

Educational Program about Vocal Hygiene Awareness among Primary School Teachers in Minia

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Abstract

Background: Teachers seriously depend on their voice in their professional lives and have to overcome vocal challenges every day. Consequently, they are especially vulnerable to developing vocal disorders. **Aim:** The aim of this research is to evaluate the effect of an educational program about vocal hygiene awareness among primary school teachers in Minia city. **Methods:** The current study used a quasi-experimental research design, with one group receiving pre- and post-tests. **Setting:** The study was conducted at six governmental public primary schools in three districts in Minia City. **Sampling:** A multistage stratified random sample involved 200 teachers, and it was calculated using the statistical software EPI-INFO V7.2.5. **Tools:** Three tools were utilized to collect data: 1st tool: part I, socio-demographic data, part II, occupational history, part III, health related habits, and part IV, vocal symptoms and pattern of vocal usage in class by teacher; 2nd tool: knowledge regarding vocal hygiene; 3rd tool: practice questionnaire regarding vocal hygiene. **Results:** The present research indicated that more than two-thirds of the studied teachers had a poor level of knowledge regarding vocal hygiene pre-educational program; this improved to nearly three-quarters in the post-test, and less than three-quarters of the studied teachers had a poor level of reported practice regarding vocal hygiene pre-educational program; this improved to more than three-quarters in the post-test. **Conclusion:** There was a highly statistically significant increase in the total mean score of these knowledge and practices before and after implementing the educational program, and there was a positive correlation between pre- and post - total knowledge and practice scores regarding vocal hygiene programs. **Recommendation:** Deliver well-structured training sessions to educate teachers on the crucial role of good vocal hygiene practices in enhancing their voice function and preventing future voice impairment.

Keywords: Awareness, Educational program, Primary school teachers, Vocal hygiene.

Introduction

Humans communicate primarily through speech, which they utilize to convey information and display their biological and psychological traits. Many professions use their voice for work, including instructors. These workers have a higher chance of experiencing voice problems including dysphonia. Teachers' voice issues can be caused by a variety of variables, including environmental, personal, and/or organizational factors (da Silva et al., 2024).

Teaching is thought about an action which can lead to operate fatigue. Teachers are noticed as relating to a professional group with the greatest number of occupational illnesses, and the issues related to physical; mental health as well as competent performance are obvious.

Among the primary causes of teachers' sickness, voice issues and psychic issues are outstanding (de Magalhães et al., 2023).

One of the biggest groups of people who utilize their voice professionally is teachers. They rely heavily on their voice in the workplace and use it as their main tool. An average voice ability is sufficient for the majority of occupations. But beyond what is needed for daily speech, there are some occupations, like teaching, that call for constant and intensive voice usage. These occupations consequently call for a high level of verbal ability. Educators are frequently impacted by behavioral vocal issues that stem from insufficient vocal usage, even though they may exhibit any kind of dysphonia (Mansouri et al., 2023).

A change in voice quality, pitch, loudness, and vocal effort that impairs communication or has a detrimental effect on voice-related quality of life is referred to as voice disorder or dysphonia. There are two main categories into which voice abnormalities may be divided: Dysphonia both organic and behavioral/functional. When it comes to voice use, organic dysphonia results from factors like reflux reflux, vocal fold paralysis, and systemic diseases; on the other hand, functional dysphonia results from abusive behaviors, misuse of the voice, poor vocal technique, and/or muscle imbalance, with or without psycho-emotional involvement (Cynthia et al., 2022).

Speaking in a loud atmosphere, unpleasant working circumstances such fluctuating temperatures and dry air, poor breathing and phonation, stress, and tense muscles are some risk factors for developing voice issues. Numerous risk factors, including lengthy teaching hours, years of experience in the field, stressful work situations, and a family history of voice issues, have been linked to the disorder. A few other societal and personal risk factors are smoking, age, gender, and allergies. Workload volume and complexity, school cultures, structures, and operating systems, community relations, humidity variations and the interference of the hydration of the pharynx and larynx mucosa, respiratory system diseases, biological constitution aspects, as well as stress are among the factors related to vocal fold pathology in teachers (Shilling et al., 2021).

The most frequent vocal complaints from educators include hoarseness, voice loss, dry throats, burning or itchy throats, vocal fatigue, dyspnea, coughing, throat clearing, difficulty projecting high-pitched sounds, vocal effort, phonation breaks, and weak vocal intensity. Usually, these symptoms develop gradually. Usually, these symptoms last until the conclusion of the workday or the workweek (Granjeiro et al., 2022).

Voice problems may have a negative impact on teachers' quality of life and professional performance, which might lead to fewer attendance, worse instruction, and even resignation. Due to missed pay, higher

replacement teacher costs, and the high cost of voice disorder treatment, the financial impact of voice problems among teachers is enormous. Thus, voice problems in educators should not be disregarded as a serious medical issue. (Feng et al., 2022).

Improving vocal health and changing vocal patterns are part of what is known as vocal hygiene, a patient-centered behavioral treatment. A regular routine of healthful practices to preserve the vocal folds' condition is known as vocal hygiene. These include avoiding circumstances that put the voice under unnecessary stress and using incorrect voice usage, as well as adopting doable actions that support effective voice production and general vocal health. (Mahendru et al., 2023).

Avoid excessive consumption of dehydrating drugs, such as alcohol and caffeine; increase water intake every day to reduce coughing and throat cleaning; it's safer to either cough quietly or take little sips of water to flush out any residue or mucus (where you push air out), Avoid yelling and speaking loudly or in a whisper for extended periods of time. Avoid prolonged conversations, make sure background noise is kept to a minimum while someone is singing or speaking (because you might want to raise your voice to cut through the cacophony), and refrain from smoking. Even if you have lost your voice, don't try to talk when you're unwell. (Santhosh & Kumaraswamy, 2022)

Significant of the study

The majority of people who rely heavily on their voice at work are schoolteachers. Since the voice is the primary means by which teachers convey knowledge to students, it needs to be adaptable, strong, and clear in order to facilitate effective instruction. Due to voice abuse and overuse as well as additional loading variables such as lengthy speaking distances, background noise, inadequate equipment like voice amplifiers, and deficient room acoustics, there is a lot of vocal loading in the teaching profession (Zaky et al., 2020).

The risk of developing a voice issue is 2–3 times higher in teachers than in non-teachers. A person's quality of life may be adversely affected by reduced pitch and loudness, as well

as by breathy, effortful, and hoarse vocal characteristics brought on by a voice disease (Pappas, 2023). Teachers had a greater prevalence of vocal symptoms (11.0%) than non-teachers (6.2%) in a cross-sectional study carried out on a random sample in the United States. Teachers also had a greater lifetime prevalence of voice disorders (57.7%) than the non-teacher reference group (28.8%) (Naryani et al., 2023)

Egypt lacks large-scale research or national surveys that have looked into the topic of occupational dysphonia among teachers or its prevalence (Mahmoud et al., 2022). A crucial factor to take into account is the absence of instruction on vocal health and cleanliness, which can have detrimental effects on both professional voice users and their audience. Voice disorders in professional voice users are a widespread and systemic issue that may arise from a deficiency of knowledge concerning vocal healthiness, hygiene practices, and dysphonia (Pappas, 2023).

There is a lack of research available in Egypt that reports on vocal hygiene among teachers, but most studies (Abdel-Hamid and collagenous, 2020; Zaky and collagenous, 2020; and MM and collagenous, 2021) have focused on the prevalence and risk factors of voice problems. Based on the recommendations mentioned in the previous research, there is a need for an educational program regarding vocal hygiene programs to improve the teaching performance of teachers and prevent vocal problems.

The study's aim:

The aim of this research is to evaluate the effect of an educational program about vocal hygiene awareness among primary school teachers in Minia city.

Research Hypothesis:

1. Vocal hygiene awareness programs will help in improving the total knowledge and practice score among primary school teachers.
2. Some factors may increase the risk of vocal problems among primary school teachers.

3. Socio-demographic features significantly correlate with knowledge and practice of effective vocal hygiene

Subjects and methodologies

Design of the research: The current study used a quasi-experimental research design, with one group receiving pre- and post-tests.

Setting: The research was carried out in six public primary schools sponsored by the government in three districts in Minia city. The three districts were El borgaya, Taha Hussein and Demsheer. One of the 27 governorates in Egypt is called Minia; it is in Upper Egypt and has fourteen districts.

Population of the study sample: The sample size was estimated by applying the online Epi Info tools software version 7.2.5. at a statistical power of 0.95 and significance of less than 0.05, the predicted prevalence is 25% with a margin of error of 5% and a population size of 565 teachers at the selected schools. The minimal estimated sample size was 180, but to account for the expected non-response, it was increased to 200. Two hundred teachers took part in the research.

Technique of sampling:

The study used a multistage stratified random sampling procedure to create a representative sample that was considered appropriate for its objectives. The Minia Governorate's primary schools were listed for each district. Three districts out of fourteen were determined using a simple random sample. The next step was to choose two schools from each district using stratified random sampling. After that, teachers were randomly selected from each of the chosen schools based on inclusion and exclusion criteria. teachers with a pre-diagnosed case of voice disorder were excluded from the study, whereas all Minia City government primary school teachers were included. The size of the sample for each school was proportional to the total number of teachers.

Table (1) Population of study sample

No	School name	Total	Ratio (%)	Sample size at 95% power
1	Damarees primary school	105	18.5 %	37
2	Abo sweelam primary school	97	17.2%	34
3	El Saleh primary School	93	16.6 %	33
4	El Fuli primary School	110	19.5 %	39
5	Demsheer primary school	85	15 %	30
6	Nazlet El flaheen primary school	75	13.2 %	27
	Total	565	100	200

Tools for research

Three tools were employed in the current research to gather data:

(1) 1st tool (pretest): the researcher was designing a structured interview questionnaire after evaluating relevant literature as (Roslanic et al., 2019 & Sundram et al., 2019 & Abdel-Hamid et al., 2020 & Mahmoud et al., 2022 & Feng, et al., 2022 & Nallamuthu et al., 2023 & Pappas, 2023). It was divided into four different parts:

Part I: Socio-demographic data as age, gender, status of marriage, grade of teaching, and types of courses taught.

Part II: Occupational history such as years of teaching experience, average teaching hours per day, number of students per class and duration of breaks between classes.

Part III: Health related habits such as smoker, amount of caffeine intake cups/day, water intake per day, daily hours of sleep and types of food taken.

Part IV: Vocal symptoms and pattern of vocal usage in class by teacher as Hoarseness, tired voice while speaking, dry throat, feeling of lump in throat, change in pitch, intensive voice use, shouting too much.

(2) 2nd tool: - Knowledge regarding vocal hygiene (pre/post):

It was designed by the researchers depend on recent literature. (Pomaville and colleagues, 2020; Cynthia and colleagues, 2022; Lin and colleagues, 2023) to assess teachers' knowledge regarding vocal hygiene. It includes 20 questions, divided into vocal (7 questions), non-vocal (2 questions), classroom management (4 questions), diet (4 questions),

and general knowledge (3 questions). Scoring system: knowledge questions were given scores of 1 and zero for correct and incorrect answers, respectively. The overall knowledge category score of less than 50% represents poor, average between 50% and 75%, and good over 75%. (Mahendru & Chauha, 2023).

(3) 3rd tool: - practice questionnaire regarding vocal hygiene among primary teachers (pre/post):

It was designed by the researchers based on recent literature. (Sathyanarayan and colleagues, 2019; Porcaro and colleagues, 2021; Vermeulen and colleagues, 2022) to assess teachers' reported practice regarding vocal hygiene. It includes 20 questions, divided into vocal (7 questions), non-vocal (2 questions), classroom management (4 questions), diet (4 questions), and general practice (3 questions). Scoring system: knowledge questions were given scores of 1 and zero for yes and no answers, respectively. There were two categories for the overall practice score: poor (<70%) and good (> 70%). (Nallamuthu et al., 2023).

The tools Validity and Reliability:

The content validity of the study tools was revised by a five-member panel of community health nursing experts to evaluate the tools' clearness, feasibility, and applicability. The reliability of the tools was evaluated through an Alpha Cronbach test, and they were found to be highly reliable, with a score of 0.953 for knowledge regarding vocal hygiene while a score of 0.926 for practice questionnaire

Pilot study

It was performed on 10% (N = 20 teachers) of the overall sample examined. It was executed to determine the instruments' usefulness and accessibility, the viability of field studies, and any potential challenges the

researcher would face that might obstruct data collection. The outcomes of the pilot study were incorporated into the last results of the study, as no central adjustments were made to the tools of the study.

Ethical consideration

Prior to conducting the research, the ethical and Minia University's nursing faculty's research committee gave its clearance. Teachers' verbal consent was attained after they were informed of the nature and goals of the study to elicit their collaboration. For the sake of anonymity and privacy, each assessment page was coded. Participants have the option to leave before beginning the study.

Procedure

Prior to beginning the research, an authority's permission was obtained from the manager of the primary educational district at Minia Governorate to communicate with the selected schools to start the research, and letters were sent to the directors of those schools. The date and time of the research's data collection were communicated to each director. Data was collected twice a week (9.00 a.m.–12.00 p.m.) for three months, beginning in March 2024 and ending in May 2024, in accordance with teachers' schedules, until the intended sample size had been achieved. Three stages were used to conduct the current study: assessment (pretest), implementation, and follow-up and evaluation (posttest).

1. Assessment phase (pre-test):

- At the beginning, the researchers were conducting the first meeting with teachers and briefly explaining the essence and intent of the study. The teachers were told that their contributions are optional and that they have the right to discontinue at any time. Oral approval was obtained from all teachers.
- After gaining the teachers consent to participate in the present research, the researcher provided an overview and illustration of the evaluation tools. The pretest was done by distributing a self-administered questionnaire to evaluate sociodemographic characteristics, occupational history, health-related habits, vocal symptoms, and patterns of vocal usage in class by the teacher, as well as their

knowledge and practice regarding vocal hygiene. It took about 25–30 minutes to complete the question sheet. The researchers gathered around 5-10 teachers each day.

2- Implementation phase (accomplishing the education program):

- Health education sessions were conducted for the teachers of each school at the school library after finishing their daily teaching schedule. Diverse instructional approaches were utilized, involving demonstrations along with group discussions. The contents of the program cover vocal hygiene practices in the classroom.
- The researchers created the educational guidance, and it was composed of two sections:
 - The first section (theoretical part) is comprised of one session (it lasted for approximately 15 to 20 minutes) that covers knowledge about the description of the anatomy and physiology of the normal and pathologic vocal mechanism, causes and risk factors harming the voice, sources of voice misuse, warning signs of vocal fatigue, and overuse by teachers.
 - The second section includes four practice sessions, which each lasted for about 15-20 minutes and included the following: -
 - The first session focused on parts associated with vocal versus non-vocal behaviors. It involved focusing on their vocally abusive behaviors, such as clearing their throats, yelling, conversing over loud noises, talking nonstop, speaking until they were out of breath, writing while speaking, and using lozenges nonstop. Instead of straining their voices to shout at the students, they were given alternatives like drinking water to keep their vocal tract hydrated, making physical gestures as well as facial expressions, or clapping or blowing a whistle to get their attention. If at all possible, they were also instructed to reduce background noise before speaking.
 - Second session (classroom management): reduce background noise before lecturing, reduce speaker-listener distance, stay away from chalk dust if it irritates you, and reduce fan noise before lecturing.
 - The third session focused on dietary adjustments, which involved cutting back on caffeinated beverages and spicy/fatty foods

and replacing them with healthier options. The benefits of maintaining a strict meal schedule were also discussed with the participants, as it may shield them against gastro-esophageal reflux disease, which may also be the root cause of future voice troubles.

- Fourth session (general practices): instruct the teachers to not exert themselves when sick, seek assistance when an alteration in voice is noted, and avoid sleeping immediately after dinner.
- In order to meet the session's goals, a brochure with information on the same issue was handed to the teachers at the end of the session. This was done to get feedback from them regarding this subject and make sure the benefits for teachers were realized.

3. Evaluation phase (post-test):

- Immediately after the intervention was put into practice and finished, the educational program's efficacy was assessed using a posttest that made use of the same second and third instruments as the pre-test.

Statistical analysis

The collected data was tabulated, summarized, and shown using descriptive statistics. Version 20 of the Statistical Package for the Social Sciences (SPSS) was used to statistically analyze the data. The frequency distribution was utilized to display the qualitative data, and the mean and standard deviation were used to convey the quantitative data's degree of dispersion. Regression was utilized to show how the variables related to one another. The correlations within the quantitative variables were found using Pearson correlation. Statistical significance was considered at a p -value ≤ 0.05 .

Results

Table 1. illustrates that (52.5%) of studied teachers were in the age group (41-50 years) with a Mean age \pm SD 42.23 ± 3.2 , also (55%) of them were female and the majority of participants (78.5%) were married. (52.5%) of teachers were dealing with grades 4–6. and (67.5%) of them were teaching basic courses.

Table 2. Indicates that (52.5%) of studied teachers have teaching experience of 11-20 years, also (67.5%) of them teach for 5-6 teaching hours per day, and (49%) of studied teachers have 51- 60 students per class. Regarding the duration of breaks between

classes (54%) of them only take a 10-minute break.

Table 3. Shows that (70%) of studied teachers were nonsmoking, also (52.5%) and (45%) of them take 1 to 2 cups and consume 3 to 5 glasses of water per day respectively. Regarding daily hours of sleep (45%) of studied teachers slept ≤ 6 hrs and (40%) of them ate healthy food.

Fig 1. Indicates that the most frequent vocal symptoms informed by studied teachers were hoarseness, tired voice while speaking, dry throat, feeling of a lump in the throat, and change in pitch, intensive voice use and shouting too much by 87.5%, 90%, 95%, 80%, 75%, 93.5% and 97.5 of them respectively

Table 4. Shows that the differences were extremely statistically significant (p -value < 0.000 , 0.001) between pre- and post-implementation of the educational program concerning all items knowledge (vocal hygiene, non-vocal hygiene, classroom management, balanced diet, and general knowledge) regarding vocal hygiene among primary school teachers.

Fig. 2 illustrates that 68% of the studied teachers had a poor level of knowledge regarding vocal hygiene prior to the educational program; this improved to 73% of them having a good level of knowledge about vocal hygiene post-educational program.

Table 5. Presents the extremely statistically significant changes (p -value < 0.000 , 0.001) between pre- and post-completion of the educational program concerning all items of reported practice (vocal hygiene, non-vocal hygiene, classroom management, balanced diet, and general practices) regarding vocal hygiene among primary school teachers.

Fig. 3 illustrates that 71% of the studied teachers have a poor level of reported practice in the vocal hygiene pre-educational program. This improved to 76% of them having a good level of reported practice regarding vocal hygiene post-educational program.

Table 6. denotes that teachers in the age category (41–50 years), having teaching experience from 11 to 20 years, female teachers, and were teaching basic courses had higher significant odds of their knowledge score than those relevant category.

Table 7. indicates that teachers in the age category (41–50 years), having a teaching

experience from 11 to 20 years, and the number of students in class ≤ 40 students, their average teaching hours per day is 3-4 hrs. Those who took 6-8 glasses of water every day and, slept 8hrs daily had higher significant odds of their reported practice score than those relevant categories.

Table 8. Reveals that there was a positive correlation among the studied teachers' pre-

total knowledge score as well as their post-total knowledge score, where the r- value was 0.324 with an extremely statistically significant change (P value < 0.000). Also, there was a positive correlation between the studied teachers' pre-total reported practice score and their post-total reported practice score, where the r- value was .493 with a very statistically significant difference (P value < 0.000).

Table 1: Distribution of primary school teachers according to their socio-demographic data in Minia City (n = 200)

socio-demographic data	no	%
Age		
25- less than 30 yrs	30	15.0
30- less than 40 yrs	43	21.5
40- less than 50 yrs	105	52.5
Above 50 yrs	22	11.0
Mean \pm SD = 48.23		
Gender		
Male	90	45.0
Female	110	55.0
Marital status		
Married	157	78.5
Single	43	21.5
Grade of teaching		
Grade 1-3	88	44.0
Grade 4-6	105	52.5
Both Grade 1-6	7	3.5
Type of Courses teaching		
Basic courses	135	67.5
Complementary courses	65	32.5

Table 2: Distribution of primary school teachers according to their occupational history data in Minia City (n = 200)

Occupational history	no	%
Years of teaching experience		
≤ 5 yrs	30	15.0
6-10 yrs	43	21.5
11-20 yrs	105	52.5
More than 21 yrs	22	11.0
Average teaching hours per day		
1-2 hrs	20	10.0
3-4 hrs	35	17.5
5-6 hrs	135	67.5
7-8 hrs	10	5.0
Number of students per class		
≤ 40 students	10	5.0
41- less than 50 students	72	36.0
50- less than 60 students	98	49.0
≥ 60 students	20	10.0
Duration of breaks between classes		
10 min	108	54.0
20 min	62	31.0
21-60 min	20	10.0
61-90 min	10	5.0

Table 3: Distribution of primary school teachers according to their health related habits in Minia City (n = 200)

Health related habits	pre	
	no	%
Smoking		
Yes	60	30.0
No	140	70.0
Amount of caffeine intake cups/day		
None	30	15.0
Occasional, but less than 1 cup per day	20	10.0
1 cup per day	30	15.0
1 to 2 cups	105	52.5
3 to 5 cups	10	5.0
More than 5 cups	5	2.5
Water intake per day (glasses per day)		
≤ 2	50	25.0
3-5	90	45.0
6-8	50	25.0
> 8	10	5.0
Daily hours of sleep		
≤ 6 hrs	90	45.0
7 hrs	55	27.5
8 hrs	45	22.5
> 8 hrs	10	5.0
Types of food taken		
Healthy food	80	40.0
Fast food	60	30.0
Mixed	60	30.0

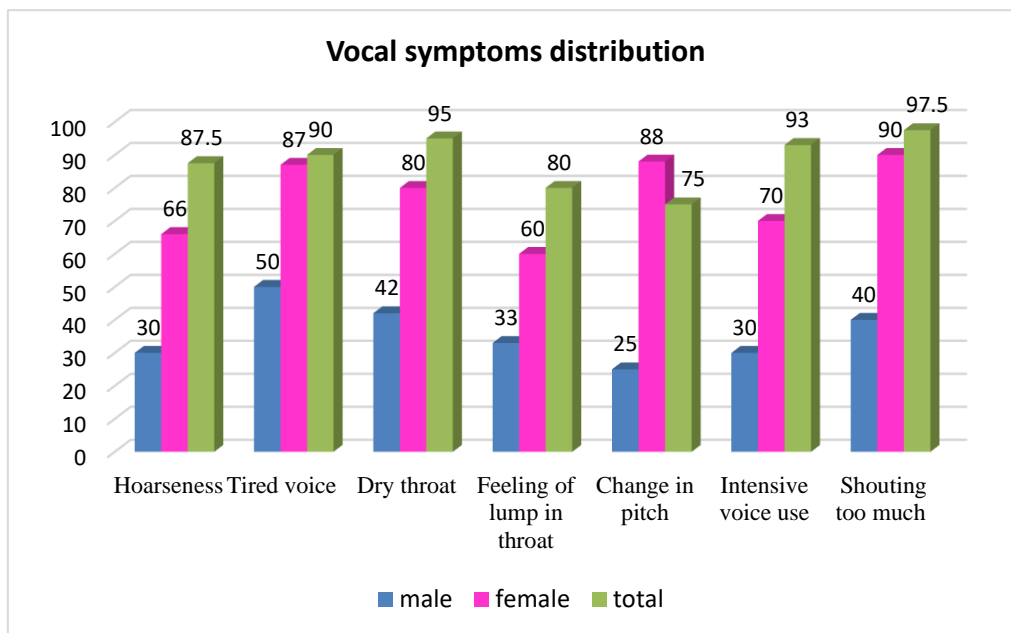


Figure 1: Distribution of primary school teachers according to their vocal symptoms and pattern of vocal usage in class in Minia City (n = 200).

Table 4: Distribution of primary school teachers according to their knowledge regarding vocal hygiene in Minia City (n = 200).

Items of Knowledge	pre	post	X ²	p- value
	Mean± SD	Mean± SD		
Vocal hygiene	18.14± 3.21	29.41± 2.14	1.215	0.001
Non-vocal hygiene	30.31± 1.02	56.32± 2.13	2.331	0.000**
Classroom management	20.12± 1.12	40.21±1.31	2.042	0.001
Balanced diet	22.17± 2.13	47.21±2.42	2.171	0.000**
General knowledge	40.14± 2.14	70.01± 3.14	2.434	0.001
Total score	130.88± 9.62	243.16± 11.14	4.211	0.001

** High Significance $P \leq 0.001$

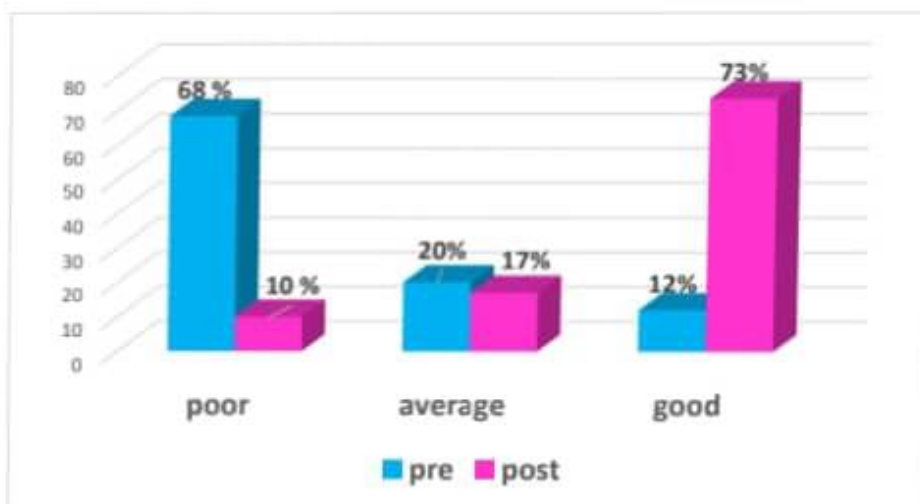


Figure 2: Percentage distribution of primary school teachers according to their total knowledge regarding vocal hygiene in Minia City (n =200).

Table 5: Distribution of primary school teachers according to their reported practice regarding vocal hygiene in Minia City (n = 200).

Practice Items	pre	post	X ²	p- value
	Mean± SD	Mean± SD		
Vocal hygiene	14.14± 1.42	45.41± 1.21	1.024	0.000**
Non-vocal hygiene	35.11± 1.02	57.12± 1.23	2.117	0.001
Classroom management	25.31± 2.14	49.31±2.11	2.341	0.001
Balanced diet	24.25± 3.17	57.21±2.42	2.162	0.000**
General practices	42.21± 2.21	63.11± 1.31	2.015	0.001
Total score	141.02± 9.96	272.16± 8.28	4.241	0.001

** High Significance $P \leq 0.001$

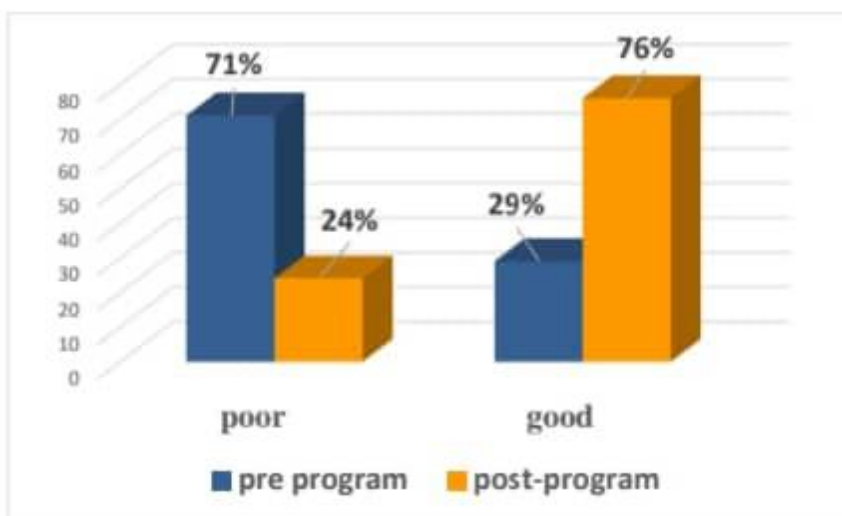


Figure 3: Percentage distribution of primary school teachers according to their total reported practices regarding vocal hygiene in Minia City (n = 200).

Table 6: Multiple linear regression analysis of predictors/factors associated with teachers' knowledge regarding vocal hygiene after educational program application (N = 200):

Variables	OR	95% CI	X ²	P-value
Age 41-50yrs	3.012	1.135, 2.374	2.128	0.000
Years of teaching experience 11-20yrs	2.431	1.425, 2.412	3.017	0.000
Gender Female	2.427	2.416, 7.521	3.191	0.001
Type of Courses teaching Basic courses	3.161	1.631, 5.291	1.236	0.002

** Statistically significant at P – value $\leq .01$. cOR, crude odds ratio; CI, confidence interval

Table 7: Multiple linear regression analysis of predictors/factors associated with teachers' reported practice regarding vocal hygiene after educational program application (N = 200):

Variables	OR	95% CI	X ²	P-value
Age 41-50yrs	3.141	1.147, 2.371	2.151	0.000**
Years of teaching experience 11-20yrs	2.321	1.317, 2.141	3.023	0.000**
Average teaching hours per day 3-4 hrs	4.211	2.153, 3.847	4.012	0.000**
Number of students per class ≤ 40 students	4.016	1.524, 2.363	2.311	0.001
Water intake per day 6-8 glasses	3.417	2.416, 2.812	3.214	0.000**
Daily hours of sleep 8 hrs	2.352	2.331, 3.121	3.141	0.000**

** Statistically significant at P – value $\leq .01$. cOR, crude odds ratio; CI, confidence interval

Table 8: Correlation between studied teachers' total knowledge and reported practices' scores pre- and post-educational program regarding vocal hygiene (n = 200):

Items	Pre total knowledge	Post total knowledge	Pre total reported practice	Post total reported practice
Pre total knowledge r. value (P. value)	1	0.324(.000) **	0.121(.211)	0.231 (.001) *
Post total knowledge r. value (P. value)	0.324 (.000) **	1	0.147 (.001)*	0.216 (.074)
Pre total reported practice r. value (P. value)	0.121(.211)	0.147 (.001)*	1	0.493 (.000) **
Post total reported practice r. value (P. value)	0.231 (.001) *	0.216 (.074)	0.493 (.000) **	1

** Correlation is significant at the 0.01 level (2- tailed). * Correlation is significant at the 0.05 level (2- tailed). NS: not statistically significant.

Discussion

Teachers' voice disorders have been a major public health concern. Vocal impairments may have detrimental implications for teachers' personal and professional lives (Fageeh et al., 2024). Investigating the pattern, risk factors, and impact of targeted educational interventions can help minimize the magnitude of such problems (Gadepalli and colleagues, 2019; Barbosa and colleagues, 2021).

The current study included 200 primary school teachers in Minia City, and as regarding the sociodemographic criteria, over half of the studied teachers were between the ages of 41 and 50 years with a mean age \pm SD of 42.23 \pm 3.2, and were female. Also, the majority of participants were married and dealing with grades 4–6. While more than two-thirds of them were teaching basic courses.

It has been proposed that certain physiological features of the larynx in women make them more susceptible to voice issues. Because of their shorter vocal cords, they talk at a higher fundamental frequency. Men's vocal folds have a homogeneous distribution of hyaluronic acid, but women's have lower concentrations in the superficial layer compared to the deeper layers of the lamina propria. Furthermore, pupils are more likely to dread a male teacher's anger than a female one. As a result, it can be challenging for a female teacher to maintain order in the classroom when there is a lot of commotion and misbehavior. She must speak loudly to keep the children under control.

This result is consistent with Alshuhayb and colleagues (2022), who observed that over half were between the ages of 41 and 50. Regarding

gender, females represented more than two-thirds of our sample, as well as in terms of marital status, the majority were married. Their research was conducted in the Al-Ahsa city in the eastern region of the Kingdom of Saudi Arabia and their studied sample consisted of six hundred and four Saudi teachers.

Concerning the frequency distribution of occupational history, over half of the studied teachers have teaching experience of 11–20 years; more than two-thirds of them teach for 5–6 hours per day; and nearly half of the studied teachers have 51–60 students per class. Regarding the duration of breaks between classes, more than half of them only take a 10-minute break. The present study result is not in harmony with Sankar et al., (2022), who carried out their study on three hundred and sixty government school teachers in Kundrathur block, Kancheepuram district, and reported that less than half had ten to twenty years of teaching experience and had 20–30 students per class. Most school teachers reported working between twenty-one and thirty hours a week in the classroom. However, almost half of them only received a five- to ten-minute recess during their classes. This outcome disagrees with Kyriakou et al., (2020) study on primary public-school teachers in Cyprus, with a sample size of four hundred and forty-nine finding that three-quarters were nonsmokers, more than one-third consumed 3–5 glasses of water per day, and nearly half slept 7 hours. Furthermore, according to How & Ang (2021), who completed their research on forty primary school teachers in Klang Valley, Malaysia, all of the respondents do not smoke, and almost two-thirds of them occasionally eat spicy food. While over two-thirds of respondents consume more

than 1.5 liters of water daily, and over half of respondents sleep between six and seven hours per day.

As regard vocal symptoms, the present study shows that the majority of studied teachers had hoarseness, a tired voice while speaking, a dry throat, and shouting too much. While more than three-quarters were feeling a lump in the throat and a change in pitch, intensive voice use. The high number of pupils in each class may be the cause of this, as nearly half of the teachers in our study had 51–60 students per class. Furthermore, our sample was from primary school teachers, and the strain at work would be greater for those who teach younger age classes. This result disagrees with **Granjeiro et al., (2022)**. They stated that more than two-thirds were hoarseness, as well as vocal strain, dry throat, burning throat, and weariness, which accounted for more than one-third of the cases. Long-term, frequent, intense vocal use in the classroom without sufficient rest increases susceptibility to various forms of voice disorders **Ohlsson et al., (2021)**. Lack of proper sleep and rest can be associated with vocal hoarseness **Liu et al., (2022)**.

According to a previous Egyptian study, the most frequently reported symptom was having a dry throat, which was followed by shortness of breath and voice changes. **Mahmoud et al., (2022)**. According to a Saudi Arabian study, the most commonly reported symptoms were hoarseness, throat pain, and dryness of the throat, which represent less than and more than half, respectively, according to **Fageeh et al., (2024)**. Changes in the reported percentages of voice-related indicators may be related to variations in the use of assistive teaching technologies in the classroom, as well as variations in research methodologies, definition criteria, study sample size, and studied population characteristics.

As regards gender, a higher percentage of voice difficulties were found in women, which is consistent with the majority of previous research findings (**Meier and Beushausen, 2021; Fareeh et al., 2024; Menon et al., 2021; and Nusseck et al., 2020**). This can be attributed to anatomical and physiological causes, including the larynx's size **Byeon, (2019)**. In addition to hormonal fluctuations, which are called menopausal voice changes, **Vertanen-Greis et al., (2024)**.

The present findings indicated that over two-thirds of teachers had inadequate knowledge and practice before educational program implementation. This can be attributed to the shortage of organized training programs for teachers regarding vocal hygiene in Egyptian schools. As a consequence of the implementation of educational interventions on studied teachers, it was revealed that both knowledge and practice scores were significantly improved among the studied sample concerning all items. In accordance with **Mahajan & Gore (2019)**, who work with forty permanent secondary school teachers from five government schools in Sundernagar, Mandi and noticed that, over three-quarters of the studied teachers had a poor level of knowledge concerning vocal hygiene pre-educational programs and increased to three-quarters post-educational programs.

Many previous studies illustrated the impact of educational intervention on awareness and practice; Two Indian studies illustrated the consequence of Voiced hygiene teaching on awareness improvement among female teachers (**Nallamuthu et al., 2023 & Raheja and Kelkar, 2023**). A study performed in Germany; there were voice improvements among a large number of participating teachers (**Meier & Beushausen, 2021**). However, it is necessary to be noted that these studies have different method and duration for educational interventions that differs from recent study. So, it is difficult to be comparable with our results. In spite of variations there is a fact that vocal hygiene training exercises have been demonstrated to be beneficial (**Porcaro et al., 2021**).

As regards predictors of knowledge improvement, it was revealed that female teachers aged 41–50 years, having teaching experience from 11 to 20 years, and those who are teaching basic courses had higher significant odds of their knowledge score after educational program application. This can be explained by the fact that all these categories are more susceptible to voice disorders than other categories. This outcome agrees with **Mahmoud and colleagues (2022)**. They conducted the study on 427 Egyptian universities and state that teachers in the age category (46–55 years), having teaching experience from 10 to 19 years, female teachers, and teaching basic courses had higher significant

odds of their knowledge score than those relevant categories.

By multivariable logistic regression for factors predicting practice improvement among teachers after educational program reported in recent study, it was found that teachers aged (41-50) years, with teaching experience (11 to 20) years and number of students ≤ 40 students, their average teaching hours 3-4 daily, and those took 6-8 water glasses per day have significantly improved their practice. Older teachers with prolonged teaching experience are of the high-risk group so it is expected that increased their awareness had effect on their practice improvement. In addition, suffering from vocal problems makes them willing to change their vocal behavior.

Previous research has shown that voice disorders are more common in instructors who work longer weekly hours and teach larger courses. Particularly in packed classrooms or when imparting knowledge on issues that call for increased vocal projection, **Byeon (2019)**. However, practice improved among teachers with ≤ 40 students and 3-4 hours working per day per class. This indicates that a large number of pupils throughout the lesson and higher occupied periods were barriers against vocal hygiene practice, even in the presence of good knowledge.

The present study shows that there was a positive correlation among studied teachers among pre- versus post-implementation of vocal programs regarding whole knowledge score and also between prior- and after-total reported practice score with very statistically significant variances (P. value = 0.001, 0.001), respectively. The findings agree with **Rosa and colleagues (2022)**, who performed their study on two hundred and sixty-four people at a university in Brazil and mentioned that there was a positive correlation among the studied teachers' pre- and post-whole knowledge scores through extremely statistically significant variances (P value < 0.000). Also, there was a positive correlation amongst the studied teachers' pre-whole reported practice score as well as their post-whole reported practice score with very statistically significant variances (P value < 0.000).

Finally, the current study emphasized that the educational program about vocal hygiene an awareness was effective in changing teachers'

knowledge regarding vocal hygiene which was reflected in desirable changes in their behaviors and significant improvement in their practices. From researchers' points of view, findings of this study could be taken as baseline for desirably changing teachers practice and persuading them to adopt desirable practices toward vocal hygiene.

Conclusion:

In the context of the study's findings, age, duration of teaching experience, average number of hours taught each day, number of students in class, water intake, and daily sleep were predictors associated with teachers' practices regarding vocal hygiene. There was a highly statistically significant increase in the total mean score of these knowledge and practices prior to and after the training program was put into place. A high percentage of teachers have voice problems, as more than half of them are from high-risk groups. Females were significantly affected; the most common abnormality was shouting too much, followed by dry throat. There was a positive correlation among pre- and post-study knowledge and practice scores about vocal hygiene.

Recommendations:

- Conduct health education sessions to heighten teachers' awareness of ergonomic risk factors in their work environment.
- Developing straightforward, colorful booklets providing instructions on voice treatment to ensure teachers stop speaking beyond their natural breath cycle.
- Deliver well-structured training sessions to educate teachers on the crucial role of good vocal hygiene practices in enhancing their voice function and preventing future voice impairment.
- Implement regular follow-ups by school health nurses to pinpoint teachers most vulnerable to voice problems and provide them with necessary assistance.
- Ensure that this work is repeated with a larger study sample to confirm its generalizability.

References:

- Abdel-Hamid, A., Fahmy, V., Momen, M., & Elokda, E., (2020)**. Prevalence, risk factors and impact of voice disorders among primary school teachers in Cairo, Egypt. *Egyptian Journal of Community Medicine*, 38(1).

- Alkhalidi, A., (2024).** Voice Disorders Among Teachers in Taif City, Kingdom of Saudi Arabia. *Cureus*, 16(2).
- Alshuhayb, B., Alkhars, A., AlMaghlouth, M., Alkhars, F., Alamer, Z. A., Alarfaj, A., & AlYahya, K., (2022).** Voice Disorders Among Teachers in Al-Ahsa, Eastern Region, KSA: Vocal Complaints, Treatment-Seeking Behaviors, and Knowledge of Vocal Care, *Journal of Voice*; 1(11).
- Barbosa, I., Behlau, M., Lima-Silva, M., Almeida, L., Farias, H., & Almeida, A., (2021).** Voice symptoms, perceived voice control, and common mental disorders in elementary school teachers. *Journal of voice*, 35(1), 158-e1.
- Byeon, H., (2019).** The risk factors related to voice disorder in teachers: a systematic review and meta-analysis. *International journal of environmental research and public health*, 16(19), 3675.
- Cynthia, O., Tom, A., & Nelly, O., (2022).** Relationship between Vocal Hygiene Awareness and Voice Function among Teachers in Selected Public Primary Schools in Migori County, Kenya. *Journal of Humanities And Social Science (IOSR-JHSS)*, 27 (07), : 2279-0845. www.iosrjournals.org
- da Silva, B., dos Santos Andrade, C., Gonçalves, I., Fernandes, G., Pirana, S., Bittencourt, F., & Soares, E., (2024).** Screening of voice disorders concerning anatomy teachers who use formaldehyde cadaveric parts in laboratory classes. *Morphologie*, 108(361), 100757.
- de Magalhães, T., Ferreira, E., de Souza, J., Santos, V., Rossi-Barbosa, L., Nascimento, J., & Haikal, D., (2023).** Voice Disorders and Mental health of Basic Education Teachers in a Brazilian Municipality. *Journal of Voice*. The Voice Foundation. Published by Elsevier Inc. All rights reserved. <https://doi.org/10.1016/j.jvoice.2023.02.010>
- Fageeh, Y., Alotaibi, T., Althobaiti, N., Alkhalidi, A., Althobaiti, A., Althobaiti, H., & Alharati, S., (2024).** Voice Disorders Among Teachers in Taif City, Kingdom of Saudi Arabia. *Cureus*, 16(2)
- Feng, S., Weng, C., Yang, Z., Wu, M., & Kang, N., (2022).** The prevalence and risk factors for perceived voice disorders in public school teachers Laryngoscope Investigative Otolaryngology; 7(3), 790-798.
- Gadepalli, C., Fullwood, C., Ascott, F., & Homer, J., (2019).** Voice burden in teachers and nonteachers in a UK population: a questionnaire-based survey. *Clin Otolaryngol*, 44(6), 1045-1058.
- Granjeiro, R., de Carvalho, L., Dias, O., de Oliveira, C., Gomes, G., & Oliveira, F., (2022).** Video laryngoscopy Findings of the Vocal Health Program in Dysphonic Teachers in the Federal District, Brazil *Int Arch Otorhinolaryngol*; 26(2):e243–e249.
- How, D., & Ang, M., (2021).** A Vocal Health Survey among Primary School Teachers in Klang Valley, Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 11(7), 1687–1697.
- Kyriakou, K., Theodorou, E., Petinou, K., & Phiniketos, I., (2020).** Risk factors for voice disorders in public school teachers in Cyprus. *J Prev Med Hyg*; 61:E221-E240. <https://doi.org/10.15167/2421-4248/jpmh2020.61.2.1403>
- Lin, K., Chan, R., Wu, C., & Liu, S., (2023).** A vocal hygiene program for mitigating the effects of occupational vocal demand in primary school teachers. *Journal of Speech, Language, and Hearing Research*, 66(5), 1525-1540.
- Liu, H., Chen, S., Gao, L., Li, J., Liu, B., Raj, H., Xie, Q., Duan, H., Jiang, Z., Liu, Y. & Chen, B., (2022).** Comparison between combination of resonant voice therapy and vocal hygiene education and vocal hygiene education only for female elementary school teachers. *Journal of Voice*, 36(6), pp.814-822.
- Mahajan, V., & Gore, G., (2019).** Voice related quality of life (V-RQOL): impact of vocal hygiene programme in secondary school teachers. *Int J Health Sci Res.*; 6(5):307-316.
- Mahendru, S., & Chauha, P., (2023).** Awareness of Vocal Hygiene in University-Level Teachers in Delhi-NCR. *Journal of Survey in Fisheries Sciences*, 10(4S), 3364-3368.

- Mahmoud, N., Khaled, D., & Mohammed, H., (2022).** Knowledge of Egyptian faculty members about voice care: a national cross-sectional study. *The Egyptian Journal of Otolaryngology*, 38(1), 59.
- Mansouri, Y., Naderifar, E., Hajiyakhchali, A., & Moradi, N., (2023).** The relationship between dysphonia severity index and voice-related quality of life in the elementary school teachers with voice complaint. *Journal of Voice*, 37(3), 466-e35.
- Meier, B., & Beushausen, U., (2021).** Long-term effects of a voice training program to prevent voice disorders in teachers. *J Voice*; 35:324.1-8.
- Menon, U., Raj, M., Antony, L., Soman, S., & Bhaskaran, R., (2021).** Prevalence of voice disorders in school teachers in a district in South India. *Journal of Voice*; 35(1), pp.1- 8.
- MM, E., HM, G., TA, H., & EE, A., (2021).** Prevalence and risk Factors of Benign laryngeal lesions among teachers. *Egyptian Journal of Occupational Medicine*, 45(1), 129-144
- Nallamuthu, A., Boominathan, P., Arunachalam, R. & Mariswamy, P., (2023).** Outcomes of vocal hygiene program in facilitating vocal health in female school teachers with voice problems. *Journal of voice*, 37(2), pp.295-e11.
- Naryani, P., Khuzhaima, S., Jamil, J., Sharaf, J., Ubaid, S., & Sreejith, A., (2023).** Prevalence and factors of vocal symptoms amongst school teachers in the United Arab Emirates: a cross-sectional study. *International Journal of Community Medicine and Public Health*, 10(12), 4560.
- Nusseck, M., Spahn, C., Echternach, M., Immerz, A. & Richter, B., (2020).** Vocal health, voice self-concept and quality of life in German school teachers. *Journal of voice*; 34(3), pp.488-e29.
- Ohlsson, A., Demitz-Helin, G., Furu, A., Hällgren, I., & Karjalainen, S., (2021).** Potential risk factors and prevalence of voice symptoms in students starting their teacher education. *J Voice*; 35:323.1-8.
- Pappas, A., (2023).** Examining Learning Models and Learning Preferences for Vocal Health Instruction for Pre-service Teachers (Master's thesis, Miami University)
- Pomaville, F., Tekerlek, K., & Radford, A., (2020).** The effectiveness of vocal hygiene education for decreasing at-risk vocal behaviors in vocal performers. *Journal of Voice*, 34(5), 709-719.
- Porcaro, C., Howery, S., Suhandron, A., & Gollery, T., (2021).** Impact of vocal hygiene training on teachers' willingness to change vocal behaviors. *Journal of Voice*, 35(3), 499-e1.
- Raheja, S., & Kelkar, P., (2023).** Modes of Educating Teachers About Vocal Hygiene: A Comparative Study. *Journal of Voice*. The Voice Foundation. Published by Elsevier Inc. All rights reserved. <https://doi.org/10.1016/j.jvoice.2023.09.031>
- Rosa, I., Dassie-Leite, A., Pereira, E., & Martins, P., (2022).** Future teachers and the self-perception of vocal symptoms and knowledge about vocal health and hygiene, *CoDAS*;35(5):e20220160 DOI: 10.1590/2317-1782/20232022160en 1/7
- Roslaniec, A., Sielska-Badurek, E., & Niemczyk, K., (2019).** Evaluation of compliance of the principles of voice hygiene and emission among teachers. *Polski Przegląd Otolaryngologiczny*, 8(2), 18-24.
- Sankar, G., Ganesan, V., Shantharam, R., Palanisamy, K., & Katam, I., (2022).** Epidemiology of Voice Disorders among Government School Teachers-An Analytical Cross-Sectional Study from Kancheepuram District. *National Journal of Community Medicine*, 13(12), 869-875
- Santhosh, A., & Kumaraswamy, S., (2022).** Awareness of Vocal Hygiene Among Kattunayakan Tribe; p:1-10. *Language in India* www.languageinindia.com ISSN 1930-2940 22:8 August 2022 Ms.
- Sathyanarayan, M., Boominathan, P., & Nallamuthu, A., (2019).** Vocal health practices among school teachers: a study from Chennai, India. *Journal of Voice*, 33(5), 812-e1

Shilling, T., Verhelle, H & Johnson, J., (2021).

“Online Vocal-health Education Program for Teachers,” *The Journal of Adventist Education* 83(3): 32-35.

Sundram, E., Norsa’adah, B., Mohamad, H., Moy, F., Husain, N., & Shafei, M., (2019).

The effectiveness of a voice care program among primary school teachers in Northeastern Malaysia. *Oman medical journal*, 34(1), 49.

Vermeulen, R., Du Toit, M., van Lierde, K., & Van der Linde, J., (2022).

The effect of vocal hygiene education programs on voice quality in professional voice users: a systematic review. *Journal of Speech, Language, and Hearing Research*, 65(12), 4700-4713.

Vertanen-Greis, H., Löyttyniemi, E., Uitti, J., & Putus, T., (2024).

The interaction between voice disorders and stress for work ability of teachers. *Logopedics Phoniatrics Vocology*, 49(1), pp.11-16.

Zaky, E., Mamdouh, H., Maher, A., & Khalaf, Z., (2020).

Comparison between male and female teachers in Egyptian primary schools regarding the effect of teaching on their voice. *The Egyptian Journal of Otolaryngology*, 36, 1-10.