

Impact of a structured voice care education program on voice hygiene practices among rural schoolteachers: a longitudinal pilot study

Samir Kasam Choudhari^{1(A,B,C,D,E,F)}

¹Krishna Institute of Nursing Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, India

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Address for correspondence: Samir Kasam Choudhari, Krishna Institute of Nursing Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Malkapur, Karad (Dist. Satara), Maharashtra 41553, India, e-mail: sarsenal.choudhary@gmail.com, <https://orcid.org/0000-0002-5758-2510>

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Abstract

Background. Teachers are at increased risk of voice disorders due to prolonged occupational voice use. This study assessed the effectiveness of a structured voice hygiene practice program among teachers from Western Maharashtra, India.

Material and methods. A longitudinal quasi-experimental pilot study using a pre-test and post-test design was conducted among 32 primary school teachers. A structured voice hygiene practice training program was delivered, and voice hygiene practices were assessed on days 0, 15, 30, and 45. Data were analyzed using repeated-measures ANOVA to assess changes in voice hygiene practice scores, with $p < 0.05$ considered statistically significant.

Results. Significant improvement was shown in taking short breaks for one's voice during teaching hours ($p < 0.0046$), resting the voice during hoarseness ($p < 0.0046$), limiting the intake of caffeinated drinks ($p < 0.0046$), avoiding teaching when the voice was strained ($p < 0.0224$), keeping proper posture while teaching ($p < 0.0417$), avoiding shouting to control the classroom ($p < 0.0694$), avoiding speaking loudly for long periods ($p < 0.0694$), using non-verbal signals ($p < 0.0046$), and seeking medical help with ongoing voice issues ($p < 0.0224$). Drinking adequate amounts of water, avoiding throat clearing, avoiding shouting, avoiding prolonged loud speaking, and using relaxation and deep breathing exercises were not shown to be statistically significant ($p > 0.05$).

Conclusions. This pilot study concluded that a structured voice care education program is beneficial in improving voice hygiene practices and vocal health among teachers.

Keywords: voice hygiene, pilot projects, health promotion, teachers, health education

Introduction

The prevalence of vocal-related problems is significantly higher among teachers than among non-teaching staff [1-3]. The constant use of one's voice during teaching can lead to issues like vocal fatigue, vocal fold nodules, and other organic vocal fold lesions [4-6]. Several studies have shown that vocal hygiene programs help reduce vocal disorders and boost teachers' awareness of their voices [7,8]. Research is often conducted in urban or developed settings due to easier access to participants and clinical infrastructure [9,10]. There is a lack of information

regarding vocal wellness for teachers in rural or remote regions, where environmental factors and infrastructure barriers lead to the hygiene program failing [11,12].

Teachers are at increased risk of voice disorders due to the many factors involved in their regular professional speaking. Dysphonia is a multifactorial condition that can be affected by several factors, which include frequent speaking at high intensity, background noise, insufficient drinking of water, poor voice-use technique, unfavorable environmental conditions, and respiratory or nasal disorders [13-14].

The need to examine voice hygiene practices in a group of teachers may be particularly relevant in rural settings, where working conditions, classroom environments, and opportunities for occupational health education may differ from those in urban areas. Some possible factors that could affect the voice hygiene of the teachers could be that their prolonged voice use, classroom noise, acoustics, and the availability of preventive health education may influence teachers' voice hygiene behaviors. However, evidence from rural Indian contexts on voice hygiene practices and their associated preventive measures for these practices remains limited. Because of this, this study on rural Western Maharashtra teaching staff can provide evidence on this subject particular to such settings and may also highlight the usefulness of a planned voice hygiene program for rural education [15-17].

Aim of the work

The aim of this study was to evaluate the effectiveness of a structured voice hygiene practice program in improving self-reported voice hygiene practices among teachers in Western Maharashtra, India.

Material and methods

Study design

A quasi-experimental, one-group pre-test and post-test research design was adopted for the study. The population of the study involved primary school teachers from a rural setting. Permission was obtained from the school authorities before recruitment. A non-probability

convenience sampling method was used to select the samples. Teachers who were available during the data collection period, willing to participate, and had no prior training in vocal hygiene practices were included in the study.

Sample size

For the proposed main study, the sample size was decided upon taking into consideration the prevalence of previously reported voice problems among Indian primary school teachers. Rajashekhar et al. found that voice problems were present in 17.4% of primary school teachers [13]. A formula for finding a confidence interval of 95% ($Z=1.96$) was used. The expected prevalence (p) was 17.4%, the complementary proportion (q) was 82.6%, and the absolute precision was 5%. This gave an estimated sample size of 221 teachers. Allowing for 20% attrition, the final required sample size would be around 277 teachers. The current study was planned as a longitudinal pilot study, and only 10% of the expected main-study sample was considered [18], i.e. about 28 teachers for the pilot sample. 32 teachers were selected for the pilot study to make sure that there was good feasibility checking, and potential drop out was also considered.

Sample selection procedure

The study was conducted among primary school teachers from five rural primary schools in Western Maharashtra, India. The schools were selected using a cluster sampling technique. The teachers were responsible for teaching primary school children, aged 6-11 years. Primary school teachers were selected because their work involves frequent and sustained verbal communication, classroom instruction, and repeated interaction with young children, resulting in substantial occupational vocal demands. The study therefore focused on this group to evaluate whether structured voice care education could improve modifiable voice hygiene practices in a rural school setting.

Data collection

The questionnaire was prepared by the researcher and submitted to experts in the field of otolaryngology and speech therapy. The questionnaire was evaluated by five experts in otolaryngology and two experts in speech therapy, who suggested some modifications to the questionnaire. The researcher refined the questionnaire in accordance with the experts' suggestions. A questionnaire consisting of three sections was used. The first section (A) consisted of demographic variables, including age, gender, marital status, teaching hours per week, years of teaching experience, and average teaching hours per day. The second section (B) consisted of voice health variables, and section (C) consisted of 12 statements related to vocal hygiene practices in school. Responses were scored on a 3-point Likert scale, where: 3 = Always, 2 = Sometimes, and 1=Never (Table 1).

Table 1. Voice Hygiene Practice Assessment Tool

Sr. No.	Voice hygiene practice item	Response		
		Always	Sometimes	Never
1.	I drink adequate amounts of water throughout the day	3	2	1
2.	I take short breaks for my voice during teaching hours	3	2	1
3.	I rest my voice when I feel hoarse or tired	3	2	1
4.	I use non-verbal signals, like hand gestures or claps, to get attention	3	2	1
5.	I avoid clearing my throat	3	2	1
6.	I limit my intake of caffeinated drinks	3	2	1
7.	I avoid teaching when my voice is very strained	3	2	1
8.	I use relaxation and deep breathing exercises	3	2	1
9.	I keep proper posture while teaching	3	2	1
10.	I avoid shouting to control the classroom	3	2	1
11.	I avoid speaking loudly for long periods	3	2	1
12.	I seek medical help when I have ongoing voice issues	3	2	1

Reliability of the tool

The structured questionnaire was conducted in 32 cases, and the reliability of the tool was computed by applying Cronbach's Alpha using SPSS software. The reliability coefficient was found to be $r=0.756$ in voice hygiene practices among teachers.

Voice Hygiene Practice Training Program

The program was conducted in four phases.

Phase I: Assessment of voice hygiene practices

All the participants were gathered in a classroom on the very first day. With the help of a structured questionnaire, information on socio-demographic and voice-related clinical variables was obtained. Baseline assessment of teachers' voice hygiene practices was done through a structured voice hygiene practice questionnaire.

Phase II: Implementation of the Voice Hygiene Practice Training Program

The structured Voice Hygiene Practice Training Program was conducted immediately after the baseline assessment. The total duration of the program was approximately 60 minutes. The investigator explained how voice impacts teaching effectiveness, which common issues are faced by educators, and how bad habits hurt both performance and daily living. Charts and models were used to demonstrate how sound is formed through breath control and the link between excessive strain and vocal cord damage. Common vocal problems (hoarseness of voice, voice fatigue, dry throat, frequent throat clearing, pain while speaking, and temporary loss of voice) and risk factors (inadequate water intake, dusty classroom environment, chalk dust, stress and anxiety, excessive consumption of tea and coffee, spicy foods) were discussed with the participants. The teachers were educated regarding voice hygiene practices like hydration strategies, healthy voice use, avoiding harmful habits, etc.

Phase III: Demonstration of exercises

In addition to the Voice Hygiene Practice Training Program, the teachers were shown the breathing and relaxation techniques. The objective of deep breathing included not only relaxed ventilation and voice control but also decreasing vocal strain. Relaxation exercises mainly targeted neck, shoulder, jaw, and facial muscles by relieving their tension through relaxation and allowing the use of a relaxed voice.

Each exercise was demonstrated and practiced under the guidance of the investigator. The exercise duration was 10 minutes.

Breathing exercise: The participants were instructed to sit comfortably with an upright but relaxed posture, keep the shoulders relaxed, inhale slowly through the nose while allowing the abdomen to expand, and exhale slowly through the mouth. The investigator first demonstrated the technique, after which the participants practiced the exercise under supervision for 5 minutes.

Relaxation exercise: Progressive muscle relaxation was demonstrated to reduce tension in the neck, shoulders, jaw, and facial muscles and to promote relaxed voice production. The participants were instructed to sit comfortably, maintain slow breathing, briefly contract selected muscle groups, and then consciously release the tension, with emphasis on the shoulders, neck, jaw, and facial muscles. The exercise was demonstrated and practiced under the guidance of the investigator for 5 minutes.

Phase IV: Follow-up assessment

On Day 15, Day 30, and Day 45, the voice hygiene practices of the teachers were followed up using the same structured voice hygiene practice checklist. Day 15: The participants were observed to determine the extent to which they implemented the voice hygiene practices. Queries related to the exercises and precautions were answered, and the main practices were restated for support. Day 30: Voice hygiene practices were reassessed. Day 45: A last check of voice hygiene practices was done. Enhancement of voice hygiene practices across the three observations was measured.

Data analysis

Data were analyzed using SPSS Software version 20. Repeated-measures ANOVA was used to assess changes in voice hygiene practice scores across the four assessment points (Day 0, Day 15, Day 30, and Day 45), as the same participants were assessed repeatedly. A p -value <0.05 was considered statistically significant.

Results

Participant demographics

Most of the teachers (62.50%) were aged 23-40 years old, while 37.50% were aged 41-60 years old. 65.62% of the participants were male, 34.38% were female, and 93.75% of the population was married. Workload data revealed that 69% of the staff taught more than 24 hours each week. The majority of the participants had over 10 years of experience and a daily teaching duration of 5-6 hours per day (Table 2).

Table 2. Demographic characteristics of the study participants (N=32)

Socio-demographic variables		Frequency (n)	Percentage (%)
Age	23-40 years	20	62.50
	41-60 years	12	37.50
Gender	Male	21	65.62
	Female	11	34.38
Marital Status	Married	30	93.75
	Unmarried	2	6.25
Teaching hours per week	20-24 hours	10	31.25
	More than 24 hours	22	68.75
Years of teaching experience	Less than 5 years	3	9.38
	5-10 years	14	43.75
	More than 10 years	15	46.88
Average teaching hours per day	Less than 5 hours	15	46.87
	5-6 hours	17	53.13

Notes: Data is presented in the form of frequency (n) and percentage (%).

Voice-related clinical variables

A history of voice problems was reported by 18 (56.25%) participants, while 14 (43.75%) had no such history. Occasional voice-related problems were reported by 17 (53.13%) teachers, while 46.88% experienced them frequently. Throat-related symptoms were reported by 40.62% of the teachers. Most teachers, about 69%, do not drink enough water during school hours. No teacher had ever received voice care training (Table 3).

Table 3. Frequency and percentage distribution of voice-related clinical variables (N=32)

Voice health variables	Category	Frequency (n)	Percentage (%)
History of voice problems	Yes	18	56.25
	No	14	43.75
Frequency of voice problems	Occasional	17	53.13
	Frequent	15	46.88
	Chronic	0	0.00
Present throat symptoms	Hoarseness	1	3.13
	Throat pain	2	6.25
	Dryness	6	18.75
	Frequent throat clearing	4	12.50
	None	19	59.38
Medical conditions affecting the voice	Allergies	0	0.00
	Acid reflux	6	18.75
	Respiratory illness	0	0.00
	None	26	81.25
Smoking or tobacco use	Yes	0	0.00
	No	32	100.00
Habit of shouting in the classroom	Never	1	3.13
	Sometimes	19	59.38
	Often	12	37.50
Daily water intake at school	Adequate	10	31.25
	Inadequate	22	68.75
Previous voice care training	Yes	0	0.00
	No	32	100.00

Notes: Data is presented in the form of frequency (n) and percentage (%).

Effect of structured voice care education on voice hygiene practices of teachers: pre- and post-intervention analysis

The longitudinal analysis of voice hygiene practices among teachers demonstrated a statistically significant improvement in voice hygiene practices; a repeated-measures ANOVA

test was used, and $p < 0.05$ was considered significant. Significant improvements were observed in taking short breaks during teaching hours ($p < 0.0046$), resting the voice during episodes of hoarseness ($p < 0.0046$), limiting the intake of caffeinated drinks ($p < 0.0046$), avoiding teaching when the voice was strained ($p < 0.0224$), keeping proper posture while teaching ($p < 0.0417$), using non-verbal signals during teaching hours ($p < 0.0046$), and seeking medical help for persistent voice problems ($p < 0.0224$). Drinking adequate amounts of water, avoiding throat clearing, avoiding shouting, avoiding prolonged loud speaking, and using relaxation and deep breathing exercises were not shown to be statistically significant outcomes ($p > 0.05$) (Table 4).

Table 4. Item-wise distribution and trend analysis showing a statistically significant effect of voice hygiene practices among teachers from Day 0 to Day 45

Voice hygiene practice item	Days	Response			Friedman test value	p value
		Never	Sometimes	Always		
I drink adequate amounts of water throughout the day	0 days	6	16	10	5.733	0.0569
	15 days	3	7	22		
	30 days	1	3	28		
	45 days	0	0	32		
I take short breaks for my voice during teaching hours	0 days	1	13	18	8.000	0.0046*
	15 days	1	11	20		
	30 days	0	6	26		
	45 days	0	3	29		
I rest my voice when I feel hoarse or tired	0 days	0	12	20	8.000	0.0046*
	15 days	0	7	25		
	30 days	0	4	28		
	45 days	0	2	30		
I use non-verbal signals, like hand gestures or claps, to get attention	0 days	8	10	14	8.000	0.0046*
	15 days	2	12	18		
	30 days	1	8	23		
	45 days	0	6	26		
I avoid clearing my throat	0 days	19	11	2	0.1333	0.9355
	15 days	8	10	4		
	30 days	7	8	17		
	45 days	0	0	32		
I limit my intake of caffeinated drinks	0 days	28	4	0	8.000	0.0046*
	15 days	24	7	1		
	30 days	20	10	2		
	45 days	14	12	6		
I avoid teaching when my voice is very strained	0 days	0	12	20	7.600	0.0224*
	15 days	0	6	24		
	30 days	0	4	26		
	45 days	0	0	32		

I use relaxation and deep breathing exercises	0 days	25	7	0	0.9333	0.6271
	15 days	18	8	6		
	30 days	10	12	10		
	45 days	6	10	16		
I keep proper posture while teaching	0 days	7	19	6	6.500	0.0417*
	15 days	7	17	8		
	30 days	5	15	12		
	45 days	4	22	16		
I avoid shouting to control the classroom	0 days	16	10	6	6.000	0.0694*
	15 days	15	11	6		
	30 days	10	18	4		
	45 days	10	20	2		
I avoid speaking loudly for long periods	0 days	16	10	6	6.000	0.0694*
	15 days	16	10	6		
	30 days	12	16	4		
	45 days	10	20	2		
I seek medical help when I have ongoing voice issues	0 days	2	4	26	7.600	0.0224*
	15 days	1	5	26		
	30 days	0	2	30		
	45 days	0	0	32		

Notes: Repeated-measures ANOVA test was used. p -value <0.05 was significant.

Discussion

The present study observed the effect of a structured voice care education program on voice hygiene practices among primary school teachers over 45 days. The results show improvements in several crucial aspects of voice hygiene practices. The study observed that the teachers improved their voice hygiene practices such as taking short vocal breaks during teaching, resting the voice when experiencing hoarseness, using non-verbal classroom management strategies, limiting caffeinated beverages, avoiding teaching when the voice was strained, maintaining proper posture, and seeking medical help for ongoing voice problems. These outcomes show the positive impact of promoting awareness and implementation of healthy voice practices [19-21].

In this pilot study, certain practices such as drinking adequate amounts of water, avoiding clearing the throat, avoiding shouting to control the classroom, avoiding prolonged loud speaking, and using relaxation deep-breathing exercises were not shown to be statistically significant outcomes for this concern. These findings suggest that the response to voice care education may vary across different voice hygiene behaviors. The differences in behavioral

responses may be related to occupational and environmental constraints. Shouting and prolonged loud speaking may be difficult to modify in busy classrooms. Other behaviors such as hydration, throat clearing, and relaxation exercises may require regular reminders and repeated practice. Based on the findings of this pilot study, we are planning to conduct a weekly session on a voice hygiene practice training program in the main study to promote voice hygiene practices among teachers.

The present study found improvements in several voice hygiene practices following the structured voice care education program. This is important because adequate hydration, appropriate voice use, avoidance of vocal strain, and other healthy vocal behaviors contribute to maintaining vocal function and reducing voice-related problems among professional voice users. Although maintaining proper posture showed a statistically significant improvement, sustained postural changes may still require continued reinforcement because posture can be influenced by musculoskeletal tension or altered cervical alignment and may therefore require physical assessment and targeted intervention rather than education alone [19-21].

Multiple studies have supported the concept of promoting awareness and understanding of vocal hygiene by executing programs aimed at helping teachers maintain a healthy voice [12, 22]. In the present study, approximately 50% of the teachers reported voice problems, which was higher than in a cross-sectional study of 217 teachers in Saudi Arabia, which found a prevalence of voice problems among 19.4% of the participants, significantly related to classroom noise, high work-related stress, and specific clinical factors. Although experiencing a mild to moderate occupational hazard, only a small percentage of the teachers sought professional voice therapy, highlighting a need for improved intervention strategies to encourage the participation of more teachers [23].

A total of 10 (43%) of the reviewed studies indicated that providing voice training or vocal hygiene education were factors contributing to favorable voice outcomes, and 6 (26%) of them pointed out that vocal hygiene education alone is not sufficient for achieving effective voice training and that it should be paired with voice therapy [19].

A study conducted on 26 teachers to see the impact of vocal hygiene training on teachers' willingness to incorporate vocally hygienic behaviors showed that the teachers adopted good vocal hygiene behaviors and used vocal hygiene techniques, as well as a willingness to incorporate these techniques [24]. In a similar study, Jiang et al. recommended early vocal

training and preventive interventions for teachers to reduce the occurrence of occupational voice disorders associated with excessive voice use and adverse workplace conditions [25]. A quasi-experimental study found that vocal hygiene training significantly improved teachers' willingness to adopt healthy vocal behaviors, highlighting its effectiveness in promoting vocal health [26]. The study concluded that the incorporation of these educational programs in teacher training is effective for reducing the burden of voice disorders and maintaining the well-being of vocal professionals. These findings suggest that voice care education should be integrated into formal teacher training programs and occupational health policies to prevent voice disorders before they become chronic.

The limitations of the study included a short observation period of 45 days, which is insufficient to break long-standing habitual behaviors, such as shouting or improper posture, which often require longitudinal reinforcement. A larger sample size can help generalize the findings to a broader population. The study had a self-report bias because the data collection relied on self-reporting by the teachers, which may be subject to social desirability bias, where participants report better hygiene practices than they actually perform. Objective voice assessment was not performed; therefore, changes in vocal function or voice quality could not be objectively confirmed. The absence of a control group limits the ability to attribute the observed improvements solely to the intervention. The study did not consider external variables like classroom acoustics, class size, or background noise, which significantly influence vocal demand regardless of hygiene knowledge.

Future research should include larger samples, extending the study duration to at least 60 days, control groups, and objective voice assessments. Regular reinforcement sessions may also be considered to support sustained adoption of voice hygiene practices. In addition, teachers with persistent voice problems should undergo appropriate clinical assessment and referral to ENT and/or speech-language pathology services when indicated.

Conclusions

This study showed that giving teachers straightforward, practical voice care lessons can prevent serious communication and functional disorders. By bridging the gap between clinical knowledge and classroom application, the intervention helped the participants to transform from

harmful vocal habits to sustainable, protective behaviors. Incorporation of such training programs into regular teacher programs could help teachers avoid voice issues, feel more comfortable, and keep their voices healthy for the long run.

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To conduct the study, the researcher obtained the ethical clearance from the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth (Deemed to be University) (Reference No. KVV/IEC/03/2024, Protocol No. 371/2023-2024, Date: March 28th, 2024). After assuring the confidentiality of their information and explaining the study objective, methods, and possible benefits, informed consent was obtained from all the participants. The participation in the study was entirely voluntary.

Artificial intelligence (AI) was not used in the creation of the manuscript.

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