Is There an Improvement on Acoustic Voice Parameters in Patients with Bilateral Vocal Fold Nodules after Voice Therapy? A Meta-Analysis

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OBJECTIVE

- The aim of this study is to estimate the effect of voice therapy intervention in adults with vocal fold nodules (VFNs), on three acoustic voice parameters: fundamental frequency, jitter and shimmer.

- The purpose of this meta-analysis is to present evidence based on literature regarding objective acoustic voice parameters changes, after voice therapy, in patients with measurements of three acoustic voice parameters.

METHOD

- A literature review was performed by searching studies in adults, with bilateral VFNs whom received voice therapy, and where voice quality was evaluated quantitatively using acoustic analysis, before and after treatment.

- Meta-analysis was performed using random-effects model. PubMed, CINAHL, CENTRAL and Web of Science were searched for retrospective and prospective cohort, cross-sectional and case-control with comparative studies in adults published between January/1995 and March/2019 and English written.

- Search terms used were intervention, therapy, vocal, voice, nodules, bilateral, multidimensional assessment, acoustic and analysis.

Acoustic analysis plays a clinical role in patients with VFNs, by objectively assessing and providing data on the effect of voice therapy in voice acoustic parameters.

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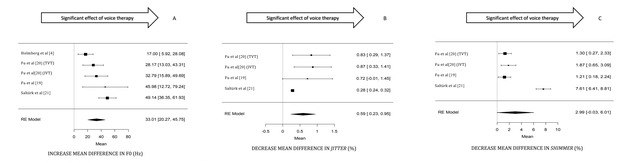
RESULTS

The pooled results analysis showed a statistically significant effect in 2 acoustic parameters after voice therapy:

- ✓ F0 [increased mean difference post-therapy was 33.00Hz (95%CI:20.26-45.74, p<0.001)]
- ✓ jitter (%) [decreased mean difference post-therapy was 0.59% (95%CI:0.23%-0.94%, p=0.0012)].

In addition, a non-statistically significant effect in shimmer (%) [decreased mean difference post-therapy was 2.98% (95%CI:-0.03-6.00, p=0.052)].



Abbreviation: TVT, traditional voice therapy; IVT, intensive voice therapy

Fig. 1. Forest Plot illustrating change of F_0 (Hz), jitter (%) and shimmer (%) after voice therapy in patients with VFNs.

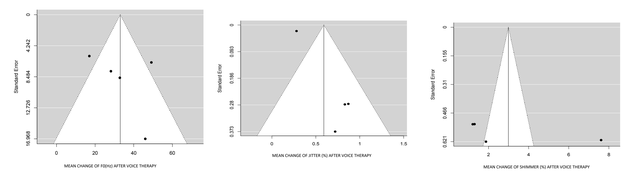


Fig. 2. Funnel Plot: asymmetrical scatterplot, consistent with presence of publication bias.

DISCUSSION

- The inability of using acoustic measurements to provide noninvasive quantitative indices, in order to help differentiate among laryngeal pathologies, have narrowed its clinical utility to assess the effectiveness of different therapeutic options and to monitor progress of ongoing course of therapy.

- In patients with VFNs, the ability to control the vibration of the cords is affected reducing the pitch range that they can produce and the resistance of glottal closure. The presence of VFNs also compromise the intensity of the voice and the range of amplitude the patient can produce.

- In the included studies, all patients before treatment had F0 values within normal range (pitch), while jitter (%) and shimmer (%) values were mostly increased (amplitude). These changes corroborate with the expected acoustic parameters that derived from the pathophysiological changes imposed by the presence of the nodules.

- Heterogeneity among studies was a problem in the results of all the acoustic parameters results presented in this meta-analysis, caused by clinical and methodological diversity. Even though significant statistical heterogeneity arose from differences in methods used does not necessarily suggest that the true intervention effect was altered (increased mean F0, decreased jitter (%) and shimmer (%).