

Correlation between Risk Factors with Dysphonia on Elementary School Teachers in Lhoknga District

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Abstract: *Dysphonia is a disorder characterized by changes in vocal quality, pitch, loudness or vocal effort that may interfere with communication and reduce a person's quality of life. Prolonged use of voice in professional working groups such as teachers, singers and so on can affect voice quality. This study aims to determine the relationship of risk factors with the incidence of dysphonia in elementary school teachers in Lhoknga District. This study conducted with observational analytic design and cross-sectional approach. The sample is 72 teachers that obtained by using consecutive sampling technique. The research instrument uses the VHI-30 questionnaires which has been adapted into Indonesian. The statistical test used in this study is the Chi Square test. The locations in this study were all public elementary schools in Lhoknga District, Aceh Besar. It was conducted from August 10 to August 14, 2021. Based on research conducted on 72 respondents using the VHI-30 questionnaire, respondents who experienced mild dysphonia were 44 teachers (61.1%), and respondents who experienced moderate dysphonia were 28 teachers (38.9%). The results of data analysis using the Chi Square statistical test showed that there was a significant relationship between risk factors and dysphonia. The associated risk factors were gender ($p=0, 017$), duration of teaching ($p=0, 001$), number of subjects taught ($p=0, 006$), and length of teaching ($p=0, 012$). The conclusion is that there is a relationship between sex risk factors, duration of teaching, number of subjects taught, and length of teaching with the incidence of dysphonia in public elementary school teachers in Lhoknga District.*

Keywords: Dysphonia, Elementary School Teacher, VHI-30

1. Introduction

Voice production disorder or dysphonia is a disorder characterized by changes in vocal quality, pitch, loudness or vocal effort that can interfere with communication and reduce a person's quality of life. Dysphonia is not a disease but is a symptom of disorders of the larynx which can be caused by pathological changes from infectious and inflammatory processes, neuromuscular conditions, psychiatric, systemic disorders and neoplasms [1].

Teachers have multifactorial risk factors for the occurrence of sound production disorders [2]. Research showed that the longer the experience a teacher has, the better the effect on the voice of the teacher. This happens because the experience of teachers who teach for years will familiarize with the importance of maintaining sound quality [3]. The duration of teaching is also a risk factor for the occurrence of dysphonia. The duration of teaching hours more than 5 hours per day and continues to be prolonged is a significant risk factor for the occurrence of voice disorders in teachers because it can cause dryness on the vocal cords [4]. Teachers who have taught the number of subjects are also associated with risk factors for the occurrence of voice disorders. Teachers who teach all subjects or more than one subject will often experience voice disorders due to the lack of availability of sufficient rest time so that vocal and physical fatigue occurs, making it easy for teachers to experience dysphonia [5].

Another risk factor for gender, women were found to be higher for the occurrence of voice disorders than men. It happens because women are associated with physiological

aspects of the laryngeal system having less hyaluronic acid in the superficial layers than in the deeper layers of the lamina propria, while men have a homogeneous distribution of hyaluronic acid throughout the vocal cords. This makes it easy for women to injure the vocal cords and the sound production will be easily disturbed [5].

The United States medical database nationally in 2001 revealed the prevalence of point dysphonia is 0.98% (536, 943 patients with dysphonia per 55, 000, 000 patients) in the population seeking treatment [6]. In fact, 20% of teachers are on sick leave due to dysphonia, because absenteeism from this job alone has cause economic loss of \$2.5 billion annually in the United States [6]. In Indonesia, a study conducted by Pasisha in 2012 in Depok City on elementary school teachers, out of 107 teacher population, there were 74 teachers who had voice disorders or dysphonia (69.8%) [7]. In a study conducted by Balmain 2019 in Sukajaya Village, Palembang City on elementary school teachers using VHI-10 measurements, it was found that the prevalence of dysphonia was 6.7% with the largest percentage being >30 years old [8]. Research by Naharohin 2019 on the work profession at Dr. RSUP. Mohammad Hoesin Palembang Period January 2018 - June 2019, was found in the professional voice user profession (teachers/lecturers, preachers) the prevalence reached 10.52% [9].

Teacher is one of the occupational groups where vocals are very demanding, for example using the voice repeatedly or using a heavy voice [3, 4]. Elementary school teachers are more prone to vocal health problems than secondary school teachers due to differences in the duration of voice use. Elementary school teachers can use sound continuously

because there are fewer opportunities for voice breaks. Elementary school children also have difficulty with words, so teachers are forced to raise their voices [3].

If the teacher experiences vocal dysfunction and continues to develop so that it worsens during the teaching career process of the teacher, then it should be included at one of the most important occupational hazards to be aware of [5]. Permanent dysphonia can affect the professional performance of an elementary school teacher which can result in absenteeism due to illness, interfere with communicative abilities, weakness in social life and even fear that it can lead to the end of the teacher's professional career [3, 6].

This research was conducted in public elementary schools in Lhoknga District because Lhoknga District has a geographical location close to the coast which has a noisy environmental background so that the potential for using high or excessive volume of sound will occur in the teaching process. Hellen's research said that elementary school teachers who teach in a noisy environment have a risk factor for voice fatigue 3.4 times higher than elementary school teachers who teach in a quiet environment [11]. The incidence of dysphonia in the teaching profession is a harmful occupational hazard because it has bad implications. This is certainly something to watch out for. The results showed a high prevalence of dysphonia in the teaching profession, especially elementary school teachers [2]. However, there are no studies in Aceh regarding the risk factors associated with dysphonia in primary school teachers. Therefore, the authors are interested in conducting a study "The Relationship of Risk Factors with the Incidence of Dysphonia in Elementary School Teachers in Lhoknga District"

2. Method

This research is an analytic observational research with a cross-sectional approach. The purpose of this study is to determine the relationship between risk factors and the incidence of dysphonia in public elementary school teachers in Lhoknga District. This research was conducted in public elementary schools in Lhoknga District, Aceh Besar Regency which included 11 elementary schools. Data collection in this study was from August 10 to August 14, 2021. This study uses non-probability sampling technique with the consecutive sampling method, meaning that the sample is taken by including the entire population that meets the inclusion criteria and excludes samples that include the exclusion criteria. There were 72 samples that met the inclusion criteria in this study from a total of 87 teacher populations spread across public elementary schools in Lhoknga District. The data used in this study is primary data obtained directly by the respondents by filling out the questionnaire on risk factors for dysphonia and followed by the VHI-30 questionnaire.

This study was using univariate and bivariate analysis. Univariate data analysis was done by describing the characteristics of each research variable without aiming to draw conclusions and bivariate analysis was carried out to analyze the relationship between the independent variable

and the dependent variable. The statistical test used was the Chi Square test.

3. Result Univariate Analysis

1) General Characteristics of Respondents

Characteristics of respondents who were sampled in this study were grouped by gender and age which are presented in Table 1.

Table 1: Frequency Distribution of Respondents General Characteristics

Characteristic	Frequency (n)	Percentage (%)
Gender		
Man	12	16.7%
Woman	60	83.3%
Age		
17-25	3	4.2%
26-35	21	29.2%
36-45	20	27.8%
46-55	21	29.2%
56-65	7	9.7%

Based on Table 1, it can be seen that the largest number of respondents is female with a total of 60 teachers (83, 3%). Most respondents in this study were aged 26-35 (29, 2%) and 46-55 (29, 2%) where the age of the youngest respondent in this study was 24 years old and the oldest was 59 years old.

2) Characteristics of Teaching Duration

The measurement duration of teaching is grouped into two in this study, which are long time (≥ 25 hours/week) and short time (< 25 hours/week). It is adjusted with the teaching hours of teachers during the COVID-19 pandemic which is presented in Table 2.

Table 2: Frequency Distribution of Teaching Duration

Characteristic	Frequency (n)	Percentage (%)
Teaching Duration		
Long time: (≥ 25 hours/week)	48	66.7%
Short time: (< 25 hours/week)	24	33.3%

Based on Table 2, it can be seen that there are 48 respondents with long teaching hours (≥ 25 hours/week) (66, 7%) and 24 respondents answering short teaching hours (< 25 hours/week) (33, 3%) with respondents' answers for the lowest duration is 4 hours/ week and the highest is 30 hours/week, and the average teacher answers the duration of teaching hours is 25 hours/ week.

3) Characteristics of the Number of Subjects Taught

The number of subjects taught by respondents in this study was divided into 2 groups, which is 1 subject and > 1 subject, which are presented in Table 3.

Table 3: Frequency Distribution of the Number of Subjects Taught

Characteristic	Frequency (n)	Percentage (%)
Number of Subject Taught		
> 1 Subjects	51	70.8%
1 Subject	21	29.2%

Based on Table 3, it can be seen that respondents who teach more than 1 subject are 51 teachers (70, 8%) while respondents who teach 1 subject are 21 teachers (29, 2%).

4) Characteristics of Length of Teaching Length

The longest length of teaching for the respondents in this study was 38 years of teaching and the latest was 2 months of teaching. In terms of research purposes, the length of teaching respondents in this study were grouped into two groups, which is the >1 year group and the 1 year group which are presented in Table 4.

Table 4: Frequency Distribution of Length of Teaching

Characteristic	Frequency (n)	Percentage (%)
Length of Teaching		
>1 Years	61	84.7%
≤ 1 Year	11	15.3%

Based on Table 4, it can be seen that the majority of respondents with teaching years > 1 year are 61 teachers (84, 7%), respondents with teaching years 1 year are only 11 teachers (15, 3%). The average length of teaching for teachers in this study was found to be 13 years.

5) Description of Respondent's Dysphonia Classification

This study uses a voice handicap index-30 questionnaire whose measurement results are divided into 3 groups, which is mild degrees, moderate degrees, and severe degrees which are presented in Table 5.

Table 5: Description of Respondent's Dysphonia Classification

Characteristic	Frequency (n)	Percentage (%)
Dysphonia		
Mild	44	61.1%
Moderate	28	38.9%
Severe	-	-

Based on Table 5, it can be seen that the most respondents who experienced dysphonia with mild degrees were 44 respondents (61, 1%), then moderate degrees were 28 respondents (38, 9%), and no respondents experienced severe dysphonia in elementary school teachers in Lhoknga District. Score 25 is the average VHI score of respondents in this study.

Bivariate Analysis

1) The Relationship of Gender with Dysphonia

Table 6 below is the result of the relationship between gender and dysphonia.

Table 6: The Relationship of Gender with Dysphonia

Gender	Dysphonia				Total		P value
	Mild		Moderate		n	%	
	n	%	n	%			
Man	11	91,7	1	8,3	12	100	0,001
Woman	33	55	27	45	60	100	

The conclusion obtained from Table 6 is that there are more women who experience dysphonia, both mild and moderate degrees than the male sex. After the Chi Square statistical test was carried out, the p value was 0,017. This significant value is smaller than the value of <0,05. The significance

value which is smaller than the value of indicates that there is a relationship between gender and the incidence of dysphonia in public elementary school teachers in Lhoknga District.

2) The Relationship of Teaching Duration with Dysphonia

Table 7 below is the result of the relationship between teaching duration and dysphonia.

Table 7: The Relationship of Teaching Duration with Dysphonia

Teaching Duration	Dysphonia				Total		P value
	Mild		Moderate		n	%	
	n	%	n	%			
Long time: (≥25 hr/week)	23	47,9	25	52,1	48	100	0,001
Short time: (<25 hr/week)	21	87,5	3	12,5	24	100	

The conclusion obtained from Table 7 is that respondents with a long teaching duration (≥25 hours/week) experienced more dysphonia, both mild and moderate degrees, than respondents with a short teaching duration (<25 hours/week). After the Chi Square statistical test was carried out, the p value was 0,001. This significant value is smaller than the value of <0,05. The significance value which is smaller than the value of indicates that there is a relationship between teaching duration and the incidence of dysphonia in public elementary school teachers in Lhoknga District.

3) The Relationship between the Number of Subjects Taught and Dysphonia

Table 8 below is the result of the relationship between the number of subjects taught and dysphonia.

Table 8: The Relationship between the Number of Subjects Taught and Dysphonia

Number of Subjects Taught	Dysphonia				Total		P value
	Mild		Moderate		n	%	
	n	%	n	%			
>1 Subject	26	51	25	49	51	100	0,006
1 Subject	18	85,7	3	14,3	21	100	

The conclusion obtained from Table 8 is that respondents with more than 1 subject having mild and moderate dysphonia than respondents who only taught 1 subject. After the Chi Square statistical test, the p value was 0,006. This significant value is smaller than the value of <0,05. The significance value which is smaller than the value of indicates that there is a relationship between the number of subjects taught and the incidence of dysphonia in public elementary school teachers in Lhoknga District.

4) The Relationship of Length of Teaching with Dysphonia

Table 9 below is the result of length of teaching relationship with dysphonia.

Table 9: The Relationship of Length of Teaching with Dysphonia

Length of Teaching	Dysphonia				Total		P value
	Mild		Moderate		n	%	
	n	%	n	%			
>1 Years	41	67,2	20	32,8	61	100	0,012
≤1 Year	3	27,3	8	72,7	11	100	

The conclusion obtained from Table 9 is that respondents with a length of teaching for >1 year experienced more dysphonia with mild and moderate degrees than respondents with a length of teaching less than or equal to 1 year. After the Chi Square statistical test was carried out, the p value was 0,012. This significant value is smaller than the value of <0,05. The significance value which is smaller than the value of indicates that there is a relationship between length of teaching and the incidence of dysphonia in public elementary school teachers in Lhoknga District.

4. Discussion

Dysphonia is a disorder of sound production that may interfere with social and professional communication [12]. This study uses a voice handicap index-30 questionnaire to determine the degree of dysphonia experienced by public elementary school teachers who are actively teaching in Lhoknga District. The results obtained from the description of dysphonia in this study showed that of the 72 respondents all experienced dysphonia which was divided into mild and moderate degrees. All respondents who experienced dysphonia or complained of voice disturbances during their length teaching period generally did not consult a doctor regarding the voice problem, but only rested their voice for a few days.

Table 5 explains that there are teachers who experience mild dysphonia (61, 1%), teachers who experience moderate dysphonia (38, 9%), and there are no teachers who experience severe dysphonia in this study. According to the author's analysis, this can happen because public elementary schools in Lhoknga District have classrooms that are not too large and the number of students is not too crowded. This study is in accordance with the research conducted by Setiawanat the Kanaan Christian

Elementary School Tangerang (2021) on elementary school teachers. The results obtained of this study is inline with his research that there are teachers who experience mild dysphonia (78, 1%), teachers who experience moderate dysphonia (21, 9%), and none of the Canaan Christian elementary schoolteachers who experience severe dysphonia [13].

1) General Characteristic of Respondents

In this study, the average age of teachers was 41 years. The age of the youngest respondent is 24 years and the oldest is 59 years. Age grouping in this study according to the Ministry of Health of the Republic of Indonesia (DEPKES RI). Based on research conducted by Lee et al from Korea (2018) on the problem of voice in teachers, it was found that the average age of primary school teachers who experienced dysphonia or voice problems with an average age of 40 years [14]. In addition, this study is in accordance with the

research conducted by Kiakojoury et al from Iran (2015) on dysphonia, which found that the highest prevalence of voice disorders occurred at the age of <45 years [15]. This happen due to voice disorders can increase with age but the peak of vocal fatigue during a teaching career is mostly complained of by teachers aged <45 years. Another reason is that teachers have long professional careers which can have a cumulative effect of vocal use, tissue injury and are also associated with biological aging factors [14, 15].

2) Gender Risk Factors for Dysphonia

In terms of gender, according to the results of this study in Table 1, dysphonia is more dominant in female respondents, namely 60 teachers (83, 3%). While the male respondents were only 12 teachers (16, 7%). The results obtained are because the population of female teachers is more found than male teachers who teach at public elementary schools in Lhoknga District.

Based on research conducted by Abou et al from Brazil (2019) on teachers who experience vocal fatigue, the results in their research found that female teachers had a greater risk of developing dysphonia compared to male teachers. This is due to differences in the anatomy and proportions of the glottis in the female larynx and the shorter female vocal cords than males [16]. In addition, Silvaetal's research in Brazil (2020) on the risk of dysphonia in teachers, stated that women have a higher prevalence of dysphonia and even always become the majority and dominant in various professional professions such as elementary school teachers [17]. This is because in women they have a smaller larynx size but the use of sound frequencies is often of high quality [18]. In Table 6, which has been previously described, it is found that the female gender is more dominant with mild and moderate dysphonia than the male gender. From the author's analysis, this might happen because female teachers are more charged with using longer voices with a higher frequency than male, lack of knowledge about maintaining voice quality, tone of voice, and vocal hygiene during teaching also become problems. This study is inline with research conducted by Pasishain Depok City (2012) on elementary school teachers, that there are 61 female teachers who experience dysphonia, and 13 male teachers who experience dysphonia. Therefore, there is a significant relationship between gender and dysphonia. Her research also explained that women are having up to 6, 8 times higher voice problems than men. This happen due to women have difference amount of hyaluronic acid (HA) in the laminapropria layer of the vocal cords that will make the female vocal cords thinner and stiffer than men [7].

3) Risk Factors of Teaching Duration for Dysphonia

Based on the duration of teaching in this study, the results are presented in Table 2 and Table 7. Based on the Regulation of the Minister of Education and Culture No.15 of 2020 regarding the fulfillment of the work load of teachers, principals and school supervisors stated that teachers are having 40 teaching hours per week which is divided into 37, 5 hours for effective work and 2, 5 hours for rest. However, due to the current situation of the COVID – 19 pandemic, teacher teaching hours are limited, hence the regulation cannot be implemented for a while. The author adjusts the situation in the field during the research from the

teacher's answers. For the duration of teaching public elementary school teachers in Lhoknga District per week, the average teacher answers 25 hours.

Respondents with the lowest teaching duration in this study is 4 hours/week and the longest was 30 hours/week. Respondents in the study for the category of teaching duration is long time, namely 25 hours/week with 48 teachers (66, 7%) and the rest is <25 hours/ week (33, 3%). Analysis from the author, dysphonia can occur in the teaching profession of public elementary schools in Lhoknga District due to the burden of teaching duration per week is still too long which resulted in vocal and physical fatigue, and stressed at work. It happens because they are constantly required to produce excessive vocals every day and only have little time to rest their voices. There are also still not enough microphone for the teacher, which is resulting in voice disturbance occurrence. If this is continuously carried out, it will have an impact on the health of the tone of voice produced from the vocal cords, making it easier for teachers to develop dysphonia or problems with their voice. Based on research by Korn et al from Brazil (2015) on risk factors for voice disorders in teachers, teachers who teach only one to three hours per day are less likely to develop dysphonia than teachers who teach four to six hours per day. This is due to teachers who teach four to six hours per day will experience vocal fatigue more quickly and lack of time to rest, so that it is easy for voice disturbances to occur [19].

Based on Table 7 which has been described previously, teachers with long teaching duration categories (≥ 25 hours/week) are more likely to experience dysphonia, both mild and moderate degrees. Based on author's analysis, this can happen due to the long teaching hours that made the teacher must adjust tone of the voice so that it still can be heard even with the noisy sound background of the class. The teachers are also required to fulfill teaching hours every day and must achieve the learning objective given to the students. This later will make teachers need more energy both vocally and physically. Research conducted by De Sousa et al from India in (2018) on the problem of voice in teachers showed that teachers who are 40 years of age or older and work >20 hours per week will easily experience voice disorders. This is due to the excessive burden of the larynx every day and work stress on the teachers [18].

4) Risk Factors for the Number of Subjects Raised on Dysphonia

Based on the results of the study the number of subjects being taught are presented in Table 3 and Table 8. The number of subjects being taught for in this study is divided into two groups, namely 1 subject and >1 subject. Respondents who teach >1 subjects in public elementary schools in Lhokngasub-district are found to have a greater number, namely 51 teachers (70, 8%) who are also classroom teachers (thematics) and the rest are teachers who teach only 1 subject. The author's analysis in this study is because public elementary school teachers in Lhoknga District are still not evenly distributed so that there will be many teachers who teach >1 subjects to fulfill all learning objective for students required by the curriculum. It will make teachers easier to experience vocal fatigue resulting in dysphonia. Based on research by Lee et al from Korea

(2018) on the problem of voice in teachers. Class teachers are often reported for voice problems because they have a greater work load either due to the learning process or counselling. Therefore, this is also become a reason for the high prevalence of dysphonia in classroom teachers [14].

In addition, based on research conducted by Trinite from Latvia (2017) on voice disorders in elementary schoolteachers, that primary school teachers who teach >1 subjects totaling 64, 5% of respondents said that they often experience voice disturbances every day due to work pressure, and force the teacher to keep speaking every day for more than 4 hours. It is also said that there is no difference between teachers of sports subjects with other teachers in terms of sound because each teacher is required to speak loudly every day to overcome the continuous background noise because high number of students, undisciplined students, and inadequate room acoustics. The results obtained in his research are also in line with this study that the number of subjects is related to the incidence of dysphonia in teachers [20].

5) Risk Factor of Length of Teaching for Dysphonia

Another risk factor in this study is length of teaching which is presented in Table 4 and Table 9 of the risk factors for length of teaching. In this study, the average length of teaching for public elementary school teachers in Lhoknga District was 13 years. Respondents who taught the longest in public elementary schools in Lhoknga sub-district were 38 years old. In this study, the latest respondent was found to have only taught for 2 months at a public elementary school in Lhoknga District, previously the teacher was also an active teacher teaching in other elementary schools so that this made the teacher also have a risk for dysphonia. Respondents in this study had the most years of teaching experience, namely > 1 year as many as 61 teachers (84, 7%). The author's analysis that this occurs because there has been no equal transfer of teachers in elementary schools in Aceh Besar District, so that more elementary school teachers in Lhoknga District are found to have more than 1 year of teaching experience. Based on research conducted by Devada et al from India (2017) on the prevalence of voice disorders in teachers, it was found that teachers who had more years of teaching experience had a 1, 7 times higher risk of dysphonia than teachers who had just started to be a teacher. Vocal fatigue can occur in teachers with years of teaching experience. The teacher's continued daily and prolonged use of sound over the years will reach a point where sound recovery is impossible [21].

The results presented in Table 9 found that teachers with more than 1 year length of teaching were found to have more mild or moderate dysphonia. The author's analysis is related to the experience of teachers who have taught form any years turnout it is not able to make teachers aware of the importance of maintaining the quality of the tone of voice. This is also related to the knowledge of teachers who consider voice problems to be a common problem that is often experienced by the teaching profession. This is resulting on lack of awareness of teachers to avoid dysphonia. Research conducted by Abo-Hasseba et al from Egypt (2017) on the problem of voice in the teaching profession, which is comparing primary school teachers and

public school teachers. Elementary school teachers with an average length of teaching above 11 years were reported to be 58% at risk for the severity of dysphonia for moderate and severe degrees. Research by Abo-Hasseba et al found results that are in line with this study, namely that there is a relationship between the length of teacher teaching and the incidence of dysphonia [22]. In addition, the research conducted by De Brito et al from Brazil (2018) on teacher dysphonia, found that there was a relationship between teacher teaching length and the incidence of dysphonia. This is happened because teachers who teach for years will having older in age from time to time and use their voice continuously which resulted in long vocal fatigue. Increasing age of the teacher will also affect their vocal of voice. This will make the teacher more frequent to have voice problems during teaching [23]. The results obtained in this study are not in line with the background described previously. According to Alrahim et al, teachers with length of teaching for many years will have a better vocal experience compared to teachers who have just taught, because they will be able to adjust the tone of voice and vocal hygiene during the teaching process and it will make them hard to have voice disturbances [3].

5. Conclusion

Based on research conducted in all public elementary schools in Lhoknga District, from analysis of research data and discussion, it can be concluded that there is a relationship between gender, teaching duration, number of subjects taught, and length of teaching with the incidence of dysphonia in public elementary school teachers in Lhoknga District.

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