Nebulized Isotonic Saline Improves Voice Production in Sjögren’s Syndrome

Kristine Tanner, PhD,1 Shawn L. Nissen, MD,2 Ray M. Merrill, PhD, MPH,2 Alison Miner, MS,1 Ron W. Channell, PhD,1 Karla L. Miller, MD,3 Mark Elstad, MD,4 Katherine A. Kendall, MD,5 Nelson Roy, PhD6

1Dpt. of Communication Disorders, Brigham Young University; 2Dpt. of Health Science, Brigham Young University; 3Dpt. of Rheumatology, The University of Utah; 4Div. of Respiratory, Critical Care, & Pulmonary Medicine, The University of Utah; 5Div. of Otolaryngology—Head & Neck Surgery, The University of Utah; 6Dpt. of Communication Sciences & Disorders, The University of Utah

INTRODUCTION

Systemic and surface tissue hydration mechanisms regulate internal and external vocal fold fluid to maintain adequate vocal fold hydration.1

Dehydrated vocal folds stiffen, surface adhesion worsens, and subglottic pressure increases.2

Ideally, a topical hydration treatment could be developed that would target the vocal folds, similar to topical lubricants for the eyes, nose, mouth, and skin.3

Nebulized saline temporarily improves voice production following laryngeal desiccation challenge in female singers and non-singers, and in individuals with autoimmune-related vocal fold dryness.4 6

Primary Sjögren’s Syndrome (SS) is an autoimmune disease characterized by sicca symptoms that cause ocular, oropharyngeal, laryngeal, and lower respiratory tract dryness. Patients with Primary SS experience hoarseness, vocal fatigue, increased vocal effort, and strain.7,8

Due to chronic laryngeal dehydration symptoms, Primary SS represents an ideal model for in-vivo study of the longitudinal effects of a topical vocal fold hydration treatment over time.

MATERIALS AND METHODS

Participants = Primary SS (8 F); age 36-74 years (M=57)

Years with SS = 2-32 years (M=11)

Baseline VHI = range 12-62/120 (M=33)

ESSPRI = 4.6-7.0 of 10 (M=5.3); SSI = 8-16.8 of 28 (M=13.1)

Study Design

Prospective 8-week ABAB withdrawal/reversal experimental design

Participants completed twice-daily recordings of the Rainbow Passage and sustained /a/ vowels at home in quiet environments.

Instructions were provided for Zoom Handy Recorder (H1) and Audio Technica head-mounted microphone usage, which produce high-quality voice recordings9

During two-week treatment phases, twice-daily 9 ml nebulized saline doses were introduced after each voice recording [Simply Saline™ 0.9% NaCl; Omron MicroAir Vibrating Mesh Nebulizer™]

Dependent Measures

Cepstral Spectral Index of Dysphonia (CSID): vowels, Rainbow Passage (n=1628 samples)

10 cm Visual Analog Scale Ratings: vocal effort, mouth dryness, throat dryness

VHI, SS Severity (ESSPRI, SSI) at baseline and after each ABAB phase

RESULTS

Baseline CSID and patient-based ratings were in the mild-to-moderate range. CSID measures of voice severity improved by approximately 20% with nebulized saline treatment and worsened during treatment withdrawal based on regression trends. Post-treatment CSID values fell within the normal-to-mild range. Similar patterns were observed in patient-based ratings of vocal effort and dryness. CSID values and patient-based ratings correlated significantly (p < .05).

DISCUSSION

Nebulized isotonic saline improves voice production based on acoustic and patient-based ratings of voice severity. Future work should optimize topical vocal fold hydration treatment formulations, dose, and delivery methodologies for various patient populations. This study lays groundwork for future topical vocal fold hydration treatment development to manage and possibly prevent dehydration-related voice disorders.

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REFERENCES


