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Acoustic voice analysis of women with migraine: preliminary results

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Introduction

The voice reflects physical and emotional factors, providing general health indicators. The study of voice characteristics in migraine is recent, and is based on the fact that migraine shares pathophysiological aspects with the vagus nerve, which also innervates the larynx. The systemic disautonomies related to migraine (nausea, vomiting, gastroparesis and diarrhea) are manifestations whose control involves the vagus, which communicates anatomically with the trigeminal nerve, involved in migraine nociception related to hyperexcitability of the trigeminal-cervical complex, at the nucleus of the solitary tract, and both innervate part of the dura mater. Furthermore, vagus nerve stimulation seems to be a promising acute treatment of migraine, modulating the transmission of pain and reducing headache intensity. Thus, we speculate that to identify laryngeal neuromuscular imbalance in migraineurs can be of assistance in the diagnosis management of these patients.

Objective

To acoustically evaluate the voice and identify the vocal profile of women with migraine.

Methods

This is a cross-sectional study (CEP UFPE: 6.038.427) conducted with 28 women (21 migraineurs in the Migraine Group - GM; and 7 women with < 5 episodes, throughout life, of headache with characteristics of primary headaches, according to ICHD-3, in the Control Group - GC). To evaluate the acoustic parameters, voice recordings were performed, where were analyzed: fundamental frequency (f0) (number of vibratory cycles per second performed by the vocal folds, measured in Hertz and with normality value for female voices between 150 Hz and 250 Hz); loudness (how loud or soft a voice can be perceived, measured in decibel, with normality value of 60 decibels); jitter (disturbance of f0 cycle by cycle, measured in percentage, with a normal limit value of up to 0.6%); shimmer (variability of sound wave amplitude of vocal folds vibration cycle by cycle, with normality value of up to 6.5%); glottal to noise excitation ratio (GNE) (it indicates whether the vocal signal is being originated by vibration of the vocal folds or by the turbulent air current originating in the vocal tract, measured in decibel, with normality value ≥ 0.5 decibel) and Phonatory Deviation Diagram (PDD) (a two-dimensional chart in which the horizontal axis relates the measurements of jitter, shimmer and their correlations, while the vertical axis presents the measurements of the GNE. Normal voices are represented in the lower left quadrant). The voice samples (count from 1 to 10 and sustained emission of the vowel /ɛ/) were collected in a quiet environment and in interictal period.

Results

The mean age of both groups was 25±4.7 years. Regarding the vocal parameters, f0 remained within normality values in 85.7% and 57.1% of the GM and GC volunteers, respectively. The loudness parameter presented altered values for 100% of GM volunteers and 71.4% of GC. There were jitter alterations in 48% of the volunteers of the GM and in 14.2% of the GC, and shimmer was altered in 52.3% of the GM and 16.6% of the GC. The GNE parameter was altered in 66.6% of GM, remaining within normal values in 100% of GC. The PDD was altered in 66.6% of the GM and 33.3% of the GC.

Conclusion

Women with migraine present fonatory instability and laryngeal neuromuscular imbalance. Considering this is a preliminary study, these results should be interpreted with caution.

Keywords: Migraine Disorders, Voice, Speech, Language and Hearing Sciences.