



# FACTORS THAT PREDICT PATIENT PERCEIVED HOARSENESS IN SPASMODIC DYSPHONIA PATIENTS

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## ABSTRACT

**Objective:** The American Academy of Otolaryngology – Head & Neck Surgery Clinical Practice Guidelines on Hoarseness distinguished between hoarseness, which is a symptom perceived by the patient, and dysphonia, which is a diagnosis made by the clinician. The objective of this study was to determine factors that predict patient perceived hoarseness in spasmodic dysphonia (SD) patients.

**Study Design:** Retrospective cohort study

**Methods:** Voice Handicap Index-10 (VHI-10) was used to quantify patient perceived hoarseness. SD patients who presented for botulinum toxin injections from September 2011 to June 2012 were eligible. Age, gender, professional voice use, disease duration, Consensus Auditory Perceptual Evaluation of Voice (CAPE-V), Hospital Anxiety and Depression Scale (HADS), and VHI-10 were collected. Statistical analysis included description statistics, univariate analysis, and multiple linear regression.

**Results:** 145 SD patients had VHI-10 score of  $26.1 \pm 7.1$ , disease duration of  $10.5 \pm 7.0$  years, CAPE-V overall score  $43.6 \pm 20.8$ , HADS anxiety score  $6.6 \pm 3.7$ , and HADS depression score  $3.6 \pm 2.8$ . In univariate analysis, there were positive correlations between VHI-10 and CAPE-V overall ( $r=0.25$ ), age ( $r=0.18$ ), female gender ( $p=0.01$ ), HADS anxiety ( $r=0.25$ ), and HADS depression ( $r=0.18$ ). There was no correlation with professional voice use and disease duration. In multiple linear regression ( $r^2=0.153$ ), age ( $p=0.02$ ), HADS anxiety ( $p=0.03$ ), and CAPE-V ( $p=0.04$ ) were significant for predicting patient perceived hoarseness.

**Conclusions:** Older age, higher anxiety levels, and clinician perceived dysphonia predict higher levels of patient perceived hoarseness in SD patients. Hoarseness is a very personal symptom and multiple factors determine its self perception.

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## INTRODUCTION

Spasmodic dysphonia (SD) is a focal laryngeal dystonia with an overall prevalence of 5.9 per 100,000.<sup>1-3</sup> There are three types of SD: adductor, abductor, and mixed. SD is a chronic neurological disorder that causes task specific contractions of the laryngeal muscles during speech.

Since SD is a benign condition, the main treatment goal is to improve the patient's vocal quality.

Standard treatment for SD is electromyographic (EMG) guided botulinum toxin injections of the affected muscles. Dose and frequency of the botulinum toxin injections are guided by the patient's reports of vocal quality and side effects from treatment.

The American Academy of Otolaryngology – Head & Neck Surgery Clinical Practice Guidelines on Hoarseness distinguished between hoarseness, which is a symptom perceived by the patient, and dysphonia, which is a diagnosis made by the clinician.<sup>4</sup> Thus, treatment of SD is guided by patient perceived hoarseness.

The objective of this study was to determine factors that predict patient perceived hoarseness in SD patients

## METHODS

Institutional review board at the University of Washington approved this study.

**Inclusion criteria:** Any SD patient who presented to the University of Washington for their botulinum toxin injection from September 2011 to June 2012.

**Exclusion criteria:** non-English speaking patients, patients without the mental capacity to complete the study, and patients who declined.

Data collected:

- Demographic and clinical data.
- Disease duration was defined as the time of diagnosis of SD from the laryngeal EMG to the study closure date (June 30, 2012).
- Voice Handicap Index-10 (VHI-10)
- Hospital Anxiety and Depression Scale (HADS)
- Consensus Auditory Perceptual Analysis of Voice (CAPE-V)

Statistical analysis was performed using commercially available software (SPSS, version 20.0, IBM Corporation, Armonk, NY).

## METHODS (Continued)

For univariate analysis, two-tailed unpaired Student's t-tests, Pearson's correlation, and Spearman's correlation for non normal variables were performed.

For the variables that were significant on univariate analysis, multiple linear regression was calculated.

An *a priori* probability level was set at 0.05.

## RESULTS

Total sample size was 145. One patient was excluded because she had dementia. A second patient declined.

Table 1: Demographic data of the study population (n = 145).

Demographic	Data
Age (mean $\pm$ standard deviation)	59.5 $\pm$ 13.6 years
Male (n (%))	36 (24.8%)
Adductor/Abductor (n (%))	139 (95.9%) / 6 (4.1%)
Professional Voice User (n (%))	22 (15.2%)
Duration of treatment with botulinum toxin injections (years) (mean $\pm$ standard deviation)	10.5 $\pm$ 7.0
Voice Handicap Index – 10 (mean $\pm$ standard deviation)	26.1 $\pm$ 7.1
Consensus Auditory Perceptual Evaluation of Voice – Overall (mean $\pm$ standard deviation)	43.6 $\pm$ 20.8
Hospital Anxiety and Depression Scale – Anxiety (mean $\pm$ standard deviation)	6.6 $\pm$ 3.7
Hospital Anxiety and Depression Scale – Depression (mean $\pm$ standard deviation)	3.6 $\pm$ 2.8

In univariate analysis, Student's t-tests showed a significant association between VHI-10 and gender ( $p=0.01$ ). Females had a mean VHI-10 score of 26.1, which was significantly higher than males (VHI-10 of 23.5). There were also positive correlations between VHI-10 and CAPE-V overall ( $r=0.25$ ;  $p=0.002$ ), HADS anxiety ( $r=0.25$ ;  $p=0.002$ ), older age ( $r=0.18$ ;  $p=0.03$ ), and HADS depression ( $r=0.18$ ;  $p=0.04$ ). Pearson's correlation was used for all variables, except for HADS depression, which had a non normal distribution, so Spearman's correlation was calculated instead. There was no correlation with professional voice use and disease duration.

In multiple linear regression, older age ( $p=0.02$ ), HADS anxiety ( $p=0.03$ ), and CAPE-V ( $p=0.04$ ) were significant in predicting VHI-10 ( $r^2=0.153$ ). This means that approximately 15.3% of the value of the VHI-10 can be predicted by age, HADS anxiety, and CAPE-V.

## DISCUSSION

There has been a paucity of studies in this area. Behrman *et al* conducted a retrospective review of 100 patients with benign vocal fold lesions.<sup>5</sup> They concluded that high levels of vocal demands, smoking history, and shorter duration of symptoms predicted higher levels of patient perceived hoarseness. Auditory perceptual evaluation of voice and HNR were weak predictors.

González *et al* conducted a prospective study of 81 patients with benign vocal fold lesions to determine which factors predicted the VHI score.<sup>6</sup> They reported that HNR, F<sub>0</sub> and the breathiness and strain parameters of GRBAS were predictive of VHI.

There were some differences between these two studies and our study. First, the previous studies both focused on acute vocal fold lesions that can be cured with speech therapy or surgery. In contrast, SD represents a chronic disease for which there is a treatment, but no known cure. Their mean duration of symptoms was 9 months (SD = 4.7), while our study's mean duration of treatment was 10.5 years (SD = 7.0). This big difference indicates that our study populations were very different.

Second, the previous studies used objective voice analysis, while our study did not. Previous studies have questioned the utility of objective voice analysis.<sup>7-8</sup>

Strengths to this study: 1) First study examining factors predicting self perceived hoarseness in SD. 2) Homogenous group of SD patients from a mature laryngology practice. 3) Large sample size of 145 SD patients

Limitations to this study: 1) Retrospective design. 2) No control group of healthy, non-dysphonic patients.

## CONCLUSIONS

Patient perceived hoarseness is an important factor that drives patient care for benign vocal disorders, so understanding this concept is important. Older age, higher anxiety levels, and clinician perceived dysphonia predict higher levels of patient perceived hoarseness in SD patients. Professional voice use, disease duration, gender, and depression levels were not significant. Hoarseness is a very personal symptom and multiple factors determine its self perception.

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