

# Impact of Classroom Determinants on Psychosocial Aspects of Voice Among School Teachers of Indore, India: A Preliminary Survey

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**Abstract** Teaching voice is the professional voice; often different in quality from our day-to-day speaking voice, and is supposed to be subjected to vocal abuse, misuse and overuse. This paper aims towards highlighting the various classroom determinants that may impact teacher's voice and how these impacts can affect the daily activities in terms of functional emotional and psychosocial aspects. To understand the same, a cross sectional prospective study was conducted across eight English medium institutions of Indore (a city in central India) region. The study was carried out in three phases: formulation of a questionnaire, data collection (through administration of the questionnaire and VHI among sixty school teachers) followed by data analysis, to determine whether any association exists between the various classroom determinants and voice impairment. Significant association was found between determinants like teaching experience; number of classes, duration of breaks, use of any alternate method of teaching and alternate use of any amplification device with physical, emotional and functional aspects of life. The findings holistically indicate that various factors within the classroom environment only has a significant bearing on the voice disturbances of a school teacher's life thus deteriorating their quality of life. Thus it is substantial to begin a training programme by speech

language pathologists in order to heighten awareness among teachers. After all voice disturbances are a real and treatable condition and with the right amount of training can be avoided.

**Keywords** Teachers · Professional voice users · Classroom determinants · Questionnaire · Voice Handicap Index

## Introduction

Teaching is a profession that teaches all other profession. A teacher or an educationist is someone who passes on information or skills in front of a huge population of students in a class; a profession that requires excessive voice usage, and therefore, takes teachers to the high risk level of developing voice problems. Professional voice users are those whose voice requires acute vocal control including variations in intensity/loudness, pitch variation, extended phonation, yelling, and sometimes husky voice. Teachers were found to have voice problems approximately; three times that of members of other professional voice users. In India, 49% of teachers population reported to have voice problems [1]. Major voice problems as reported by teachers include deviant voice qualities, inability to sustain phonation, vocal fatigue, pain during phonation and throat irritation [1].

The teaching voice has been of special interest in several studies conducted in different parts of the world, since teaching as a profession places high on voice endurance because of the need to speak loudly for long periods, often under unfavourable circumstances [2–4], resulting in decrease in their overall ability to work effectively in long run. However, teachers apparently are not very active in

The said article has not been presented at any conference and also not under publication in any other journal.

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seeking professional help by themselves. Studies show that only a small percentage of teachers who report voice problems seek professional help [5–8]. Teachers may be hesitant to whether go for help or deal with the voice problem by themselves or simply ignore it [5–7, 9]. They do have a presupposition that their voice problems are a normal inconvenience in their occupation [6, 7, 10] or they may have adapted themselves to the adverse vocal symptoms [11] which probably account for why they do not seek help at an early stage. Apart from that many a times voice disorders may be difficult to diagnose [12] by non professionals and layman persons.

## Need of the Study

According to the profession and the nature of the demands on voice, a teacher is placed under the “Informer” category within the array of professional voice users. This category is characterized by their long periods of uninterrupted speaking to varying size groups and in large spaces, as well as to individuals. Thus throughout the world there has been an increase in the number of research work among this population. Our search of literature failed to recognize any such studies being conducted in Central India. Thus, we attempted to do a preliminary survey to determine whether classroom behaviors influence teacher’s voice.

## Objective

To analyze (1) if any significant association exists between experience and level of teaching and its effect on voice, and (2) the association between various classroom determinants and its consequences on functional, physical, and emotional domains among school teachers of Indore District, Madhya Pradesh, India.

## Materials and Method

The present study was carried in three phases. Each phase was conducted and analyzed separately.

### Phase 1: Formulation of a Questionnaire

The first phase included formulating an awareness questionnaire based on experience that could capture the various classroom behaviors and determinants related to teachers. To develop the same, view of five experienced school teachers (> 15 years) were taken regarding the common behavior of teachers in classroom environment.

Out of these suggestions, seven most common questions were selected for analysis among teachers.

The questionnaire so developed (“Appendix”) was self explanatory and gave clear idea about the classroom determinants that may directly or indirectly affect the voice of teachers. In the final developed questionnaire (“Appendix”), eleven questions were for collecting the demographic data while twelve questions (6 open ended and 6 close ended questions) were regarded as the determinants. The following were the questions:

*Demographic Data* (1) Name, (2) age/gender, (3) address, (4) name of the school/college, (5) Qualification, (6) Language spoken, (7) number of years of teaching, (8) grades being teaching (9) number of working days (per week), (10) any history/treatment of voice problem, and (11) presence of hearing loss/neurological disorder.

*Open ended questions* (1) Total duration of school (2) Average number of classes per day, (3) duration of each class (In minutes), (4) number of students (per class), (5) Number of breaks, and (6) duration of each break.

*Close ended questions* (1) Use of chalk, (2) If yes, does it reduces vocal stress? (3) use of any alternate method of teaching, (4) If yes, does it reduces vocal stress? (5) use of any amplification system, and (6) If yes, does it reduces vocal stress?

The main objective of this questionnaire was to get an overview regarding the level of awareness among the teachers of different groups about the classroom determinants that may affect their voice. Self perception of voice quality is a subjective parameter i.e., obtaining data on how relevant voice disorder can be for individual themselves. It enables them to express their knowledge on daily lifestyle.

### Phase 2: Data Collection

This phase included data collection whereby, eight non-governmental schools of Indore district were visited. At every selected school a brief overview of speech and language pathology was given to the respective principal and teachers, followed by detailed summary of the study. Sixty teachers (twenty each from pre primary, primary and secondary section) who voluntarily participated and fulfilled the inclusionary criteria (3 years or more experience of teaching with no history of hearing impairment and/or neurological disorder) were considered as the subjects. Written consent was taken from all the participants and instructions were given regarding filling two questionnaires:

- (1) The developed Awareness questionnaire to assess the classroom determinants, and
- (2) Voice Handicaps Index; VHI [13]

Approximately it took 15–20 minutes to administer questionnaire and fill in all details for each teacher. Further the questionnaires were taken back for detailed analysis.

### Phase 3: Data Analysis

This phase covered the detailed analysis of the completed questionnaire. All the obtained data's were coded and recorded in an excel database; and subjected to statistical analysis through SPSS version 16. Chi-square tests of significance were applied to analyze the association between various classroom determinants and voice impairments.

### Results and Discussion

Results so obtained from the present study has been discussed over three main sections, namely analysis of association between teaching experience and level of teaching with Voice Impairments, analysis of the open ended answers, and analysis of the close ended answers.

#### Analysis of Association Between Teaching Experience and Level of Teaching with Voice Impairments

The Teaching experience of the teachers across the pre-primary, primary and secondary teachers (Fig. 1) ranged from 2 to 15 years. The distribution and association of teaching experience and level of teaching with functional, physical, emotional subscales obtained from VHI are presented over in Table 1. Significant association has been found between personal domain and teaching experience ( $p < 0.05$ ;  $df = 9$ ), while poorly significant association ( $p < 0.07$ ;  $df = 9$ ) at 93% confidence interval exists with functional domain. Emotional domain tends to vacillate

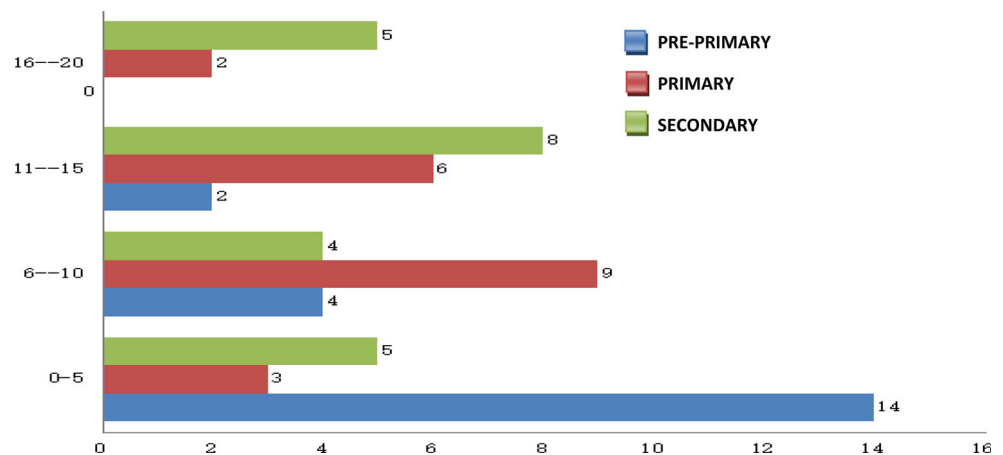
overtime due to multiple factors which directly or indirectly affect the reliability of this domain. A study by Russell, Oates & Greenwood [6] reported that 22% of teachers being surveyed have regular voice problems and 38.7% of teachers were found to miss at least 1 day of work in the past year as a result of their voice disorder.

Through a thorough search of literature, we couldn't trace any studies similar to our study design (i.e., association between years and levels of teaching with individual domains of VHI) across other geographical locations. However, many studies are available in literature (pertaining to self perception of voice problems among teachers) both in accordance as well as contradictory to our findings. Mostly it is believed that school teachers with more years of teaching experience are susceptible to develop voice disorders [5, 14] since the long durations of vocal use has got a cumulative effect on the voice giving rise to a voice disorder [15]. However, in many studies no such significant relationship was found between years of teaching [6, 7, 14, 16]. Few studies even reported a remarkable finding that teachers who were new to the teaching profession had a higher prevalence of voice disorder as compared to those who have been in the job for long; attributing to coping strategies and greater tolerance to vocal problems in the experienced teachers [17, 18]. Similarly, past research investigating the relationship between level of teaching and risk of developing voice problem had shown conflicting results. While no significant relationship was found between voice problem and grades taught [14, 16, 19], significant association was reported by [20–22].

#### Analysis of the Open Ended Answers

Association of the answers obtained from the six open ended questions pertaining to determinants like total duration of school, average number of classes per day, duration of each class (in minutes), number of students (per

**Fig. 1** Figure showing the relationship of teaching experience with number of teachers among teachers of different levels corresponding to pre primary, primary and secondary groups



**Table 1** Distribution and association of teaching experience and level of teaching with functional, physical, emotional subscales of VHI

Parameters	Physical domain				Functional domain				Emotional domain		
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate
Teaching experience (in years)											
0	21 (35%)	0 (.0%)	0 (.0%)	0 (.0%)	21 (35.0%)	0 (.0%)	0 (.0%)	0 (.0%)	19 (31.7%)	1 (1.7%)	1 (1.7%)
< 5	12 (20.0%)	4 (6.7%)	2 (3.3%)	0 (.0%)	15 (25.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	15 (25.0%)	1 (1.7%)	2 (3.3%)
5–10	10 (16.7%)	4 (6.7%)	1 (1.7%)	1 (1.7%)	14 (23.3%)	1 (1.7%)	1 (1.7%)	0 (.0%)	15 (25.0%)	0 (.0%)	1 (1.7%)
10–15	2 (3.3%)	1 (1.7%)	1 (1.7%)	1 (1.7%)	4 (6.7%)	1 (1.7%)	0 (.0%)	0 (.0%)	5 (8.3%)	0 (.0%)	0 (.0%)
LOS	$\chi^2 = 17.138$ ( $p = 0.47$ )				$\chi^2 = 16.014$ ( $p = 0.67$ )				$\chi^2 = 2.250$ ( $p = 0.859$ )		
Level of teaching											
Pre primary	17 (28.3%)	2 (3.3%)	1 (1.7%)	0 (0%)	18 (30%)	0 (0%)	1 (1.7%)	1 (1.7%)	15 (25%)	2 (3.3%)	3 (5.0%)
Primary	13 (21%)	3 (5.0%)	3 (5.0%)	1 (1.7%)	16 (26%)	2 (3.3%)	0 (0%)	2 (3.3%)	19 (31%)	0 (0%)	1 (1.7%)
Secondary	15 (25%)	4 (6.7%)	0 (0%)	1 (1.7%)	20 (33.3%)	0 (0%)	0 (0%)	3 (5.0%)	20 (33.3%)	0 (0%)	0 (0%)
LOS	$\chi^2 = 5.7$ ( $p = 0.458$ )				$\chi^2 = 8.444$ ( $p = 0.207$ )				$\chi^2 = 8.278$ ( $p = 0.082$ )		

class), number of breaks, and duration of each break with functional, physical, emotional subscales obtained from VHI are presented in Table 2.

In our study we have found a significant association of emotional domain with determinants like total duration of school ( $p < 0.02$ ;  $df = 2$ ), number of classes in a day ( $p < 0.05$ ;  $df = 8$ ) and duration of breaks ( $p < 0.05$ ;  $df = 6$ ), while a poorly significant association number of breaks ( $p < 0.07$ ;  $df = 6$ ) at 93% confidence interval. No significant associations have been noted between any other determinants being analyzed in this section with personal and functional domains in isolation. However, the cumulative effects of personal, functional and emotional domains (i.e., total VHI score) have been observed to be highly associated with total duration of school ( $p < 0.001$ ;  $df = 8$ ), significantly associated with duration of breaks ( $p < 0.05$ ;  $df = 6$ ) and poorly associated at 94% confidence interval with duration of class ( $p < 0.06$ ;  $df = 2$ ).

When teachers are being compared with other professional voice users, voice accumulation time and the voicing percentages relative to total time at work have been found to be higher in teachers, thus exposing them to at risk of developing occupational voice disorders. For example, Massuda et al. [23] reported a voicing percentage of 21% for teachers in an 8 h workday, compared to 7% for office workers; Sala et al. [24] reported that the average speaking time of day care teachers was 40% of the time at work, compared to 28% for nurses while Buekers et al. [25] found that teaching involves a greater voice load compared to other professions. While highlighting vocal load among teachers, voice intensity is the most important factor

[4, 26, 27]. But speaking loudly is not the sole reason resulting in voice disorders. Other factors such as speaking continuously, inadequate vocal rest and speaking against background noise also leads to voice disorders [28]. Other precipitating factors related to frequency of voice disorders are class size, classroom hour, number of pupils in the classroom, exposure to dirt and chalk dust. Review of literature enlists findings corresponding to both ends of the spectrum. While some studies reported that larger class size [9], longer classroom hours [4, 7], larger number of students the classroom [14], greater exposure to dirt and chalk dust [20, 21], lesser number and duration of breaks [28–31] are related to higher incidence of voice disorders while many reported that there were no significant association between reporting a voice disorder with classroom hours [32] and average number of hours taught per day [14]. However, none of these measures are under the teachers' control as the school management normally decides the same.

**Analysis of the Close Ended Answers**

Distribution and association of use of chalk/blackboard, effect of using chalk/blackboard, any alternate methods of teaching, effect of use of any alternate methods of teaching, use of public address system and effect of use of public address system with functional, physical, emotional subscales of VHI has been depicted in Table 3.

Though statistical analysis indicates only a poorly significant association at 93.0% confidence interval ( $p < 0.07$ ,  $df = 2$ ) between use versus non use of any alternate method

**Table 2** Distribution and association of total duration of school (In hours), number of classes in a day, duration of each class in a day (In minutes), number of student's in a class (In a day), number of breaks in a day and duration of each break (In minutes) with functional, physical, emotional subscales of VHI

Parameters	Physical domain				Functional domain				Emotional domain		
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate
Total duration of school (in hours)											
3	17 (28.3%)	2 (3.3%)	1 (1.7%)	0 (.0%)	18 (30.0%)	0 (.0%)	1 (1.7%)	1 (1.7%)	15 (25. %)	2 (3.3%)	3 (5.0%)
5	28 (46.7%)	7 (11.7%)	3 (5.0%)	2 (3.3%)	36 (60.0%)	2 (3.3%)	0 (.0%)	2 (3.3%)	39 (65. %)	0 (.0%)	1 (1.7%)
LOS	$\chi^2 = 2.205$ ( $p = 0.567$ )				$\chi^2 = 3.00$ ( $p = 0.392$ )				$\chi^2 = 7.875$ ( $p = 0.195$ )		
Number of class in a day											
3	2 (3.3%)	1 (1.7%)	2 (3.3%)	0 (.0%)	5 (8.3%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	1 (1.7%)	1 (1.7%)
4	9 (15.0%)	3 (5.0%)	0 (.0%)	0 (.0%)	11 (18.3%)	1 (1.7%)	0 (.0%)	0 (.0%)	12 (20.0%)	0 (.0%)	0 (.0%)
5	23 (38.3%)	4 (6.7%)	0 (.0%)	1 (1.7%)	26 (43.3%)	1 (1.7%)	0 (.0%)	1 (1.7%)	28 (46.7%)	0 (.0%)	0 (.0%)
6	7 (11.7%)	1 (1.7%)	2 (3.3%)	1 (1.7%)	8 (13.3%)	0 (.0%)	1 (1.7%)	2 (3.3%)	8 (13.3%)	1 (1.7%)	2 (3.3%)
7	4 (6.7%)	0 (.0%)	0 (.0%)	4 (6.7%)	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	1 (1.7%)
LOS	Statistics = 18.532 ( $p = 0.100$ )				Statistics = 11.507 ( $p = 0.486$ )				Statistics = 16.341 ( $p = 0.38$ )		
Duration of each class in a day (in minutes)											
20–40	37 (61.7%)	7 (11.7%)	4 (6.7%)	2 (3.3%)	44 (73.3%)	2 (3.3%)	1 (1.7%)	3 (5.0%)	46 (76.7%)	1 (1.7%)	3 (5.0%)
40–60	8 (13.3%)	2 (3.3%)	0 (.0%)	0 (.0%)	10 (16.7%)	0 (.0%)	0 (.0%)	0 (.0%)	8 (13.3%)	1 (1.7%)	1 (1.7%)
LOS	$\chi^2 = 1.440$ ( $p = 0.696$ )				$\chi^2 = 1.33$ ( $p = 0.721$ )				$\chi^2 = 1.933$ ( $p = 0.380$ )		
Number of students in a class (in a day)											
<15	4 (6.7%)	0 (.0%)	0 (.0%)	0 (0%)	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	1 (1.7%)
15–30	6 (10.0%)	1 (1.7%)	0 (.0%)	0 (0%)	7 (11.7%)	0 (.0%)	0 (.0%)	0 (.0%)	5 (8.3%)	1 (1.7%)	1 (1.7%)
30–45	12 (20.0%)	3 (5.0%)	1 (1.7%)	0 (0%)	14 (23.3%)	0 (.0%)	1 (1.7%)	1 (1.7%)	14 (23.3%)	1 (1.7%)	1 (1.7%)
45–60	6 (10.0%)	2 (3.3%)	0 (.0%)	0 (.0%)	8 (13.3%)	0 (.0%)	0 (.0%)	0 (.0%)	8 (13.3%)	0 (.0%)	0 (.0%)
>60	17 (28.3%)	3 (5.0%)	3 (5.0%)	2 (3.3%)	21 (35.0%)	2 (3.3%)	0 (.0%)	2 (3.3%)	24 (40.0%)	0 (.0%)	1 (1.7%)
LOS	$\chi^2 = 5.617$ ( $p = 0.60$ )				$\chi^2 = 7.177$ ( $p = 0.846$ )				$\chi^2 = 7.322$ ( $p = 0.836$ )		
Number of breaks in a day											
No breaks	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	1 (1.7%)
One	11 (18.3%)	2 (3.3%)	1 (1.7%)	0 (.0%)	12 (20%)	0 (.0%)	1 (1.7%)	1 (1.7%)	10 (16.7%)	2 (3.3%)	2 (3.3%)
Two	27 (45.0%)	7 (11.7%)	3 (5.0%)	2 (3.3%)	35 (58.3%)	2 (3.3%)	0 (.0%)	2 (3.3%)	38 (63.3%)	0 (.0%)	1 (1.7%)
Three	3 (5.0%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	0 (.0%)
LOS	$\chi^2 = 3.671$ ( $p = 0.932$ )				$\chi^2 = 4.949$ ( $p = 0.839$ )				$\chi^2 = 11.09$ ( $p = 0.64$ )		
Duration of each break (in minutes)											
<20	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	1 (1.7%)
20–40	9 (15.0%)	2 (3.3%)	1 (1.7%)	0 (.0%)	10 (16.7%)	0 (.0%)	1 (1.7%)	1 (1.7%)	9 (15.0%)	2 (3.3%)	1 (1.7%)
40–60	5 (8.3%)	1 (1.7%)	0 (.0%)	0 (.0%)	6 (10.0%)	0 (.0%)	0 (.0%)	0 (.0%)	5 (8.3%)	0 (.0%)	1 (1.7%)
>60	27 (45.0%)	6 (10.0%)	3 (5.0%)	2 (3.3%)	34 (56.7%)	2 (3.3%)	0 (.0%)	2 (3.3%)	37 (61.7%)	0 (.0%)	1 (1.7%)
LOS	$\chi^2 = 3.077$ ( $p = 0.961$ )				$\chi^2 = 6.101$ ( $p = 0.730$ )				$\chi^2 = 12.544$ ( $p = 0.51$ )		

**Table 3** Distribution and association of use of chalk/blackboard, effect of using chalk/blackboard, any alternate methods of teaching, effect of use of any alternate methods of teaching, use of public address system and effect of use of public address system with sub domains of VHI

Parameters	Physical domain				Functional domain				Emotional domain		
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate
<b>Use of chalk &amp; blackboard</b>											
Yes	45 (75.0%)	9 (15.0%)	4 (6.7%)	2 (3.3%)	54 (90.0%)	2 (3.3%)	1 (1.7%)	3 (5.0%)	54 (90.0%)	2 (3.3%)	4 (6.7%)
LOS	Not applicable				Not applicable				Not applicable		
<b>Effect of use of chalk &amp; blackboard</b>											
Reduce VS	10 (16.7%)	0 (.0%)	0 (.0%)	0 (.0%)	8 (13.3%)	0 (.0%)	1 (1.7%)	1 (1.7%)	9 (15%)	0 (.0%)	1 (1.7%)
Doesn't reduce VS	35 (58.3%)	9 (15.0%)	4 (6.7%)	2 (3.3%)	46 (76.7%)	2 (3.3%)	0 (.0%)	2 (3.3%)	45 (75.0%)	2 (3.3%)	3 (5.0%)
LOS	$\chi^2 = 4.00$ ( $p = 0.261$ )				$\chi^2 = 6.133$ ( $p = 0.105$ )				$\chi^2 = 0.60$ ( $p = 0.741$ )		
<b>Any alternate methods of teaching</b>											
No	28 (46.7%)	8 (13.3%)	3 (5.0%)	2 (3.3%)	37 (61.7%)	2 (3.3%)	0 (.0%)	2 (3.3%)	39 (65.0%)	0 (.0%)	2 (3.3%)
Yes	17 (28.3%)	1 (1.7%)	1 (1.7%)	0 (.0%)	17 (28.3%)	0 (.0%)	1 (1.7%)	1 (1.7%)	15 (25.0%)	2 (3.3%)	2 (3.3%)
LOS	$\chi^2 = 0.841$ ( $p = 0.666$ )				$\chi^2 = 3.543$ ( $p = 0.315$ )				$\chi^2 = 3.089$ ( $p = 0.378$ )		
<b>Effect of use of any alternate methods of teaching</b>											
No	28 (46.7%)	8 (13.3%)	3 (5.0%)	2 (3.3%)	37 (61.7%)	2 (3.3%)	0 (.0%)	2 (3.3%)	39 (65.0%)	0 (.0%)	2 (3.3%)
Reduce vocal stress	4 (6.7%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (5.0%)	0 (.0%)	1 (1.7%)	0 (.0%)	2 (3.3%)	1 (1.7%)	1 (1.7%)
Doesn't reduce vocal stress	13 (21.7%)	1 (1.7%)	1 (1.7%)	0 (.0%)	14 (23.3%)	0 (.0%)	0 (.0%)	1 (1.7%)	13 (21.7%)	1 (1.7%)	1 (1.7%)
LOS	$\chi^2 = 5.315$ ( $p = 0.070$ )				$\chi^2 = 2.206$ ( $p = 0.322$ )				$\chi^2 = 3.922$ ( $p = 0.687$ )		
<b>Use of public address system</b>											
No	28 (46.7%)	7 (11.7%)	3 (5.0%)	2 (3.3%)	36 (60.0%)	2 (3.3%)	0 (.0%)	2 (3.3%)	39 (65.0%)	0 (.0%)	1 (1.7%)
Yes	17 (28.3%)	2 (3.3%)	1 (1.7%)	0 (.0%)	18 (30.0%)	0 (.0%)	1 (1.7%)	1 (1.7%)	15 (25.0%)	2 (3.3%)	3 (5.0%)
LOS	$\chi^2 = 15.330$ ( $p = 0.018$ )				$\chi^2 = 10.563$ ( $p = 0.032$ )				$\chi^2 = 4.443$ (0.349)		
<b>Effect of use of public address system</b>											
No	28 (46.7%)	7 (11.7%)	3 (5.0%)	2 (3.3%)	36 (60.0%)	2 (3.3%)	0 (.0%)	2 (3.3%)	39 (65.0%)	0 (.0%)	1 (1.7%)
Reduce vocal stress	1 (1.7%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (1.7%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (1.7%)	0 (.0%)	0 (.0%)
Doesn't reduce vocal stress	16 (26.7%)	2 (3.3%)	1 (1.7%)	0 (.0%)	17 (28.3%)	0 (.0%)	1 (1.7%)	1 (1.7%)	14 (23.3%)	2 (3.3%)	3 (5.0%)
LOS	$\chi^2 = 2.025$ ( $p = 0.567$ )				$\chi^2 = 7.879$ ( $p = 0.019$ )				$\chi^2 = 3.723$ ( $p = 0.155$ )		

of teaching with the emotional subscale of VHI, but significant association exists between effect of use of any alternate methods of teaching with functional ( $p < 0.02$ ,  $df = 6$ ) and emotional ( $p < 0.05$ ,  $df = 4$ ) domains. As there had not been any similar study conducted to overview the association between use of alternate method of teaching and its effect in reducing vocal strain with the psychosocial aspects of voice, the present findings regarding this determinant cannot be compared. Thus, the analysis of this determinant is unique to our study.

Our analysis also depicts that while at one end significant association ( $p < 0.02$ ,  $df = 2$ ) is existing among the use versus non use of public address system and emotional domains, only poorly significant association at 93% confidence interval ( $p < 0.07$ ,  $df = 2$ ) is evident between effect of use of public address system and emotional domain. No significant association has been seen between any other determinants and sub-domains of VHI. Though we could not find in the literature exactly similar study groups and the effect they have with use versus non use of

public address system; however in few studies [16, 33] it was reported that teachers who had experienced voice problems were more likely to use microphones in class as compared to teachers not affected by it. Also Use of amplifier may reduce the need for teachers to project their voice above background noise, and can reduce their overall vocal load and thus should be accepted as a tool for clinical utility to reduce voice disorders among teachers [34–36].

## Conclusion

Teaching is a high risk profession indeed vulnerable towards developing voice problem. The various risk factors associated (within a classroom set up) with causation of voice disorders isolated from the findings of the present study are: total duration of school, number of classes in a day, duration of breaks, use of alternate methods of teaching and public address system. Knowledge of these factors and the effects of their combinations are relevant for the diagnosis, therapy and prevention of occupational voice problems, and for avoiding psychosocial and economical detriment. Schools can provide a great help and gratitude to the teachers by taking initiative (preferably at the beginning of their career) through promoting “preventive culture among teachers” as a priority.

School teacher’s life can be affected by voice disorders in various aspects. This may lead teachers avoiding regular schools, seeking for other job options, early retirement, being reserved, avoids communicative environment, repeat statements, easily being disheartened, isolated socially, get easily upset and discouraged with their job performance. All this cumulatively affect lifestyle of these individuals. So it is very essential to provide regular training programmes for creating awareness and better rehabilitation. Voice disorders are curable and right training can work as a best tool for its treatment.

## Limitations

Due to the cross-sectional design of the study, temporal relationship and the cause and consequence could not be evaluated. A prospective cohort study would help overcome these limitations.

Secondly, this paper only covers teachers of Indore city, though we feel that additional data from the whole state (Madhya Pradesh) will not alter the results and conclusion of the study. However for a precise evaluation, future study can target to expand the sample size distributed across a larger geographical area.

Third, the result of the analysis of association between “duration of breaks” and “VHI scores”, might be

misleading, since in what type of vocal activities the teachers were involved during the break time was not been considered.

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## Compliance with Ethical Standards

**Conflict of interest** The author declares that they no conflict of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

## Appendix: Awareness Questionnaire on Classroom Determinants

### Demographic Data

- (1) Name
- (2) Age/Gender:
- (3) Address:
- (4) Name of the school/college
- (5) Qualification:
- (6) Language spoken (Mention all the languages):
- (7) Number of years of teaching:
- (8) Grades being teaching:
- (9) No. of working days (per week)
- (10) Any history/treatment of voice problem (If yes, provide details)
- (11) Presence/history of any hearing loss/neurological disorder (If yes, provide details):

### Classroom Determinants

- Q1 What is the total duration of school (per day)?
- Q2 How many classes do you take in a day?
- Q3 What is the duration of each class?
- Q4 How many students do you teach in a class?
- Q5 How many breaks do you have in a day?
- Q6 What is the duration of each break?
- Q7 Do you use chalk/black board frequently during teaching? (a) Yes (b) No
- Q8 If yes, does the use of chalk/black board frequently during teaching helps in (a) reducing vocal stress (b) does not reduce vocal stress?

- Q9 Do you use any alternate methods of teaching (like, LCD, projectors etc.) frequently? (a) Yes (b) No
- Q10 If yes, does the use of alternate methods of teaching (like, LCD, projectors etc.) (a) reducing vocal stress (b) does not reduce vocal stress?
- Q11 Do you use amplification system (mic and speaker) to be heard loud while teaching? (a) Yes (b) No
- Q12 If yes, does the use of amplification system (mic and speaker) helps in (a) reducing vocal stress (b) does not reduce vocal stress?

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