Vocal Fatigue in Indian Teachers Using VFI Scale

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ABSTRACT

By definition, voice fatigue can be considered as the irritation that happens to the voice due to poor health as well as other causative factors like talking for a long period of time. When it occurs, voice fatigue may have a drastic impact on the health of professionals such as teachers. Due to that, many researchers have empirically investigated the impact of voice fatigue but no such research has been conducted to determine how it affects Indian teachers.

Thus, this dissertation employed the VFI scale to investigate the impact and prevalence of voice fatigue amongst Indian teachers using a sample of 40 professional teachers selected from various educational sectors in India. The results of the analysis provided strong empirical evidence indicating that the prevalence of voice fatigue is highest among Indian teachers in all educational sectors and it is negatively affecting the effectiveness of the information verbal transmission. In addition, the results further indicated that the prevalence and effect of voice fatigue are greatly experienced by home tutors, primary school teachers, secondary school teachers, and college professors.

Keywords: *Indian teachers, Voice Fatigue, Voice Fatigue Index, Voice Handicap Index.*

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INTRODUCTION

The study analyzed the incidence of vocal fatigue amongst Indian teachers using both the VFI scale, which might be a serious problem affecting their performance in the education sector of the country. The study focused not only on the evidence for the extent of voice fatigue among Indian teachers but also compared the prevalence by education level and category of teachers, which was done using a quantitative research method.

1. 1 Background Information

Voice is an instrumental component of communication and, according to Sivasankar (2002), more than one-third of the current global labor works in fields where voice is crucial for the attainment of positive professional outcomes. Healthy voices are used as instruments for the wellbeing of many professionals in the social, mental and economic fields. One of the aforementioned professions that rely on voice is teaching and, as highlighted by Goodyear and Dudley (2015), teachers make the greatest impact in the society due to their influence in knowledge acquisition, transfer, and retention. For teachers, voice plays a significant role in the delivery of messages through any verbal communication while conducting their professional duties. However, in some instances, the efficiency of speech of teachers can be hampered due to voice fatigue.

Voice fatigue occurs when the voice organs are used for a long time, but ends after some period of rest (Nanjundeswaran, Van Swearingen, & Abbott, 2017). The main challenge faced by speech therapists, voice coaches and other experts in this era is the lack of a clear definition of voice fatigue. The term voice fatigue is primarily defined based on the decrements in the performance of the output of force through the larynx following activity of a certain magnitude. The fatigue in the voice of an individual is an early indicator of underlying problems that include but are not limited to larynx infections and overall voice disorders. The increased prevalence of voice disorders among professionals in different segments has prompted speech therapists, and other professionals that deal with the oral cavity, to define scales and indices that they can employ in the evaluation of underlying problems and the examples include Voice Handicap Index (VHI) and Voice Fatigue Index (VFI). The two scales are the instruments primarily being used to assess clinical issues related to the vocal cords.

1. 2 Statement of the Problem

The effectiveness of message delivery by verbal means depends on voice clarity. Under normal circumstances, a speaker is expected to address the audience without any voice interruptions. However, according to Rajasudhakar and Savithri (2010), there is a significant prevalence of voice problems among voice professionals in various industries within the global arena. Voice fatigue has therefore caused inefficiencies in communication, in a number of sectors including the education segment. A survey by Sivasankar (2002) established that 50-80% of educators experience vocal problems, which negatively affect their performance. Additionally, the prevalence of voice fatigue among high school teachers in India was estimated at 49%, which is quite high and problematic. Therefore, the central problem that this study assesses using the

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VFI scale is the increased prevalence of voice problems among Indian teachers.

1. 3 Risk Factors for Voice Fatigue

The documented literature indicates that several risk factors are responsible for voice fatigue. For example, Pizolato, Mialhe, Laura, Beltrati, and Pereira (2015) explained that voice fatigue could be caused by old age, alcohol consumption, allergies, and reflux disease of the gastroesophageal. It could also be caused by infections of the respiratory tract, colds, neurosurgical disorders, and psychological stress, neck trauma due to accidents and surgery, as well as smoking. Other factors that may lead to voice fatigue are throat cancer, dehydration of the voice cord, thyroid problems, and the overuse or misuse of the voice. Przysiezny and Sanson (2016) explained that the occupational risk factors for voice fatigue could be grouped into two categories, which are organizational and environmental factors. The organizational factors include the processes of work such as overload, absence of breaks, autonomy, stress at the place of work, and dissatisfaction with the workplace due to poor remunerations. However, environmental risk factors for voice fatigue include physical hazards such as a sudden increase in sound pressure, temperature changes, lack of proper illumination, and poor ventilation.

According to Pizolato et al. (2015), teachers who were smokers and those who had experienced infections of the larynx reported cases of voice fatigue and the analysis further showed that 66.66% of the teachers suffered voice fatigue due to shouting while 52.96% experienced voice fatigue due to previous experience of cold. Alvear and Arquero (2015) agreed with Pizolato et al. (2015) but added that males had a more likelihood of developing voice fatigue than the females. However, Alva, Machado, Bhojwani, and Sreedharan (2018) contradicted Alvear and Arquero (2015) by showing that females had a higher frequency of experiencing voice fatigue than men, with percentage frequencies of 96.3% and 3.7%, respectively. The number of years of service in the teaching profession had influence with a probability of 0.117 as indicated by Alva et al. (2018).

Banks, Bottalico, and Hunter (2017) studied the impact of classroom capacity on the possibility of occurrence of voice fatigue and the results of the analysis using the Poisson-log linear Generalized Linear Model and indicated that 60% of the teachers were experiencing vocal fatigue at the time of the study. The results further indicated that the probability of occurrence of voice fatigue increased with the expansion of class size, with an average score of 4.5 and a standard error of 0.51 as opposed to 0.31 indicated by Pizolato et al. (2015). Assuncao, Bassi, Medeiros, Rodrigues, and Gama (2014) used the Job Stress Scale Instrument to investigate risk factors of voice fatigue in teachers and the results indicated that health conditions of the teachers such as problems with the respiratory tract, gastritis, disorders in sleeping, problems with mental health, lack of regular medical check-up, and absenteeism are also significant contributing factors.

Bolbol, Zalat, Hammam, and Elnakeb (2016) applied the VHI scale to the life of teachers and the results showed that a work duration of more than 15 years had an index of 2.46 at a 95% confidence limit. A number of lessons, loudness of voice, age, gender, and marital status had indices of 3.96, 2.55, 1.05,

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1.56, and 3.63, respectively. The above results coincide with the works of Majeed and Haneefa (2017) who established that work experience, duration of work, number of students, and previous health conditions had a significant effect in causing voice fatigue.

1. 4 Prevalence of Voice Fatigue among Teachers

Research conducted by Sivasankar (2002) on voice fatigue among Indian teachers established a significant difference between the prevalence of voice fatigue among the Indian teachers, before and after they get into the teaching profession. The frequency of occurrence of voice fatigue increased from 3 times per year before being involved in full-time teaching, to 2 times a week after full-time engagement in the teaching activities. The above result is supported by a similar study conducted by Devadas, Bellur, and Maruthy (2017) on 1082 teachers in India that indicated a 17.4% rate of prevalence.

In another study, Hamid, Eldessouky, Iskender, and Hassan (2015) considered a sample of 250 teachers in India and used the Auditory Perceptual Assessment (APA) method and the results showed that female teachers had a higher voice fatigue prevalence than the male ones, with a standard deviation of 7.68 for age and 7.102 for the years in the teaching profession. Weekly teaching hours had an average of 20.14 and a standard deviation of 5.64. The frequency of voice fatigue among the teachers was 23.2, which represented a 58% level of prevalence, with a p-value of 0.398 and Pearson's coefficient of 0.71. The research works provide a comprehensive overview of the state of dysphonia among the Indian teachers but do not show any

difference in the results of both VHF and VIF that are used for the analysis.

Morawska and Bogusz (2017) conducted a research to establish the prevalence of voice fatigue among Indian teachers and established that the rate of prevalence was 20.51%, with a standard deviation of 44.26 from the general population. The survey also showed that teachers in India had a 15% higher chance of reporting voice fatigue than respondents from other occupations, who exhibited a 6% probability of suffering from voice fatigue. The research further indicated that female teachers had 87% chances of reporting voice fatigue, compared to 17% for the males. A study by Ramprasad, Das, and Maruthi (2017) considered a sample size of 3258 teachers randomly selected from 115 schools in India and their findings support the above results established by Morawska and Bogusz (2017). In particular, the research established that the prevalence of vocal fatigue among the Indian teachers was 27%, with an average of 27.5 hours in class. The study further indicated that the number of hours spent in class was the most significant cause of voice fatigue (36%), while midday classes contributed to the highest number of incidences of voice fatigue when the time of activities is considered.

Conversely, a study by Stachlert (2018) indicated different results in research, where the prevalence of voice fatigue among Indian teachers in nursery schools is 45.2%. However, the causes of the significant difference between prevalence rates of vocal fatigue among teachers in nursery and upper primary education levels are not explained. Rafee, Zambon, Behlau, and Badaro (2018) used the VFI scale to establish the prevalence of vocal fatigue among 60 Indian teachers

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and established a prevalence rate of 22%, which was considerably low as compared to the results of other above as presented above. The research further showed that teachers who sought for treatment of voice irregularities after the occurrence of voice fatigue had higher chances of experiencing the condition.

1. 5 Assessment of Voice Fatigue

The documented literature identified VFI and VHI scales as the two main instruments that are being used widely by researchers to measure and assess voice fatigue. For instance, a study by Nanjundeswaran, Jacobson, Schmidt, and Abbott (2015) indicated the VHI scale become more effective since the voice validation index is done in 3 stages, as opposed to the 2 stages adopted by Hunter and Banks (2017). As explained by Hunter and Banks (2017), the two scales rely on the index generation that focuses on the development of questions that target the main symptoms of voice fatigue. However, the viability of the questions included in the two scales is limited by the fact that voice fatigue had a general definition, and could incorporate other infections that are not related to the voice. Notably, the literature has not documented research works that indicate a clear difference between the sensitivity and validity of VFI and VHI.

The development of VFI by Nanjundeswaran et al. (2017) considered gender and age of the respondents, and excluded those who had previously been treated against illnesses that were identical to, or were related to the symptoms of voice fatigue. However, the research does not indicate how patients with primary voice fatigue and those that displayed symptoms of

voice fatigue but actually had other illnesses are identified and isolated from the study. The analysis grouped the indicator factors into 3 groups, which were voice tiredness (factor 1), physical discomfort (factor 2), and rest for symptom enhancement (factor 3). Athira and Devadas (2019) evaluated the reliability of the VHI scale through the test-retest framework and yielded a Pearson coefficient of 0.94, which was significant. The same procedure was used by Assuncao et al. (2014) to assess the reliability of VFI and established the Pearson coefficient of 0.91, which was also significant. In essence, the above studies indicate that both VFI and VHI scales are reliable for measuring the extent of voice fatigue.

On the other hand, a research study conducted by Rafee, Zambon, Badaro, and Behlau (2019) on the validity of the VFI scale using Cronbach's alpha and the t-test found that it is internally consistent. Conversely, an analysis of VFI scale by Athira and Devadas (2019) considered 3 factors, which are voice tiredness, limiting the use of voice, and symptoms of physical discomfort, which yielded standard deviations of 0.922, 0.923, and 0.925 respectively, with probability values less than or equal to 0.001 with 80% sensitivity and 71.4% specificity. However, a study by Broek, Heinjen, Hendriksma, Langeveld, and Benthem (2019) indicated that the specificity for the same factors is 83.2%. Therefore, VFI was considered appropriate in the analysis of voice fatigue due to the significant levels of specificity and sensitivity for all three factors.

On the other hand, Rafee et al. (2019) performed an analysis of logistic regression to establish the extent of sensitivity of the VFI scale. The regression was performed in

the forward stepwise manner and yielded a chi-square value of 35.05 with a probability of p<0.000. The sensitivity value was 0.91, indicating that VFI was a reliable and efficient tool for the evaluation of voice fatigue within a given population. VFI indicated 89% chances of predicting accurate results within the group that had not experienced voice fatigue, and a 94% chance of accurately predicting results within the group that had experienced voice fatigue in the past. The research works do not indicate specificity and sensitivity values yielded when VHI and VFI are used for the analysis of the same sets of data. Based on the above evidence, the current study will use the VFI scale to measure the extent of voice fatigue among Indian teachers due to its reliability.

HYPOTHESIS AND OBJECTIVES

The study aims at assessing the extent of prevalence of voice fatigue among Indian teachers using the VFI scale. In the view of the current situation, the use of the VFI scale will help identify the prevalence as well as the extent of voice fatigue among Indian teachers, which is the hypothesis being addressed. In order to do so, the secondary objectives of the study were to:

– To assess the extent of fatigue among Indian teachers using the VFI scale.

– To establish the category of teachers who are greatly affected by voice fatigue.

– To determine how the extent of voice fatigue is affected by the class sizes (the number of students).

Fulfilling the above objectives will help you to answer questions related to the research phenomenon such as:

– To what extent does voice fatigue affect teachers in the Indian education sector?

– Does the class size affect the extent of voice fatigue among teachers?

– How does the education level affect the extent of prevalence of voice fatigue?

– How is the VFI scale used for the assessment of voice fatigue?

– Answering the above questions is significant since it provides insights on the distinguishing features of the VFI scale given the diversity in the applications of the instrument. Consequently, it will identify its effectiveness for use in the analysis of voice fatigue.

In addition, the results of the study will essentially provide a useful reflection of a broad extent of voice fatigue amongst Indian teachers.

Lastly, the study is significant because its results can provide a framework for scientific or medical researchers to formulate strategies for the elimination of voice fatigue among the professional teachers thereby improving the teaching industry.

MATERIALS AND METHOD

3. 1 Research Method

A quantitative research method was embraced to explore the extent of voice fatigue among Indian teachers. Therefore, a standard set of questions will be used in the data collection process (Bryman & Bell, 2015). Quantitative research requires statistical information in the form of variables, which are assigned numeric values to be analyzed quantitatively. Since the study uses deductive logic, the quantitative method

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provided stronger empirical evidence regarding employee motivation in the changing transportation industry. As a result, when using quantitative design, numerical data is collected in which variables are accurately measured to answer the research questions and test the hypotheses (Dudovskiy, 2016). The quantitative method was chosen due to its suitability to the nature of the research phenomenon and the data to be collected, which allows the use of numerical data as was collected through questionnaires thereby allowing the use of statistical techniques to test the research hypotheses.

3. 2 Target Population

The research was conducted in the Indian education sector as the target population, which included schools and colleges. The educator sector in Indian is very competitive and many teachers work extra hard and spend several hours talking to learners while teaching which could lead to vocal fatigue. The problem could be the greatest in the education sector, which made it the appropriate target population to be investigated. The study only focused on government-sponsored schools and colleges in Mumbai.

3. 3 Sample and Sampling Technique

Because only data from all schools and colleges in India could be collected, a simple random sampling technique was employed to select a proportion of representatives from schools and colleges in Mumbai, which was the target population. Notably, the study also included individuals who offer home tutoring in the sample because they also contribute to the education sector and are affected by the voice fatigue problem. The

table below shows the sampling matrix of the respondents who were chosen to participate in the study.

Table 3—1.

Sampling matrix.

Category	Number	Sample size	Total proportion
Schools	4	36	74%
Colleges	2	8	17%
Homeschooling		4	9%
Total		48	

Source: Author's compilations.

3. 4 Data Collection Procedures

First, the sampled school and colleges in Mumbai were visited and permission to collect data requested. Once permission granted, the study sampled 9 teachers from each of the 4 schools and 4 professors or tutors from each of the two colleges. The study also sampled 4 tutors offering home tutoring in Mumbai. All the samples were then provided with a copy of the questionnaire to fill and return. A day was allocated for each school or college for the data collection process. Once they have filled, the questionnaires were collected and entered the data gathered in an SPSS file to be analyzed.

3. 5 data Collection Instrument

A questionnaire was used as the main instrument for collecting primary data from the sample respondents. The study used a standard Vocal Fatigue Index (VFI) questionnaire developed by Nanjundeswaran et al. (2015), which provided a direct

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measure of symptoms associated with voice fatigue. The VFI questionnaire included personal and social-economic information as well as modified to include a measure of demographic characteristics of the participants. The questionnaire was distributed to the respondents physically.

3. 6 Reliability and Validity of the Questionnaire

Reliability of the research instrument

Reliability refers to the level to which a research tool produces consistent and stable results (Dudovskiy, 2016). Hence, if the instrument is reliable, another researcher can generate the same results of the findings, if the survey is conducted at a different time, but on the same sample and setting. In the study, caution was exercised to ensure that the responses are defined and the participant only needs to rate or check in a box accordingly. The reliability of the questionnaire used was tested using Cronbach's alpha statistics.

The validity of the research instrument

The study did not consider any voice fatigue data that does not relate to the teachers in India, hence the data met 100% internal validity. The study considered external findings on the same study topic hence meets the requirements of external validity (Bryman & Bell, 2015). The face validity of the questionnaire was ascertained by ensuring the questionnaire is composed of short and straightforward questions that do not take much of their time.

3. 7 methods of Data Analysis

To analyze the data gathered, the study used a descriptive analysis technique, which essentially involves various measures of central tendency and dispersion such as mean, mode, skewness, and standard deviation among others (Sokovic, Palvetic, & Fakin, 2018). The results of the descriptive analysis were also visually presented in form of tables and graphs to show how the selected parameters are related to voice fatigue among Indian Teachers.

3. 8 Statistical Implementation

The data obtained were analyzed using SPSS statistical analysis software. In essence, the SPSS was e main statistical tool used for implementing various statistical analysis above for answering the specific questions and testing the hypotheses. Therefore, to complete the analysis, the questionnaire data were entered and coded in an SPSS file and then analyzed by implementing the respective statistical test.

3. 9 Ethical Considerations

Before starting the empirical investigation, approval was granted from the university's ethics and review board and after a thorough scrutiny of the aims of the research, the research instruments, and the general manner in which the survey would be conducted, permission was granted. The data from the sources were used as indicated in the sources, without any form of manipulation. Participation in the study was voluntary and no participant was coerced and forced to give any information during the data collection process.

A written and well-informed consent paper was given to the participants, which contain all the relevant information pertaining to the study including the risks and benefits that

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were subjected to the study participants, and the period of the study among others. Confidentiality was guaranteed and considered during the study period. Confidentiality is an assurance that the information obtained from the study participants is safeguarded.

Privacy of the study subjects, the teachers, is another ethical consideration that was addressed; the study was able to control itself from intruding into the personal life of daily businesses of the study participants (Sokovic et al., 2018). In addition, participants were allowed to withdraw from the study in case they felt that it intruded or interfered with their privacy. In the next chapter, the study presents the results and the interpretation of the data analysis that was done using the above techniques.

ANALYSIS AND RESULTS

The chapter presents the results of the empirical analysis that was conducted using the methodology described in the previous chapter to answer the research questions and the results of the analysis are presented in two sections namely the preliminary analysis and empirical analysis as follows.

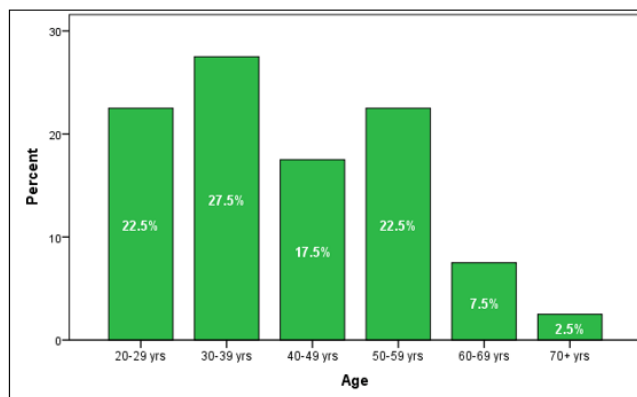### 4. 1 Preliminary Analysis

Response rate

The questionnaire was distributed to 48 individuals sampled but only 40 responded resulting in a response rate of 83.3%, which is considerably high as desired.
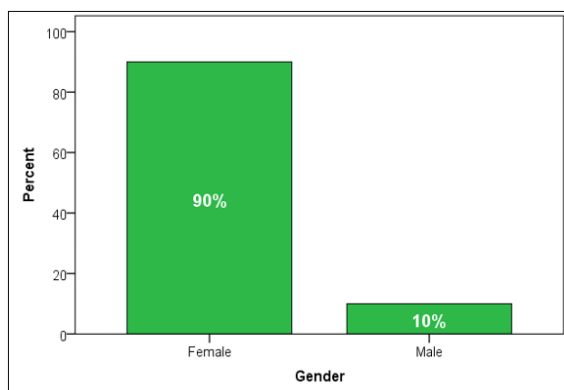
Demographic profile

Figure 4—1.

Age of the respondents. Source: Author's SPSS calculations.

Based on results in Figure 4—1 above, the majority were aged 30-39 years, which was followed by 50-59, and they represented 27.5% and 22.5% of the participants respectively. Only a small proportion of 7.5% and 2.5% were aged 60-69 years and above 70 years respectively. In addition, the mean age of the respondents was 41.45 with a standard deviation of 13.638. These respondents are old enough to have experienced the phenomenon being investigated hence would provide reliable data.

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Figure 4—2.

Gender of the respondents. Source: Author's SPSS calculations.

In Figure 4—2 above, 90% of the participants were female as compared to only 10% of the males, which implies that there was a gender imbalance in the representation, that is, the female gender was greatly underrepresented, which could undermine their opinions of the phenomenon being investigated.

Figure 4—3.

*Teaching category. Source: Author's SPSS calculations.*
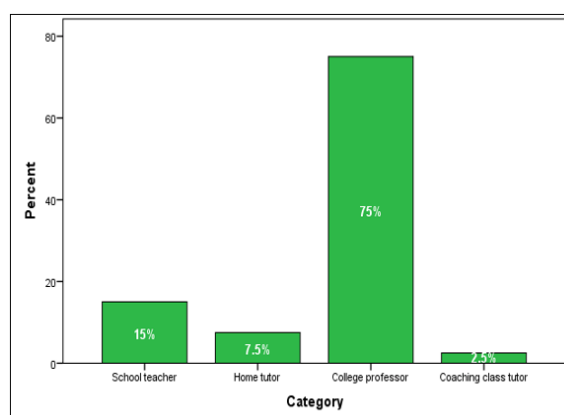
The results in the Figure 4—3 above indicate that the majority of participants were college professionals with a representation of 75%

followed at second place distantly by schoolteachers with a representation of 15% while home tutors and coaching class tutors were the least represented with 7.5% and 2.5% respectively.

Figure 4—4.

Teaching experience. Source: Author's SPSS calculations.
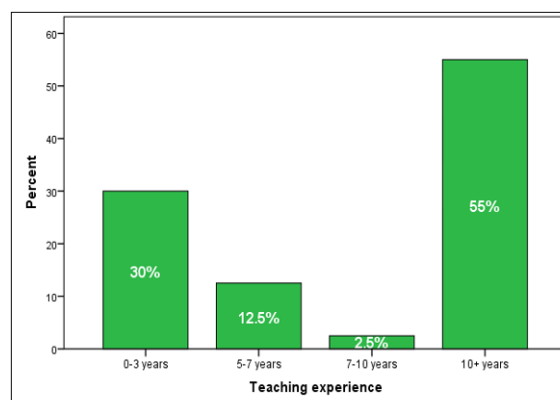
The majority of the participants have been teaching for more than 10 years and they represent 55% of the population, however, 30% have been teaching for between 0 and 3 years. In essence, the results imply that the majority have been teaching for long and have experienced the phenomenon being explored hence would provide accurate data required.

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Figure 4—5.

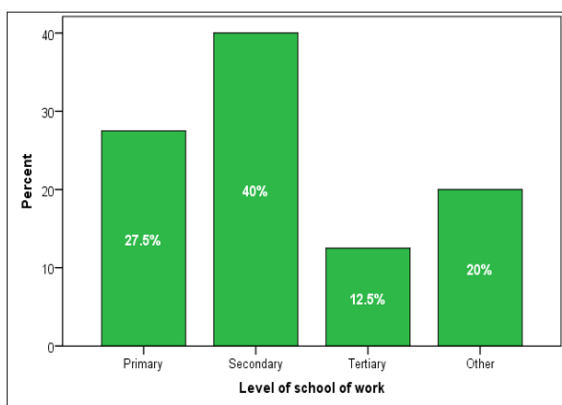*Level of school of work. Source: Author's SPSS calculations.*

Figure 4—5 represented the level of the school of work of the teachers, the majority were of secondary level, which was approximately 40%, followed by the primary level, which was 27.5% while the tertiary level was the least represented with a proportion of 12.5%. The primary and secondary school teachers could be the ones greatly affected by voice fatigue given that they talk a lot to students.

Table 4—1.

The average number of students taught.

	Frequency	Percent	Valid %	Cumulative %
0-20 students	3	7.5%	7.5%	7.5%
21-30 students	14	35.0%	35.0%	42.5%
31-40 students	5	12.5%	12.5%	55.0%
40-50 students	3	7.5%	7.5%	62.5%
50+ students	15	37.5%	37.5%	100.0%
Total	40	100.0%	100.0%	

Source: Author's SPSS calculations.

Table 4—1 above shows the average number of pupils and students that are being taught by the teachers and tutors and from the results, it can be seen that with a representation of 37.5%, the majority were handling more than 50 students, which is quite large. The results indicate that teachers in Indian are handling a large number of students, which could be contributing to increased levels of voice fatigue.

4. 2 Empirical Analysis

Prevalence of voice fatigue among teachers

The data collected were analyzed to determine the existence and prevalence of voice fatigue among teachers in Indian schools. The VFI scale was used to provide a measure of voice fatigue while the final

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score was calculated as the average of the 19 items included (questions 10 to 18 of the questionnaire) the grouped per category and the results summarized in the following table.

Table 4—2.

The extent of voice fatigue.

	Frequency	Percent	Valid %	Cumulative %
Never	3	7.5%	7.5%	7.5%
Almost Never	8	20.0%	20.0%	27.5%
Sometimes	20	50.0%	50.0%	77.5%
Almost Always	8	20.0%	20.0%	97.5%
Always	1	2.5%	2.5%	100.0%
Total	40	100.0%	100.0%	

Source: Author's SPSS calculations.

The results presented in Table 4—2 above indicate that the majority of the Indian teachers sometimes experience voice fatigue for they represent 50% of the population which is very significant indicating that it is a common problem in India's education sector. However, only 2.5% of teachers always experience signs of voice fatigue while only 7.5% have never experienced signs of voice fatigue, which are extremely small. In essence, there is a significant incidence of voice fatigue among teachers in the Indian education sector since only a small proportion of 7.5% have never experienced its symptoms while the same results are presented graphically using the figure below.

Figure 4—6.

The extent of voice fatigue. Source: Author's SPSS calculations.
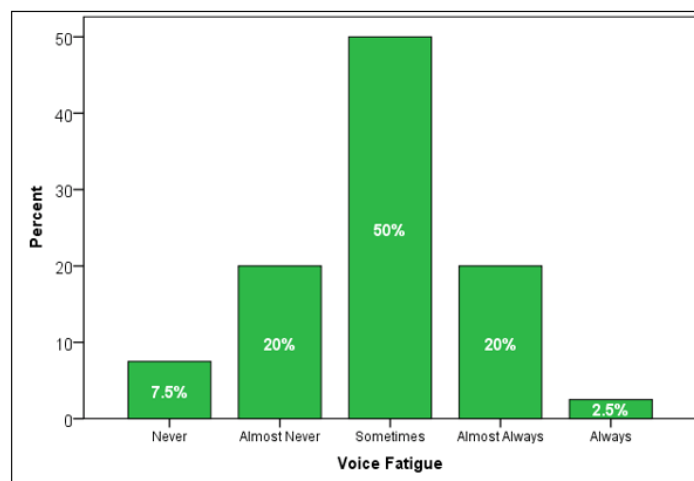
From Figure 4—6, it is apparently clear that there is a significant extent of the existence of voice fatigue amongst teachers in India with a majority of 50% who sometimes experience its symptoms. However, only a small proportion of 2.5% of teachers always experience voice fatigue that indicates that the prevalence rate is not high and can be managed. In essence, the above procedure tested the first hypotheses, which the results accepted by indicating that voice fatigue affects teachers in Indian education sector. The results of a cross-tabulation of voice fatigue by category of teachers are presented in the table below.

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Table 4—3.

The extent of voice fatigue by category of teachers.

| | | Voice Fatigue | | | | |
		Never	Almost Never	Sometimes	Almost Always	A
School teacher	Count	1	4	1	0	0
	%	16.7%	66.7%	16.7%	0.0%	0.
Home tutor	Count	0	0	2	1	0
	%	0.0%	0.0%	66.7%	33.3%	0.
College professor	Count	2	4	16	7	1
	%	6.7%	13.3%	53.3%	23.3%	3.
Coaching class tutor	Count	0	0	1	0	0
	%	0.0%	0.0%	100.0%	0.0%	0.
Total	Count	3	8	20	8	1
	%	7.5%	20.0%	50.0%	20.0%	2.

Source: Author's SPSS calculations.

Table 4—3 above summarized the extent of voice fatigue y category of teachers in India and considering the results for schoolteachers, the majority of them, approximately 66.7%, almost never experience voice fatigue, however, none of them has always experience symptoms of voice fatigue. However, for the home tutors, the majority of them, which is approximately 66.7%, sometimes experience voice fatigue while 33.3% almost always experience it while none has experienced it. Considering college professors, the majority, which is 53.3% sometimes experience while 23.3% almost always experience voice fatigue. In essence, the above results provide evidence

that the extent of voice fatigue is greatest amongst the home tutors and college professors while it is lowest among the schoolteachers. However, for the coaching class tutor, the result is not conclusive because only one sample was present. A cross-tabulation was done to determine the extent of voice fatigue by education level and the results presented in the table below.

Table 4—4.

The extent of voice fatigue by education level.

| | | Voice Fatigue | | | | | |
		Never	Almost Never	Sometimes	Almost Always	Always	Total
Primary	Count	0	1	7	3	0	11
	%	0.0%	9.1%	63.6%	27.3%	0.0%	100.0%
Secondary	Count	2	2	6	5	1	16
	%	12.5%	12.5%	37.5%	31.3%	6.3%	100.0%
Tertiary	Count	0	2	3	0	0	5
	%	0.0%	40.0%	60.0%	0.0%	0.0%	100.0%
Other	Count	1	3	4	0	0	8
	%	12.5%	37.5%	50.0%	0.0%	0.0%	100.0%
Total	Count	3	8	20	8	1	40
	%	7.5%	20.0%	50.0%	20.0%	2.5%	100.0%

Source: Author's SPSS calculations.

Results in Table 4—4 above indicate the extent of voice figure according to the school category where the teacher is working and considering the primary schools, the majority as represented by 63.6% of teachers sometimes experience voice fatigue and a

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significant 27.3% almost always experience it, which indicates higher prevalence. For secondary schools, a majority of 60.0% of teachers sometimes experience voice fatigue while 40.0% almost never experience it, which indicates reduced prevalence. For tertiary education, the majority of 50.0% of teachers sometimes experience voice fatigue and 37.5% almost never while a significant 12.5% of tutors never experience it, which also indicates reduced prevalence. In essence, the above results indicate that the extent or prevalence of voice fatigue is highest amongst primary schools. The rate of prevalence of voice fatigue is reducing with the education level with teachers in the tertiary institutions having the lowest incidences.

Table 4—5.

The extent of voice fatigue by number of students.

		Voice Fatigue					Total
		Never	Almost Never	Sometimes	Almost Always	Always	
0-20 students	Count	0	2	1	0	0	3
	%	0.0%	66.7%	33.3%	0.0%	0.0%	100.0%
21-30 students	Count	1	2	7	4	0	14
	%	7.1%	14.3%	50.0%	28.6%	0.0%	100.0%
31-40 students	Count	1	0	1	3	0	5
	%	20.0%	0.0%	20.0%	60.0%	0.0%	100.0%
40-50 students	Count	0	0	3	0	0	3
	%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
50+ students	Count	1	4	8	1	1	15
	%	6.7%	26.7%	53.3%	6.7%	6.7%	100.0%
	Count	3	8	20	8	1	40
	%	7.5%	20.0%	50.0%	20.0%	2.5%	100.0%

Source: Author's SPSS calculations.

A cross-tabulation was done to determine the extent of voice fatigue by the number of students a teacher handles and the results are presented in the table above and considering teachers managing 0-20 students, it can be seen that majority, which is 66.7% almost never experience voice fatigue while only 33.3% sometimes experience, indicating lower extent of voice fatigue. However, considering a class of 21-30 students, 50.0% of teachers sometimes experience voice fatigue while a significant 28.6% almost always experience it which indicates an increasing prevalence. Considering a class of 31-40 students, a majority of 60.0% of teachers almost always experience voice fatigue which also indicates an increased prevalence rate. For a class of more than 50 students, the majority of teachers, which is 53.3% sometimes experience voice fatigue while a significant 6.7% always experience it. In essence, the results indicate an increase in the extent of voice fatigue among teachers with an increasing number of students they manage. That is, the more the number of students in a class, the higher the chance of teachers experiencing voice fatigue, which could be due to the increased talking and voice projection to reach all students. In essence, the above procedure tested the second research hypothesis, which the results accepted the null by indicating that large class size increases the rate of voice fatigue.

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DISCUSSION OF RESULTS

5. 1 The Current Situation (Research Problem)

Voice fatigue is a serious problem that is affecting the performance of many teachers in the education sector of the different countries and needs to be addressed. Despite the presence of different past studies, the prevalence and the extent of voice fatigue amongst Indian teachers have not been investigated. Thus, the current study was designed to investigate the prevalence of voice fatigue using the VFI index among the population of Indian teachers. The study was necessary for its results will provide a useful framework for scientific or medical researchers that can be used for formulating strategies to eliminate voice fatigue among the professional teachers thereby improving the education industry in India.

5. 2 Advantages and Disadvantages of the Methodology Used

The current study used a quantitative research method, which was advantageous because it enabled the research problem to be investigated objectively thereby eliminating any subjective bias. The main disadvantage of the methodology used is that it relied on the use of self-reported data, which could contain some elements of bias especially if the respondents choose to misrepresent facts.

Other past researchers such as Nanjundeswaran, VanSwearingen, and Abbott (2017), Sivasankar (2002), and Goodyear and Dudley (2015) also used quantitative research methods and collected data through questionnaires; they found quantitative method based on survey technique to be suitable for addressing the similar research problem. Other researchers such as Rajasudhakar and Savithri (2010) used the same method but unlike the current study, measured voice fatigue using the Voice Handicap Index (VHI) scale. The method used for this study can be improved by adding aspects of qualitative analysis.

5. 3 Discussion of Results

Preliminary analysis

The results of the preliminary analysis indicated that the study's response rate was 83.3%, which is considerably high as desired. The majority of past studies considered such as Goodyear and Dudley (2015) and Rajasudhakar and Savithri (2010) also achieved a very high response rate. The results of the preliminary analysis also indicated that the majority of the respondents were young teachers of the age group aged 30-39 years. In addition, the majority were female teachers.

Prevalence of voice fatigue among teachers

The results of the analysis indicated that there is a greater extent of the existence of voice fatigue amongst teachers in India, which has become a serious problem. It implies that most teachers at all levels of education spend a long time talking to students, which accelerates voice fatigue. The above results coincides with the works of several researchers including Sivasankar (2002), Hamid et al. (2015), Pizolato et al. (2015), Alvear and Arquero (2015), Bolbol et al. (2016), and Banks et al. (2017) who have also established significant evidence for the existence of voice fatigue amongst teachers in India and other countries. The first null hypothesis was accepted and it was

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concluded that voice fatigue does not affect teachers in Indian education sector.

Unlike the current results, Sivasankar (2002) went further to argue that the frequency of occurrence of voice fatigue amongst teachers in India increases 3 times every year. Conversely, Hamid et al. (2015) showed that in India the extent of voice fatigue is greatest amongst female teachers, a result which was not established by the current study even the sample size was greatest for women participants.

Further analysis of the current investigation indicated that the extent of voice fatigue is greatest amongst home tutors and college professors, a result that was discussed by previous researchers, which makes one of the new contributions of the current study. This result might be against the expectation of many given that college professors and home tutors are expected to spend fewer hours talking to students as well as manage small groups of students.

The second null hypothesis that large class size increases the rate of voice fatigue was also accepted based on the results of the statistical analysis. In essence, the results indicated that the extent of voice fatigue increases with the increase in the size of class or number of students, which coincides with the results of previous researchers such as Banks et al. (2017), Majeed and Haneefa (2017), and Stachlert (2018). The larger the number of students a teacher handles, the more he or she tends to shout, which is strenuous thereby increasing the prevalence of voice fatigue. The current findings also established that the extent of voice fatigue is greatest amongst teachers in primary and secondary schools, which is expected due to eh increased number of students being handled by the teachers. However, this is a

new contribution to the current study given previous researchers have not assessed the prevalence of voice fatigue across different levels of education.

Research Conclusions

In conclusion, three important things were learnt about the research study that was conducted. First, there is high prevalence of voice fatigue among teachers in India that needs to be addressed. In essence, majority of teachers in India are suffering from voice fatigue, which is affecting their profession and performances. This could be due to the fact that they talk a lot during class lesson thereby having voice fatigue.

The second lesson learnt from the study is the important symptoms of voice fatigue. It was that a number of symptoms, including discomfort in the voice track and the neck, manifest the voice fatigue. These symptoms can be monitored to identify the onset of voice fatigue so that it can be addressed immediately. Some tactics for the reduction of voice fatigue that can be adopted by teachers in India may include avoiding instances that required extended periods of talking.

Third, the study revealed that almost all categories of teachers are affected and incidences are reported in all levels of learning including primary schools, secondary schools and tertiary schools such as colleges and universities. However, further analysis indicated that the extent of voice fatigue is greatest among home tutors and college professors. In addition, further analysis of the results indicated that the extent of voice fatigue is greatest among primary schools and secondary schools.

Research Recommendations

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Further research should be conducted to establish the optimal time for which the Indian teachers of different health conditions should be subjected to talking, to avoid the occurrence of voice fatigue. In addition, further studies should be done to provide evidence of the existence of voice fatigue using the VHI scale, which will provide comparative results and form a basis for justifying the current findings.

Another recommendation for future study is to compare evidence for the existence of voice fatigue among teachers using both the VHI and VFI scales, which is essential given that the current study only used the VFI scale that might have some limitations. For practical implementation, since the study has established that voice fatigue is a common problem amongst Indian teachers, schools should develop a suitable mechanism of addressing the problem in order to improve the health of teachers that will essentially make the education sector in India better.

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