

A SURVEY OF VOICE RELATED CONCERNS IN ELDERLY COLLEGE TEACHERS

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Abstract

Elderly teachers may suffer impacts in voice due to prolonged use of voice for teaching, and changes that occur at old age. The study aimed to profile voice related concerns in elderly teachers by compiling the health status, life style, their knowledge about the voice changes, their voice characteristics which consequently affect their communication in daily life. The study was carried out among 150 teachers in three phases that included development of questionnaires, pilot study to validate the questionnaire and survey of voice related concerns in elderly college teachers. On analyzing the life style and general health, there were no significant changes in voice as a result of smoking, consumption of alcohol, carbonated drinks and non vegetarian diet. Most of the subjects reported of adequate water intake and involved in regular physical exercises. Subject who reported difficulty in hearing (42%), swallowing (22%) and gastric problems (42%) were prone to develop changes in voice. Female subjects who had problems related to menopause reported to have changes in voice. Individuals with adequate knowledge on aging effects of voice were able to identify changes in their voice. Speaking with increased effort was one of the frequently reported symptoms. Subjects who reported to have voice changes were upset (negative emotion, & possibly affected quality of life) and problems in daily communication were expected. Results of this study highlighted various aspects on voice concerns of elderly teachers. Health related issues and life style factors may be considered as risk factors to develop voice problem in them. It is important to improve knowledge on lifestyle patterns and factors contributing to voice changes in the elderly to facilitate and accept age related changes in voice. Results of this study will aid to sensitize speech pathologists regarding the voice related concerns in elderly teachers that are socio-culturally relevant.

Key words: Questionnaire, life-style, emotional impact, voice characteristics.

Voice disorder can be due to excessive, prolonged use of voice and due to age related structural changes in the larynx (presbyphonia). Voice problems are noted in elderly (Roy, Stemple, Merrill, and Thomas, 2007) and in teachers (Smith, Gray, Dove, Kirchner and Heras, 1997). Boominathan, Rajendran, Nagarajan, Seethapathy and Gnanasekar (2008) reported based on a survey of voice problems in professional voice users, that teachers have more vocal symptoms and voice problems than persons in other occupations. Rowan and Gore (2005), stated that age related dysphonia is characterized by change in pitch, increased strain, voice breaks, vocal tremor, breathiness, instability, reduced loudness, change in voice, vocal fatigue, physical fatigue, and inadequate breath support for speaking. Teacher's voice problems are described as tired, weak or effortful voice and physical discomfort while speaking (Smith, Lemke, Taylor, Kircher, and Hoffman, 1998).

Opportunities are available that allow the teachers to remain in teaching even after retirement. Further, in 2007, The Union Ministry of Human Resource Development had instructed the University Grants Commission (UGC) to

increase the retirement age for teachers from 62 to 65 years. Elderly teachers may be more prone for developing and sustaining voice problems due to excessive stress and prolonged use of voice for teaching, and also due to the changes that are occurring at old age. Since there is a rise in population of elderly teachers in India and the likelihood of voice problems in them is also expected to be high.

The authors are unaware of earlier studies that report voice related concerns of this unique vulnerable professional voice user group – elderly college teachers. The present study aimed to profile the voice related concerns of elderly college teachers by compiling the health status, life style, vocal habits and methods (aids, etc) used to project voice in classrooms, their knowledge about the age related changes, their voice characteristics which consequently affect their communication in daily life situation and the emotional impact due to changes in voice using a survey method. This in turn would help to facilitate and to create awareness among the elderly teachers to preserve their voice at their older age. It will also sensitize speech pathologists regarding the voice concerns and voice problems in elderly teachers that will prove handy in clinical practice.

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Method

The study was carried out in three phases which included the development of questionnaires, pilot study to validate the questionnaire and the survey of voice related concerns in elderly college teachers. In the first phase, two questionnaires were developed. The first questionnaire (Appendix I) was developed to address voice related concerns in elderly teachers. It consisted of demographic data and 33 questions (8 open ended and 25 close ended questions). The eight open ended questions collected information on health and life style. The 25 close ended questions addressed five sections (general health, knowledge and awareness of the developmental changes, factors affecting voices in elderly, voice characteristics, its effect on communication in daily situations and the emotional impact caused due to changes in voice). Internal consistency of the questionnaire was 0.658 on using Cronbach’s alpha coefficient (α). The second questionnaire (Appendix II) was developed to judge the inter rater reliability between teachers and their students. The ten questions included voice related symptoms perceived by students in their teachers’ voice during lectures and the severity of voice symptoms were based on the frequency of occurrence ranging from never to always.

During the second phase, a pilot study was conducted on 15 elderly teachers with 30 of their students (2 students for 1 elderly teacher) to judge the inter-rater reliability in perceiving the voice characteristics of the elderly teachers. Intra class correlation coefficient analysis was carried out to judge inter-rater reliability. Since the results obtained from the pilot study indicated good inter-rater reliability the survey was continued with elderly college teachers alone. In phase three, Questionnaire I was distributed to 300 teachers of various colleges in India. Of the 300 teachers approached, only 150 elderly teachers (Male: 115; Female: 35) were involved in the study, who had a minimum of fifteen years of experience in teaching and currently used their voice for a minimum of two hours per day for teaching.

Each section of data was analyzed for gender difference, frequency of the problem reported and by comparing various sections with changes in voice. Pearson’s chi- square test of significance was used to estimate gender differences in responses to sections I to V. Odds ratio was used to estimate the risk of developing change in voice consequent to health problems, effect of knowledge of aging in identifying changes in voice and to estimate the changes in voice and its risk of impacting communication in daily situations.

Results

The study aimed to profile life style patterns, medical history, health status, knowledge of “age related changes”, voice characteristics, emotional impact caused due to the changes in voice on communication in daily life in elderly college teachers. In section I (Life style and general health), 33.9% of males reported to have the habit of smoking and 41.7% of male subjects reported the habit of consuming alcohol occasionally. However, no significant change in voice was reported as a result of smoking and alcohol consumption (table 1). Table 2 reveals that 55.7% of males and 37.1% of females consumed carbonated drinks. The percentage of consumption of non-vegetarian food was comparatively higher in both genders. Yet, no significant changes in voice were reported as a result of consumption of carbonated drinks and non vegetarian diet.

Table 1: *Number of subjects reported to be involved in social habits and its effect on changes in voice*

Social habits		Changes in voice				p - value
		Present		Absent		
		#	%	#	%	
Smoking habit	Yes	26	27.1	13	24.1	0.69
	No	70	72.9	41	75.9	
Alcohol consumption	Yes	29	30.2	19	35.2	0.53
	No	67	69.8	35	64.8	

Table 2: *Common food preferences reported by the elderly teachers and its effect on changes in voice*

Food habits		Changes in voice				p - value
		Present		Absent		
		#	%	#	%	
Carbonated drinks	Yes	41	51.4	36	47.4	0.23
	No	33	48.6	40	52.6	
	Yes	45	62.2	43	50.3	
Non-vegetarian foods	No	29	37.8	33	49.7	0.36

79.6% of males and 56.5% of females reported adequate and frequent intake of water (at least 2 liters per day) to avoid vocal fatigue. It was also reported that 70.4% of males and 65.7% of females involved in regular physical/ breathing exercise to keep them physically fit. Diabetes and elevated blood pressure were commonly reported health problems in elderly teachers. On analyzing the data obtained on difficulty in hearing (Table 3), 45.2% of males and 31.4% of females reported to have difficulty in hearing. The gradual decline in hearing in old age, initially in the higher frequencies may influence excessive vocal use in elderly. Table 4 illustrates that when the subjects had difficulty in hearing, changes in voice were reported. The risk estimate

based on odds ratio revealed that a subject who reported difficulty in hearing was 2.28 (lower: 1.12 & upper: 4.62) times prone to develop changes in voice.

Table 3: Frequency of difficulty in hearing reported in elderly teachers (males & females)

Frequency	Males		Females		Total	
	#	%	#	%	#	%
Never	63	54.8	24	68.6	87	58.0
Rarely	18	15.7	5	14.3	23	15.3
Sometimes	27	23.5	6	17.1	33	22.0
Frequent	5	4.3	0	0.0	5	3.3
Always	2	1.7	0	0.0	2	1.3
Total	115	100.0	35	100.0	150	100.0

Table 4: Comparison between occurrence of difficulty in hearing and its effect on changes in voice

Difficulty in hearing	Changes in voice				p-value
	Yes		No		
	#	%	#	%	
Yes	47	49.0	16	29.6	0.02*
No	49	51.0	38	70.4	

* (p<0.05) – statistically significant

In the present study it was found that 21.7% of males and 22.9% of females reported to have difficulty in swallowing (Table 5). Shamburek and Farrar (1990) also stated that the incidence of dysphagia along with voice problem is seen in elderly. Significant difference (p = 0.04) was obtained between individuals who reported difficulty in swallowing and changes in voice. From table 6 it was noted that individuals who reported swallowing difficulty reported to have changes in voice. The risk estimate revealed that a subject who reported difficulty in swallowing was 2.49 (lower: 1.00 & upper: 6.21) times prone to develop changes in voice.

Table 5: Frequency of elderly teachers (males & females) reported to have difficulty in swallowing

Frequency	Males		Females		Total	
	#	%	#	%	#	%
Never	90	78.3	27	77.1	117	78.0
Rarely	14	12.2	7	20.0	21	14.0
Sometimes	11	9.6	0	0.0	11	7.3
Frequent	0	0.0	1	2.9	1	0.7
Always	0	0.0	0	0.0	0	0.0
Total	115	100.0	35	100.0	150	100.0

Table 6: Comparison between subjects who reported to have difficulty in swallowing and its effect on changes in voice

Difficulty in swallowing	Changes in voice				p-value
	Yes		No		
	#	%	#	%	
Yes	26	27.1	07	13.0	0.04*
No	70	72.9	47	87.0	

* (p<0.05) – statistically significant

It was found that 60% of the males and 68.6% of the females reported to have gastric problems. Individuals who reported to have gastric problem also reported to have changes in voice and subject who reported to have gastric problem was 2.20 times prone to develop changes in voice.

Table 7: Frequency of elderly teachers (males & females) suffering from heart burn or gastric problems

Frequency	Males		Females		Total	
	#	%	#	%	#	%
Never	46	40.0	11	31.4	57	38.0
Rarely	27	23.5	14	40.0	41	27.3
Sometimes	31	27.0	7	20.0	38	25.3
Frequent	11	9.6	1	2.9	12	8.0
Always	0	0.0	2	5.7	2	1.3
Total	115	100.0	35	100.0	150	100.0

Table 8: Comparison between subjects who reported to have gastric problem and its effect on change in voice

Gastric problems	Change in voice				p-value
	Yes		No		
	#	%	#	%	
Yes	66	68.8	27	50.0	0.02*
No	30	31.3	27	50.0	

* (p<0.05) – statistically significant

In the present study, out of 35 females 25.7% reported to suffer from problems related to menopause. It was found that when elderly female subjects had problems related to menopause, they reported to have changes in voice as shown in table 9.

Table 9: Female subjects reported to suffer from issues related to menopause and its effect on voice

Problems related to menopause	Changes in voice				p-value
	Yes		No		
	#	%	#	%	
Yes	09	39.1	0	0.0	0.01*
No	14	60.9	12	100.0	

* (p<0.05) – statistically significant

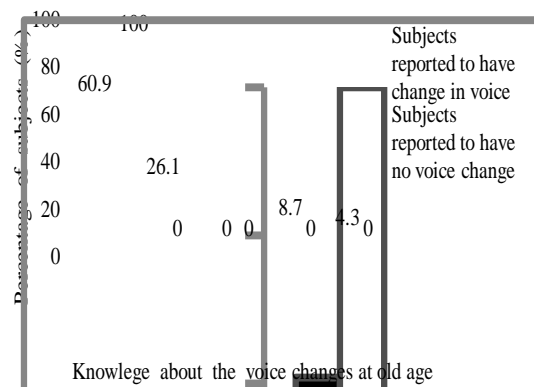


Figure 1: Comparison between knowledge of voice change at old age and change in voice

The second section addressed about the knowledge about voice changes due to aging. It was found that 86.1% of males and 94.3% of females reported to have the knowledge about the changes in voice occurring at old age.

Table 10 tabulated the knowledge about changes in voice occurring at old age and reported changes in voice. Results revealed that when knowledge of changes in voice was present, the ability to identify voice change was 4.29 (lower: 1.51 & upper: 12.20) times more than individuals with lack of knowledge. It was found that 79.1% of males and 88.6% of females reported to have the knowledge of factors affecting/ influencing voice change at old age.

Table 10: Knowledge about changes in voice occurring at old age and change in voice

Knowledge about changes in voice occurring at old age	Change in voice				p-value
	Yes		No		
	#	%	#	%	
Present	90	93.8	42	77.8	0.00*
Absent	06	6.3	12	22.2	

* (p<0.05) – statistically significant

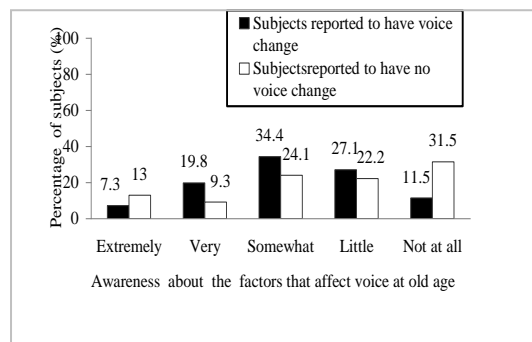


Figure 2: Comparison between awareness about the factors that voice at old age and subjects with and without voice problem

Table 11: Knowledge about factors that affect/ influence voice at old age and change in voice

Knowledge about factors that affect/ influence voice at old age	Changes in voice				p-value
	Yes		No		
	#	%	#	%	
Present	85	88.5	37	68.5	0.00*
Absent	11	11.5	17	31.5	

* (p<0.05) – statistically significant

Results revealed that when knowledge of factors affecting voice at old age was present, the ability to identify change in voice was 3.55 times more than individuals with lack of knowledge.

In section III, the voice characteristics reported by elderly teachers were documented (Figure 3). It was found that significant difference (p=0.04) was reported across gender for speaking with

increased effort (female subjects reported to have more problem than male subjects). Section IV analyzed the emotional impact due to changes in voice and is tabulated in table 12. The results indicated that subjects who reported to have change in voice had varying impacts on their ‘emotional status’ due to voice change.

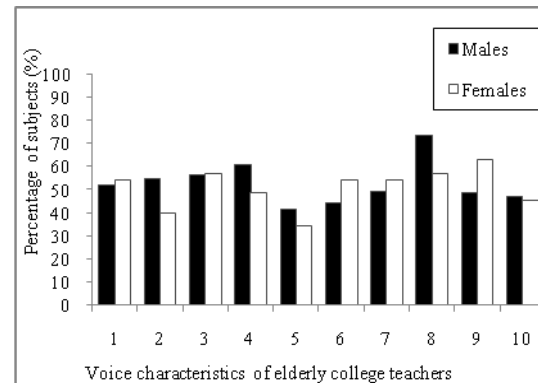


Figure 3: Comparison of voice characteristics reported in elderly teachers across gender

(1 - Change in voice; 2 - Variation of voice in a day; 3 - Change in pitch; 4 - Loss of voice after prolonged speaking; 5 - Tremulous voice; 6 - Rough voice; 7 - Difficulty in speaking aloud; 8- Getting tired while speaking for long; 9- Speaking with increased effort; 10- Running short of breath)

Table 12: Change in voice reported by elderly college teachers across gender

Change in voice	Males		Females		Total	
	#	%	#	%	#	%
Yes	73	63.5	23	65.7	96	64.0
No	42	36.5	12	43.3	54	36.0
Total	115	100.0	35	100.0	15	100.0

No significant difference (p = 0.80) was observed between male and female subjects.

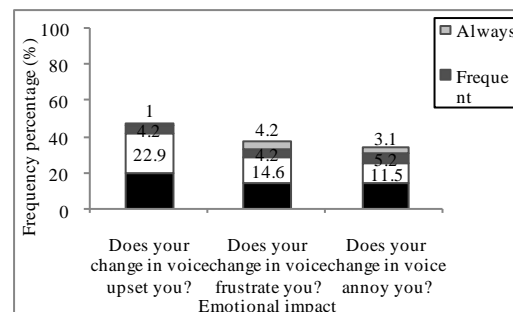


Figure 4: Frequency of change in voice reported by elderly teachers and its emotional impact

The final section addressed the effect of changes in voice on daily communication. Subjects reported to have a negative effect on their communication due to their voice problem. However, no significant difference was noticed across gender. A significant difference was reported for all the aspects of communication in

daily situations as mentioned in table 13 except for trouble being heard in noisy situations. This shows that the elderly teachers were able to accept the changes in their voice due to aging. Odds ratio (table 14) was used to estimate the risk for developing problem in communication in

daily situation in individuals who reported to have changes in voice. The results revealed that when individuals reported change in voice, problems in day to day communication was expected.

Table 13: Comparison of change in voice and its effect on communication in daily situation

Communication in daily situation		Change in voice				P - value
		Yes		No		
		#	%	#	%	
Trouble being heard in noisy situation	Yes	62	64.6	32	59.3	0.51
	No	34	35.4	22	40.7	
Difficulty identifying on phone	Yes	44	45.8	09	16.7	0.00*
	No	52	54.2	45	83.3	
Others asking for repetition	Yes	59	61.5	16	29.6	0.00*
	No	37	38.5	38	70.4	
Voice changes affecting job performance	Yes	27	28.1	04	7.4	0.00*
	No	69	71.9	50	92.6	
Change in voice annoying family and friends	Yes	28	29.2	04	7.4	0.00*
	No	68	70.8	50	92.6	
Changes in voice restricting personal and social life	Yes	32	33.3	01	1.9	0.00*
	No	64	66.7	53	98.1	

* (p<0.05) – statistically significant

Table 14: Risk estimate value for effect of voices change on communication in daily situation

Communication in daily situations	Risk estimate value
Trouble being heard in noisy situation	1.08
Difficulty identifying on phone	1.54
Others asking for repetition	1.59
Change in voice affecting job performance	1.50
Change in voice annoying family and friends	1.51
Change in voice restricting social life	1.77

Discussion

Elderly teachers reported several health related issues and life style factors that influenced changes in voice. Some of the reported factors were smoking, consumption of alcohol and

carbonated drinks, inadequate water intake, intake of spicy foods and lack of regular physical exercises. Since smoking has a deleterious effect on the mucosa of the larynx (Schwartz et al., 2005), it can lead to decreased vibratory efficiency and in turn change in voice in these subjects. However, no significant change in voice was reported as a result of smoking and alcohol consumption. Since consumption of carbonated drinks dehydrates the vocal folds (Chang, 2007), it is speculated that subjects who consumed carbonated drinks may develop voice problems.

In the present study, consumption of non-vegetarian food was higher in both genders. Ng (2000) also reported that increased intake of non vegetarian (spicy) food can lead to heart burn in turn causing laryngopharyngeal reflux. Increased and frequent intake of water was necessary especially in tropical countries like India (Boominathan, Chandrasekhar, Ravi & Krupa, 2009). Gastric problem and heart burn can result in symptoms such as hoarseness, chronic cough with a mucous-sticking sensation (Amirlak, Mudd, & Shaker, 2009). Similar findings were reported in the present study which suggested that subjects reported to have changes in voice with varying frequency of gastric problems.

In addition, National Institute on Deafness and Other Communication Disorders (2008) suggested that practices of breathing exercises are important to support voice projection and to improve breath control. However, results of this study revealed that changes in voice were reported even in subjects who practiced regular physical exercises.

Other interesting findings were, elderly teachers who reported difficulty in hearing and swallowing were more prone to develop changes in voice. The findings of the present study supported the findings of Davis (2004), who stated that during menopause vocal fold tissue dries and leads to dryness of throat, frequent throat clearing and hoarseness. These life style factors and health related issues may be considered as risk factors to develop voice problem in elderly teachers.

Individuals with adequate knowledge of aging effects on voice were able to identify changes in their voice. It is important for elderly teachers to improve knowledge on various life style patterns and the factors contributing to voice changes in old to facilitate and accept age related changes in voice. Boominathan, Chandrasekhar, Nagarajan, Madraswala and Rajan (2008) stated that sensitizing teachers through vocal hygiene program is essential to protect their voice and to stay healthy (vocally).

Elderly teachers are more prone to developing voice problem due to work pressure, stress and prolonged use of voice in teaching and age related changes. Female teachers reported of more changes in voice than male teachers. The results of the present study supported the findings obtained by Miyazaki, Mizumachi and Niyada (2009) which stated that voice characteristics of elderly include pitch change, loss of voice, tremor in voice, roughness, reduced loudness, voice fatigue, and reduced breath while speaking. Most of the elderly teachers who reported to have changes in voice had a negative effect on emotional response to voice change and day to day communication. Similar findings were reported in a study done by Leeuw and Mahieu (2003) which stated that age related vocal changes are associated with psychological dysfunction in daily life.

Conclusion

Elderly teachers are more vulnerable to developing voice problems. Therefore, it is important for elderly teachers to improve knowledge on various life style patterns and the factors contributing to voice changes in old age to facilitate and accept age related changes in voice. Most of the elderly teachers who reported to have changes in voice had a negative effect on emotional response to voice change and day to day communication. Results of this study highlighted various aspects of lifestyle, voice use, risk factors, emotional and communication impairment due to voice changes in elderly teachers. This information will aid to sensitize speech pathologists regarding voice related concerns in elderly teachers that are socio-culturally relevant.

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Appendix – I

Questionnaire for elderly college teachers

Name: _____ Age/ Gender: _____
 Date: _____ Designation: _____
 No. of years of experience: _____ Hobbies: _____
 No. of hours of voice use for teaching in a day: _____
 Any other profession: _____
 Use of amplification or public address system: _____
 How would you rate ambient noise levels in your work environment? (Low, Tolerable, Loud)

Health and life style:

1. Do you smoke or have you ever smoked?
2. Do you consume alcohol or have you ever consumed it?
3. Do you consume carbonated drinks; if yes is it occasionally/ frequently? Mention the frequency of intake.
4. Are you a vegetarian or non-vegetarian?
5. How many glasses of water do you consume in a day? Mention the frequency of intake.
6. Specify the duration of exercise you do every day to keep physical fitness.
7. Are you under any medications; if yes specify the drugs, its dosage, purpose & duration of medication?
8. Have you undergone any vocal surgery; if yes specify its purpose & period of surgery?

No.	Section I: General health	Never	Rarely	Some times	Frequent	Always
01	Do you have difficulty in hearing?					
02	Do you have difficulty in swallowing?					
03	Do you suffer from heartburn or gastric problems?					
04	Do you suffer from problems related to menopause? (If applicable)					
No.	Section II: Knowledge of aging	Extremely	Very	Some what	Little	Not at all
05	Do you know about the voice changes occurring at old age?					
06	Are you aware of the factors that affect/ influence your voice due to aging?					
No.	Section III: Present voice characteristics	Never	Rarely	Some times	Frequent	Always
07	Do others recognize changes in your voice?					
08	Does your voice vary throughout the day?					
09	Do you recognize changes in your pitch while speaking?					
10	Do you lose your voice after prolonged speaking?					
11	Does your voice sound tremulous?					
12	Does your voice sound rough?					
13	Do you have difficulty in speaking aloud?					
14	Do you have difficulty in speaking aloud?					
15	Do you speak with increased effort?					
16	Do you run short of breath when you speak?					
No.	Section IV: Emotional impact	Never	Rarely	Some times	Frequent	Always
	Do you have change in your voice? If yes,					
17	Does your change in voice upset you?					
18	Does your change in voice frustrate you?					
19	Does your change in voice annoy you?					

No.	Section V: Communication in daily situations	Never	Rarely	Some times	Frequent	Always
20	Do you have trouble being heard in noisy situations?					
21	Do people have difficulty in identifying you on the phone?					
22	Do people ask for repetition?					
23	Does your voice affect your job performance?					
24	Does your voice annoy your family and friends?					
25	Do you feel your voice restricts your personal and social life?					

Appendix – II

(Questionnaire for students)

Name: _____ Age/ Gender: _____ Date: _____
 Course: _____ Year: _____ College: _____
 Teachers' Name: _____ No. of hours of lecture/ week: _____

No.	Present voice characteristics	Never	Rarely	Some times	Frequent	Always
01	Do you recognize changes in your teachers' voice?					
02	Does his/ her voice vary throughout the day?					
03	Do you recognize changes in his/ her pitch while speaking?					
04	Does your teacher lose his/ her voice after prolonged speaking?					
05	Does his/ her voice sound tremulous?					
06	Does his/ her voice sound rough?					
07	Does he/ she have difficulty in speaking aloud?					
08	Does he/ she get tired when speaking for long?					
09	Does he/ she speak with increased effort?					
10	Does he/ she run short of breath while speaking?					