OBJECTIVE ACOUSTIC VOICE ANALYSIS PARAMETERS IN PEDIATRIC PATIENTS WITH BRONCHIECTASIS

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Conclusion: Our study shows that a comprehensive therapeutic approach affected patients. Bronchiectasis patients have revealed significant voice changes, particularly in terms of the NHR and VTI. The bronchiectasis group showed an increase in the NHR and VTI compared to the healthy control group.

Objectives: Bronchiectasis usually involves a chronic cough, purulent sputum production, fatigue, shortness of breath, chest pain, coughing up blood, and airway dilation. The aim of this study was to objectively evaluate changes in the acoustic properties of the voice in bronchiectasis and healthy control patients.

Methods: The absolute jitters, jitter percent, shimmer, noise-to-harmonics ratio (NHR), voice turbulence index (VTI), and soft phonation index (SPI) were obtained. The bronchiectasis and healthy control data were compared using paired t-tests.

Results: There were no statistically significant changes in the absolute jitters, jitter percent, shimmer, and SPI. There were statistically significant changes in the NHR and VTI, respectively.

Key words: Acoustic analysis, voice, hoarseness, bronchiectasis.

Introduction: Bronchiectasis is generally classified into cystic fibrosis and non-cystic fibrosis bronchiectasis (NCFB). Bronchiectasis is defined as permanently dilated airways due to chronic bronchial inflammation caused by the inappropriate clearance of various microorganisms and recurrent or chronic infection.

NCFB may change the voice through a malfunctioning glottis, the effects of NCFB on speech remain unclear as the choice of speech analysis method. The aim of this study was the objective evaluation of changes in acoustic properties of the voice in bronchiectasis and healthy control patients in pediatric ages.

Methods: We included 37 children with bronchiectasis (mean age: 11.53 (min-max 7–13) years), selected among 125 patients who were followed by the pediatric pulmonology department and a healthy control group (mean age: 9.88 (min-max 7–13) years). We performed this prospective, controlled clinical study in tertiary referral hospital. All patients had clinical and radiological findings of bronchiectasis and had a negative sweat test. The absolute jitters, jitter percent, shimmer, noise-to-harmonics ratio (NHR), voice turbulence index (VTI), and soft phonation index (SPI) were obtained.

Results: There were no statistically significant differences in the absolute jitters, jitter percent, shimmer, and SPI. There were statistically significant differences in the NHR (p=0.02) VTI (p=0.03). The bronchiectasis group showed an increase in the NHR and VTI compared to the healthy control group.

Discussion: Owing to recurrent sinopulmonary tract infections, voice changes are expected with NCFB patients. People with bronchiectasis may suffer from a chronic cough (CC), which may cause dysphonia. Vocal abuse such as coughing can result in phonotrauma that subsequently alters the biomechanical properties of the vocal fold cover, hinders the regularity of vocal fold vibration, increases irregularities in voice signals, and thus worsens the symptoms of dysphonia. Acoustic analysis is a non-invasive evaluation method that separates normal and pathological voices. The jitter and shimmer offer valuable information about short-term phonatory instabilities.

The observed rise in intensity in bronchiectasis patients could thus be explained by the inefficient lung function and partial lower airway obstruction characteristic of bronchiectasis physiopathology. Additionally, a CC, a major symptom of bronchiectasis, leads to excessive vocal adduction. In this way, it could also contribute to an increase in the VTI.

Bronchiectasis patients showed high NHR values, which can be considered pathologically hoarse and highly detrimental to normal voice production. The dysphonic characteristics observed in bronchiectasis patients can be potentially attributed to dysfunctions in vocal fold movement, postnasal drip, chronic irritation, purulent sputum, throat cleaning due to sputum, and can be caused by the accumulation of mucus and a CC. The F0, Jtt, Shim, NHR, VTI, SPI, degree of voiceless (BUV), and degree of voice breaks (DVB) were investigated. In our study, we only found a rise in the NHR and VTI.

Hamdam et al. evaluated the short-term effects of endotracheal intubation on voice. The FF, Shim, NHR, and VTI were investigated in relation to the following endotracheal intubation. The acoustic parameters did not change significantly, except for a decrease in the maximum phonation time. In our study, the reason for the rise in the NHR and VTI can be related to permanent CC and phlegm causing vocal trauma.

Conclusion: Bronchiectasis patients have revealed significant voice changes, particularly in terms of the NHR and VTI. The bronchiectasis group showed an increase in the NHR and VTI compared to the healthy control group. We showed that patients with bronchiectasis exhibit changes in objective vocal parameters. This may be a relevant feature of bronchiectasis pathology and morbidity.

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