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OUTCOMES OF VOCAL HYGIENE TRAINING AND PROGRAM IN TEACHERS: A SYSTEMATIC REVIEW

INTRODUCTION:

A person is said to have a healthy voice if they can easily generate voice to suit their personal, social, and professional needs (Nallamuthu, Boominatham, Arunachalam and Mariswamy, 2020). There are issues with the voice when the person's vocal health is damaged. Teachers, legislators, vendors, singers, and other professionals who use their voice for extended periods of time are more likely to experience voice issues. Teachers are at more risk of voice disorder compared to other professional voice users because they use their voice more Effortfully and continuously. The most common symptoms among teachers in Epidemiologic research were hoarseness, fatigue, and temporary voice loss (Marcal & Peres, 2011).

Among all the professional voice users, teachers use their voice heavily compared to others. Even more, in south Asian countries like India, school teachers have to take more classes and are dependent on loud voice rather than microphone. Louder voice, shouting and continuous speaking is common in school teachers which leads to dryness, tired, painful throat and vocal nodule. Teachers use their voice a lot, and they experience vocal issues more commonly than people in other occupations. The size of classroom, reverberation time and noise level in classroom in India is usually high and unacceptable to maintain the standard.Voice disorders are a fairly prevalent occupational risk for school teachers. (Oates, & Greenwood, 1998; Pekkarinen, Himberg& Pentti, 1992).

According to Fawcus (1991) basically, phonation can be impacted by three different scenarios.

- The vocal folds can have structural issues.
- At rest, the folds could seem regular, yet they could show a disruption of the patterns of movement.
- Structurally and functionally there may not be any obvious organic damage.

The vocal demands of teaching school are main reason for the rise in the prevalence of voice problems among this group of occupational voice users. Many teachers strain their voice by speaking loudly for extended periods of time without having enough time to rest or recuperate.

According to Titze (1994), the vibrational amplitude(A), and frequency are directly related to the time-averaged vocal fold impact (collision) force(F), (F0). He proposed that if a crucial "vibration dose" is surpassed, vocal fold tissue harm may manifest in a susceptible person.Teachers are more prone to "vibration overload" because they spend more time vocalizing in a way that enhances vocal fold acceleration/deceleration and shearing/collision forces. Vibration overload is thought to be a factor in the repetitive cycles of vocal fold tissue damage, healing, and voice mutation.A focus of numerous studies on educational and direct voice intervention programs has been the prevention of voice issues in instructors.According to several authors, teachers can avoid occupational dysphonia and be made aware of the early warning symptoms of voice disorders through vocal educational programs or indirect interventions (Pizolato, Rehder, Tadeu, Meneghim, Ambrosano and Pereira, 2013).

Vocal hygiene- preventive and therapeutic approach:

Vocal hygiene is regarded as a patient-centered behavioral therapy that is used as a direct and indirect (or preventive and therapeutic) technique (Behlau and Oliveira, 2009).Therefore, two distinct sets of therapy approaches that incorporate voice hygiene techniques can be identified: i) Vocal hygiene program, which teaches patients about healthy and unhealthy voice production, as well as the impact of environmental factors and personal behaviors on voice, in order to avoid or lessen voice disorders (Roy, Weinrich, Gray, Simon, Dove, Lewis, Stemple and Sapienza, 2003). ii) Two-phase vocal education programs that include a classic (preventive) vocal hygiene curriculum in one phase and a more modern (corrective) approach in the other (Behrman, Rutledge, Hembree and Sheridan, 2008).

In this section, various voice-training techniques are introduced in an effort to reshape the way voices are produced. Vocal hygiene is the awareness in the individuals that helps to maintain and safeguard the vocal folds for production of better-quality voice. These include avoiding unsuitable vocal practices and circumstances that put undue strain on the voice, as well as using common sense to engage in actions that promote effective voice production and overall vocal health.Extra vocal load, bad acoustics or disciplinary issues with students, disregard for personal health, and stress are important factors affecting teacher's vocal health (Trinite, 2017). As mentioned, voice issues affect teachers more frequently than those in other professions. Few people seek medical attention, and even fewer are trained in vocal hygiene (Smith, 1994). The prevention of a voice issue requires education on appropriate vocal behavior. (Smith E, Lemke J, Taylor

1998). Teachers have been reported to have the highest chance of developing voice issues of any job, and they are also the group of people who seek voice treatment the most frequently (Verdolini and Ramig, 2001).

ASHA (2020) suggests the following for teachers to maintain their vocal health:

- *Adopt healthy habits*: Drink plenty of water, consume alcohol in moderation (it dehydrates the body), quit smoking, refrain from throat clearing and shouting, and don't push your voice when you're sick or try to talk over loud noise.
- *Utilize a microphone*: If you're teaching in person, utilizing a microphone as a component of a personal amplification system can help you avoid having to project your voice more aggressively owing to physical distance and masks that muffle sound.
- *Take breaks*: Give your voice as much time as you can to recuperate. In a perfect world, this would occur through short breaks throughout the day, even if they were only for a few minutes between subjects (or classes)
- *Reduce noise*: If you are teaching in person, set up your classroom so that it encourages a quieter atmosphere. Observe the following advice if you are teaching online: To reduce loud student chatter and cross-talk, use a room free of noise from household appliances and other people, promote appropriate communication skills among students (such as speaking one at a time), and make use of helpful video platform features like the "mute" option. All of this can help you speak less loudly all the time.
- *Consider the warning signs and get assistance*: Many teachers have voice loss from time to time, but more severe issues can be detected by unusual or persistent soreness when speaking or singing, hoarseness that lasts more than two weeks, a breathy, harsh, or scratchy sounding voice, and frequent coughing or throat clearing. Consult a speech-language pathologist for assistance if you notice any of these symptoms.

Positive Effects of Vocal Hygiene:

Numerous studies pertaining to educational intervention programs have focused on the prevention of occupational dysphonia in teachers (Duffy &Hazzlet, 2004; Bovo, Galceron& Hatzopoulos, 2007). Vocal hygiene practices are carried out as an indirect educational approach, which aid professional voice users in understanding vocal use, how environmental circumstances may affect the voice, and how healthy voice habits may contribute to the prevention of vocal problems (Pasa, Oates &Dakies, 2007). To maintain vocal hygiene, avoid drinking too much alcohol because it dehydrates the body, don't smoke, don't shout or clear your throat, and don't push your voice when you're unwell or try to talk over loud noise (ASHA, 2020). Many studies

have shown positive effects of vocal hygiene practice and program as a preventive and therapeutic approach in voice of teachers.

The vocal demands of teaching school are one explanation for the rise in the prevalence of voice problems among this group of occupational voice users. Many teachers strain their voice by speaking loudly for extended periods of time without having enough time to rest or recuperate.School can work on providing teachers relief from vocal burden by installing amplification devices in classrooms.Teachers can currently choose from a wide variety of voice amplification devices. There are no studies that have unbiasedly assessed the impact of voice amplification for teachers with voice issues, despite a rise in the variety and popularity of voice amplification in the classroom. Two well-liked methods for providing voice amplification in classrooms are sound-field frequency modulation (FM) systems (witone or more strategically placed speakers) and stationary or portable personal voice amplifiers.

The vocal hygiene group showed better improvement than the vocal function exercise (VFE) or control groups, according to these authors. Teachers in the vocal hygiene group showed the greatest growth in their understanding of voice care principles, as well as in reducing vocally risky practices and indications of vocal problems (Pasa, Oates, and Dacakis, 2007).Similarly Chan (1994) found teachers who took part in the vocal hygiene program discovered that their voices significantly improved both acoustically and according to electroglottographic criteria, while those who did not showed no discernible difference in their voices. In a study by Bovo, galceran, Petrucceli and Hatzopoulos, (2007) found treatment group's acoustic and VHI characteristics were improved, but that there was no significant difference between the two groups' stroboscopic outcomes after twelve months of training.

RREVIEW OF LITERATIRE

Teachers are the professionals who use voice for their earnings and its impairment negatively affect their earning ability.Persistent dysphonia can have disastrous effects on their ability to perform in the school. Continuous dysphonia can make their condition unfit for teaching job and can lead to socio-economical and emotional problems. Mattiske, Oates, Greenhood (1998) reviewed the key papers on voice issues that affect teachers and discovered that the majority of authors use questionnaires as their approach, while only a small minority use endoscopic exams to clarify the laryngeal diagnosis. Additionally, multiple studies have shown that dysphonia affects 50% of teachers, and the main symptoms are vocal fatigue, throat discomfort, roughness, and dysphonia.Undoubtedly, crowded classrooms and excessive noise are risk factors for teachers' dysphonia development.

Vocal Hygiene Techniques to Protect Voice:

A vocal hygiene training and program often includes: education regarding voice production; identification and minimizing phonotraumatic behaviors; understanding high risk situations that can damage voice, conservation of voice, controlling the amount of talking, monitoring vocal pitch and intensity; systemic hydration; optimal dietary considerations; controlling laryngopharyngeal reflux, gastroesophageal reflux and allergies; and minimizing the medications intake, avoid allergens like dust, husk, smoke and etc.; environmental factors, and lifestyle choices on voice (Roy, Gray & Simon, 2001). Vocal hygiene as a therapeutic technique is regarded as a patient-centered behavioral therapy that entails changing vocal habits and putting into practice guidelines to support better vocal health.

Hydration:

According to data, systemic and environment hydration combination may lower the phonation pressure threshold in healthy people and may lessen voice fatigue after extended reading (Verdolini**,** TitzeFennell**,** 1994). By adjusting the environment's moisture content, dysphonic people with benign mass lesions can have their perceived phonatory effort, vocal fold appearance, and short-term amplitude perturbation altered (shimmer).

Vocal warm up and cool down approach:

Vocal warm-up aims to prepare the voice for speaking, singing, teaching or any other professional use. The information about the vocal folds' viscosity is debatable (reduction of or increase in phonatory pressure threshold; lowering, no changes, and gender-dependent favoring female). Warm up exercises like straw phonation has great impact on teacher voice. The goal of cool-down exercises is to reduce body temperature, remove waste products from working muscles, promote muscular relaxation, realign fibers, and restore normal range of motion while improving lactate clearance and postural control.

Voice Rest:

Modified vocal rest and voice conservation program are still popular. Modified vocal rest regimens, which work to lessen voice amount and use, are frequently used as an initial course of therapy, especially to reduce lesions (Verdolini-Marston &Lessac, 1995). Voice use reduction

program (VUR) is a structured program for voice conservation which aims to improve vocal quality, reduce vocal fatigue and improvement in vocal fold appearance. Voice rest reduces the risk of voice damage and prevents the unwanted misuse and abusive behaviors.

Authors have been publishing papers on vocal hygiene and its effectiveness on vocal health. In one study Pasa, Oates, and Dacakis (2007) evaluated thirty-seven teachers to determine the results of vocal function training and vocal hygiene training (VFE). This involved a control group, two experimental groups, and more. Training took place over the course of four sessions, with a follow-up session taking place ten weeks after the first session. At the follow-up session, participants filled out a questionnaire to assess how much they felt the preventative program had helped them. The vocal hygiene group showed better improvement than the VFE or control groups, according to these authors.Teachers in the vocal hygiene group showed the greatest growth in their understanding of voice care principles, as well as in reducing vocally risky practices and indications of vocal problems. Similarly, Chan (1994) involved twelve kindergarten teachers in a study to ascertain the effectiveness of a program of vocal hygiene instruction. Teachers who took part in the vocal hygiene program discovered that their voices significantly improved both acoustically and according to electroglottographic criteria, while those who did not showed no discernible difference in their voices.

In a randomized control trial study Bovo, galceran, Petrucceli and Hatzopoulos, (2007) divided 64 female teachers into two groups. The first set of 23 teachers received a professional voice user training (4 sessions) and an informational leaflet, and over the course of the following three months, they concentrated on vocal ergonomics standards, filled out daily reports, performed their exercises, and reported the results. Control group is an additional group. Twelve months later, teachers in the two groups were compared, and the findings showed that the treatment group's acoustic and VHI characteristics were improved, but that there was no significant difference between the two groups' stroboscopic outcomes.

Selected Articles Review:

In an Indian study Nallamuthu, Boominathan, Arunachalam and Mariswamy (2020) investigated a thorough voice evaluation process, it was anticipated that the implementation of a socioculturally relevant vocal hygiene program would facilitate vocal health among seventeen female school teachers who had experience of teaching of ten years in average. Before and four weeks after the vocal hygiene program (VHP), everyone received a thorough voice assessment that included subjective, objective, and self-perceptual vocal measurements.To compare

continuous variable pre- and post-treatment measures, the Wilcoxon signed ranks test was utilized.After VHP, teachers stated that hazardous vocal and non-vocal activities had decreased. Improvements were noted in vocal and associated symptoms, including heartburn, throat discomfort, and difficulties controlling ones breathe while speaking. The quality of the voice barely changed perceptually (overall grade). All stroboscopic examination parameters showed changes, with the exception of the non-vibratory part and ventricular fold hyper-adduction. V-DOP scores showed improvement in the functional domain, physical domain, and overall severity. After a period of voice rest, VFI showed that teachers' voices had improved.Although VHP helped teachers become more aware of potentially dangerous phono-traumatic behaviors and their vocal health, its effectiveness in enhancing teachers' voices physiologically was limited.

In another controlled experimental study Pizolato, Rehder, Dias,Meneghim, Ambrosano, Mialhe, and Pereira (2013) examined the impact of a voice education program for teachers on vocal hygiene and exercise for vocal function, and contrast a pre- and post-vocal exercise for the teacher's voice quality.A 102-person random sample was split into two groups: the experimental group (29 women and 7 men) received vocal hygiene instruction and training activities, while the

control group (52 women and 14 men) received vocal hygiene instruction.Men's mean fundamental frequency (f0) fell with the cervical posture and relaxation workouts, whereas women's f0 increased with the phonation, intensity, and frequency exercises and their glottal to noise excitation ratio increased. After three months, there was no statistically significant difference between the intergroup judgments. In the final evaluation, the control group had higher mean voice intensity.The teacher's voice quality improved immediately after voice training activities, but the improvement did not last over time, suggesting that further efforts should be made in schools to achieve this goal.

On the similar note Faham, Ahmadi, Drinnan, Saadatmand, Fatahi and Jalalipour (2015) studied the effects of a voice education program on voice handicap index (VHI) score in 127 elementary school teachers divided into training (61) and control group (66).Voice instruction was provided to teachers in the trained group for 4 weeks, and they then followed the curriculum for another 4 weeks.To determine whether the results (change from pre- to posttraining time) were statistically different from zero, the Wilcoxon signed rank test was performed and to compare the distribution of scores between the teaching and control groups, the Mann-Whitney U test was utilized. Teachers in the training group considerably reduced their overall VHI score (from 14.2 to 6.8), but those in the control group significantly increased their score (from 10.1 to 13.7).This

outcome suggests that a voice education program can benefit teachers' voices and sustain voice quality.

Porcaro, Howery, Suddhandron and Gollery (2019) studied teachers' readiness to change their vocal actions that would be influenced by training on the effects of vocal hygiene practices.Teachers participated in a one-hour instruction on vocal hygiene techniques between the pre- and post training questionnaires. This instruction covered fundamentals including the anatomy and physiology of the voice, good and bad vocal habits, the consequences of phono-trauma, and the advantages of vocal hygiene practices.The findings demonstrated that vocal hygiene training had a statistically significant impact on teachers' desire to adopt vocal hygiene behaviors. By virtue of receiving vocal hygiene instruction, study participants reported feeling more motivated to practice the targeted vocal hygiene activities in about 90% of the cases. Finally, it can be said that teachers are open to learning about proper voice use and vocal hygiene practices.

Need for the study

Professionally many people are dependent on their voice like singers, teachers, receptionist, politician etc. Among all these professional voice users, comparatively school teachers are at his risk of voice disorders than others. Due Lack of awareness in many teachers, misuse or abuse of voice is common in teachers which leads to some kind of voice problems. Vocal hygiene has been considered as one of the basic treatment and maintenance approach towards better voice. Therefore, the need of the study is to systematically review the outcomes of the vocal hygiene practice in school teachers.

Aim of the study

- To systematically review the studies that describes the outcomes of vocal hygiene practice in school teachers.

Objective of the study

- To provide a thorough analysis of the outcomes of teaching and practicing vocal hygiene in school teachers.
- To evaluate the amount of evidence supporting the teaching and practice of vocal hygiene in schools.
- To compile the findings of the objective voice analysis in different voice parameters after the use of vocal hygiene practice.

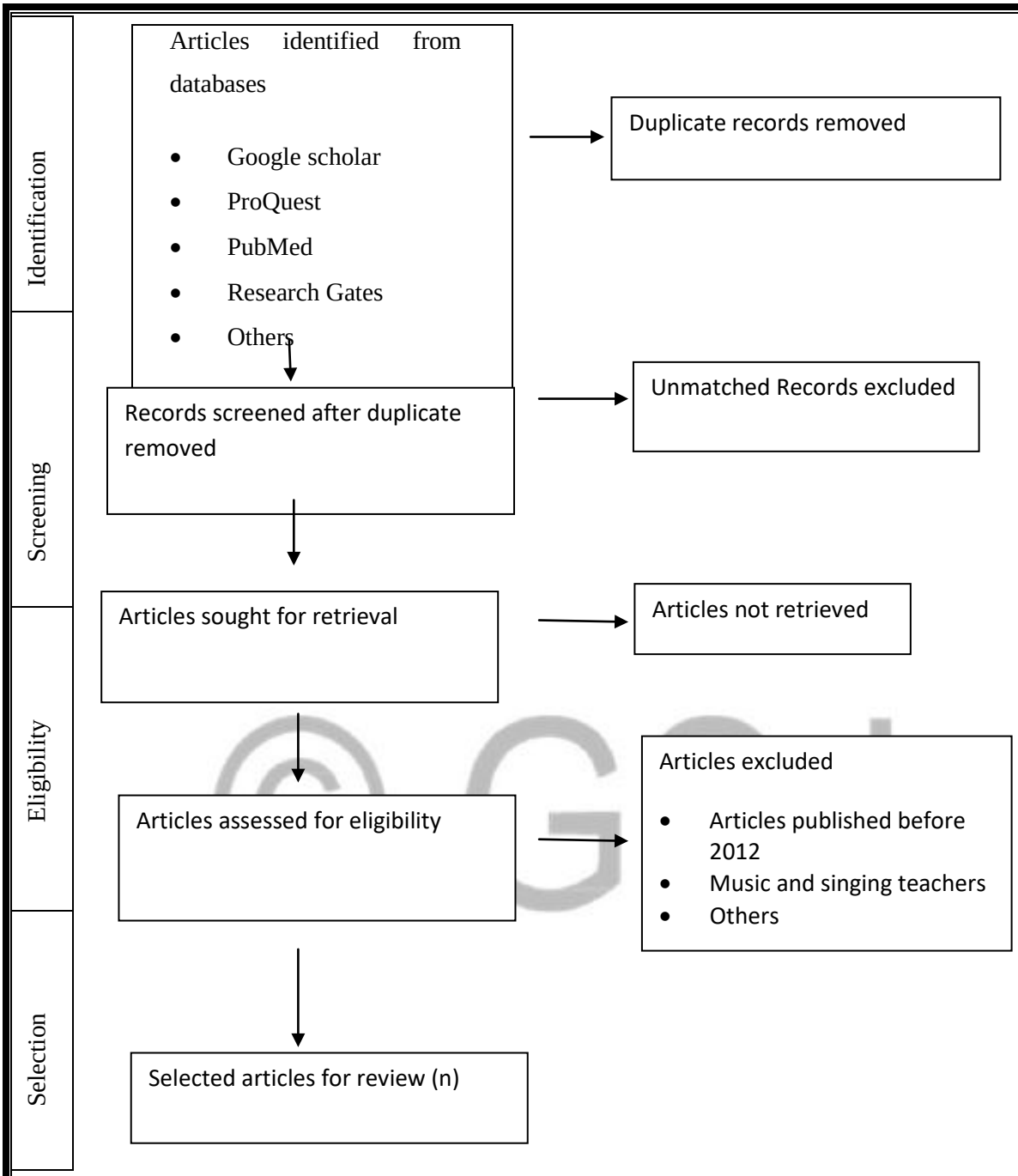
- To document the several research methods those have been utilized to examine the outcomes of vocal hygiene practice and education in school teachers.

METHODS

Review Questions:Following questions were used to review the outcomes of vocal hygiene.

- What is the outcome of vocal hygiene practice and education in school teachers?
- How well can vocal hygiene be employed to maintain the state of school teacher's healthy vocal folds?

Searches: The review was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards. Key words like Vocal hygiene, vocal hygiene practice and vocal hygiene education program, vocal hygiene practice in teachers, throat clearing, misuse and abuse of voice, outcomes of vocal hygiene practice, effectiveness of vocal hygiene etc. were the search terms. These search terms were used to look up literature across several databases. PubMed, Google Scholar, Science Direct, ProQuest, and PsyNet databases were used to find out the related articles for the review. The PRISMA flow chart has four steps: discovering the articles, screening the articles that have been found, determining their eligibility, and choosing the articles for study. These concluding articles were chosen as qualitative studies that met the requirements for inclusion in the current investigation.Figure 1: Diagram illustrates the PRISMA (Moher, Liberati, Tetzlaff, & Altman, 2020) process for choosing the papers for the current systematic review, which involved searching across many databases



Criteria for Inclusion of Literature:

a) Published in peer-reviewed journals since last 10 years (2012 to 2022).

b) Adult school teachers in age group 20-50 years of age.

c) Pre- and post-vocal hygiene training and program comparison which was done to evaluate the voice parameters.

d) Studies that investigated outcomes and effectiveness of vocal hygiene practice and education in school teachers.

Criteria for Exclusion of literature:

a) Studies with unclear findings
b) Duplicates studies that were found multiple times in different databases
c) Studies that were published earlier than 2012.
d) Studies that included teachers other than school teachers such as music and singing teachers, university teachers etc.

Data Extraction :

The titles and/or abstracts retrieved from the search strategies were screened to find the studies that matched the inclusion criteria. The potential studies' entire texts were then obtained and compared to see if they qualified. The data that was extracted covered the following topics: study population, methodology, participant demographics, including evaluation techniques, and treatment outcome. Using a pre-designed table, the data from the selected studies was extracted (Table 1). Additionally, data on the eligible studies that met the inclusion criteria were retrieved, including information on the year of publication, the kind of publication, the study design, the research type, the research topic, the study's origin, and author profiles with their affiliations.

Table 1:Shows the pre-study format for data extraction

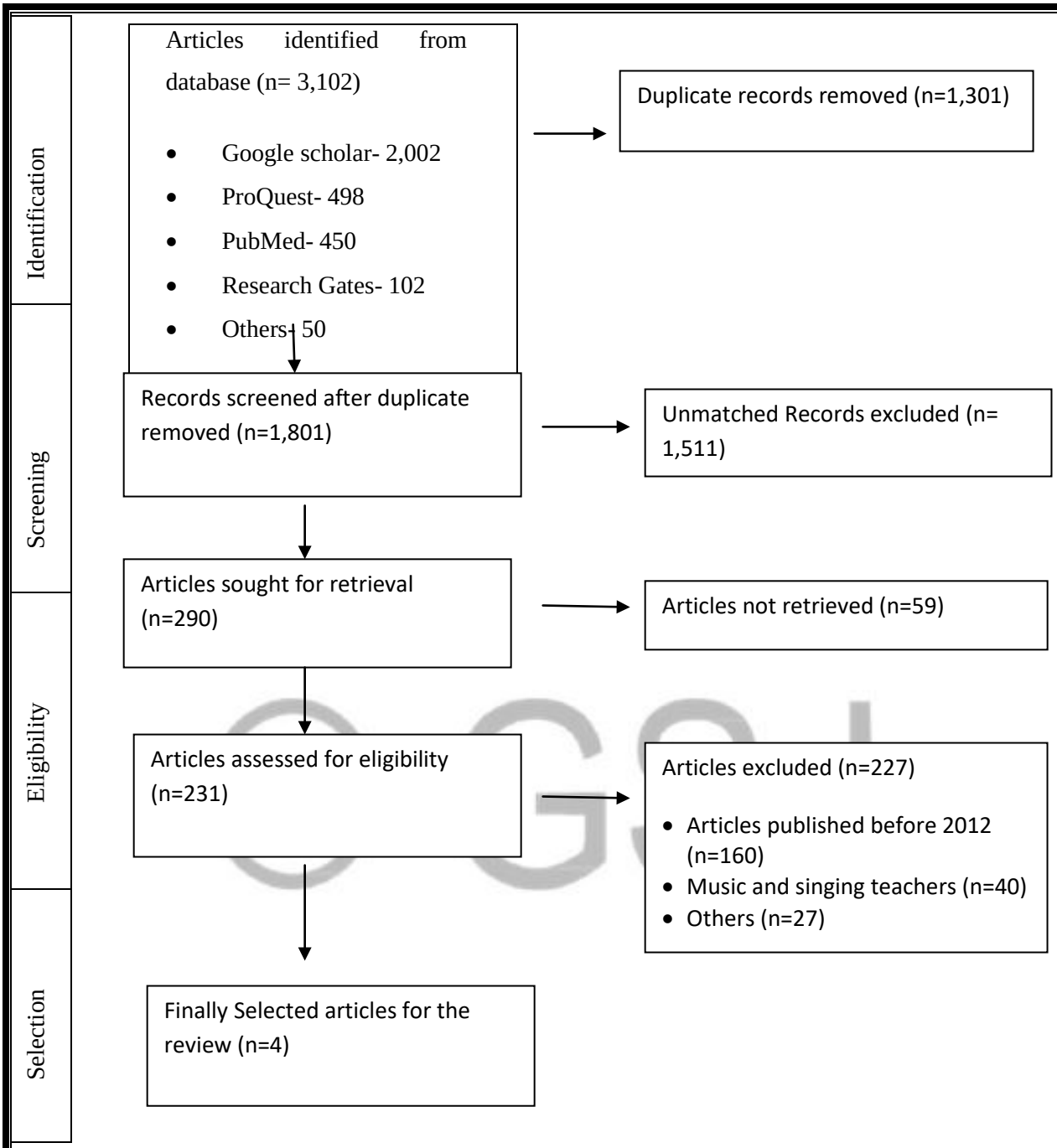
Title of the article	
Authors	
Year of publication	
Journal	
Database	
Study design	
Participants	
Vocal hygiene techniques	
Results	

RESULT AND DISCUSSION

Selection of articles:

Identification of the articles relevant to the current topic was important step and using key words to the different electronic databases, 3102 records were identified. Different database included Google scholar (n=2002), proQuest (n=498), PubMed (n=450), ResearchGate (102) and Others (n=50). From the total identified articles (3,102), duplicate articles (1,301) were excluded and remaining 1,801 articles were screened for the study. The articles (1,511) that did not match the review topic were also excluded. Remaining 290 articles were taken into consideration for further process and 59 articles were not able to be retrieved and were also not included. 231 articles were assessed for eligibility for inclusion in the current review. Articles that were published (160) earlier than 2012 were also not included. 40 teachers other than school teachers, like music and singing teachers, were also excluded from the study. And unspecified teachers and others (27) were also excluded from the study. Finally,only four articles fully matched our eligibility criteria and were selected for the study. These four articles are the latest research papers that are published in journal of voice between.2012 to 2022. These all papers include vocal hygiene practice and education program in school teachers and all papers are comparative study before and after the vocal hygiene practice and education.

Study design and characteristics: Papers selected for the current review was all pre and post test research design depending on comparative, observational, training survey and experimental study (Table 2). The outcomes and effectiveness of vocal hygiene practice and program on vocal health are listed in Table 3. Nallamuthu. included 17 female teachers in their study and Porcaro. included 26 teachers in which 25 were female and 1 male. Faham. divided 127 teachers into two groups (treatment group- 61 and control group-66) and Pizolato. also divided 102 teachers into two groups (experimental group and control group).Figure 2: Shows the Diagram that illustrates the PRISMA (Moher, Liberati, Tetzlaff, & Altman, 2020) Processof identification, screening and selection of the articles for the present study.



Outcomes of vocal hygiene training and program:

All the four articles selected for review showed positive outcomes on vocal quality of the teachers. Overall throat discomfort was reduced whereas breathe control was improved in most of the teachers and almost everyone felt some kind of improvement in voice quality. Table 2 shows the objectives and study design of the selected articles. Pre and post test questionnaire, training survey, experimental and comparison were done to find out the outcomes and effects of vocal hygiene in teachers. Table 3 shows the outcomes measures and findings of all the four selected articles. Three to eight months was the duration of vocal hygiene practice and program in the

selected articles. Acoustic analysis, vocal handicap index (VHI), Voice disorder profiles (V-DOP), McNemar test, Ling wave phonetogram and questionnaire were the outcome measures to find out the outcomes of vocal hygiene practice and program.The treated group displayed clear improvement in voice symptoms, maximal phonation timeand quality of voice and Voice Handicap Index values.

Table 2: Shows the final set of four articles selected for the review and compilation of their characteristics and design.

Author /Year	Title of the paper	Journal	Objectives	Study design
Nallamuthu et al. (2021)	Outcomes of vocal hygiene program in facilitating vocal health in female school teachers with voice problems	Journal of Voice	To estimate the outcome of instituting a sociocultural relevant vocal hygiene program in facilitating vocal health among female teachers	Pre and post-comparativestudy (questionnaire)
Porcaroet al. (2019)	Impact of Vocal Hygiene Training on Teachers' Willingness to Change Vocal Behaviors	Journal of voice	To determine whether education on vocal hygiene practices would impact teachers'willingness to modify vocal behaviors	Pre- and post-comparative study (questionnaire)
Faham et al. (2015)	The Effects of a Voice Education Program on VHI Scores of Elementary School Teachers	Journal of voice	To investigate the effects of a voice education program on the Vocal Handicap Index (VHI) scores of elementary school teachers	Pre- and post-comparative study (experimental design)
Pizolato et al. (2013)	Evaluation of the effectiveness of a voice training program for teachers	Journal of voice	To investigate the effects of a voice education program to teachers on vocal	Pre and post-comparative study (experimental

				design)

Table 3: Shows the outcome measures and findings of vocal hygiene training and program in teachers.

Authors	Participants	Techniques	Durations	Outcome measures	Final outcomes
Nallamuthu et al.	17female teachers	Proper posture and alignment, a healthy vocal diet, enough hydration, vocal exercises while teaching, and an optimal speaking environment.	4 weeks	Voice disorder profiles (V-DOP), McNemar test, Ling wave phonetogram	i)Improvement in throat discomfort and breath control ii)Perceptually minimal improvement in voice quality iii)V-DOP- overall change in severity iv)VFI- improvement in voice after voice rest
Porcaro et al.	26 teachers (female-25 and male-1)	Training - voice production, healthy, and unhealthy vocal behaviors, impact of phonotrauma behaviors, and positive effects of vocal hygiene techniques.	5 weeks	Questionnaire (0-6 scale and statistical analysis program (IBM SPSS Statistics, version 21)	i) Teachers seem to benefit from education in vocal hygiene and proper voice use. ii)Teachers engaged in vocal hygiene behaviors by virtue of vocal hygiene training

Faham et al.	127 teachers (treatment group-61 control group-66)	i)Treatment group-breating pattern modification, laryngeal muscle tension reduction ii)control group	8 weeks	Vocal handicap index Questionnaire	i) Teachers in the experimental group significantly raised their VHI scores, while those in the control group saw a decline.
Pizolato et al.	102 teachers (women-81 and men-21)	i)Experimental group: vocal hygiene and voice training exercise ii)Control group	3 months	Acoustic analysis, Student t test, Proc MIXED	i) The experimental group's voice quality improved after voice training exercises. ii) Voice training exercises had an immediate and beneficial impact on voice quality, but they were not continued over time.

In an Indian study Nallamuthu, Boominathan, Arunachalam and Mariswamy (2020) investigated a thorough voice evaluation process, it was anticipated that the implementation of a socioculturally relevant vocal hygiene program would facilitate vocal health among seventeen female schoolteachers who had experience of teaching of ten years in average.Before and four weeks after the vocal hygiene program (VHP), everyone received a thorough voice assessment that included subjective, objective, and self-perceptual vocal measurements.To compare continuous variable pre- and post-treatment measures, the Wilcoxon signed ranks test was utilized.After VHP, teachers stated that hazardous vocal and nonvocal activities had decreased. Improvements were noted in vocal and associated symptoms, including heartburn, throat discomfort, and difficulties controlling ones breathe while speaking. The quality of the voice barely changed perceptually (overall grade). All stroboscopic examination parameters showed changes, with the exception of the nonvibratory part and ventricular fold hyper-adduction. V-DOP scores showed improvement in the functional domain, physical domain, and overall severity. After a period of voice rest, VFI showed that teachers' voices had improved. Although VHP helped teachers become more aware of potentially dangerous

phonotraumatic behaviors and their vocal health, its effectiveness in enhancing teachers' voices physiologically was limited.

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On the same note Faham, Ahmadi, Drinnan, Saadatmand, Fatahi and Jalalipour (2015) studied the effects of a voice education program on voice handicap index (VHI) score in 127 elementary school teachers divided into training (61) and control group (66).Voice instruction was provided to teachers in the trained group for 4 weeks, and they then followed the curriculum for another 4 weeks.To determine whether the results (change from pre- to post training time) were statistically different from zero, the Wilcoxon signed rank test was performed and to compare the distribution of scores between the teaching and control groups, the Mann-Whitney U test was utilized.Teachers in the training group considerably reduced their overall VHI score (from 14.2 to 6.8), but those in the control group significantly increased their score (from 10.1 to 13.7).This outcome suggests that a voice education program can benefit teachers' voices and sustain voice quality.

Porcaro, Howery, Suddhandron and Gollery (2019) studied teachers' readiness to change their vocal actions that would be influenced by training on the effects of vocal hygiene practices (Table 3)Teachers participated in a one-hour instruction on vocal hygiene techniques between the pre- and post training questionnaires. This instruction covered fundamentals including the anatomy and physiology of the voice, good and bad vocal habits, the consequences of phonotrauma, and the advantages of vocal hygiene practices.The findings demonstrated that vocal hygiene training had a statistically significant impact on teachers' desire to adopt vocal hygiene behaviors. By virtue of receiving vocal hygiene instruction, study participants reported feeling more motivated to practice the targeted vocal hygiene activities in about 90% of the cases. Finally, it can be said that teachers are open to learning about proper voice use and vocal hygiene practices.

Nallamuthu. (2021), the best speaking environment, good posture and alignment, a healthy vocal diet, adequate hydration, vocal exercises while instructing, and overall changes in vocal severity can all improve voice quality. Similar findings were made by Porcaro. (2019), who discovered that people appear to gain from education in vocal hygiene and appropriate voice use after learning about appropriate voice production, healthy, and unhealthy vocal behaviors, the impact of phonotrauma behaviors, and the advantages of vocal hygiene techniques.In the Faham. (2015) study, the training group's VHI scores significantly improved after their breathing patterns were modified and their laryngeal muscle tension was decreased. Vocal hygiene and voice training exercises in the experimental group demonstrated an immediate and positive impact on voice quality, according to Pizolato. (2013) findings in a different controlled study. Overall, every study pointed to a benefit of vocal hygiene instruction and programs.

DISCUSSION:

According to an analysis of the four studies, vocal hygiene practices and programs changed how people perceive the quality of their voices and the production process as a whole. Overall improvement in voice quality and breathe control and reduction in throat discomfort were noted. Studies by Faham (2015) and Pizolato (2013) divided teachers into two groups (experimental/training group and control group). In both studies, experimental/ training group showed improvement compared to control group (Table 3)Only few articles related vocal hygiene practice and program between 2012 to 2022 has been published. The majority of the analyzed studies were observational pre- and post-test designs without control groups for comparison. To establish a greater level of proof, additional randomised controlled studies are therefore required.The current study also discovered that the majority of research only included a small population (Nallamuthu 2021 and Porcaro 2019).

In studies, female teachers were considered more than male teachers.It will also be necessary to undertake multicenter studies to ascertain the effectiveness of these procedures and programs for various demographics, genders, and clinical practitioners.It is generally acknowledged that well-conducted randomised controlled trials offer valuable information. However, observational research may also yield significant information, particularly if there are few studies using randomised controlled trials (Barton 2007). More Indian studies related to vocal hygiene in teachers is needed. Long term positive outcomes of vocal hygiene practice and education is not clearly mentioned in the studies.There were two uncontrolled cohort studies and two randomised controlled trials among these two investigations. Despite a variety of flaws in their methodological approaches, they all demonstrated positive results when voice hygiene practices were used.

The primary tool used by teachers is their voice. Their professional performance may suffer as a result of prolonged dysphonia, which may need sick leave and/or reassignment to administrative duties for which they are not always equipped or motivated.The main objective should be to prevent voice issues in instructors. The best solution is prevention, which calls for taking preventive action before a problem even emerges. Unfortunately, not many schools have this situation.Munier and Kinsella (2008), discovered that 305 teachers who answered a questionnaire on vocal quality revealed that 93% had never received any professional advice or training to prevent voice issues. Prevention of voice disorders can be minimized if proper vocal hygiene education and training is provided to teachers before they start teaching profession.

Most of the schools in remote are in India, has high teachers to student's ratios. Teacher has to take continuous classes and has to depend on their voice. To make audible to the corner and last benches, teacher need to raise their vocal effort and loudness which lead to some kind of phonotrauma such as dryness, discomfort, Pain, foreign body sensation and loss of voice. This is all because teachers do not get proper vocal hygiene education and facilities to protect their voice. Microphone is rarely used by school teachers in rural areas of India.

SUMMARY AND CONCLUSION

The majority of jobs in the modern world need the use of a voice, and people who work as professional voice users are at a greater risk of developing voice disorders, which can ultimately impair their vocal ability. The strength and quality of the voice can be harmed by misuse and abusive behaviors that he/she might be unknown of. The main objective of vocal hygiene is to reduce stress on the vocal tract and produce quality voice with less effort. To fully meet the vocal demand, one needs a backup that can sustain quality while minimizing wear and tear on the glottal area. Teaching profession is heavily dependent on vocal capacity of the individuals. Due to high pitch voice and higher fundamental frequency, female teachers are even at more risk of vocal damage compared to male teachers. Professionally teachers are the one who use their voice more loudly and effortfully compared to other professional voice users. Due to lack of vocal hygiene training and education, many teachers become victim of poor vocal health and frequently suffer from some kind of voice disorders.

According to Nallamuthu (2021) proper posture and alignment, a healthy vocal diet, enough hydration, vocal exercises while teaching, and an optimal speaking environment can overall change in vocal severity and improve quality of voice. Similarly, Porcaro (2019) found teachers seem to benefit from education in vocal hygiene and proper voice use after learning appropriate voice production, healthy, and unhealthy vocal behaviors, impact of phonotrauma behaviors, and positive effects of vocal hygiene techniques. Training group in the study by Faham (2015) showed

significant improvement in VHI scores after breathing pattern modification and reducing laryngeal muscle tension. In another controlled study Pizolato (2013) found vocal hygiene and voice training exercise in experimental group showed immediate and beneficial impact on voice quality. Overall all studies suggested some kind of benefit of vocal hygiene training and program.

Implications of the current study:

- The study supports the notion that using vocal hygiene techniques as part of curative and preventive treatments is safe.
- Teachers can benefit from vocal hygiene training and education program and can get rid of vocal misuse and abusive behaviors.
- Vocal hygiene practice can reduce throat discomfort, dryness, foreign body sensation in throat and can improve breathe control and quality of voice.

Limitations of the studies:

- The bulk of the participants in the studies were female teachers, which resulted in a limited sample size. The results could be strengthened by future research with a larger randomized sample size and the inclusion of men to examine gender differences.
- Long term positive outcomes were not clearly mentioned in the studies.
- Inadequate amount of instrumental and acoustic analysis of voice were performed prior to vocal hygiene training and post training.
- Vocal hygiene techniques were not clearly mentioned and limited techniques were applied to the teachers during the training period.

Finally concluding, current review suggests that vocal hygiene training and program has positive outcome on teacher's vocal health. Improvement in throat discomfort, breathe control and quality of voice was seen in most of the teachers. Voice rest also improved the quality of voice over short period of time. Vocal hygiene practice can be used as a preventive and therapeutic approach by teachers to maintain vocal quality and produce voice more efficiently. Teachers in the experimental group significantly raised their vocal handicap index (VHI) scores, while those in the control group saw a decline. Voice training exercises had an immediate and beneficial impact on voice quality, but they were not continued over time. Teachers are engaged in vocal hygiene behaviors by virtue of vocal hygiene training. Larger number of teachers can be included in random controlled type of study to get more appropriate results. At the end, all four qualitative studies found vocal hygiene training and program can help teachers to produce voice more efficiently and economically and help them to get rid of vocal misuse and abuse.

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