

Perceptual Parameters And Vocal Self-Perception Of A Teachers Group Due To The Permanent Use Of Masks In The Covid-19 Pandemic

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ABSTRACT

A descriptive study with a quantitative approach and cross-sectional design, whose purpose was to determine the perception and self-perception of a teacher group's vocal conditions from an Official Educational Institution from the Department of Sucre in Colombia. The population consisted of 80 teachers aged between 25 and 70 years, to whom the evaluative guidelines survey for organizational factors and vocal hygiene, vocal fatigue self-perception. It starts from A and B, adapted by López and Yévenes (2018) was applied.) and the RASAT perceptual evaluation scale proposed by Rebelo and Pontes (2002). The Epi Info 7.1.5.2 statistical package was used for data coding. The results showed an average workload of 28.72 hours per week in organizational factors terms. With a high student rate in the classroom. It oscillates in a range of 27 to 40 students. This situation generates a greater exposure time due to the prolonged use of the voice, adding to this a higher voice volume, causing greater muscular and vocal overload. Additionally, the findings in the medical history refer more frequently to gastroesophageal reflux and upper respiratory tract diseases of allergic rhinitis, sinusitis, and laryngopharyngitis which can increase vocal signs and symptoms. Regarding the behavior that contributes to tissue injuries in the larynx, a high percentage was evidenced in the habit of drinking coffee and sudden changes in temperature. As well, the students report being exposed to noisy environments and speaking in an inappropriate voice tone. In the description of vocal fatigue self-perception, they feel improvement in their voice after having rested and consider that in the presence of hoarseness their voice improves with rest. In addition, they self-perceive discomfort in the neck when speaking, weak voice, sore throat, vocal effort, hoarse voice, and poor projection due to the use of the mask. In relation to vocal condition perception, they show greater affectation in the moderate category in the parameters of hoarseness, roughness, and tension, after prolonged masks use. In conclusion, the use of the mask denotes changes in the vocal quality of those who wear it, which in the long term could generate vocal dysfunctions or dysphonia.

Keywords: self-perception, perception, teachers, voice, dysphonia

1. INTRODUCTION

In the framework of the COVID 19 coronavirus disease pandemic, the World Health Organization has suggested different strategies to prevent the spread of the SARS-CoV-2 virus through the different personal protection elements (PPE) use, which highlights the surgical mask and/or N95 utilized in public and private spaces (WHO, 2020). Thus, the Spanish Society of Otorhinolaryngology and Head and Neck Surgery- SEORL-CCC (2021) indicated that the use of the mask induces the unconscious need to increase vocal effort, possibly causing a risk of developing voice alterations. Along the same lines, Guzmán (2020) emphasizes that an increase in voice intensity is necessary for the message understanding to happen; triggered in this way, at a physiological level, sudden shocks in the vocal folds translate into a greater phonatory effort, possible vocal fatigue and, in the worst cases, the vocal cords inflammation as well as phono-traumatic injuries produced by the mask, that acts as a filter attenuating high frequencies and sound radiation. In this sense, teachers are the professionals with the greatest risk of developing voice problems, because this profession requires continuous voice overexertion to transmit knowledge to the students. This situation is aggravated by the inadequate conditions in the teaching-learning process, for the greater hours' number of teaching, noisy environment, or classrooms with poor acoustics, affecting the health and educational performance of teachers. (Dominguez et al., 2019).

In the statistics reported by the SEORL-CCC in normal processes before the COVID-19 Pandemic, it is highlighted that between 8 and 10% of the population suffers from voice disorders during the year. Population studies detect a prevalence of around 8% in the United States and South Korea, and up to 38% in Greece; highlighting that only one in ten goes to a health professional (SEORL-CCC, 2017), and three out of four work as a teacher (Gutiérrez et al., 2019). Similarly, the WHO reveals that there is between a 20 and 80% probability that a teacher will suffer from a voice disorder during their working life. However, due to the current situation of Covid-19, the teachers' vocal conditions are possibly aggravated, mainly because the personal protection elements significantly degrade the speech quality that, in combination with the environment noise, the poor favorable acoustic qualities from physical space conditions, and the lack of non-verbal information that do not allow complete auditory information to be completed effectively, make a speech in many cases unintelligible and vocal effort is generated, Vittar (2020).

Now, as a consequence of the appearance of COVID-19, many investigations have emerged around this topic. In the literature different international studies have been found on the mask effects in vocal conditions evaluation. In Spain, Khayi and Morales (2021) executed a correlational study with determining purpose how the use of a mask affected vocal quality.

It establishes that there is no significant difference between the acoustic indices and the surgical mask use. In contrast, in the United States, Magee et al. (2020) established that surgical masks influence a smaller proportion and a greater one for those made of transparent plastic in voice and speech conditions. In Italy, Fiorella et al. (2021) investigated the surgical masks effects on some of the vocal parameters. It determines that no significant differences were found in vocal intensity between the conditions with and without the mask, 65% of the subjects experienced a slight decrease in intensity when wearing surgical masks. For their part, Randazzo, Koenig, and Prierer (2021) in the USA showed that there is a significant effect on the mask condition, that is, the N95 use is the one that produces the greatest affectation while the surgical one is the one with the least impact on speech intelligibility.

At the national level, in Bogotá, Ortiz (2021) found that 88% of teachers have noticed changes in their voice during working hours and 90% feel that mask use has prevented them from managing their voice. It produces the need to raise the intensity of communication. Thus, the mask use generates a barrier for the passage of the voice, It causes the decibels to decrease and the receiver to fail to capture and understand the verbal message, and added to this, the distancing that makes the sender speak louder and it causes a greater overload at the laryngeal level, manifesting pain symptoms, throat clearing, tiredness, and vocal fatigue.

According to the above references and the investigative interest arising from the practical training experiences, the need arises to determine the perception and self-perception of a group of teachers' vocal conditions due to the permanent mask use in the COVID-19 pandemic. Consequently, it is important to specify that, in the department of Sucre there are no investigative disclosures that show vocal commitments as a result of mask permanent use in the teaching population. From this perspective, the University of Sucre as an official Higher Education Institution leads this investigative process under this theme. It encourages the student population and professionals in speech therapy the investigative interest in voice disorders line. Also, benefits will be seen for the teaching community, due to the fact that they will be provided with the results of the vocal condition perception and self-perception, which will serve to design or elaborate the program for the educators' voice management and conservation.

2. MATERIALS AND METHODS

The research was executed under a quantitative approach with a descriptive study type, and cross-sectional design since the measurements made allowed establishing the phenomena, data, and population characteristics under study at a given time (Hernández, Fernández, and Baptista, 2014). The population consisted of 110 teachers assigned to the Francisco José de Caldas Educational Institution from Corozal. It selects an 80 educators sample, through an intentional non-probabilistic convenience sampling, who met the inclusion and exclusion

criteria that make professional use of the voice. They work for more than 2 hours and a half in a row and use a mask and/or face mask. As well, They sign the informed consent and do not present a cold picture at the evaluation time or contagion by COVID -19. Finally, they are evaluated in the month of December 2021.

To achieve the objectives, an approach was made to the Educational Institution, through a face-to-face meeting with the rector and coordinators. This is for the study execution authorization. Subsequently, the informed consent was signed according to the ethical regulation in research with human beings in Colombia. It was determined by Resolution 008430 of the Health Ministry (1993) which establishes the scientific, technical, and administrative standards for health research and the Ethical Principles at the international level. of the Helsinki Declaration (2013).

For the collection of information, the evaluative guidelines, organizational factors survey, vocal hygiene, and vocal fatigue self-perception parts A and B adapted by López and Yévenes (2018) were applied. For the voice perceptual analysis, the RASAT scale was used with a score of 0-3 being 0 normal, 1 mild, 2 moderate, and 3 severe proposed by Rebelo and Pontes (2002). The acronym evaluates the hoarseness, asthenia, breathiness, roughness, and tension parameters in a perceptual or auditory way. It determines the absence or presence of the vocal parameter.

Finally, the statistical package Epi Info 7.1.5.2 was used for data coding. The descriptive statistical analysis types were performed according to the qualitative variables scales (frequency and percentage) and quantitative variables (mean, standard deviation, minimum and maximum values) in objectives 1, 2, and 3.

3. RESULTS

Table 1 shows the characterization of the organizational factors in the total sample made up of 80 teachers, of which 63.75% (51) are female and 36.25% (29) are male. With an age range between 25 and 70 years. The age presents a mean and deviation corresponding to 51.18 - 9.68; the workload, an average equivalent to 28.72 hours per week (S.D. 7.32). The years of teaching practice, a mean of 25.35 (S.D. 10.57); and the number of students in the room, a value ranging between 27.23 and 40 with one (S.D. 8.15).

Table 1: Descriptive of the teachers' organizational factors

Organizational factors	Media	DE	VMI	VMA
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Age	51,18	9,68	25,00	27,00
Workload	28,72	7,32	15,00	70,00
Years of teaching practice	25,35	10,57	1,00	48,00
Number of students in the room	27,23	8,15	8,00	40,00

Table 2 describes the sample medical history, indicating that gastroesophageal reflux shows a higher frequency of presentation with 28.75%, followed by upper respiratory diseases of allergic rhinitis (20.00%), laryngopharyngitis (17.50 %), and sinusitis (12.50%).

Table 2: Descriptive of the medical history of the teachers

Medical history	It shows		It not shows	
	N	%	N	%
Gastroesophageal reflux	23	28,75%	57	71,25%
Allergic rhinitis	16	20,00%	64	80,00%
Laryngopharyngitis	14	17,50%	66	82,50%
Sinusitis	10	12,50%	70	87,50%
Medical diagnosis related to the voice.	8	10,00%	72	90,00%

Table 3 details the general consumption habits distribution of teachers, it is established that the intake of coffee represented by 73.75% occupies the first place of preference, followed by dairy with 68.75%, fried foods with 46.25%, very hot foods with 52.50%, and soft drinks with 42.25%.

Table 3: Descriptive of teachers' consumption habits

Consume habits	No consume		It consume	
	N	%	N	%
Water	1	1,25%	79	98,75%
Juice	21	26,25%	59	73,75%
Coffee	22	27,50%	58	72,50%
Dairy products	25	31,25%	55	68,75%
Chili pepper	53	66,25%	27	33,75%
Mustard	73	91,25%	7	8,75%

Fried	43	53,75%	37	46,25%
Soft drinks	47	58,75%	33	42,25%
Tobacco	78	97,50%	2	2,50%
Alcohol	60	75%	20	25%
Very cold food	49	61,25%	31	38,75%
Very hot food	38	47,50%	42	52,50%

Figure 1 describes the teachers' environmental conditions, highlighting that 38.75% (31) are always exposed to sudden changes in temperature; followed by dusty or smoky environments 36.25% (29); and 25% (28) to dry environments, excessive heating, or air conditioning.

Figure 1: Characteristics of teachers' environmental conditions

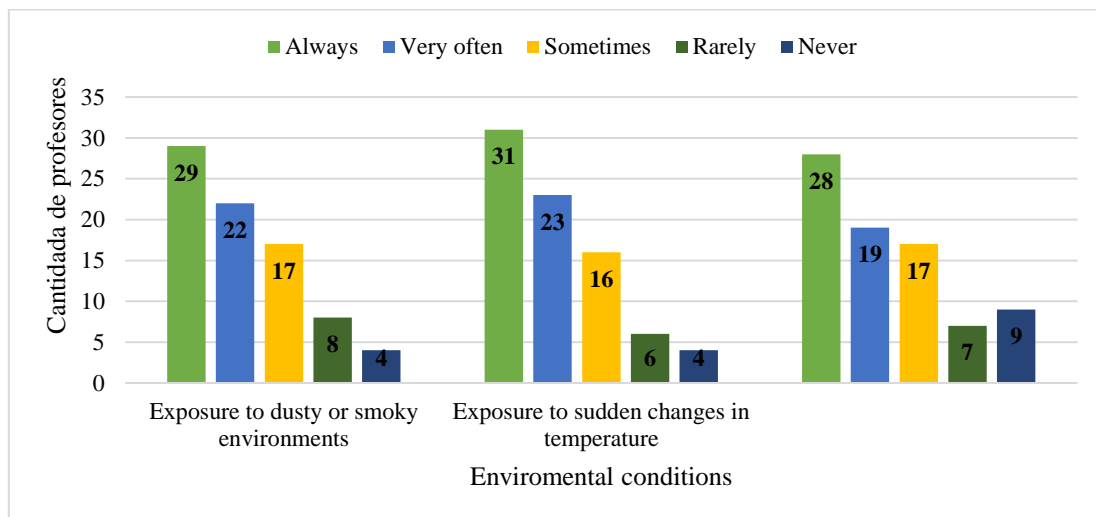
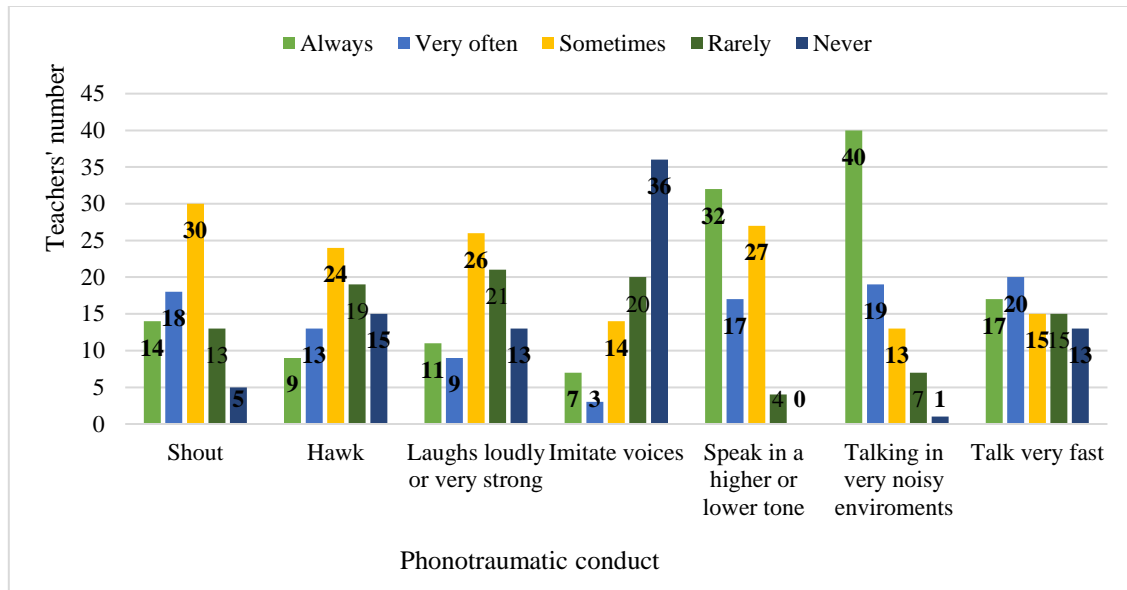


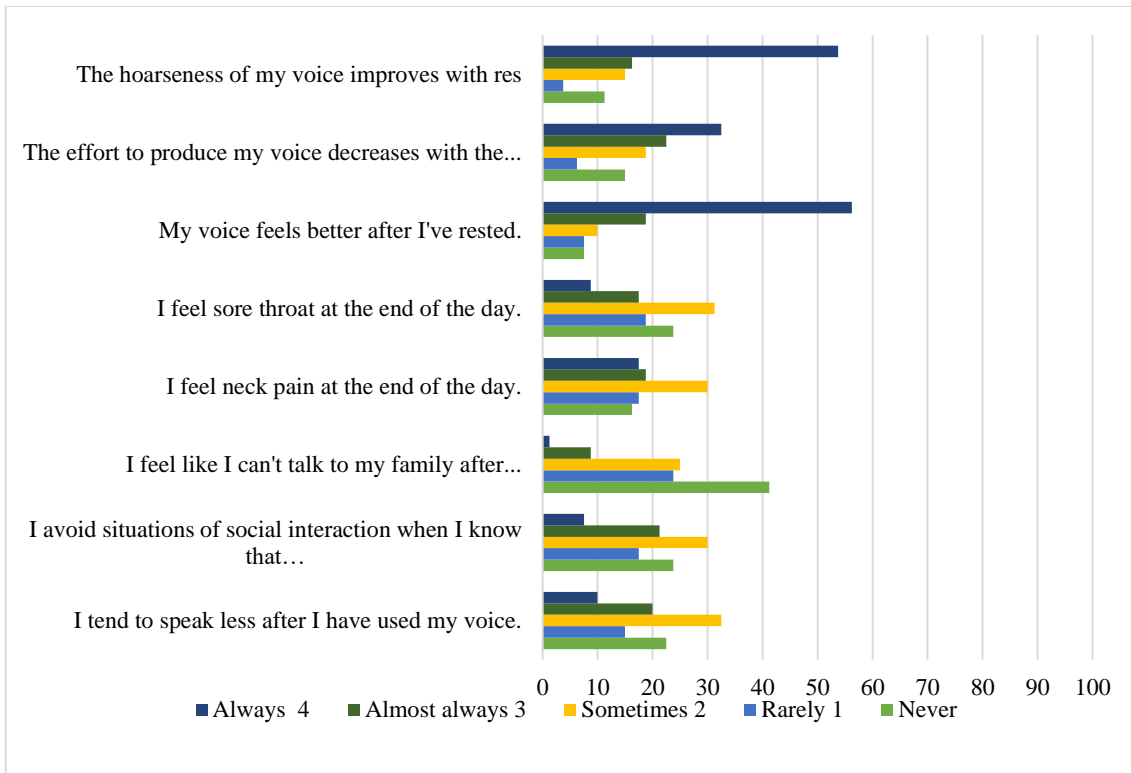
Figure 2 shows the phono-traumatic behaviors presented by the teachers, determining that 50% (40) always speak in very noisy environments and 40% (32) in a higher or lower tone. Likewise, it establishes that sometimes 37.50% (30) shout, 32.50% (26) laugh out loud or very loudly, and 30% (24) clear their throats. Also, very often 25% (20) speak very fast and 45% (36) never imitate voices.

Figure 2: Characterization of the teachers' phono-traumatic behaviors



The reading of figure 3 describes the self-perception of vocal fatigue (AFV-A), in which it indicates that 56.25% (45) of teachers always feel better after having rested, 53.75% (43) consider that their hoarseness voice improves with rest and 37.50% (30) perceive that the effort to produce their voice decreases with rest. Likewise, it establishes that sometimes 32.50% (26) tend to speak less after having used their voice, 31.25% (25) feel a sore throat at the end of the day, 30% (24) avoid social interaction situations when you know you have to talk more and your neck hurts at the end of the day; and 41.25% (33) never feel that they cannot talk to the family after work.

Figure 3: Descriptive of teachers' self-perception of vocal fatigue part A (AFV-A)



In figure 4, the characteristics of vocal fatigue self-perception (AFV-B) are detailed, It shows that the majority of teachers strongly agree in self-perceiving behaviors of vocal fatigue due to the mask use, indicating that 38.75% (31) feel discomfort in the neck when speaking, 37.50% (30) feel their voice weak, 33.75% (27) feel pain in the throat when speaking, 32.50% (26) make an effort to produce their voice, 30% (24) feel labored when using their voice, 31.25% (25) do not feel like speaking and their voice feels tired and 28.75% (23) feel their voice hoarse and He has difficulty projecting his voice.

Figure 4: Characteristics of vocal fatigue teachers' self-perception part B (AFV-B)

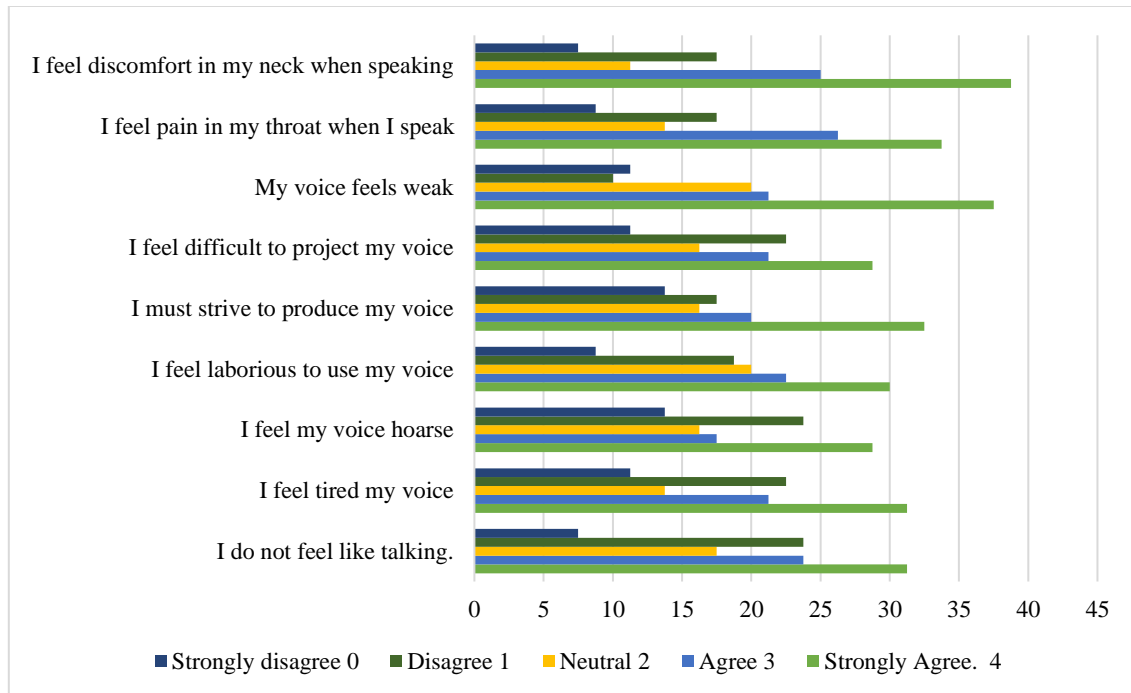


Table 4 details the perceptive voice characteristics, in most of the teachers the parameters of R (hoarseness), A (roughness) and T (tension) were evidenced with the highest score in the moderate category, represented by a 32.50% with a raspy voice, 27.50% with some irregularity of the vocal source causing a dry voice without projection and 23.75% with an excessive effort in vocalization due to glottis adduction related to the increase in the activity of the larynx extrinsic musculature.

Table 4: Characteristics of vocal conditions teachers' perception

Characteristic	Grados	N°	%
Hoarseness	0	43	53,75%
	1	10	12,50%
	2	26	32,50%
	3	1	1,25%
Roughness	0	44	55,00%
	1	13	16,25%
	2	22	27,50%
	3	1	1,25%
Blowing	0	67	83,75%
	1	11	13,75%

	2	1	1,25%
	3	1	1,25%
Asthenia	0	78	97,59%
	1	2	2,50%
	2	0	0,00%
	3	0	0,00%
Strain	0	58	72,50%
	1	3	3,75%
	2	19	23,75%
	3	0	0,00%

4. DISCUSSION

In relation to organizational factors, it is highlighted that the average workload and teaching practice years are found in a greater proportion in the population under study. There are factors that over time can generate commitments or greater overload both muscular and vocal in the laryngeal apparatus, thus, the voice prolonged use for more than 5 hours a day in rooms with inadequate acoustic conditioning increases the probability of suffering from dysphonia due to vocal overexertion. Naverrete (2020) and Mora, et al. (2018). Similarly, Castillo, et al. (2015) state that prolonged speaking time and poor vocal use due to technique lack generate the appearance of muscle fatigue in the intra and extra-laryngeal muscles, which translates into dysphonia due to sustained hyper-function due to inadequate muscle use. Additionally, the high students rate in the room allows the previous behaviors to worsen, since the voice intensity must be raised, causing, according to Gamarra, et al. (2019), a dysphonia of functional origin and later an organic one.

Regarding the organizational factors, medical history and teachers' general habits, the findings showed in the study are predisposing factors to injure the mucosa and the laryngeal epithelium, causing possible irritability, swelling in the vocal tract and therefore dysphonia. In this context, Domínguez, et al. (2019) indicated that environmental factors such as ventilation, humidity and temperature are considered the main voice enemies. Likewise, Gamarra, et al. (2019) found that the consumption habits that affect the teaching population are determined by the intake of tobacco, coffee, alcohol, spicy foods, among others, possibly leading to dysphonia in the short, medium and long term because they cause dryness in the vocal folds and gastroesophageal reflux. Therefore, it is necessary to reduce their consumption since they cause laryngeal dehydration.

However, in self-perception findings, it was established that teachers experience signs and hoarseness symptoms, and vocal fatigue, generating discomfort at the peri-laryngeal

muscles level, weak voice, sore throat, vocal effort, hoarse voice and little projection after the mask use, therefore they are forced to increase their voice volume so that the interlocutor's oral discourse is understood, generating sudden or strong glottis approximations that injure the extra and intra-laryngeal muscular behavior, producing vocal fatigue due to the greater phonatory effort. Additionally, face masks increase the vocal effort perception. The difficulty in speech intelligibility, auditory feedback, speech coordination, and breathing. (Ribeiro et al., 2020). Similarly, Marler and Ditton (2021) point out that the voice quality, tone and volume are essential to communicate our own emotions. But with the mask, the intelligibility and speech volume are affected, so, to improve communication, the population tends to raise their voice levels involuntarily.

In relation to the vocal conditions perception, they show moderate vocal alterations in hoarseness, roughness and tension parameters, after prolonged masks use. In short, the mask use denotes changes in the vocal quality of the wearer, which in the long term could generate vocal dysfunctions or dysphonia. In this sense, the SEORL-CCC (2021) establishes that mask use induces the unconscious need to increase vocal effort, which, over time, can increase the risk of developing functional dysphonia. Likewise, Ortiz (2021) argues that the mask use generates a barrier to the voice passage, causing the decibels to decrease and the receiver to fail to capture and understand the verbal message, and added to this, the distancing that makes the sender speak louder and cause greater overload at the laryngeal level. For their part, López and Yévenes (2018) determined that there are significant changes for the hoarseness, roughness, and breathiness parameters, after prolonged use of the voice.

5. CONCLUSIONS

Organizational factors and general habits that can affect the voice qualities with noticeable consequences in the communication process that are influenced by consumption habits, environmental conditions, phono-traumatic behaviors, medical history, and occupational factors typical of the professional exercise were evidenced in teachers' medical history. In the vocal conditions self-perception, it was determined that the teachers perceive signs and vocal fatigue symptoms after the mask use, being a predisposing factor to significantly affect the vocal quality that added to the inadequate vocal abuse patterns, and misuse, and organizational factors mean that the teachers' voice is exposed to a latent risk at the phonatory level. The perception of the teachers' vocal conditions due to the permanent mask use denoted moderate changes in hoarseness, roughness, and tension aspects after the working day.

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