Socioeconomic Variables of Patients with Spasmodic Dysphonia: A Preliminary Study

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Summary: Objectives/Hypothesis. To characterize socioeconomic status (SES) variables of spasmodic dysphonia (SD) patients and determine their impact on voice outcomes after treatment with botulinum toxin.

Study Design. Retrospective review.

Materials and Methods. SD patients treated with botulinum toxin for the past 10 years (July 2007–July 2017) for whom sufficient SES and outcome data were available were included. Spearman rho nonparametric correlation coefficients were calculated to determine if SES variables were significantly associated with self-perceived vocal quality. Voice Handicap Index-10 was recorded. Patients were asked at each visit to rate their best voice quality during the period of previous botulinum toxin injection on a scale of 1–10, with 10 being the best.

Results. Fifty SD patients were included. Average age was 60.3 ± 11.4 years, with men representing 24% of patients. Ethnicity was 74% Caucasian and 26% non-Caucasian. Median household income was $76,564 ± $24,782. Sixty-six percent of patients were employed. Adductor SD was diagnosed in 82% of patients and abductor SD in 12%. Best voice out of 10 was 7.23 ± 2.0. Mean Voice Handicap Index-10 score was 25.14 ± 9.4. Patients were treated with botulinum toxin for 165.9 ± 101.9 months. Age, gender, median household income, ethnicity, and employment status were not significantly associated with self-perceived vocal quality. Patients with longer disease duration self-reported a better voice ($P = 0.02$, $r = 0.387$).

Conclusions. SES variables were not associated with voice outcomes for SD patients treated with botulinum toxin. Patients self-reported improved voice with longer duration of disease.

Key Words: Spasmodic dysphonia–Socioeconomic–Median income–Employment status–Ethnicity.

INTRODUCTION

Spasmodic dysphonia (SD) is a focal laryngeal dystonia that results in contractions of the intrinsic muscles of the larynx.[1] SD is task specific, so it only affects speech, but spares the other laryngeal functions of swallowing and breathing. Various types of SD exist, including adductor, abductor, and mixed. Adductor SD is the most common, comprising 82% of patients.[2] SD can result in debilitating voice quality for patients. Treatment options for SD are geared toward improving voice quality, with the most frequent treatment being electromyographic-guided botulinum toxin injections.[2]

The estimated prevalence of SD is 5.9 per 100,000.[3] Because of this low prevalence, studies with a large number of patients enrolled are uncommon, leaving many questions unanswered. A recent review on SD commented on the need for further studies on the epidemiological and pathophysiological factors for this disorder.[4] One of the pending questions of SD is the impact of socioeconomic status (SES) on voice outcomes.

The American Psychological Association defines SES as "the social standing or class of an individual or group."[5] Variables used to measure SES include income, occupation/employment status, education, ethnicity, etc. Studies have shown that SES affects health outcome from myocardial infarction, stroke, operative mortality, prostate cancer, lung cancer, and breast cancer.[6–12] There are few studies on this topic in the voice literature. SD was chosen as the model voice disorder to study this topic for several reasons: 1) SD is a chronic neurological voice disorder during the course of which the laryngologist forms a long-term relationship with the patient. 2) SD has a treatment, but not a cure, so patients need to adapt their lifestyles to their disorder. 3) Botulinum toxin injections can be a costly, out-of-pocket medical treatment that is elective therapy for SD patients.

The purpose of our study was to first characterize the SES of SD patients and then to determine if SES is associated with voice outcomes. The SES variables that we examined were median household income, employment status, and ethnicity. Our hypothesis was that patients with higher SES will have better access to health care and have better voice outcomes. The first step to reducing potential barriers to treatment is to identity them.

MATERIAL AND METHODS

The study was approved by the Medical Institutional Review Board at Drexel University College of Medicine in Philadelphia, Pennsylvania. A retrospective chart review was conducted of adult SD patients (>18 years old) who were treated over the past 10 years (July 2007 to July 2017) at a tertiary care academic practice. All patients for whom sufficient data were available were included.

Demographic information for each patient was documented, which included age and gender. The type of SD (adductor versus

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abductor) was documented for each patient, along with disease duration. Disease duration was calculated from the date of diagnosis at the initial consultation to July 2017. For patients who received treatment elsewhere prior to presentation at our practice, the date of diagnosis was calculated based on the referring physician's documentation. Vocal history, including whether the patient was a professional voice user, was documented. A professional voice user is anyone whose voice is essential to his or her job.[13]

The three SES variables studied were median household income, employment status, and ethnicity. Patients' median household income was determined using their primary residence's zip code. Each zip code was input into the US Census Bureau Community Facts search engine to determine the median household income for each patient.[14] Studies have shown that using census data with zip codes is a valid and useful method for estimating SES.[15,16] Employment status was a binomial variable (yes versus no). Retirees and students were considered unemployed. Full- and part-time workers were considered employed. Ethnicity was a binomial variable (Caucasian versus non-Caucasian). It was intended to include the highest education level, but this variable was not routinely recorded in the medical charts; therefore, it was excluded.

Two variables were collected to quantify self-perceived vocal outcome: 1) Voice Handicap Index-10 (VHI-10) scores were documented for each patient upon initial evaluation, providing a validated measure of self-perceived vocal quality.[17] 2) Patients were asked at each visit to rate their best voice quality during the period of previous botulinum toxin injection effect on a scale of 1–10, with 10 being the best. The most recent visit's best vocal quality rating was recorded.

Descriptive statistics were calculated for the demographic data. Spearman rho nonparametric correlation coefficients were calculated for associations between median income, disease duration, age, and best voice out of 10 of the overall sample. Separate subgroup Spearman rho correlation coefficients were also calculated for the same variables when split by race (Caucasian/non-Caucasian), employment (yes/no), gender (male/female), type of SD (adductor/abductor), and professional voice user (yes/no). Coefficients of determination (r^2) were calculated to aid in the interpretation of the data. A significance criterion of $\alpha = 0.05$ was set for all analyses. Statistical Analyses for the Social Sciences (IBM SPSS version 24; Chicago, Illinois) software was used for all the analyses.

RESULTS

A total of 50 patients diagnosed with SD were included in the study. One patient was excluded because she was less than 18 years old. The type of SD diagnosed within our population was found to be 82% adductor, 12% abductor, 4% mixed SD, and 2% unknown. Demographic data for this patient population are found in Table 1.

The VHI-10 was only recorded for 29 of 50 patients; hence, we decided to use the "best voice out of 10" as the main measurement for the patient's self-reported vocal quality. Thirty-five of the 50 patients completed this measurement. Given that the sample size was small and that the distributions of some variables may be non-normal, we decided on a conservative analysis plan to minimize the overestimation of the relationships between the variables. As a result, the nonparametric test, Spearman's rho, was used to investigate whether there is an association between the two variables. Statistical significance was set at $P < 0.05$.

Table 2 shows the association between continuous variables. Patients with longer disease duration self-reported a better voice ($r = 0.387$, $P = 0.02$). Using the coefficient of determination (r^2), approximately 15% of the variation of voice can be explained by the duration of the disease treatment. Subgroup analyses were then performed for the categorical variables of gender, type of SD, professional voice user, ethnicity (Caucasian versus non-Caucasian), and employment status. Nonprofessional voice users with longer disease duration self-reported a better voice ($r = 0.654$, $P = 0.029$). Approximately 43% of the variation in voice can be explained by the duration of disease treatment in this subgroup. Caucasian patients with a longer duration of treatment self-reported a better voice ($r = 0.434$, $P = 0.017$), where 19% of the variation in voice can be explained by the duration of treatment in this subgroup (Table 3). Employed patients with a longer duration of treatment self-reported better voice ($r = 0.448$, $P = 0.025$), and 20% of the variation in voice can be explained by the duration of treatment in this subgroup (Table 4). There were no significant correlations in subgroup analysis for gender and type of SD.

TABLE 1.
Demographic Data for the Study Population (n = 50)

Characteristic	Data
Age (mean ± standard deviation) (years)	60.29 ± 11.38
Male gender n (%)	12 (24%)
Adductor/abductor/mixed/unknown (n)	41/6/2/1
Professional voice user n (%)	33 (66%)
Disease duration (mean ± standard deviation) (months)	165.94 ± 101.92
Voice Handicap Index-10 (mean ± standard deviation) (out of 40) (n = 29)	25.14 ± 9.44
Best voice (mean ± standard deviation) (out of 10)	7.23 ± 2.02
Median household income (mean ± standard deviation) ($)	76,564.20 ± 24,781.97
Employed n (%)	33 (66%)
Caucasian n (%)	37 (74%)