

Investigation of Voice Disorder Symptoms and their Effects on the Job Performance of Elementary School Teachers

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Abstract

Background: Teachers are prone to Voice Disorder (VD). The present study aims to investigate the onset of VD symptoms and their effects on the job performance of the elementary school teachers.

Methods: This cross-sectional, descriptive-analytical study was conducted on 121 male and female elementary school teachers in Mobarakeh County during the academic year 2018-2019. Data were collected using a researcher-made questionnaire. In doing so, the researchers talked to 10 people composed of qualified experts in occupational health, ergonomics, and health education and a number of teachers about how to design the questions as well as the answer scale for each section.

Results: In the present study, the prevalence of VD was higher among female teachers (41%) compared to male ones (20%). That is to say, the prevalence of the VD symptoms in female teachers was more than twice that of the male teachers. The study results demonstrated a significant relationship between having a silent resting place and coughing ($P=0.028$). Accordingly, the prevalence of the symptoms of cough was significantly higher in the teachers who did not have a silent resting place in comparison to those who benefitted from a quiet resting place.

Conclusion: Thus, it is recommended that safety, occupational health, and ergonomic programs should be designed for teachers at the Ministry of Education in collaboration with concerned specialists. Periodic examinations, identification of teachers with disorders, culturalization, and education are among the themes of these programs.

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Introduction

One of the major ways of human communication is verbal method, using the voice.¹ Voice is of emotional, social, and economic significance as one of the key aspects of verbal communication. Therefore, any kind of Voice Disorder (VD) could face individuals with many problems daily.² Voice production is one of the complex mechanisms in humans. Voice is produced in

the larynx. The voice produced in the larynx is a weak, rough, unpleasant, and raw voice. Having passed through and hit the mouth space and speech organs, it undergoes changes that make the voice audible. The audible voice means the voice that is heard from other surrounding humans while speaking.^{3,4}

VD refers to any change in the voice due to the malfunction of vocal cords or their structures, impeding the production of natural voice. Fatigue,

difficulty in speaking, hoarseness, phlegm in the throat, coughing, heaviness in the chest or throat, and decrease in the severity of voice are among the symptoms of VD.⁵ According to statistics, using the voice is considered to be the essential part of the job in one-third of the work force.⁶ The professional users of the voice are those who need a catchy and steady verbal quality as the main instrument in their jobs.⁷ Teachers, as the largest group of professional users of voice, are at risk of verbal disorders.⁸ One of the most important characteristics of the teachers that remains in the minds of the students is their voice. Indeed, maintaining a clear and natural voice is of immense significance for having a proper verbal communication.^{9, 10} VD in teachers could reduce the students' concentration and, as a result, reduce the quality and effectiveness of teaching.¹¹

VD could affect all aspects of an individual's life.¹² VD is in fact one of the prevalent disorders among the individuals who professionally use their voice as a key instrument in their work.¹³ The results of an investigation conducted in 2006 indicated a relationship between VD and use of one's voice professionally.⁵

According to the statistics provided by Iran's Ministry of Education in 2019, as many as 550 thousand teachers are teaching at different educational grades.¹⁴ Exposure to harmful chemical, physical, psychological, ergonomic, and even biological occupational factors is among the teachers' safety and health risks that may have consequences, such as developing musculoskeletal disorders, pulmonary diseases, and VD.^{1, 8, 15} VD could be attributed to a variety of factors like background noise, number of students in the class, exposure to chalk dust, acoustic characteristics of the class, students' educational grade, tone of voice, use of microphone while teaching, and having underlying diseases like cold, asthma, and sinusitis.^{5, 12} As an example, occupational VD has been reported to be higher among elementary school teachers compared to those of middle school students because the former have a slight chance of resting their voice during the day.¹⁶ In the same vein, Munier et al. found that the teachers of elementary schools were more susceptible to VD compared to those of middle schools and the VD symptoms were more prevalent among elementary school teachers. Nonetheless, nearly all participating teachers did not receive formal and vocational voice training and there was a lack of sufficient information and awareness regarding these problems. Inaccessibility of medical aids was reported, as well. Therefore, interventions were recommended to identify the risk factors and to reduce them for mitigating the negative impact of the voice on the person and the work.¹⁶

In the study conducted by Marçal et al., the

prevalence of VD was reported to be 47.6%, which was higher in females than in males. Additionally, the most commonly reported diseases were nasal membrane edema, sinusitis, and physical inactivity, due to which VD occurred.¹⁷ In the study by Roy et al., the prevalence of VD was higher among teachers compared to non-teachers (58% vs. 29%).¹⁸ Roy et al. argued that voice problems among teachers led to occupational restrictions like lost working days and a potential increase in job burnout.⁵ Furthermore, Verdolini et al. stated that the cost of sick leave and medical treatment was approximately \$2.5 billion for VD among teachers in America annually.¹⁹ The study conducted by Roy et al. in America revealed that the teachers were more likely to develop voice hoarseness, have difficulty in speaking, and have a coherent voice compared to non-teachers. The teachers were also more likely to experience the symptoms of the voice problems attributed to their job (60.2% of teachers vs. 20.5% of non-teachers). Moreover, 18% of teachers and 7% of non-teachers had been absent from work for at least one day a year due to the poor performance of their voice. Finally, teachers were reported to be more likely to change jobs due to VD compared to non-teachers.⁵

In their cross-sectional study conducted among elementary school teachers in Hong Kong, Lee et al. reported that the prevalence of VD was 62.6% among male teachers and 71.9% in female ones.¹² In the same line, Angelillo et al. conducted a study in the Napoli region and showed that the prevalence of VD was notably higher among Italian teachers in comparison to non-teachers (8.7% of teachers vs. 2.9% of non-teachers). Hence, essential training for using the voice for teachers as well as professors should be proposed as a useful tool for preventing VD.²⁰

de Medeiros et al. carried out a research among women in the public schools of Belo Horizonte to examine the relationship between VD and environmental and organizational factors as well as the teachers' behaviors.²¹ In another investigation performed by Cutiva et al. among teachers from different countries, the prevalence of VD was reported to vary to 80% during twelve months. The results suggested that VD was a serious health issue among teachers and was more prevalent in teachers compared to non-teachers. Indeed, the effective factors in VD were different among different countries.²²

In their seminal paper entitled "The Prevalence of VD among the Teachers of the Southern Australia", Russell et al. reported that the prevalence of VD was 20% and that the majority of people (65%) did not seek professional treatment.²³ Da Costa et al. also performed an investigation among the teachers of Northern Carolina and indicated that 22% of the teachers had voice hoarseness and 23% had lost their

jobs because of voice hoarseness.²⁴

In their landmark paper entitled “The Prevalence of VD among the Teachers of the Elementary Schools of Yazd City and their Awareness and Performance in relation to VD”, Bagiani Mogaddam et al. found that the prevalence of VD was 55.4% among teachers and that the most common problem was throat drying. However, the teachers’ awareness was reported to be at the intermediate level. Yet, the teachers who held bachelor or higher degrees had stronger awareness compared to others. Furthermore, there was a significant relationship between sex and number of teaching hours. Accordingly, females were more aware of the preventive factors of this disorder compared to males. Overall, the high prevalence of this problem among the elementary school teachers of Yazd indicated the weak preventive behaviors against this disorder. This revealed the necessity to enhance the teachers’ awareness and performance through conducting educational classes so as to prevent and control this problem.²⁵ Similarly, Shakeri et al. mentioned that due to the wide range of harmful factors of VD, these factors should be considered by therapists to prevent, reduce the risk, and treat VD among vulnerable groups like teachers.⁶

Considering what was mentioned above, the prevalence of VD has been addressed in more details in studies and little is known about the analysis of the onset of VD symptoms and the negative effects of these symptoms on the teachers’ performance as the professional users of voice, especially in Iran. Hence, the present study aims to investigate the onset of VD symptoms and their effects on the job performance of the elementary school teachers of Mobarakeh County.

Methods

This cross-sectional, descriptive-analytical study was conducted on 121 male and female elementary school teachers in Mobarakeh County during the academic year 2018-2019. After obtaining informed consent forms, the teachers employed in schools with the minimum work experience of one year introduced by the Department of Education in Mobarakeh County were enrolled into the study. In doing so, the list of all elementary schools of Mobarakeh County was obtained from the Department of Education. Then, 15 schools and 121 elementary school teachers were randomly selected. With the permit of the Department of Education, the research team went to the selected schools and explained the study objectives to the principals and teachers. The sample size was calculated at the confidence level of 95% and test power of 80%. The participants were selected via random sampling.

The study data were collected using a researcher-made questionnaire. In doing so, the researchers talked to 10 people consisting of qualified experts in

occupational health, ergonomics, and health education and a number of teachers about how to design the questions as well as the answer scale for each section. Ambiguities in the questions were also resolved. The reliability of the questionnaire was calculated to be 0.842, using Cronbach’s alpha. Its validity was also confirmed by the experts, indicating the adequacy of questions, lack of ambiguity, and content suitability. The questionnaire items were divided into five categories as follows: a) demographic characteristics including gender, education level, teaching grade, number of teaching hours, and work experience; b) class and environmental conditions such as number of students, teaching instruments, classroom noise level, and break between classes; c) performance factors including limitations on continuing teaching activities, decision to change jobs, using day-off, and physical conditions during the disorder; d) measures taken by teachers regarding VD including the status of developing the disorder, having drinks, and taking medications; and e) the symptoms of being affected by VD, i.e. hoarseness, fatigue, difficulty in regular conversation, inability to read aloud, inability to read monotonously, attempt to produce voice, tremor, chronic dry throat, chronic sore throat, constant throat clearing, feeling a bitter taste, difficulty swallowing water, phlegm in the throat, cough, and laryngitis (dependent variables).

The study data were entered into the SPSS software, version 21. Descriptive statistics were used to describe the data. Besides, data analysis was done using chi-square test and Fisher’s exact test. The significance level was considered to be 0.05.

In this study, all ethical considerations, such as respecting the confidentiality of the data and obtaining informed consent forms, were met. Besides, the teachers who were unwilling to cooperate were excluded from the research.

Results

The results of this study revealed that nearly 59.5% of the participants were females aged 20-40 years. In addition, 63.9% of the teachers had academic degrees and 27% had more than 20 years of teaching experience. Besides, 48.2% of the teachers taught the first three years of the elementary school. Approximately, 81.8% of the classes had more than 20 students. Moreover, 52% of the teachers used only chalk and blackboard. Furthermore, around 58% of the teachers complained about the lack of a quiet and noiseless environment during the break time between classes.

The descriptive statistics related to the performance factors of the teachers and the measures taken by teachers in relation to VD are reported in Table 1. In addition, the symptoms of VD are presented in Figure 1.

Table 1: Descriptive statistics related to the performance factors of the teachers and the measures

Variable		N (%)		
a) Performance factors	Physical conditions during the disorder	Hoarseness	89 (73.6)	
		Vertigo and headache	26 (21.5)	
	Using day-off	Muscle disorders	10 (8.3)	
		Yes	6 (5.1)	
	Limitations on continuing teaching activities	No	111 (94.9)	
		Yes	17 (15)	
	Decision to change jobs	No	96 (85)	
		Yes	15 (13.3)	
	b) Measures taken by teachers regarding VD	The status of developing the disorder	No	99 (86.6)
			Disordered before starting a teaching job	3 (3.3)
Already had a disorder, but now it has been resolved			39 (43.3)	
Having drinks		They have been affected since their inception and have not yet been remedied	49 (52.8)	
		Use of hot drinks	78 (64.5)	
		Use cold drinks	5 (4.1)	
		Sit down and relax audio	12 (9.9)	
Taking medications		No action	28 (23.1)	
		Yes	28 (23.1)	
		No	90 (76.3)	

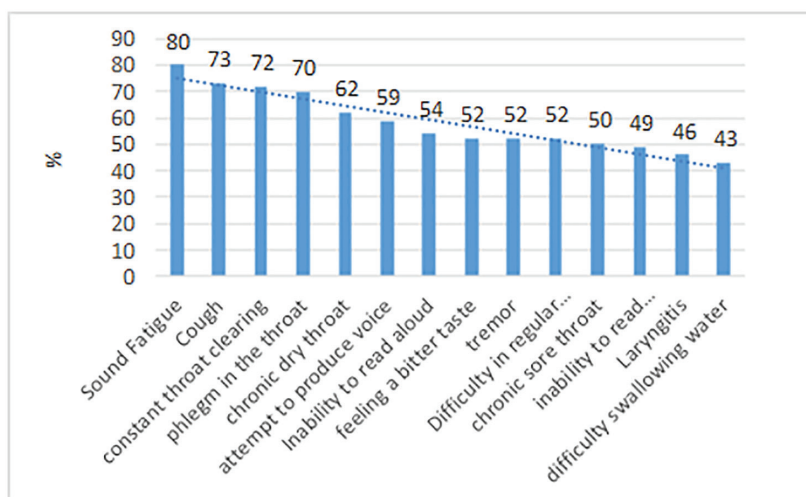


Figure 1: Symptoms of VD

The relationship between the symptoms of VD among the teachers and demographic characteristics are displayed in Table 2. Besides, class characteristics are reported in Table 3. As the Table shows, a significant relationship was found between gender and inability to read aloud ($P=0.038$). Accordingly, the incidence of inability to read aloud was significantly higher in males than in females. There was also a significant relationship between the number of students in the class and voice fatigue ($P=0.034$). Accordingly, the prevalence of voice fatigue significantly increased with the increase in the number of students in class.

In this study, most of the teachers had a great teaching experience. The results revealed a significant relationship between teaching experience and the feeling of a bitter or acidic taste in the throat ($P=0.034$). Accordingly, the prevalence of the symptoms of feeling a bitter or acidic

taste in the throat was significantly higher in the teachers who had more than 10 years of teaching experience compared to those with less than 10 years of teaching experience. The results also showed a significant relationship between digestive disorder and the feeling of a bitter and acidic taste in the throat ($P=0.031$). This implies that the prevalence of the symptoms of feeling a bitter or acidic taste in the throat was significantly higher in the teachers with digestive disorders compared to those who did not suffer from these disorders.

The study results demonstrated a significant relationship between having a silent resting place and coughing ($P=0.028$). Accordingly, the prevalence of the symptoms of cough was significantly higher in the teachers who did not have a silent resting place in comparison to those who benefitted from a quiet resting place.

Table 2: The relationship between the symptoms of VD among the teachers and demographic characteristics

Variable	Laryngitis		Cough		Phlegm in the throat		Difficulty swallowing water		Feeling a bitter taste		Constant sore throat		Chronic dry throat		Tremor		Attempt to produce voice		Inability to read monotonously		Inability to read aloud		Difficulty in regular conversation		Sound Fatigue		Hoarseness				
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No			
Gender	17	22	30	7	28	10	15	24	16	21	32	7	18	21	22	16	25	13	22	15	19	18	25	12	17	22	33	6	37	2	
Female	39	43	57	24	56	26	43	37	45	35	55	26	41	37	51	28	37	43	55	30	39	41	39	43	47	34	63	18	71	11	
P value	0.682	0.220	0.549	0.421	0.190	0.104	0.513	0.486	0.047	0.001	0.047	0.038	0.794	0.651	0.853	0.124	0.926	0.299	0.143	0.627	0.138	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	
Age	20-40	29	43	50	19	47	24	32	39	41	29	51	20	39	30	47	23	39	31	40	26	33	36	39	23	42	29	57	14	66	6
>40	27	22	37	12	37	12	20	28	20	27	36	13	20	28	26	21	23	25	26	19	25	23	25	22	22	27	39	10	42	7	
P value	0.108	0.711	0.274	0.713	0.890	0.843	0.114	0.195	0.405	0.766	0.766	0.605	0.735	0.667	0.786	0.429	0.680	0.508	0.616	0.838	0.508	0.680	0.680	0.680	0.680	0.680	0.680	0.680	0.680	0.680	0.680
Teaching experience	1-10	17	29	30	14	37	18	20	25	30	16	31	14	21	23	28	17	22	23	28	16	21	24	26	19	23	22	36	9	42	4
11-20	20	21	28	12	31	10	16	25	14	24	29	12	22	18	26	13	22	17	17	17	17	19	20	20	21	25	16	31	10	36	5
21-30	18	15	28	5	25	8	15	17	16	16	26	7	15	17	18	14	17	16	20	12	18	14	18	14	16	17	28	5	29	4	
P value	0.271	0.215	0.196	0.780	0.034	0.605	0.735	0.667	0.786	0.429	0.680	0.508	0.616	0.838	0.508	0.616	0.838	0.508	0.616	0.838	0.508	0.616	0.838	0.508	0.616	0.838	0.508	0.616	0.838	0.508	0.616

Table 3: The relationship between the symptoms of VD among the teachers and Besides & class characteristics

Variable	Laryngitis		Cough		Phlegm in the throat		Difficulty swallowing water		Feeling a bitter taste		Constant sore throat		Chronic dry throat		Tremor		Attempt to produce voice		Inability to read monotonously		Inability to read aloud		Difficulty in regular conversation		Sound Fatigue		Hoarseness			
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Number	10	12	16	5	18	4	10	12	9	12	19	3	11	9	13	8	12	9	12	6	7	12	10	10	12	14	8	19	3	
of students	46	53	71	26	66	32	42	55	52	44	68	30	48	49	60	36	50	47	54	39	51	47	52	44	55	44	82	16	89	10
P value	0.932	0.777	0.181	0.854	0.347	0.107	0.653	0.956	0.641	0.496	0.641	0.956	0.641	0.956	0.641	0.956	0.641	0.956	0.641	0.496	0.225	0.974	0.412	0.412	0.034	0.034	0.628	0.628	0.628	
Having a resting place	26	23	31	18	31	18	19	28	26	22	33	15	25	21	29	17	25	33	28	18	23	24	27	20	25	33	41	7	42	7
No	28	40	53	12	52	15	33	35	34	31	51	17	32	35	42	26	36	30	36	25	34	33	36	31	37	31	53	15	62	6
P value	0.203	0.028	0.091	0.391	0.845	0.458	0.491	0.890	0.795	0.847	0.795	0.890	0.795	0.890	0.795	0.890	0.795	0.890	0.795	0.847	0.849	0.695	0.804	0.804	0.312	0.354	0.354	0.354	0.354	
Having a break time between classes	42	51	66	24	64	29	38	54	45	44	24	69	43	48	55	36	47	43	50	36	39	51	46	44	44	49	75	18	82	11
No	9	12	16	5	14	7	9	11	12	9	13	7	10	9	12	7	11	10	12	7	13	7	12	9	13	7	15	5	19	2
P value	0.848	0.788	0.848	0.761	0.525	0.403	0.670	0.725	0.990	0.678	0.403	0.670	0.725	0.990	0.678	0.403	0.670	0.725	0.990	0.678	0.079	0.618	0.151	0.151	0.569	0.764	0.764	0.764	0.764	

There was a significant relationship between the inability to produce monotone or flat voice and musculoskeletal disorders. Accordingly, the inability to produce monotone voice was significantly greater in the teachers who had musculoskeletal disorders compared to those who did not suffer from these disorders.

Discussion

In this study, the onset of VD symptoms was analyzed among the elementary school teachers in Mobarakeh County. In the study conducted by Cutiva et al.²² the prevalence of VD was found to be 15-80% among teachers. Lee et al.¹² also conducted a study on teachers in Hong Kong and estimated the prevalence of VD to be 60%. In the study carried out by Roy et al.¹⁸ the prevalence of VD was 58% among elementary and high school teachers. Similarly, Angelillo et al.²⁰ reported that the prevalence of VD was 51.4% among teachers. This measure was found to be 47.6% in the study carried out by Marcal et al.¹⁷ and 55.4% in the one performed by Bagiani et al.²⁵ Thus, the prevalence of this disorder has been reported to be high in the majority of studies conducted among teachers. Lee¹² maintained that strained vocal cords, social factors, the risks associated with workplace, and a variety of factors including background noise, number of students, exposure to chalk dust and acoustic characteristics of the class were among the reasons for VD.

In the present study, the prevalence of VD was higher among female teachers (41%) compared to male ones (20%). That is to say, the prevalence of the VD symptoms in female teachers was more than twice that of the male teachers. In the same vein, Lee et al.¹² found that the prevalence of VD was higher among female teachers (71.9%) in comparison to male ones (62.6%). Van Houtte et al.²⁶ also showed that the prevalence of VD was significantly higher among female teachers in comparison to males. It should be noted that the participation level of female teachers was higher than that of male ones (more than twice) in that study.

In the present study, the highest and lowest prevalence rates were related to voice hoarseness (89%) and difficulty in swallowing mouth water (43%), respectively. Consistently, Roy et al.⁵ found that voice hoarseness was the most prevalent symptom experienced by teachers. Lee et al.¹² also reported that voice hoarseness was the most prevalent symptom of VD experienced by teachers. In the same vein, the results of the investigation pursued by Shakeri et al.⁶ revealed that the most prevalent symptom was voice hoarseness (66%), while the least prevalent one was decrease in the phonation range (4%).

In the present study, the teachers experienced a lot

of VD symptoms, with some displaying one symptom (35%), two symptoms (23%), three symptoms (18%), four symptoms (10%), and five or more symptoms (12%). In the same line, Roy et al.⁵ found that teachers had experienced many symptoms of VD, with some having one symptom (15.5%), two symptoms (13.3%), three symptoms (12.1%), four symptoms (10.8%), and five or more symptoms (42.3%).

In the current study, 13.2% of the teachers decided to change jobs due to VD. This measure was reported to be 0.3% in the research carried out by Roy et al.⁵ This difference might be attributed to the differences in economic conditions, teachers' income levels, and the costs related to VD treatment.⁵

In the current study, 73.6% of the teachers with VD did not take any measure to treat their disease, which was in agreement with the findings of the study conducted by Russell et al. in southern Australia²³ (65%). Da Costa et al.²⁴ argued that teachers considered VDs to be their job's nature and, consequently, they were less likely to receive treatment. Job involvement, economic problems, and lack of knowledge about how to treat these disorders were also reported as the reasons for this issue.

The present study findings revealed a significant relationship between the VD symptoms and some variables like teaching tools, number of students in the class, and having a silent resting place. Consistently, Marcal et al.¹⁷ found a significant relationship between VD and teaching tools, lack of break time between classes, number of students in the class, and the level of noise.

The small population and using self-reporting tools were the main limitations of this study. It is necessary to carry out more extensive research studies in order to improve their health and safety.

Conclusion

Education has been regarded as one of the major concerns in any society. Enjoying a natural and pleasing speech voice plays an instrumental role in the quality of education and learning process. Voice has been considered to be a key instrument in the teaching profession, and VD is expanding in this large community. More than half of the teachers in the current study showed the symptoms of VD. Voice hoarseness, voice fatigue, phlegm in the throat, and throat drying were the most prevalent symptoms of VD among the teachers. Poor environmental characteristics in the class, lack of proper management planning for the teachers' rest hours, lack of knowledge about treatment, and lack of proper therapeutic and hygienic mechanisms have led to the high prevalence of the VD symptoms. Thus, it is recommended that safety, occupational health, and ergonomic programs should be designed for teachers at the Ministry of Education

in collaboration with concerned specialists. Periodic examinations, identification of teachers with disorders, culturalization, and education are among the themes of these programs.

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References

- Martins RHG, Pereira ERBN, Hidalgo CB, Tavares ELM. Voice Disorders in Teachers. A Review. *Journal of Voice*. 2014;28(6):716-24.
- Behlau M, Zambon F, Guerrieri AC, Roy N. Epidemiology of Voice Disorders in Teachers and Nonteachers in Brazil: Prevalence and Adverse Effects. *Journal of Voice*. 2012;26(5):665.e9-.e18.
- Boone DR, McFarlane SC, Berg SLV. *The voice and voice therapy*: Pearson Education; 2014.
- Speyer R. Effects of Voice Therapy: A Systematic Review. *Journal of Voice*. 2008;22(5):565-80.
- Roy N, Merrill RM, Thibeault S, Gray SD, Smith EM. Voice disorders in teachers and the general population: effects on work performance, attendance, and future career choices. *Journal of Speech, Language, and Hearing Research*. 2004;47(3):542-51.
- Shakeri N, Khoddami SM, Radaee M, Jahani Y. Voice problems and its risk factors in primary school teachers. *Journal of Modern Rehabilitation*. 2015;9(2):35-43.
- Södersten M, Lindhe C, editors. *Voice ergonomics-an overview of recent research*. 39th Nordic Ergonomics Society Conference; 2007.
- Sadri Khanlou M, Monazzam M, Azam K, Morteza pour A, Zakerian SA. Vocal Disorders and Risk Factors Affecting It: Voice Ergonomics in Teachers. *Journal of Health and Safety at Work*. 2019;9(3):241-24.
- Roy N, Merrill RM, Thibeault S, Gray SD, Smith EM. Voice Disorders in Teachers and the General Population. *Journal of Speech, Language, and Hearing Research*. 2004;47(3):542-51.
- Pasa G, Oates J, Dacakis G. The relative effectiveness of vocal hygiene training and vocal function exercises in preventing voice disorders in primary school teachers. *Logopedics Phoniatrics Vocology*. 2007;32(3):128-40.
- Cantor Cutiva LC, Vogel I, Burdorf A. Voice disorders in teachers and their associations with work-related factors: A systematic review. *Journal of Communication Disorders*. 2013;46(2):143-55.
- Lee SY-y, Lao XQ, Yu IT-s. A cross-sectional survey of voice disorders among primary school teachers in Hong Kong. *Journal of occupational health*. 2010;52(6):344-52.
- Sliwinska-Kowalska M, Niebudek-Bogusz E, Fiszer M, Los-Spychalska T, Kotylo P, Sznurowska-Przygocka B, et al. The Prevalence and Risk Factors for Occupational Voice Disorders in Teachers. *Folia Phoniatrica et Logopaedica*. 2006;58(2):85-101.
- Madandar arani A, Navid M, Ranaei M. A Comparative Study on the Position of Formal Education System of Islamic Republic of Iran among its Neighboring Countries. *Iranian Journal of Comparative Education*. 2019;1(3):1-35.
- minoonejad h. Evaluation of low back pain and its association with physical activity and BMI in teachers. *The Scientific Journal of Rehabilitation Medicine*. 2019:-.
- Munier C, Kinsella R. The prevalence and impact of voice problems in primary school teachers. *Occupational Medicine*. 2007;58(1):74-6.
- Marçal CCB, Peres MA. Self-reported voice problems among teachers: prevalence and associated factors. *Revista de Saúde Pública*. 2011;45(3):503-11.
- Roy N, Merrill RM, Thibeault S, Parsa RA, Gray SD, Smith EM. Prevalence of voice disorders in teachers and the general population. *Journal of Speech, Language, and Hearing Research*. 2004;47(2):281-93.
- Verdolini K, Ramig LO. Occupational risks for voice problems. *Logopedics Phoniatrics Vocology*. 2001;26(1):37-46.
- Angelillo IF, Di Maio G, Costa G, Barillari U. Prevalence of occupational voice disorders in teachers. *Journal of preventive medicine and hygiene*. 2009;50(1).
- de Medeiros AM, Barreto SM, Assunção AA. Voice disorders (dysphonia) in public school female teachers working in Belo Horizonte: prevalence and associated factors. *Journal of Voice*. 2008;22(6):676-87.
- Cutiva LCC, Vogel I, Burdorf A. Voice disorders in teachers and their associations with work-related factors: a systematic review. *Journal of Communication Disorders*. 2013;46(2):143-55.
- Russell A, Oates J, Greenwood KM. Prevalence of voice problems in teachers. *Journal of voice*. 1998;12(4):467-79.
- Da Costa V, Prada E, Roberts A, Cohen S. Voice disorders in primary school teachers and barriers to care. *Journal of voice*. 2012;26(1):69-76.
- Baghiyani Moghadam M, Lalegani Z, Morowaty M, Karimi G, Fallah Zade H. Prevalence of dysphonia in teachers of elementary schools of Yazd city Iran, and their knowledge and practice to it. *Modern Care Journal*. 2011;8(2):79-85.
- Van Houtte E, Claeys S, Wuyts F, Van Lierde K. The impact of voice disorders among teachers: vocal complaints, treatment-seeking behavior, knowledge of vocal care, and voice-related absenteeism. *Journal of voice*. 2011;25(5):570-5.