

A Multimodal Study of Vocal Function and Upper Airway Temperature in Individuals with Asthma Versus Controls

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Chronic inhaler use for asthma and its effects on vocal physiology and function are not well understood. Medication taken for asthma is known to have a negative effect on vocal function [1]. This preliminary study aimed to understand upper airway temperature and vocal function differences in individuals with asthma versus healthy controls.

Using a prospective between group design, 3 participants with asthma and 3 controls were recruited. Inclusion criteria: nonsmokers or not pregnant; no breastfeeding prior six months; no diagnosis of other respiratory disease, reflux, diabetes, neurological disease, or hormonal imbalance; take a maintenance inhaler daily (asthma group); and no drying medications (other than an inhaled corticosteroid). Following consent, posterior pharyngeal wall temperature was collected after 20 minutes of equilibration to lab environment with an infrared thermometer. Videolaryngostroboscopic imaging, acoustic, aerodynamic, and perceptual measures were collected as seen in Figure 1.

Average upper airway temperature (UAT) for asthma volunteers pre-trial was 34.6°C and post-trial 35.28°C. Average UAT for control volunteers pre-trial was 34 °C and post-trial average was 35.2°C. Upper airway temperature change (Δ UAT) increased by an average of 0.68°C in the volunteers with asthma and an average of 0.53°C in controls. Average phonation threshold pressure (PTP) for asthma volunteers was 7.79 cm H₂O. Average PTP for controls was 5.73 cm H₂O. The average Voice Handicap Index (VHI) score for the asthma group was 22.67. Average VHI for controls was 3.67. The average OMNI-VES score for asthma volunteers was 3 out of 10, and the controls' was 0 out of 10. The

average Rate of Fatigue (ROF) Scale score in asthma volunteers was 2.33, and the average for controls was 0.33.

UAT average, range, and differences pre- and post-trial were essentially the same in both groups. PTP values were higher in the asthma group by 2.06 cm H₂O, which is consistent with clinical observations of more vocal effort reported secondary to voice use with asthma and from inhaler use. Average perceptual measures from the VHI were 19 points higher in participants with asthma than those who were in the control group.

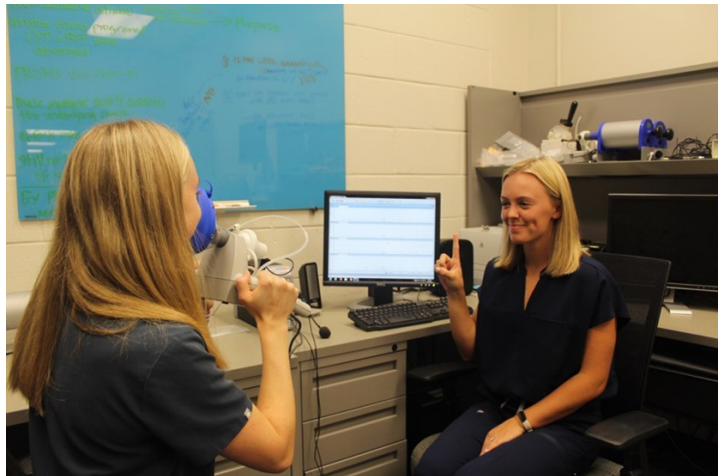


Fig. 1 Annie Pauley collecting phonation threshold pressure, an aerodynamic measure of minimal lung pressure required to produce voice.

Since this is a preliminary study, data collection is still ongoing and will be described further in future published work.

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Statement of Research Advisor

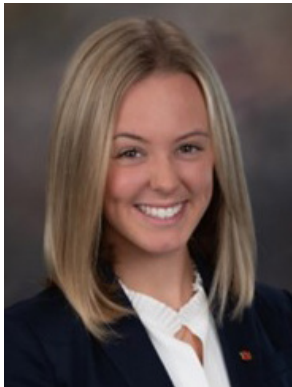
Annie Pauley conducted a complex, multimodality research protocol with volunteers. To date, she has gathered all of the data for the control population and plans to wrap up data collection for the rest of the asthma group as part of her masters thesis project.

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References

[1] Sandage, et al. "Passive upper airway thermoregulation and high-speed assessment for conventional versus menthol cigarette: implications for laryngeal physiology." Journal of Voice, Jan. 2020; 34(1): 25-32

Authors Biography



Annie L. Pauley is a senior-year student pursuing a B.S. degree in Speech, Language, and Hearing Sciences (SLHS) at Auburn University. She has played key research roles in recruiting participants, collecting data, and presenting research at conferences and symposiums. She will attend graduate school in the Department of Speech Language & Hearing Science in Fall 2024.



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