Prevalence of and Sociodemographic Factors Related to Voice Disorders in South Korea

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Summary: Objectives. Studies on the prevalence of and the sociodemographic factors related to voice disorders are rare. The purpose of the present study was to analyze the prevalence of voice disorders and to identify sociodemographic factors associated with an increased risk of voice disorder.

Methods. A cross-sectional study was conducted using data from the Korea National Health and Nutrition Examination Survey, 2008–2011. Subjects consisted of 19 636 men and women aged ≥19 years. Sociodemographic factors including occupation, level of education, health status, and economic activity were assessed by means of individual interviews, and health behaviors such as smoking and alcohol consumption and subjective voice problems were assessed with the use of self-administered questionnaires. Laryngology interviews and vocal fold examinations were also conducted.

Results. The prevalence of voice disorders was 8.12% (n = 1594). Subjective perception of the presence of voice problems was significantly higher in individuals with vocal nodules and vocal polyps (27.7% and 23.0%, respectively; $P < 0.001$). Among sociodemographic factors and health behaviors, voice disorders were found to be associated with age, gender, education level, and health status ($P < 0.05$) but were not associated with occupation, household income, smoking, or alcohol consumption.

Conclusions. The results of this large epidemiologic study provide valuable information regarding the prevalence of voice disorders, and the specific data regarding sociodemographic factors and health behaviors suggest potential ways of targeting counseling and prevention efforts to control voice disorders.

Key Words: Voice disorder–Prevalence–Polyp–Nodule–Sociodemographic factor.

INTRODUCTION

Nationwide epidemiologic studies that are conducted by government organizations can provide powerful data for investigating the national prevalence of disease conditions. The Korea National Health and Nutrition Examination Survey (KNHANES) has been conducted annually since 1998 to examine the general health and nutrition status of the South Korean population. From 2008 to 2011, a total of 4600 households were selected annually. The participating household members were interviewed on their health and nutrition and asked to undergo a basic health examination that included blood pressure measurement, pulmonary function tests, urine and blood collection, a dental examination, and an otolaryngologic examination. The characteristics of the diseases being studied were considered to determine the age groups targeted on the physical examinations. During the otolaryngologic interview and examination, participants who were aged ≥19 years were surveyed for any history of voice disorders, and vocal fold examinations using rigid telescopic laryngoscopy were subsequently conducted on those participants.[1,2]

The prevalence of voice disorders in the United States was reported to be 6.6% in 2005[3]; voice problems are more common in women than in men, and the prevalence increases with age.[4] It has been reported that 3–9% of Americans have experienced voice problems,[5] which can lead to unemployment secondary to voice problems as well as medical bills. Voice injuries in the teaching profession alone are estimated to cost the US economy 2.5 billion dollars/y.[6] In 2014, a study conducted by Woo et al[1] using KNHANES data reported that 1.96% of the Korean population is affected by laryngopathy, but analyses of the prevalence of voice disorders and the sociodemographic factors associated with an increased risk of voice disorders remain lacking.

Epidemiologic studies of the prevalence of and the sociodemographic factors related to voice disorders in the nationwide surveys are rare. These surveys, however, can provide accurate identification of laryngologic diseases, and they also aid in reducing the incidence of these diseases and facilitate the efficient allocation of public health resources.

The present study aimed to establish a basis for selecting high-risk populations and preventing voice disorders by analyzing the prevalence of voice disorders and the sociodemographic factors associated with these disorders using data from the period 2008 to 2011 of the KNHANES.

MATERIALS AND METHODS

Study population and data collection

The KNHANES is an ongoing cross-sectional survey of the civilian noninstitutionalized population of South Korea. Each year from 2008 to 2011, 10 000–12 000 individuals in 4600 households were selected from a panel to represent the Korean population by using a multistage cluster and stratified random sampling method that is based on the National Census Data. A total of 324 surveys were conducted by four survey teams

within a time span of 27 weeks each year. Each survey team had one otolaryngologist, three nurses, and four interviewers. The survey teams, working between Tuesday and Friday each week, moved to preassigned locations with a mobile examination unit and performed laryngologic interviews and examinations of vocal folds using rigid telescopic laryngoscopy on survey participants aged >19 years. Written informed consent was obtained from all study participants. A total of 135 otolaryngology residents from 43 training hospitals were recruited for this project.

From 2008 to 2011, the participation rate of selected households in the survey ranged from 79% to 84%. The total number of participants was 19 636; among them, 8461 were men and 11 175 were women, for a male-to-female ratio of 1:1.32. Participants ranged in age from 19 to 80 years. In addition to the general survey, laryngologic interviews and vocal fold examinations using rigid telescopic laryngoscopy were also conducted on participants.

Health survey and screening
In the survey, occupation, education level, health status, and economic activity were assessed by means of individual interviews, and health behaviors such as smoking and alcohol consumption, as well as subjective voice problems, were assessed through a self-administered questionnaire.

Assessment of voice disorders
Subjective perception of voice problems was assessed by the question, "Do you feel you have a problem with your voice?" on the otolaryngology questionnaire. Participants were given the option to respond either "yes" or "no" to this question. Because there are no standardized questions to define the presence of a voice disorder, a participant in the present study was determined to have a voice disorder on the basis of a "yes" response to the previously mentioned question.

Assessment of sociodemographic characteristics
To assess sociodemographic characteristics, age, gender, education level, occupation, and household income were surveyed. Age was recorded as actual age and was then reclassified into generations (every 10 years). Collected data on occupations were reclassified according to the Korean Standard Classification of Occupations (Sixth Version, Korean National Statistical Office, 2007), and unemployment was defined to include housewives and students. Education levels were categorized into elementary school graduation or below, middle school graduation, high school graduation, and college/university graduation or above, and household income was classified by the average monthly household income into low (0–700$), mid-low (700–1400 $), mid-high (1400–2300 $), and high (≥2300). This classification was based on quartile of mean household income. Health status was assessed by a self-administered questionnaire and classified into excellent, good, moderate, bad, and poor. Participants were categorized on the basis of smoking habits as current smokers who checked "currently smoking," past smokers who checked "smoked in the past but have quit" (classified how long it has been since the smokers quit smoking 5–10 years, 10–15 years, ≥20 years), and nonsmokers who checked "never smoked" on the questionnaire.

Alcohol intake was classified according to the Alcohol Use Disorders Identification Test score, which was developed to identify persons with hazardous and harmful patterns of alcohol consumption.[7] It is a 10-item questionnaire which covers the domains of alcohol consumption, drinking behavior, and alcohol-related problems. Responses to each question are scored from 0 to 4, giving a maximum possible score of 40. A total score of <8 is regarded as nonhazardous alcohol consumption. However, a total score of ≥8 is recommended as an indicator of hazardous and harmful alcohol use, and a total score of ≥13 indicates possible alcohol dependence.

Laryngologic survey
A laryngeal examination was performed using a 4-mm 70°-angled rigid endoscope with a charge-coupled device camera. The Epidemiologic Survey Committee of the Korean Otolaryngologic Society made a disease decision protocol. Laryngoscopic findings of organic changes such as polyps, nodules, cysts, and leukoplakia were recorded. Uncertain findings to suggest either muscle tension dysphonia or laryngopharyngeal reflux were regarded as normal. The documentation of video was obtained as 640×480-sized Audio Video Interleave files, which were compressed by DivX 4.12 codec (DivX inc.) using a compression rate of 6 Mb/s. The Epidemiologic Survey Committee of the Korean Otolaryngologic Society verified the quality control of the survey.

Statistical methods
The number of subjects who were positive for abnormal findings on laryngoscopy was analyzed without weighting, with the subjects divided by gender (men and women) and age groups (19–29, 30–39, 40–49, 50–59, 60–69, and ≥70 years) for analysis. The prevalence for the total sample, for each gender, and for each of the age groups was calculated for each year. The chi-square test was used to analyze subjective perception of voice problems, laryngeal lesions, age, gender, education level, occupation, smoking, alcohol consumption, and health status. To reflect national population estimates, sample weights were applied in all analyses. All P values were two-sided, and a value of $P < 0.05$ was considered to be statistically significant.

RESULTS
Among the 19 636 participants aged >19 years, the prevalence of voice disorders was 8.12% (n = 1594). The number of subjects who underwent voice disorder survey was 3141 in 2008, 6592 in 2009, 5224 in 2010, and 4679 in 2011. The number of subjects who were positive for voice disorder was 261 in 2008, 521 in 2009, 397 in 2010, and 415 in 2011.

Relations between voice disorders and laryngeal lesions
Examining voice disorders and laryngeal lesions, it was found that subjective perception of voice problems was higher in people with vocal nodules than in people without vocal nodules,