exact tests where appropriate. Independent *T* test, one-way ANOVA, and post-hoc tests were used to compare normally distributed quantitative data. The level of significance was set at a probability (*P*) value < 0.05.

Results

Patient population and demographics

The two investigated groups, with and without voice complaints, were very similar regarding the mean age and gender. There were 43 (49.4%) elderly with voice disorders (27 men, 16 women) compared with 44 (50.6%) elderly without voice disorders (26 men, 18 women). No significant difference was found between genders in the two groups (*P* > 0.05). The mean age of the group with voice disorders was 69.53 ± 5.63 years. The mean age of the group without voice disorders was 71.34 ± 8.47 years. No significant difference was found in the mean age between the two groups (*P* > 0.05).

The diagnoses in the group with voice complaints according to clinical laryngoscopic examination were as follows: (1) functional voice disorders (*n* = 11)—hyperfunctional dysphonia *n* = 4 (9.3%), ventricular dysphonia *n* = 2 (4.7%), and presbylaryngis *n* = 5 (11.6%); (2) minimal pathological associated lesions (MAPLs) (*n* = 12)—vocal fold cyst *n* = 4 (9.3%) and vocal fold polyp = 8(18.6%); (3) neoplastic lesions (*n* = 12)—vocal cord leukoplakia *n* = 9 (20.9%), supraglottic *n* = 1 (2.3%), and mixed glottis and supraglottic masses *n* = 2 (4.7%); and (4) neurological lesions (*n* = 8)—vocal fold paralysis *n* = 6(14%) and vocal fold paresis *n* = 2 (4.6%). Table 1 summarizes the demographic data of the case group.

Table 3 Interpretation of V-QOL among the elderly with voice complaints

	<i>N</i>	Mean	Std. deviation
Poor	25	69.64	6.297
Fair	9	72.11	5.302
Good	8	66.75	1.669
Very good	1	66.00	
Total	43	69.53	5.629

Table 4 Frequency of potential vocal health hazards and general medical comorbidities among all studied population

		Elderly group				P value
		With voice complaints		Without voice complaints		
		Count	Row, N %	Count	Row, N %	
Professionalism	Professional	16	64.0%	9	36.0%	0.084
	Non-professional	27	43.5%	35	56.5%	
Retirement	Retired	37	48.7%	39	51.3%	0.716
	Non-retired	6	54.5%	5	45.5%	
Abuse of voice	Present	22	78.6%	6	21.4%	< 0.001
	Absent	21	35.6%	38	64.4%	
Smoking	No	18	45.0%	22	55.0%	0.396
	light	6	40.0%	9	60.0%	
	Heavy	18	62.1%	11	37.9%	
	Ex-smoker	1	33.3%	2	66.7%	
Temperament	Quiet	11	57.9%	8	42.1%	0.404
	Tense	32	47.1%	36	52.9%	
Repeated URTIs	Present	2	22.2%	7	77.8%	0.157
	Absent	41	52.6%	37	47.4%	
Allergy	Present	1	16.7%	5	83.3%	0.202
	Absent	42	51.9%	39	48.1%	
Rheumatoid symptoms	Present	2	40.0%	3	60.0%	1.000
	Absent	41	50.0%	41	50.0%	
Chronic cough	Present	15	68.2%	7	31.8%	< 0.001
	Absent	28	43.1%	37	56.9%	
Breathing problems	Present	5	62.5%	3	37.5%	0.484
	Absent	38	48.1%	41	51.9%	
Swallowing problems	Present	12	48.0%	13	52.0%	0.866
	Absent	31	50.0%	31	50.0%	
Reflux symptoms	Present	11	45.8%	13	54.2%	0.679
	Absent	32	50.8%	31	49.2%	
Medications	Present	20	45.5%	24	54.5%	0.454
	Absent	23	53.5%	20	46.5%	
Medications	Anti- rheumatic	2	40.0%	3	60.0%	0.148
	Anti-reflux	3	23.1%	10	76.9%	
	Steroids	2	100.0%	0	0.0%	
	Anti-reflux, DM-HTN diuretics, steroids	0	0.0%	2	100.0%	
	DM-HTN diuretics, anti-reflux	1	100.0%	0	0.0%	
	DM-HTN diuretics	5	45.5%	6	54.5%	
	HTN ACI	1	50.0%	1	50.0%	
	HTN diuretics, anti-reflux	2	66.7%	1	33.3%	
	HTN diuretics	0	0.0%	1	100.0%	
	Mucolytic	1	100.0%	0	0.0%	
	Steroids, anti-reflux	3	100.0%	0	0.0%	

ACI/ angiotensinogen converting enzymes inhibitors, DM diabetes mellitus

Table 5 Comparisons of means between case and control groups in regards to subdomain scores and total V-RQOL score

	Group	N	Mean	Std. deviation	P value
Social-emotional	Cases	43	13.12	3.500	< 0.001
	Controls	44	4.34	0.963	
Physical-functional	Cases	43	18.60	4.193	< 0.001
	Controls	44	8.66	1.999	
Total VRQOL	Cases	43	31.65	7.267	< 0.001
	Controls	44	13.00	2.533	

Self-reported symptoms

Results showed that a 100% proportion of those elderly with voice complaints perceived a change in their voices. Both frequent throat clearing (90.7 %) and sensation of sticky secretions of the throat (90.7%) were being the two most commonly reported symptoms. Additionally, the feeling of reduced vocal range (81.4%) and throat dryness (76.7%) were prevalent in the sample. Most of the dysphonic elderly groups interpreted the V-QOL questionnaire as poor (*n* = 25) and then fair (*n* = 9) and good (*n* = 8), and only one interpreted very well (Tables 2 and 3).

Group comparisons

Etiological risk factors associated with geriatric dysphonia

As demonstrated in Table 4, of all the examined variables for identification of etiological risk factors for dysphonia in the elderly, abuse of voice and chronic cough were statistically significantly associated with dysphonia while no statistical significance was found in each of the following variables: smoking, temperament, repeated upper respiratory tract infections (URTIs), allergy, breathing problems, swallowing problems, reflux symptoms, and medications. Elderlies in both groups were on medications for general medical comorbidities which may affect voice either by hypertension, arthritis, reflux or asthma, or combinations of previous medications with

no statistically significant difference between both groups

The mean overall VRQOL social-emotional, physical-functional, and total scores of the dysphonic group were 13.12, 18.60, and 31.65, respectively. The case group exhibited higher mean scores (i.e., less voice-related quality) when compared with the control group that had lower scores (i.e., better voice-related quality). This indicated a significant difference between the means for the groups (Table 5, Fig. 1).

Gender analysis

As shown in Table 6, female elderly with voice disorders had higher totals and subscale scores on the V-RQOL than males except for the physical-functional subscale. However, no significant differences were found (Table 6).

Analysis of the correlation between results of dysphonia grade assessed by the clinicians and the V-RQOL scores assessed by subjects with voice complaints

The statistical analysis indicated that the results of the V-RQOL protocol showed a significant correlation between the vocal assessment made by the clinicians and the self-assessment made by the subjects (Table 7, Fig. 2).

Diagnoses analysis

Significance in statistical differences in V-RQOL scores regarding the type of voice disorder is shown in Table 8 and Fig. 3. The highest score (poorest QOL) on the V-RQOL was for functional voice disorders, followed by neoplastic lesions; however, MAPLs had the lowest score (highest QOL) on the V-RQOL.

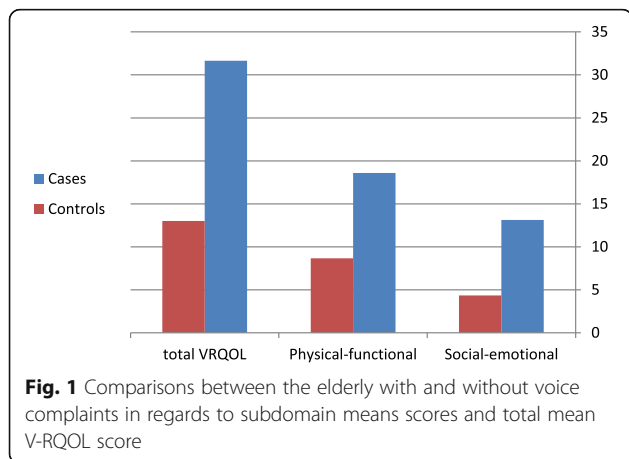


Fig. 1 Comparisons between the elderly with and without voice complaints in regards to subdomain means scores and total mean V-RQOL score

Table 6 V-RQOL means scores across the total, social-emotional, and physical functioning domains among males and females under the study

	Male, <i>n</i> = 27 (mean ± SD)	Female, <i>n</i> = 16 (mean ± SD)	P value
Social-emotional	12.89 ± 3.501	13.50 ± 3.578	0.243
Physical-functional	19.19 ± 4.377	17.63 ± 3.793	0.586
V-RQOL	31.96 ± 7.679	31.13 ± 6.722	0.719

Table 7 Relation of total V-RQOL score of the dysphonic group to perceptual analysis of dysphonia grade

Mean ± SD	Mild (n = 4)	Moderate (n = 27)	Severe (n = 12)	P
V-RQOL	20.25 ± 2.217	31.67 ± 7.152	35.42 ± 4.078	< 0.001

Discussion

The present study showed a significant statistical difference in total V-RQOL and subdomains scores between the elderly with and without dysphonia. So, Dysphonia significantly affects the quality of life in the elderly. Our results were matched to the work of Smith and colleagues who found that older participants with voice disorders were more likely to show the quality of life affects [17] with perceived greater social, psychological, and communicative consequences in older adults than those of working age with a voice disorder.

Also, our findings are consistent with Murry et al.'s [18] findings that revealed a statistically significant difference between the control group and voice disordered group. They considered that the physical-functional domain of V-RQOL is the main contributor to the decline of V-RQOL rather than the social-emotional domain; this finding matches with our study as we found that the physical-functional score affects the V-RQOL more than the socio-emotional score in both case and control groups. This finding was similar in both studies despite the different ages between them as in Murry's study, the age ranged from 22 to 90 years while in our study, the age ranged 65 to 90 years.

Previous studies [18–20] showed that The V-RQOL results of women were found to be worse than those of men. While our results showed no significant difference between male and female elderly, this may be explained by the smaller number of participants and a variety of diagnostic categories.

Numerous potential vocal risk factors have been reported to be associated with this study. When

comparing both groups under the study, only both abuse of voice and chronic cough had statistical significance, and no statistical significance was found in each of the following: smoking, temperament, repeated URIs, allergy, breathing problems, swallowing problems, reflux symptoms, and medications. Elderly in both groups were on medications which may affect voice [21], e.g., diuretics or angiotensinogen converting enzymes inhibitors (ACE) for hypertension; anti-rheumatoid, anti-reflux, or steroids for asthma; or combinations of previous medications with no statistically significant difference between both groups. This again is mainly due to differences in study groups and shortage of detailed data about these different medications, e.g., duration of intake, dosage, regular intake or not, and type of administration (as in asthma medication oral or inhalation). Another explanation not considered in the current study was if the studied population was aware of voice hygienic measures or not as enough hydrations, stop smoking, or smoke contact. So, further studies should investigate elderly persons with voice problems considering general medical comorbidities, detailed medical history, other health behaviors, and their correlations with different voice diagnoses categories.

The gold standard for self-assessment of voice is the Voice Handicap Index (VHI), a 30-item questionnaire examining functional, physical, and emotional aspects of voice disorders [22–25]. An alternative is the V-RQOL questionnaire, which is shorter [25–29] and gives almost identical results. The latter is recommended for clinical application as it only comprises 10 items, while the VHI consists of 30 questions, and so V-RQOL is considered

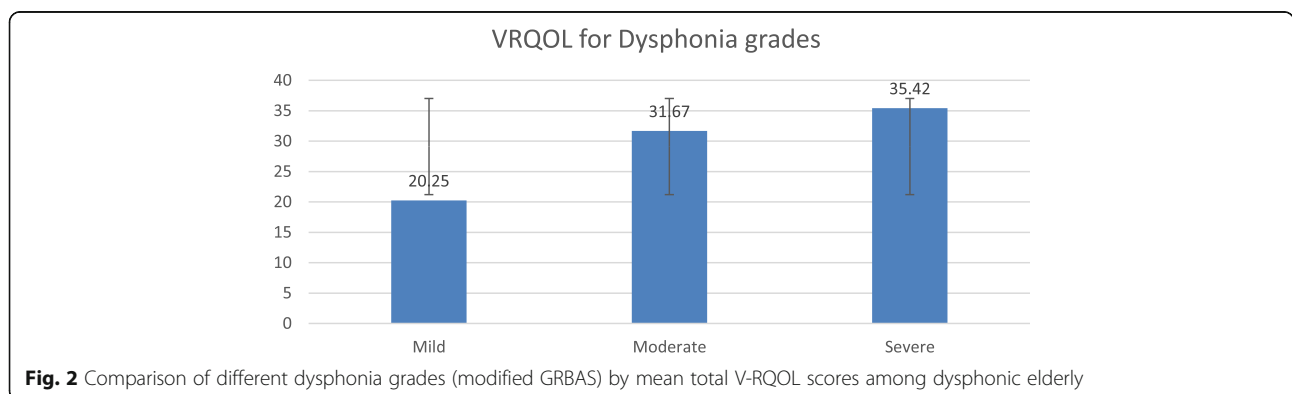


Fig. 2 Comparison of different dysphonia grades (modified GRBAS) by mean total V-RQOL scores among dysphonic elderly

Table 8 Relation of V-RQOL scores for the elderly with different voice disorders

Mean ± SD	Functional (n = 11)	Neurological (n = 8)	MAPLs (n = 12)	Neoplastic (n = 12)	P
V-RQOL	37.64 ± 6.104	31.88 ± 6.578	24.50 ± 5.402	33.17 ± 4.108	< 0.001

more practicable in this particular group of patients. Although a new shortened version of the VHI was designed and comprises 10 questions from the original 30 questions of the VHI and was termed as VHI-10 [30]. social and physical domains were not distinct. Furthermore, Golub et al. [31] proved that the V-RQOL may be used in elderly patients.

A major aim of this study is to investigate the correlation between perceptual assessment made by the clinicians and the self-assessment V-RQOL made by the subjects. Our results revealed a statistically significant correlation and that is confirmed by the already published results of other quality of life studies using the V-RQOL protocol [32–38]. As expected, elderly with “mild dysphonia” had a better voice-related impact on their quality of life.

In the current study, different diagnostic categories were found by clinical laryngoscopic examination: functional, neoplastic, neurological, and MAPLs. The poorest V-RQOL scores were for functional voice disorders while the best scores were for MAP lesions. There was a significant difference between total V-RQOL scores with different diagnostic categories.

Our results are not matching with a previous study [39], which demonstrated the mean V-RQOL score differences between patients with malignant and those with nonmalignant voice disorder. The higher mean was for the group with malignant voice disorders. Serious diagnoses such as laryngeal neoplasm can lead patients to define the quality of life differently and may perceive

voice quality as a secondary problem. This is maybe explained as the elderly in our study were not seeking treatment before and this was the first time for them to be a part of voice examination protocol.

However, because it was not the main aim of our study, a possible limitation may refer to the association between different medicines used by the same individual. And so, future studies should emphasize the different medications reported per patient including type, duration of treatment, onset of vocal symptoms in relation to medications intake, and possible drug interactions. Finally, this study raised the issue of using pharmacological medications and prognosis of patients with dysphonia especially in geriatrics population.

Conclusion

In light of a rapidly expanding elderly population and related problems, our preliminary results revealed that different types of voice disorders are common among the elderly population with significant negative effects on quality of life. Future studies with a larger sample of seniors will be needed to ensure equal representation across both age and sex strata for assessing additional risk factors that might contribute to voice disorders either social, behavioral, or underlying health status variables and determining the optimum approaches related to their prevention and management considering multi-disciplinary treatment regarding pre- and posttreatment assessment.

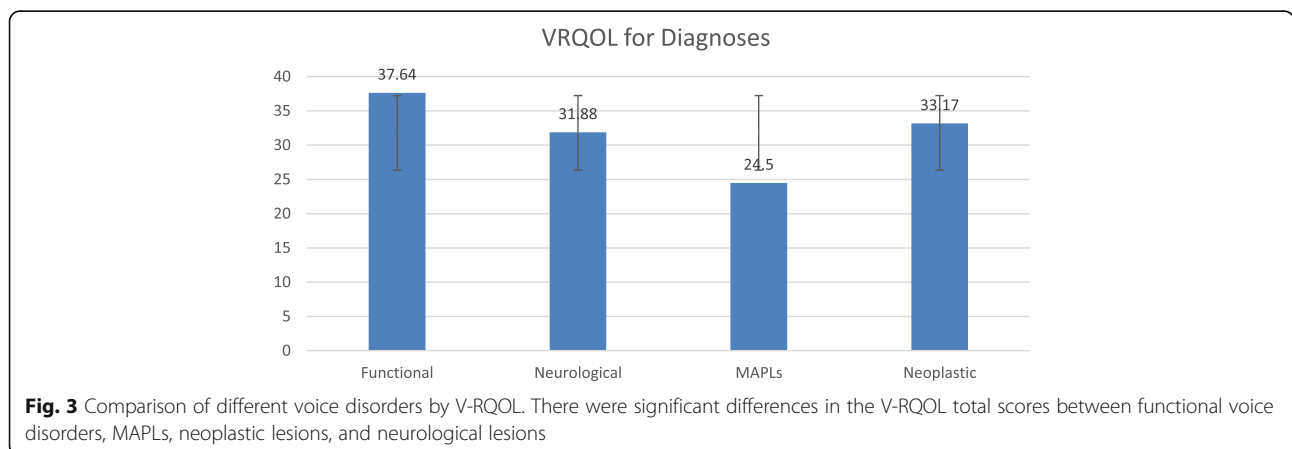


Fig. 3 Comparison of different voice disorders by V-RQOL. There were significant differences in the V-RQOL total scores between functional voice disorders, MAPLs, neoplastic lesions, and neurological lesions

Abbreviations

V-RQOL: Voice-Related Quality of Life; APA: Auditory perceptual analysis; MAPLs: Minimal associated pathological lesions; VHI: Voice Handicap Index

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Authors' contributions

NF performed the research methodology. HH contributed to the interpretation of the results. SA supervised the project. All authors contributed to the writing and revising of the manuscript. All authors have read and approved the manuscript.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Beni-Suef University, Faculty of Medicine, ENT department, has approved the study protocol (FMBSUREC/03112019/Mahmoud). Written informed consent was obtained from participants before the examination.

Consent for publication

Not applicable

Competing interests

The authors have no financial conflicts of interest in the publication of these data.

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