

Prevalence of Voice Disorders and Risk Factors in Teachers of Eastern Nepal

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Abstract- Disorder Voice is a voice which is not capable of fulfilling its linguistic and paralinguistic functions. Among professional voice users teachers form the largest group seeking medical help for their voice problems. We aim to find the prevalence of voice disorder in teachers of Eastern Nepal and determine risk factors associated with voice disorder. 307 teachers of various institutions of Morang and Sunsari district were selected after proportionate stratified sampling method from April 2012 to March 2013. They were filled with standard questionnaire and underwent basic clinical and otorhinolaryngological examinations. Flexible nasal endoscopy and 70⁰ direct Endoscopy performed in the department. Out of 307 teachers, 190 (61.89%) had voice disorder out of which primary school teachers have more prevalence (67.4%) as compared to non-primary teachers ($p < 0.012$). Majority had Laryngopharyngeal Reflux (25.79%), Acute Laryngitis (23.16%), Vocal Cord Nodule (21.05%), Vocal Cord Polyp (17.37%), Vocal Cord Cyst (5.26%), Reinkes Oedema (3.68%), Leukoplakia (2.11%) and Functional Dysphonia (1.58%). Teachers with more than 20 years was weak statically significant ($p = 0.051$) with voice disorder. Tobacco ($p = 0.408$) and Alcohol ($p = 0.96$) was not statistical significant with voice disorder whereas smoking ($p = 0.039$) and chalk user ($p < 0.001$) was associated with voice disorder.

Index Terms- Nepal, Professionals, Teachers, Voice Disorder

I. INTRODUCTION

Precise definition of 'voice' is the acoustic outputs from the vocal tract that are characterized by their dependence on vocal fold vibratory inputs. Phonation means the act of voice production and also to the mechanism of voice production.[1] A disordered voice can be defined as one that has one or more of the following characteristics:

- It is not audible, clear or stable in a wide range of acoustic settings;
- It is not appropriate for the gender and age of the speaker;
- It is not capable of fulfilling its linguistic and Paralinguistic functions;
- It fatigues easily;
- It is associated with discomfort and pain on phonation.[2]

Voice disorder or dysphonia when caused by laryngeal pathology represents dysfunction of the voice in its most general aspects.[1] All people who depend on speaking or singing skills for employment (e.g. salesmen, receptionists, telephone operators, lawyers, clergy, teachers, politicians, public speakers, and most physicians) should be considered professional voice users, because all of them place diverse yet significant demands on their voices.[3] Among professional voice user, teachers form the largest group seeking medical help for their voice problems.[4] They are found to be at an exceptionally high risk of developing voice problems because of stress inherent in their occupation and the environmental conditions in which they work.[5]

II. METHODS

This was comparative cross sectional study conducted in Department of Otorhinolaryngology and head and neck surgery, B.P. Koirala Institute of Health Sciences, Dharan, Nepal, during a period of one year from April 2012 to March 2013. Ethical approval was taken from Ethical Committee. Informed & Written Consent was taken from each participant.

The following inclusion and exclusion criteria were made for sample to include in the study:

Inclusion criteria:

1. Teachers by profession both male and female of Morang and Sunsari district
2. Taking at least 6 hours of class per week at least one year

Exclusion criteria

1. Teachers having other professions as singers, radio jockey, actors, politicians and salesman
2. Diagnosed case of allergic pharyngitis, rhinosinusitis, gastroesophageal reflux disease or any previously diagnosed laryngo pharyngeal disease
3. Not willing to take part in study

Total 307 teachers of various institutions were selected after proportionate stratified sampling method. Information's were filled with standard questionnaire and underwent basic otorhinolaryngological examinations. Flexible Nasopharyngolaryngoscopy and 70⁰ Direct laryngoscope performed in the department.

The collected data were entered into Microsoft Excel Spreadsheet. The data was analyzed using SPSS version 17. Mean and standard deviation of variables were calculated for numerical data. Chi Square test was used for analyzing categorical data and t- test used for numerical variable. Multivariate analysis was done with logistic regression. Significance level was set at less than 0.05.

III. RESULTS

Among 307 teachers included in study, male were predominant (204, 66.45%). The mean±S.D. age of the participants was 42.19 years ± 10.955. Region wise most of the teachers were from Morang district having 52.77% as compared to Sunsari district having 47.23%. Most of the teachers were non smoker 51.47% as compared to smokers 48.53%. In the study most of the teachers were not tobacco chewers (75.24%) as compared to tobacco chewers (24.76%) In the study majority of teachers was non alcoholic having 59.93% as compared to alcoholic were 40.07%.

Table I. Socio-Demographic characteristics of the participants (n=307)

Characteristics	Frequency	Percentage
Age (in years)		
20-30	61	19.87
31-40	58	18.89
41-50	101	32.90
51-60	79	25.73
>60	8	2.61
Mean (Years)	Age±SD	42.19 ± 10.955
Gender		
Male	204	66.45
Female	103	33.35
District		
Morang	162	52.77
Sunsari	145	47.23
Smoking Habit		
Yes	149	48.53
No	158	51.47
Chewing Tobacco		
Yes	76	24.76
No	231	75.24
Alcohol Intake		
Yes	123	40.07
No	184	59.93

In the study majority of teachers were from primary level having 61.89% and higher secondary level teachers were less accounting 4.56%. Campus and University teachers comprised of 5.21%. The mean years of experience of teachers were 17.42 years with standard deviation of ±9.786. Majority of teachers were having teaching experience of more than 20 years (38.44%) and teachers having experience from 1 to 10 years were 30.29%.

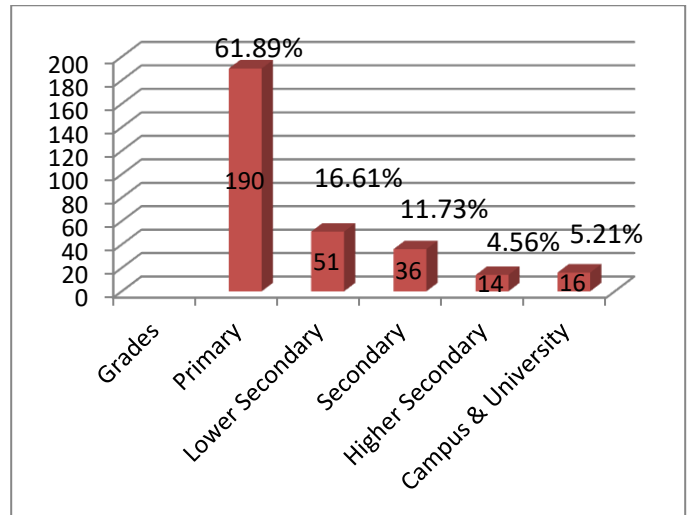


Figure 1: Distribution of Teachers according to grades of teaching

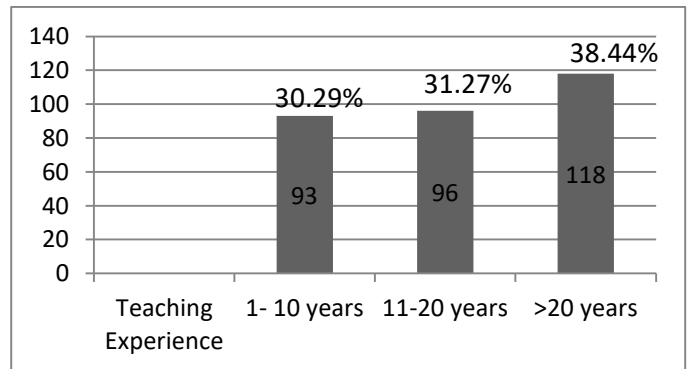


Figure 2: Experience of teachers in years

Main materials for teaching in the classes were chalk accounting 85.70% where as projector and power pointer was less having 1.30%.

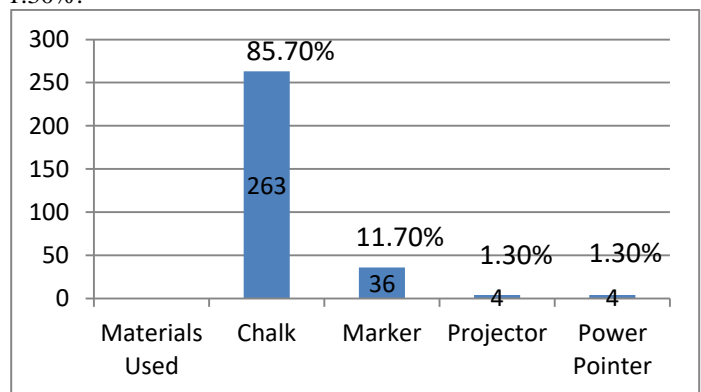


Figure 3: Distribution of materials used in class by teacher

In the study among all teachers 61.89% of total teachers complained that they have voice problems as compared to 38.11% who did not have any voice problems.

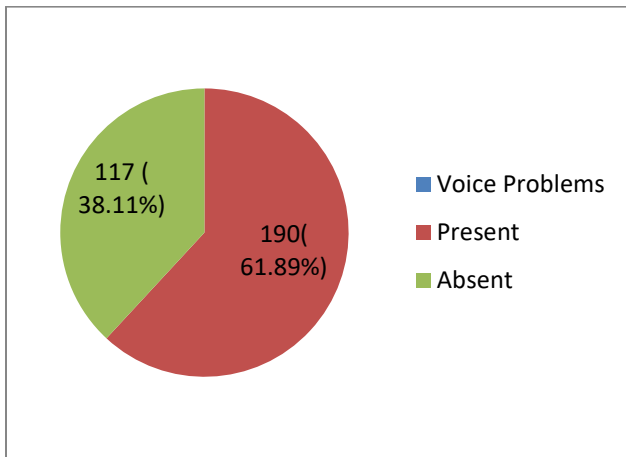


Figure 4: Voice Problems of teachers

Most common findings in flexible nasopharyngolaryngoscopy and 70° direct endoscope was laryngopharyngeal reflux having 25.79%, acute laryngitis as 23.16% and vocal nodule 21.05% as second and third common findings. Functional dysphonia was least common findings in just 1.58%

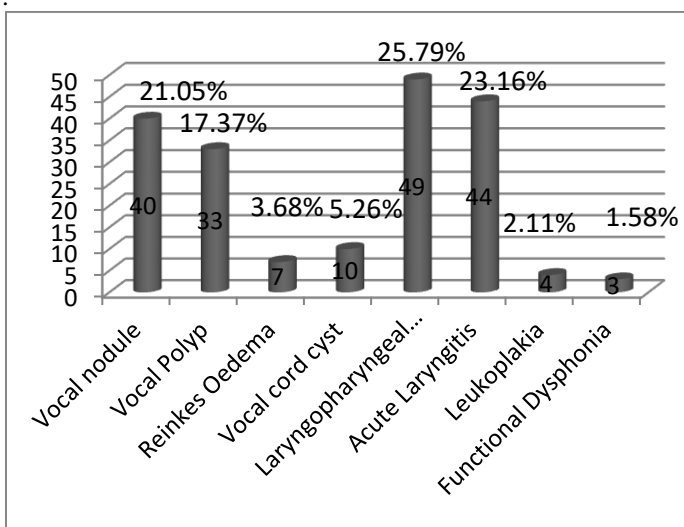


Figure 5: Findings from flexible laryngoscopy and 70° direct laryngoscopy

The prevalence of voice disorder was more in primary level teachers as compared to non primary teachers ($p < 0.012$). Smoking was statistically significant with voice disorder than non smoker ($p = 0.039$). Voice disorder were mostly seen in chalk users than non chalk users ($p < 0.001$). There was no statistical significance between voice disorder and tobacco chewers ($p = 0.408$). There was no significant between alcohol use and voice disorder ($p = 0.976$). There was weak statistical significant between teaching experience and voice disorder by Pearson Chi Square test. Teachers having working experience of more than 20 years were having more voice disorder than those teachers having experience of less than 20 years

Table II: Relationship between voice disorder with level of teaching, smoking, chalk user, tobacco chewer, alcohol consumptions and teaching experience

Level of teaching	Voice Disorder (n=190)	Normal (n=137)	p Value
Primary	128(67.4%)	82(32.6%)	0.012
Non-primary	62(53%)	55(47%)	
	Voice Disorder	Normal	P Value
Smoking	101(67.8%)	48(32.2%)	0.039
Non Smoker	89(56.3%)	69(43.7%)	
	Voice Disorder	Normal	p Value
Chalk User	166 (66.7%)	83(33.3%)	<0.001
Non Chalk user	24 (41.4%)	34 (58.6%)	
	Voice Disorder	Normal	p Value
Tobacco User	44 (57.9%)	32(42.1%)	0.408
Non Tobacco user	146 (63.2%)	85(36.8%)	
	Voice Disorder	Normal	p Value
Alcoholic	76(61.8%)	47(38.2)	0.976
Non alcoholic	114 (62%)	70(38.2)	
	Teaching Experience	Normal	p value
1-10 years	54(58.1%)	39(41.9)	0.051
10-20 years	53(55.2%)	43(44.8%)	
>20 years	83(70.3%)	35(29.7%)	

Factors responsible for the voice disorder were analyzed by logistic regression by including those factors whose p value was less than 0.2. The risk for voice disorder for teaching experience more than 20 years teachers have 1.809 times more than that of 0 to 10 years of teaching experience which is statistically significant. Similarly risks for primary teachers have 1.424 times of developing voice disorder than non primary teachers but statistically not significant. Also smokers have risk of 1.265 times than non smoker to develop voice disorder ($p = 0.41$). Finally chalk users have high risk of 2.69 times than of non chalk users to develop voice disorder.

Table III: Logistic Regression of voice disorder with teaching experience, level of teaching, cigarette smoking and materials used in class

	Odd Ratio	95% Confidence Interval	Significance (p value)
Teaching Experience			
0 to 10 years	1	Reference	
10 to 20 years	0.902	0.498-1.633	0.073
>20 years	1.809	1.0033-3.264	0.049
Level of teaching			
Non Primary	1	Reference	
Primary	1.424	0.803-2.526	0.226
Cigarette Smoking			
Non Smoker	1	Reference	
Smoker	1.265	0.723-2.213	0.41
Materials used in Class			
Non Chalk User	1	Reference	
Chalk User	2.69	1.465-4.940	0.001

IV. DISCUSSION

Voice disorders are most common among teachers who have to overwork their voices in a noisy atmosphere, in places where there is an echo, or that have poor acoustics, in big rooms or open spaces, a lecture theater where there is not any amplifying equipment, and so on. These things result in chronic or acute symptoms of vocal attrition as vocal fatigue, hoarseness, throat discomfort or pain and benign mucosal lesions. [6]

In this study majority of age distribution were in 41-50 years (32.90%) and least in age above 60 years (2.61%) with mean age of 42.19 years. Preciado et al had teachers from range of 21 to 68 years with mean age of 43.1 years.[9] Lee et al more age group of 30-39 years of 37.8% and least of 9.8% in above 50 years.[7]

In this study male were more (66.45%) as compared to female (33.55%). The study population had less female because the numbers of female teachers are very less as compared to male in Nepal (39.62% in primary level, 24.69% in lower secondary level, 15.56% in secondary level and 4.7% in higher secondary level).[8] The reasons for less number of female teachers in Nepal could be due to less female literacy rate (57.4%) as compared to male (75.1%).[9] Smith et al had male teachers of 49.45% and female of 50.55%.[10] Preciado et al had more female (65.08%) as compared to male teachers (34.92%).[6] Lee et al had study population of female of 78.5% and male 21.5%.[7]

In this study Majority of teachers in schools used Chalk as their main materials (85.70%) and was exposed to chalk dust. Preciado et al mentioned the dust level in 89% (n=511) among dysphonic teachers and 88% (n=284) among normal teachers but did not mentioned particular about the dust of chalk or surroundings.[6] Sampaio et al also mentioned 50.2% of total teachers reported chalk dust in their classes.[11]

In this study 48.53% of total teachers were smokers which were higher than other study results. Preciado et al had 41.87% non smoker.[6] Lee et al study had 98% non smoker.[7] The result of smoker's percentage was much higher than WHO report on prevalence of current cigarette smoking of Nepal in adult population which is 19.25%.[12]

Only 24.76% were tobacco users among the teachers in this study. The prevalence of tobacco use in Nepal as per WHO data is 21.95%.[12] Behlau et al study has shown 82.7% of teachers had tobacco users that include both smoking and chewing tobacco.[13]

In the study 40.07% were alcoholic. Preciado et al study showed 73.33% of total teachers had habit of consuming alcohol.[6] Lee et al had 11.5% of teachers consuming alcohol.[7] The result of this study on alcohol use is less than percentage of alcohol consumption by adult population of Nepal which is 67.5%.[14]

In this study 61.89% (n=190) of total teachers had voice disorder. The prevalence rate varies from country to country. Preciado et al study has prevalence of 57%.[6] Urrutikoetxea et al showed 17.3% current voice problem, 70% had voice problem in their professional career and 22% frequent.[15] Bacha et al (1999) reported 43.41% of teachers in Brazil.[16] Smith et al mentioned 32% of teachers had some voice problems as compared to non-teachers having voice problem (1%).[17]

Laryngopharyngeal reflux were major findings (23.16%), vocal cord nodule in 18.42%, vocal cord polyp in 15.79% Preciado et al study showed 20.2% organic dysphonias, 28.8% functional dysphonias and 8.1% chronic laryngitis in which among organic disorder it was nodular lesion of 16.9%, polyp 2.4%. Similarly it showed gastric reflux laryngitis of 2.7% and tobacco laryngitis of 3.4%.[6] Urrutikoetxea et al have nodules in 9%, Reinkes oedema (3.7%).[20] Sala et al had prevalence of vocal cord nodule of 6% and chronic laryngitis in 17%.[18] In this study functional dysphonia accounted just 1.58% (n=3) where as

Precaido et al study have functional dysphonia of 30.8% which is more due to videolaryngostroboscopy examination.[6]

Precaido et al study found higher prevalence of voice disorder in elementary school (18.5%), secondary school (18.5%) and Primary school (9.3%).[6] The reasons for having more voice problems in primary teachers is that teachers have to take long duration of class, more number of students in class and noise production in class made by students which all provokes the teachers to speak in louder intensity that leads to voice disorder. In this study smokers had more voice problem than non smoker ($p < 0.039$). Precaido et al study showed more dysphonic teachers smoked than normal ones ($X^2: 6.48$, $df: 6$, $p < 0.001$).[6] In this study chalk users were majority and were having more voice disorder as compared to non chalk users ($p < 0.001$). Precaido et al study mentioned the dust level in classroom which was not statistically significant though they have not mention the type of dust.[6] As in the case of this study majority of teachers were chalk users, continuous exposure to chalk is one of the factor to create voice disorder. There was no statistical significant between voice disorder and tobacco users ($p = .408$). In the study of Behlau et al there was statistical significant between tobacco users and non users having voice disorder.[13] Alcohol and voice disorder were also not statistical significant in this study ($p = 0.976$). In the study of Precaido et al there was no statistical significant between daily alcohol user and voice disorder.[6] In the study of Lee et al alcohol consumption was statistical significant with voice disorder ($p < 0.008$).[7] Behlau et al study also showed significant relations with alcohol drinking and voice disorder.[13]

With the experience of teaching and voice disorder there was weak significant relationship. Experience more than 20 years were having more voice disorder than others ($p < 0.051$). Precaido study has found no any association with teaching experience of teacher.[6] It has been suggested that voice abnormalities among voice-using professionals occur after 10–20 years of work.[19] Persistent poor voice adaptation, resulting from the vocal load over many years in the profession, may lead to reduction in the amplitude of mucous wave vibrations in the vocal folds and incomplete glottic closure.[20]

V. LIMITATIONS

This study was first to be conducted in the country. Videostroboscopic laryngoscopy was not available which could have detected the vocal fold movements and character. This study was cross-sectional study so the follow up and evaluation of teachers with voice problem was limited. The effectiveness of using markers, avoiding the cigarettes, alcohol and chewing tobacco in same individual could not be assessed.

VI. CONCLUSION

The prevalence of voice disorder in teachers of Morang and Sunsari district of Nepal is 61.89%. The main risk factors for the voice disorder for teachers is use of chalk as teaching material ($OR = 2.69$, 95% $CI: 1.465-4.940$).

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