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The immediate effect of air suction exercise on vocal quality and vocal self-assessment of teachers with vocal complaints: a pilot study

Efeito imediato do exercício de sucção de ar na qualidade vocal e autoavaliação de professoras com queixas vocais: estudo-piloto

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ABSTRACT

Purpose: To analyze the immediate effect of the air suction exercise on vocal quality and vocal self-assessment of teachers. **Methods**: This is an intervention pilot study. Thirteen dysphonic teachers from private elementary schools participated in this study, with an average age of 35 years and ten months. The air suction exercise was performed ten times by each participant. The measured outcomes were: auditory-perceptual evaluation of voice, acoustic analysis, and vocal self-assessment. The data were analyzed using descriptive and inferential statistics. **Results:** there was no difference in the acoustic and auditory-perceptual parameters measured before and after the intervention. There was a significantly higher proportion of teachers who self-evaluated the voice as better after the intervention. **Conclusion:** the air suction exercise produces immediate positive effects on teachers' vocal self-assessment.

Keywords: Dysphonia; Teacher; Vocal training; Therapy; Occupational health

RESUMO

Objetivo: Analisar o efeito imediato do exercício de sucção de ar na qualidade vocal e na autoavaliação vocal de professoras. **Métodos:** trata-se de um estudo piloto de intervenção. Participaram 13 professoras disfônicas da rede particular do ensino fundamental, com média de idade de 35 anos e 10 meses. O exercício de sucção de ar foi realizado dez vezes, por cada participante. Os desfechos mensurados foram: avaliação perceptivoauditiva da voz, análise acústica da voz e autoavaliação vocal. Os dados foram analisados por estatística descritiva e inferencial. **Resultados:** não houve diferença nos parâmetros acústicos e perceptivoauditivos mensurados antes e após a intervenção. Houve proporção significativamente maior de professoras que autoavaliaram a voz como melhor, após a intervenção. **Conclusão:** o exercício de sucção de ar produz efeitos imediatos positivos na autoavaliação vocal de professores.

Palavras-chave: Disfonia; Docente; Treinamento vocal; Terapia; Saúde do trabalhador

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INTRODUCTION

The voice is a primary instrument for the professional performance of teachers[1]. Despite this, teachers have a higher occurrence of dysphonia than nonteachers[2].

The most frequent type of dysphonia in teachers is behavioral[3], associated with the use of voice at work in inadequate conditions, excessive vocal demand, lack of knowledge about vocal hygiene, lack of vocal training, and individual predisposition[3].

Due to the high occurrence of dysphonia and the social importance of this professional, it is important to analyze the effect of interventions on vocal quality and the teachers' self-perception[4-6]. The objectives of interventions with teachers are to improve vocal quality, promote normotensive muscle adjustments, and balance vocal production to make it functional for professional and social use[4].

The air suction exercise (ASE), used in clinical practice for these purposes, is an exercise that stimulates larynx lowering by air suction, simulating the suction of a spaghetti, also known as spaghetti exercise. It is believed that it promotes larynx lowering, pharyngeal and supraglottic growth, favors lip rounding, palate elevation, and tongue dorsum lowering[7]. Such adjustments can provide a decrease in tension and an improvement in vocal projection and resonance[8,9], parameters constantly altered in dysphonic teachers[10]. However, scientific evidence on the effects of ASE is lacking to support its clinical use in the rehabilitation of voice professionals. Therefore, it is necessary, first, to develop a pilot study on the immediate effects, to understand the possible outcomes and the exercise's safety on the target population. The operational hypothesis of the present study is that the ASE promotes positive effects on the vocal quality and the vocal self-assessment of teachers.

Thus, this research sought to analyze the immediate effect of ASE on vocal quality and vocal self-assessment of teachers.

METHODS

This is a pre-post intervention pilot study[11], approved by the Ethics Committee of the Universidade Federal de Sergipe (No. 1.666.410). All participants signed the Free and Informed Consent Form, following the Resolution 466/2012.

Participants were recruited from a private elementary school in Sergipe. The following inclusion criteria were adopted: female gender, age between 18 and 45 years old, professional practice for at least three years, a 40-hour per week workload with vocal demand, presence of vocal complaints, and risk of dysphonia (score higher than 5 points in the Screening Index for Voice Disorder – SIVD[12]). Teachers who presented reports of systemic diseases that could influence vocal production and who were in the premenstrual period were excluded.

To select the sample, the participants answered direct questions about the eligibility criteria and the SIVD[12]. The SIVD is a validated instrument, composed of 12 indicators of vocal symptoms, with scores according to the frequency between "never" and "always". For the calculation of the score, the sum of the number of symptoms whose answers were "sometimes" or "always" were performed. Five (5) was considered as the cutoff point for the risk of dysphonia[12].

Thirty female teachers were interested in participating in the research, six of whom were excluded since they were in the premenstrual period and 11 because they were not at risk for dysphonia. Thus, the sample consisted of 13 teachers with vocal complaints.

The intervention was performed through the ASE exercise. For this, the participants were instructed to take a deep breath, with their lips protruding as if pronouncing the vowel /u/, to hold their breath for about five seconds, and exhale again. The procedure was repeated ten times[7].

The measured outcomes were: auditory-perceptual evaluation of the voice (APE), acoustic analysis of the voice, and vocal self-assessment. The APE and acoustic analysis were measured before and after the intervention, and the vocal self-assessment was performed after the intervention.

For APE and voice acoustic analysis, vocal recordings were collected in schools, in a quiet environment. Samples of the sustained emission of the vowel /e/ and chained speech were recorded. During the recordings, the participants remained in an orthostatic position, with the microphone positioned at a distance of 6 cm and 45º from the lip commissure. The Lucky brand digital recorder, model K-70, with a unidirectional cardioid microphone was used, in a sampling rate of 44,100 Hz, in 16 bits. The microphone was attached to a Philco notebook, and the recordings were saved in WAV format.

The APE recordings were sent to analyze three evaluators, speech therapists, voice specialists, with experience of at least five years in APE. The speech and vowel samples of each participant were organized in pairs (pre-intervention and post-intervention of the same participant), and the moments were randomized. The evaluators received the following instruction: "The two files are from the same subject. Listen to the audio samples and analyze which one is the best voice (voice A, voice B, or no differences)". The evaluators received prior training, with the presentation of pairs of anchor voices of the main vocal parameters and discussion of the differences between the samples, for calibration. For data analysis, the mode among the three evaluators was considered. The interrater reliability was satisfactory (Fleiss' Kappa Agreement Coefficient = 0.731).

For acoustic analysis, the PRAAT software was used. The central three seconds of the samples of the sustained emission of the vowel /e/ were used. The samples were edited, and the initial and final sections were discarded. The extracted acoustic parameters were: fundamental frequency (F0), local jitter (%), and local shimmer (%).

After the intervention, the participants answered the questions of an instrument developed by the authors of this study, aiming at self-assessing their voices. For this, the participants were instructed to consider the parameters comfort to the emission and vocal quality and should mark the answer option that corresponded to the vocal self-perception, between a better voice before the exercise, no differences, and a better voice after the exercise.

To analyze the results was used the SPSS® 25.0 software. The results were analyzed through descriptive and inferential procedures. For the inferential analysis, the normality of the quantitative variables was analyzed with the Shapiro Wilk test, and all of them had a normal distribution. The comparison between the pre and post-intervention moments for the quantitative variables was made with the paired T-test and, for the qualitative nominal variables, with the test for Equality of Two Proportions. The level of significance was set at 5% in all inferential analyzes.

Table 1. Comparison of auditory-perceptual evaluation and vocal self-assessment pre- and post- air suction exercise in teachers

Variables and categories	N	%	p-value
APE			
Better voice before the exercise	4	30.8	0.227
Better voice after the exercise	9	69.2	
Vocal self-assessment			
Better voice before the exercise	1	7.7	0.006*
Better voice after the exercise	12	92.3	

Test for Equality of Two Proportions

Subtitle: N = relative frequency; % = percentage frequency; APE = auditory-perceptual evaluation; * = p<0.05

Table 2. Comparison of acoustic analysis pre- and post-air suction exercise in teachers

Variable	Pre-		Post-		p-value
	Mean	SD	Mean	SD	
F0	199.46	25.88	196.23	18.64	0.427
Jitter	0.37	0.09	0.45	0.34	0.439
Shimmer	2.97	1.10	2.67	1.04	0.357

Paired T-Test

Subtitle: F0 = fundamental frequency; SD = standard deviation

RESULTS

Thirteen teachers from private elementary schools participated in the study, with a mean age of 35 years and ten months and a mean professional experience of 14 years and six months.

There was a significantly higher proportion of teachers who self-rated their voices as better after the intervention (p = 0.006). However, there was no statistical difference in the auditory (Table 1) and acoustic (Table 2) parameters measured pre- and post-intervention.

DISCUSSION

There is a high occurrence of dysphonia in Brazilian teachers[2], which may be associated with occupational and health factors, habits, lack of vocal training, and individual predisposition[3]. The vocal rehabilitation of teachers is an important and necessary topic, and the ASE is an exercise that can be used for this purpose. However, there is no scientific evidence on its applicability. Thus, the present study sought to analyze the effect and safety of ASE on the voice and self-perception of teachers with vocal complaints. The APE showed that, although descriptively, there is a greater proportion of improved voices in the post-intervention moment. No differences were found between the moments. It is believed that this may have occurred because it is a pilot study, with small sample size, due to the evaluation method used, or due to the duration of the exercise, which may not have been enough to provide noticeable changes in vocal quality. It is important to note that there is a chance of a type II error due to the small sample size[11]. However, as mentioned, this is a pilot study that presented preliminary data and sought to initiate discussions about the effects and safety of the ASE.

No statistical differences were found in the acoustic parameters of F0, jitter, and shimmer. At both times, the parameters F0 and jitter were within the range considered normal (F0 = 150 to 250; jitter <0.633), and shimmer was above what is recommended for Brazilian women (shimmer <1.997)[13]. Shimmer reflects the disturbance cycle by cycle of the amplitude and, despite reduced, there was no statistical relevance in this result. It is believed that this may have occurred because the immediate effect of the exercise was not sufficient to promote relevant differences in the contact coefficient of the vocal folds[13].

There was a significantly higher proportion of teachers who noticed a vocal improvement after the exercise. This may have been due to the increased impedance in the vocal tract, which occurs with air suction and can improve self-perception and assist in voice monitoring[14], in addition to expanding the vocal tract and balancing the pressure at the glottic level[7], promoting a decrease in muscle adjustments with excessive tension, common among teachers[15]. Such data is very important in preliminary exercise tests since a positive perception of comfort can indicate safety and directly interferes with the patient's adherence to the exercise. It is important, however, to emphasize that these were subjective findings, which may have been influenced by psychological issues[16] since they were not confirmed by objective clinical findings. Studies with other techniques, such as finger kazoo[14], shaker[17], and LaxVox tube[17,] also showed positive self-assessment immediately after execution, promoting similar effects in the vocal tract. Besides, teachers commonly present difficulties in self-perception of vocal quality, and an exercise that improves it can be positive[18,19].

The present study has limitations regarding the sample size, absence of a control group, and absence of control over the participant's inspiration time. As this is a pilot study, the results presented here are preliminary and cannot be generalized. Clinical trials are required, in all its phases, to compare the efficacy and safety of the ASE with gold standard techniques of effectiveness, certified for the same purpose. Studies are also needed to analyze the specificities of the population and the temporal variables of ASE execution. Future studies will also be able to control the time of inspiration in the ASE to verify if it interferes with the results of the exercise. Such data will provide further support for the clinical use of ASE.

CONCLUSION

Under the conditions in which it was performed and in the population of participating teachers with vocal complaints, the ASE promoted immediate positive effects on vocal self-assessment. However, it did not change vocal quality.

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