

**FORMULATION OF A VOICE PROBLEM SELF ASSESSMENT SCALE (VPSS)  
AS A PATIENT BASED TOOL FOR EGYPTIAN DYSPHONIC POPULATION**

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Receive: 10/3/2010 - Accepted: 6/5/2010

**ABSTRACT**

**Introduction:** The perceptions of a disability regarding its effect on work, social, and daily activities of an individual in the population of less-developed countries may be different from those of highly developed countries.

**Aim of the study was:** (1) To develop voice problem self assessment tool suitable to the Egyptian population, that is clear with minimal bias, reliable and covering functional, social and emotional and voice symptoms (2) to establish the reliability and validity of the developed tool.

**Methods:** The questionnaire was formulated and was labeled Voice Problem Self Assessment Scale (VPSS). It is five points scaled and constitute of four clusters (Functional, Physical, Emotional and Phonasthenic). A hundred and fifteen individuals (75 dysphonic patients and 40 subjects having no dysphonia) were asked to fulfill the questionnaire. The reliability was revealed by test retest (Cronbach's alpha of .712-.922). Validation studies revealed significant difference between patient and control and showed good correlation between total VPSS and its clusters. After application of the VPSS it was revised and a shorter form of 20 question emerged. This short form was further subjected to studies of reliability (Cronbach's alpha ranged from .754-.942) and validation.

**Conclusion:** The short version of voice problem self-assessment scale (VPSS) was proven to be valid and reliable and more suitable for clinical practice.

**Key words:** Voice Disorders Dysphonia, Questionnaire, Self Assessment Scale, Voice Symptoms

**Abbreviations:**

- **VPSS:** Voice Problem Self-assessment Scale
- **VHI:** Voice Handicap Index
- **VRQOL:** Voice related quality of life
- **VAPP:** Voice Activity and Participation Profile
- **QOL:** Quality of life
- **VHI-10:** Voice Handicap Index-10
- **VOS:** Voice outcome Survey
- **VoISS:** Voice Symptom Scale

**INTRODUCTION**

According to WHO, health and treatment outcome evaluation must indicate the severity and frequency of disease, and estimate the well being. It should evaluate the individual's physical health, psychological state, level of independence, social relations, and personal beliefs, as well as environmentally related characteristics.<sup>(1-3)</sup>

The perceptions of a disability regarding its effect on work, social, and daily activities of an individual in the population of less-developed countries may be different from those of highly developed countries. There are certain resemblances between life style in developing countries as Egypt and India.<sup>(4)</sup> Prakash and colleagues<sup>(5)</sup> study conducted on Indian population may resemble very much Egyptian habits as of the subjects reported that they resort to traditional home remedies such as honey, ginger, herbal medicines, and do not seek treatment.

Evaluation of quality of life (QOL) is primarily conducted by means of questionnaires, many of which were developed in English and directed to the population that speaks this language. Thus, for these instruments to be used in other languages, they must

be translated and adapted based on international guidelines, and their measuring properties must be demonstrated in a specific cultural context.<sup>(6,7)</sup>

The use of questionnaires as assessment tools may be challenging if facing illiterate patients. The instrument must be culturally adapted and carefully translated and tested, avoiding literal translation that excludes cultural and social contexts.<sup>(8)</sup> These inherent multicultural differences affect the effectiveness of QOL assessments for voice disordered patients.

**Aim of the Study was:**

(1) To develop voice problem self assessment tool for the Egyptian population that is clear with minimal bias, reliable and covering functional, social, emotional and voice symptoms, and (2) to establish the reliability and validity of the formulated instrument.

**METHODS**

The study started with a total of 115 subjects (40 controls and 75 dysphonic patients). The controls were 8 males and 32 females and the patients were 44 males and 32 females. Their ages ranged from 23-56 years, and 18-67 years respectively. The controls collected of families of patients or volunteers not complaining dysphonia or voice related problems and agreed to participate in the current research program.

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### Formulation of long form of VPSS

After reviewing the available voice self assessments questionnaires in literature, a preliminary version of the questionnaire was formulated. (Appendix A). A group of five phoniaticians revised the questionnaires and modified this form of questionnaire. It was literally translated and it constituted of 45 questions and classified into four clusters: Functional, Physical, Emotional and Phonasthenic clusters. Ten patients were asked to comment on questions as regards clarity of the questions in content or form.

Questions 7, 9, from functional cluster and 5 and 9 from physical clusters were omitted based on 50% of agreement between judges. The questions (4,7, and 12) in functional cluster, questions (1,2,6,7 and 10) in physical cluster were rephrased. Questions 7 and 8 in emotional cluster were suggested to have the same idea so they were reformulated in one statement. In phonasthenic cluster questions (1,6,7,8,9 and 10) were rewritten for more clarification.

### Administration

A version of forty questions with ten questions in each cluster was then formulated. It constituted of 5-scale points. The time of administration ranged from 10-20 minutes. The illiterate individuals were asked to fulfill the questionnaire with the help of Phoniaticians that read and clarified questions to the patient. A hundred and fifteen subjects (40 control and 75 patients) were asked to fulfill the revised form. 40 subjects (20 patients and 20 controls) were asked to fulfill it again two weeks latter.

### Reliability and validity:

The questionnaire was tested for reliability. Test-retest was performed in addition to internal consistency. (Table I, II) Table III shows the representation of the convergent validity whereby the correlation between Arabic version of Voice Handicap Index (VHI)<sup>(9)</sup> and the proposed voice problem self-assessment scale (VPSS) form was determined. The scores between patients and controls were also compared for evaluation of construct validity (Figure 1).

**Table I:** Test-retest reliability of long version of VPSS test.

	Cronbach's alpha	Correlation coefficient
<b>Functional</b>	.922	.881
<b>Physical</b>	.712	.573
<b>Emotional</b>	.912	.944
<b>Phonasthenic</b>	.903	.824
<b>Total</b>	.854	.756

Alpha: >0.7 acceptable, >0.8 good and >0.9 excellent  
Reliability coefficient = <0-0.25 weak, 0.25-0.75 moderate reliability, 0.75-<1strong reliability and 1 is optimum.

### Development of the short form of VPSS

On application of the 40 questions form of VPSS there was an agreement that the questionnaire is too lengthy especially in crowded clinics. A shorter form has been developed constituting of (20) questions with omission of questions showing lowest alpha score in each cluster to reveal a final short form of the questionnaire, and rewording of others. (Appendix B) It constituted of functional, physical, emotional and phonasthenic clusters, provided in 5-scale points, 0 indicate never, 1 indicates rarely, 2 indicate sometimes, 3 indicate often and 4 indicate always. In comparison to the first long version questions (6-10) in functional cluster, questions (4,5,6,9, and 10) in physical cluster, questions (1,5-9) in emotional cluster and (1,3,4,7 9,and 10) in phonasthenic cluster were removed. Question 8 in phonasthenic cluster was reworded, while question 5 was added.

For determination of content validity five members of Unit of Phoniaticics staff at Alexandria main University hospital were asked to judge the first long and final short version. They were asked to comment on (1) the representative of the situations reflected by the items in the questionnaire, (2) the cluster adequacy of the items, (3) the clarity of the wording of questions, (4) lengthiness of questionnaire, and (5) grading nature of the questionnaire. (Figure 2)

The questionnaire was then fulfilled by a total 77 subjects (51 dysphonic patients and 26 controls). They were 32 males and 36 females. The control ages ranged from 23-56 years and 51 patients' ages ranged from 16-67 years. No significant difference was found between patient and control as regards age using Mann-Whitney U. test  $z=-.884$ ,  $p=.377$ . No correlation was found between age and cluster and total VPSS score indicating no age dependence. No significant difference as regards sex using Mann-Whitney U test had been detected for the clusters and total VPSS score indicating adequacy for both sexes. (Table IV) Figure 3 represents boxplots for short version VPSS total and cluster scores for dysphonic patients and control.

**Construct validity:** The summary scores of all four clusters (functional, physical, emotional, and phonathenias) were correlated with each other as well as with the total VPSS score. Table V represents the item to total correlations of short and long forms of VPSS questionnaire revealing the internal consistency of VPSS. For determination of *concurrent validity* VPSS total score was compared to the patient' self perceptual of their voice problem severity. (Table II)

**Scoring of the short version of VPSS** was based on distribution of cases, in perceiving the overall grade of dysphonia and median and mean value ranges. The severity of VPSS was subjectively distributed:

below 15 is considered mild, 30 to 45 moderate and above 45 severe.

#### Statistical Analysis:

The Statistical Package for the Social Sciences, Version 13 (SPSS Inc, Chicago, IL) was used for all statistical analyses. The internal consistency of the VPSS was assessed using Cronbach's alpha coefficient. Values greater than 0.7 are considered acceptable, greater than 0.8 "good" and greater than 0.9 "excellent." The test-retest reliability was assessed by estimating the correlation coefficient and Cronbach's alpha coefficient. Pearson's

correlation coefficient was calculated to assess the degree of association between the VPSS cluster and total scores and their correlation to the self-rating dysphonia severity scale whereby p value is significant at the 0.01 level. Comparisons of mean scores of patients and control were done using student t-test with a level of significance of 0.05. Comparison of scores between male and females were made using the nonparametric Mann-Whitney U test. The level of significance level was set to 0.05.

**Table II:** Internal Consistency of long and short version of VPSS

	Long version				
	Functional	Physical	Emotional	Phonasthenia	
<b>Physical</b>	.852**				
<b>Emotional</b>	.892 **	.878 **			
<b>Phonasthenia</b>	.559 **	.763 **	.679 **		
<b>Total</b>	.680 **	.961 **	.951 **	.810 **	
Short version					
	Functional	Physical	Emotional	Phonasthenia	Dysphonia
<b>Physical</b>	.796**	.663 **			.663 **
<b>Emotional</b>	.759 **	.702 **			.702 **
<b>Emotional</b>	.759 **	.702 **			.702 **
<b>Phonasthenia</b>	.534 **	.593 **	.571 **		.593 **
<b>Total</b>	.886 **	.553 **	.896 **	.782 **	.553 **

Dysphonia stands for Self perception of severity of Dysphonia

\*\*Correlation is significant at the 0.01 level (2-tailed)

**Table III:** Convergent validity using Arabic version of voice handicap index (VHI) and functional, physical, emotional and total VPSS (long version) scores

VHI	VPSS		
	Functional	Physical	Emotional
<b>Social</b>	.902(**)	.804(**)	.842 (**)
<b>Physical</b>	.714(**)	.898(**)	.772(**)
<b>Emotional</b>	.835(**)	.829(**)	.935(**)
<b>Total VHI</b>	<b>Total VPSS</b>	<b>r=.931</b>	<b>p=.000</b>

Pearson's Correlation

\*\* Correlation is significant at the 0.01 level (2-tailed)

**Table IV:** the mean and standard deviation of the short version of VPSS clusters scores in respect to sex.

VPSS scores	Male (no. 32)		Female (no 36)		z-value	P value
	mean	SD	mean	SD		
<b>Functional</b>	7.5	1.15	5.47	.88	-1.539	.124
<b>Physical</b>	9.28	1.16	7.55	1.00	-1.136	.256
<b>Emotional</b>	6.06	.94	5.25	.89	-1.186	.236
<b>Phonasthenia</b>	9.37	.86	8.18	.86	-1.005	.315
<b>Total</b>	32.22	3.33	25.86	3.36	-1.605	.108

**Table V:** Item to total correlations of long and short versions of VPSS.

	Long version	Short version
<b>Functional</b>	.959	.918
<b>Physical</b>	.980	.942
<b>Emotional</b>	.975	.898
<b>Phonasthenia</b>	.895	.754

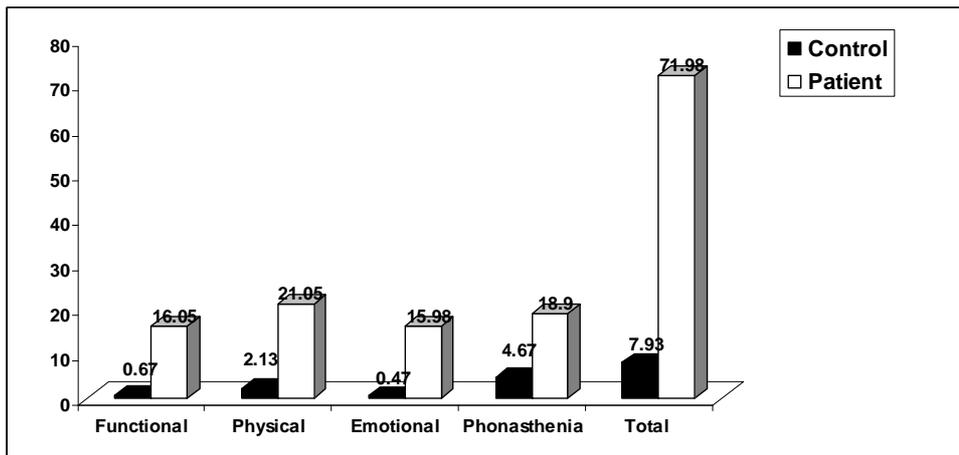


Fig 1: The mean of total and Cluster VPSS (long version) scores for the dysphonic patients and control

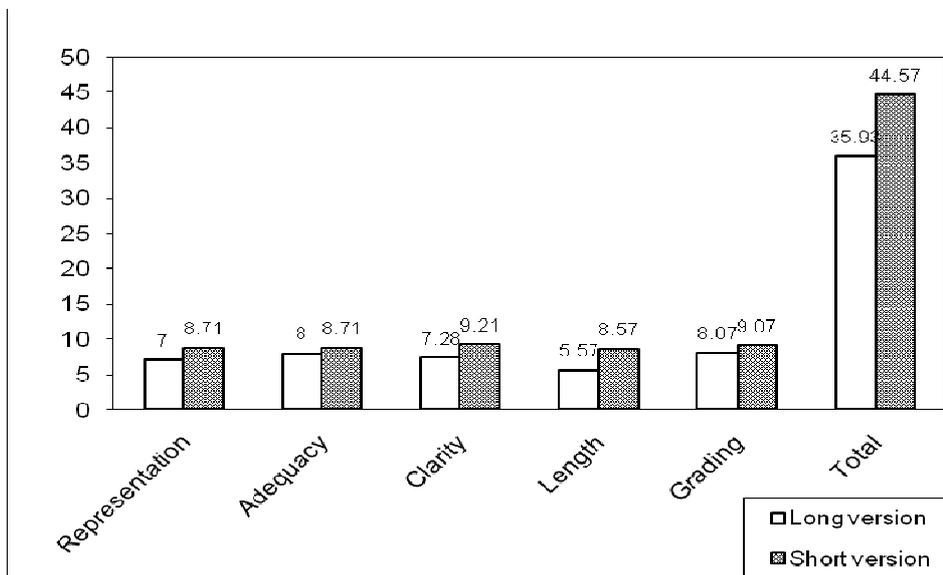


Fig 2: The mean scoring for the opinion of 5 judges on long and short version of VPSS test.

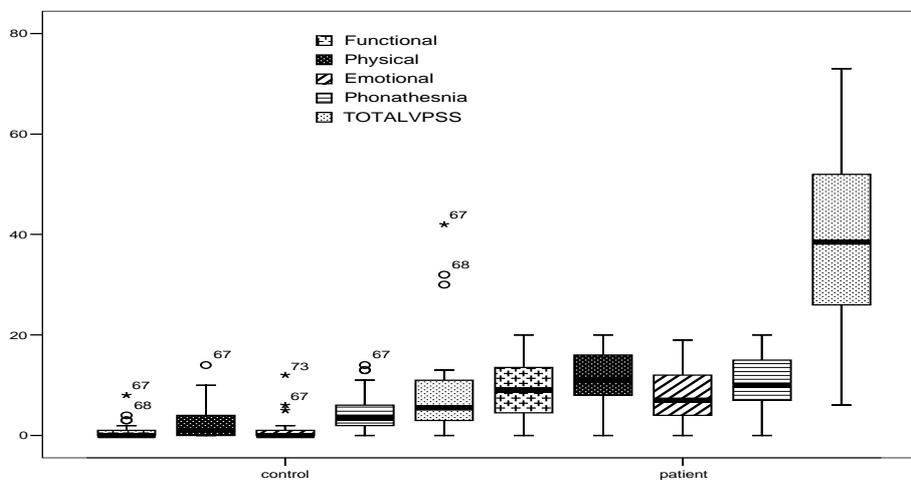


Fig 3: Boxplots for short version VPSS total and cluster scores for dysphonic patients and control.

## DISCUSSION

There are many instruments used in western countries to cover the impact of voice disorder on patient and the quality of life. These includes Voice Handicap Index (VHI),<sup>(9)</sup> Voice Handicap Index-10 (VHI-10),<sup>(10)</sup> Voice-related quality of life (VRQOL),<sup>(11)</sup> Voice Outcome Survey (VOS),<sup>(12)</sup> Voice Activity and Participation Profile (VAPP),<sup>(13)</sup> Pediatric Voice Outcome Survey,<sup>(14)</sup> and the Voice Symptom Scale (VoiSS).<sup>(15)</sup> They include questions reflecting the social, physical emotional domain commonly affected in health disorders. The phonasthenic symptoms were firstly considered in VoiSS<sup>(15)</sup> and were included in the formulated VPSS because it is commonly associated and closely related to voice disorders. Moreover, they are easily confined by the patients than those related to working conditions and social life.

The developed voice problem self assessment scale (VPSS) was tested for its reliability and validity. Test-retest reliability was applied for the original VPSS score in individuals who had not been expected to show rapid improvement. This reliability measure was not applicable for the shorter version in which memory effect of 20 questions may have caused false results. The reliability of test to test in long version was good to excellent in all clusters except for the physical clusters it was acceptable. The correlations were strong in all total and clusters except in physical cluster it was moderate. This may be attributed to the fact that physical complaints may be habitual after a period of time, whereby the emotional, functional and phonsthenic symptoms are more persistent. The test–retest reliability suggested that the patient’s problem was consistent within the 14-day interval between tests. Moreover, it shows that the questionnaire items appear to have been clearly understood by the patients and responded to with approximately the same ratings.

Table V represents the item to total correlations of short and long forms of VPSS questionnaire revealing the internal consistency of VPSS.

R-value was above .75 for all relations but an evident drop in R-value when the two versions were compared was noticed. So the shorter form could be less reliable in reflecting the internal consistency. Using Pearson’s correlation, the calculations were significant, but R-value varied between the two version forms. Konnai et al.<sup>(16)</sup> reported moderate but statistically significant correlation (at the 0.01 level) among the three domain subscales of the voice self assessment tool done on Indian population and between each of the three subscales of the profile and their total assessment score tool. Their correlations ranged from 0.49 to 0.69. The high correlations would suggest that a person’s voice problem creates nearly equal effects across all three domains, but patients may have stronger effects in

one domain than in another, thus lowering the correlations is expected.

In the present study the cluster to total correlation varied slightly from long to short version of VPSS. (Table II) The physical and emotional showing the highest correlation to the total VPSS scores in the long version, while the functional has recorded the lowest correlation. In the short version the phonasthenic cluster recorded the lowest correlation. In Indian study the functional and emotional domains correlated the highest with the total self assessment score followed by the physical domain.<sup>(16)</sup>

The *concurrent validity* of the profile developed here was further evaluated through the correlations study between the VPSS cluster and total scores and the individuals’ self-perceived overall severity of dysphonia. This question was included in the long version as question (4) in physical cluster and was omitted from the short version and considered as a separate entity. There was a moderate correlation, similar to other studies.<sup>(16,17)</sup> Table II shows that the emotional clusters recorded the highest value. Unlike other studies R-values was lowest between total VPSS and patient self perception of severity of dysphonia.<sup>(16)</sup> Jacobson et al.<sup>(9)</sup> and Ma and Yiu,<sup>(13)</sup> suggested a common trait among the voice profile assessment tools in that respect. Their findings support meaningful concurrent validity of the instrument, even though the overall severity appears to be a more global, whereby our tool should be viewed in each domain separately and advising inclusion of criteria for description of vocal demands to the self assessment questionnaire.

*Construct Validity* was evaluated for the long version by comparing between patient and control. This showed a significant difference using student t test with p value <0.001 for all items. (Figure1) Boxplots for the VPSS cluster and total scores had a wider range for the patients. (Figure 3) So VPSS can differentiate patients from control like other developed test.<sup>(16)</sup> Comparison of the VPSS scores between male and female individuals indicated that there was no difference between males and females in the perception of their voice problems within each of the clusters and for the total score, although males tended to record higher values. This suggests that a voice disorder may have similar implications and problems for females as for males, but still further analysis in respect to occupation and life conditions should be considered.<sup>(16)</sup>

*Convergent Validity* was done by comparison of long version to an Arabic translated version of VHI. A high significant correlation for functional, physical, emotional and total domains was recorded.

*Content validity* was carried out based on experts Phoniaticians opinion. The graphic representation revealed the preferral of the Phoniatician to the

short version. These results suggest that the construct validity appears to be sufficient to consider the short version of VPSS to be a useful tool.

### Conclusion

The VPSS is a reliable and valid tool that measures the impact of voice disorders on Egyptian patients. The short version is more clinically acceptable for our working circumstances and life style nature. Sex and age do not affect the scoring system. It is recommended to be included in the protocols of voice disorders assessment for more comprehensive evaluation. Further assessment and research work results has been done to indicate its relation to the specific voice disorder for assessing treatment effectiveness and patient responsiveness. The relation of VPSS to other objective tools has also been assessed.

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## Appendix (A)

## مقياس التقييم الذاتي لمشكلات الصوت

0 أبدأ 1 : نادرا 2 : أحيانا 3 : غالبا 4 : دائما

## الجزء الاول : وظيفياً

4	3	2	1	0	هل صوتك يجعل من الصعب على الناس سماعك؟	1
4	3	2	1	0	هل يجد الناس صعوبة في فهم ما تقول في وجود ضوضاء؟	2
4	3	2	1	0	هل تجد اسرتك صعوبة في سماعك عندما تناديهم عبر المنزل؟	3
4	3	2	1	0	هل تستخدم الهاتف اقل مما تريد؟	4
4	3	2	1	0	هل تميل لتقاضي مجموعات الناس بسبب صوتك؟	5
4	3	2	1	0	هل تتكلم مع اصدقائك واقاربك وجيرانك اقل من المعتاد بسبب صوتك؟	6
4	3	2	1	0	هل يطلب الناس منك ان تعيد ما تقول حين تتحدث معهم وجها لوجه؟	7
4	3	2	1	0	هل صعوبات صوتك تحدد حياتك الشخصية والاجتماعية؟	8
4	3	2	1	0	هل تشعر بانك خارج دائرة الحوار بسبب صوتك؟	9
4	3	2	1	0	هل تتسبب مشكلة صوتك في قلة دخلك المادي؟	10
4	3	2	1	0	هل مشكلة صوتك تقلل من حياتك الاجتماعية؟	11
4	3	2	1	0	هل تتكلم اقل من المعتاد لديك؟	12

## الجزء الثاني:جسيمياً

4	3	2	1	0	هل ينفذ منك الهواء عندما تتكلم؟	1
4	3	2	1	0	هل يتفاوت صوتك على مدار اليوم؟	2
4	3	2	1	0	هل يسالك الناس ( مالذي اصاب صوتك )؟	3
4	3	2	1	0	هل يبدو صوتك خشنا وجافا؟	4
4	3	2	1	0	هل تشعر كما لو أنك تجاهد لاصدار الصوت؟	5
4	3	2	1	0	هل تتوقع متى يكون صوتك نقياً؟	6
4	3	2	1	0	هل تحاول ان تغير صوتك لبيدو مختلفا؟	7
4	3	2	1	0	هل تبذل مجهودا كبيرا كي تتكلم؟	8
4	3	2	1	0	هل يسوء صوتك في المساء؟	9
4	3	2	1	0	هل يضعف صوتك في منتصف الكلام؟	10
4	3	2	1	0	هل صوتك مبحوح؟	11
4	3	2	1	0	هل تفقد صوتك؟	12

## الجزء الثالث :نفسياً

4	3	2	1	0	هل تشعر بتوتر عند كلامك مع الاخرين بسبب صوتك؟	1
4	3	2	1	0	هل يبدو الناس منز عجين من صوتك؟	2
4	3	2	1	0	هل تجد ان الاخرين لا يفهمون مشكلة صوتك؟	3
4	3	2	1	0	هل تضايقتك مشكلة صوتك؟	4
4	3	2	1	0	هل تقلل من الاختلاط بالناس بسبب صوتك؟	5
4	3	2	1	0	هل يجعلك صوتك تشعر بالاعاقه؟	6
4	3	2	1	0	هل تشعر بالانزعاج عندما يطلب منك الناس اعادة ما تقول؟	7
4	3	2	1	0	هل تشعر بالحرج عندما يطلب منك الناس اعادة ما تقول؟	8
4	3	2	1	0	هل تشعرك مشكلة صوتك بعدم الكفاءة في الحوار؟	9
4	3	2	1	0	هل تخجل من مشكلة صوتك؟	10
4	3	2	1	0	هل يتجاهلك الناس؟	11

## الجزء الرابع:أعراض وهن الصوت

4	3	2	1	0	هل لديك مشكله بالغناء؟	1
4	3	2	1	0	هل حلقك يؤلمك؟	2
4	3	2	1	0	هل تقدر علي القراءة بصوت عال؟	3
4	3	2	1	0	ما مدى قلقتك من الاصابه بالتهاب الحلق؟	4
4	3	2	1	0	هل تسعل أو تتنحج لتنتقيه صوتك؟	5
4	3	2	1	0	هل تشعر كأن هناك شيء في حلقك؟	6
4	3	2	1	0	هل لديك الام في الصدر؟	7
4	3	2	1	0	هل تجد أن مجهود الكلام مرهق؟	8
4	3	2	1	0	هل لديك الكثير من المخاط في حلقك؟	9
4	3	2	1	0	ما مدى اصابتك بالتهاب الحلق؟	10

## Appendix (B)

المقياس الذاتي لمشكلات الصوت  
اسم المريض  
العبارات التالية تستخدم لوصف الإعاقة الصوتية ومدى تأثيرها على أنشطة الحياة ضع علامة على الإجابة الملائمة لحالتك :  
التاريخ  
: 0 أبداً 1 : نادراً 2 : أحياناً 3 : غالباً 4 : دائماً

## الجزء الأول: وظيفياً

4	3	2	1	0	1 هل مشكلة صوتك تجعل من الصعب على الناس سماعك؟
4	3	2	1	0	2 هل يجد الناس صعوبة في فهم ما تقول في وجود ضوضاء؟
4	3	2	1	0	3 هل تجد اسرتك صعوبة في سماعك عندما تتأديهم عبر المنزل؟
4	3	2	1	0	4 هل تتكلم مع اصدقائك واقاربك وجيرانك اقل من المعتاد بسبب صوتك؟
4	3	2	1	0	5 هل تتكلم اقل مما تعودت بسبب صوتك؟
					المجموع

## الجزء الثاني: جسماً

4	3	2	1	0	1 هل تشعر بقصر النفس أثناء الحديث؟
4	3	2	1	0	2 هل يتغير صوتك على مدار اليوم؟
4	3	2	1	0	3 هل يسألك الناس ( مألذى أصاب صوتك )؟
4	3	2	1	0	4 هل تبذل مجهوداً أثناء الحديث؟
4	3	2	1	0	5 هل يضعف او ينقطع صوتك في منتصف الكلام؟
					المجموع

## الجزء الثالث : نفسياً

4	3	2	1	0	1 هل يبدو الناس منز عجين من صوتك؟
4	3	2	1	0	2 هل تجد ان الآخرين لا يفهمون مشكلة صوتك؟
4	3	2	1	0	3 هل تضايقتك مشكلة صوتك؟
4	3	2	1	0	4 هل تشعر بالانزعاج والحرج عندما يطلب منك الناس اعادة ما تقول؟
4	3	2	1	0	5 هل يتجاهلك الناس بسبب صوتك؟
					المجموع

## الجزء الرابع: اعراض وهن الصوت

4	3	2	1	0	1 هل حلقك يؤلمك؟
4	3	2	1	0	2 هل تسعل أو تتنحج لتنقيه صوتك؟
4	3	2	1	0	3 هل تشعر كأن هناك شيء ملتصق في حلقك؟
4	3	2	1	0	4 هل تشعر بارهاق أثناء الحديث او القراءة؟
4	3	2	1	0	5 هل تشعر بجفاف في الحلق عند الحديث؟
					المجموع

## المجموع الكلي:

اقل من 15: تأثير بسيط  
من 16 الى 45: تأثير متوسط  
اكثر من 46: تأثير شديد