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ORIGINAL ARTICLE

Changes in prevalence of precancerous oral submucous fibrosis from 1996 to 2013 in Taiwan: A nationwide population-based retrospective study

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Background/Purpose: Oral submucous fibrosis (OSF) has been regarded as a precancerous condition. Research examining the prevalence of OSF could be the first step in preventing or reducing malignant transformation. In this study, we probed a nationwide registered database to assess the prevalence, gender distribution, age, income, and urbanization status of OSF patients in Taiwan.

Methods: A retrospective study was conducted to analyze the registered database compiled by the National Health Insurance provided by the Ministry of Health and Welfare, Taiwan. We identified dental visit patients diagnosed with OSF during the period between January 1, 1996 and December 31, 2013. In addition, demographic characteristics were analyzed by multivariate Poisson regression.

Results: The prevalence of OSF increased significantly from 8.3 (per 10^5) in 1996 to 16.2 (per 10^5) in 2013 ($p < 0.0001$). Men had a significantly higher OSF prevalence than women ($p < 0.001$). The mean age of patients with OSF increased from 1996 to 2013. Individuals living in rural areas had a higher risk of OSF compared with those living in urban areas [relative risk (RR), 1.10; 95% confidence interval (CI), 1.07–1.13]. The higher income group had a lower risk of OSF compared with the lower income group (RR, 0.76; 95% CI, 0.73–0.80).

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

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Conclusion: This large-scale government-centered survey demonstrates that the prevalence of OSF in Taiwan significantly increased from 1996 to 2013. The prevalence was higher among men than among women.
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Introduction

Oral submucous fibrosis (OSF), an oral potentially malignant disorder, has been widely accepted as a precancerous condition of oral squamous cell carcinoma.[1] OSF is a chronic disease featuring deposition of fibrous tissue mainly in the submucosal layer of the oral cavity that potentially leads to limitation of mouth opening. The main etiologic agent causing OSF has been confirmed as arecoline, a major areca nut alkaloid, and it has been shown to cause the accumulation of extracellular components in oral connective tissues.[2] The malignant transformation rate of OSF in Taiwan is about 3.27–8.63%.[3,4]

The prevalence of OSF varies among Southern-East Asia countries. The prevalence is reported to be 1.0–3.03% in Hunan Province, China,[5,6] 0.62–6.42% in India,[7,8] 0.15–14.4% in Vietnam,[9] and 0.086–17.6% in Taiwan.[10,11] Investigating OSF may render treatment and prevent malignant transformation at an early stage. The prevalence of OSF could provide important information for planning the national oral cancer prescreening health promotion program.

The National Health Insurance (NHI) program in Taiwan is a compulsory and universal health insurance program that includes all inpatient and outpatient medical benefit claims. Up to 99.9% of the inhabitants of Taiwan were enrolled in 2014.[12] This high coverage rate made the NHI databases the best national indicator of health issues, and they are easy to update annually. On the basis of this detailed information, services, outcomes, and goals for dental care can be obtained for individuals in Taiwan.

Trends in the prevalence of OSF over an extended time with the same methodologies for investigation are sparse in the literature. The aim of this study was to investigate the prevalence of OSF in Taiwan from the National Health Insurance Research Database (NHIRD). In addition, patients were further stratified by age, sex, income, and urbanization factors from 1996 to 2013.

Methods

Data source

The dental dataset (DN),[13] original dental claim data, which is a subfile in the CD data file provided by the Bureau of NHI for ambulatory care expenditures by dental visit, was used for this study. In addition, the registry for beneficiaries was used to analyze the income and urbanization of OSF patients. This study was approved by the Ethics Review Board at the Chung Shan Medical University Hospital (CS2-15071; Taichung, Taiwan). Because the data were analyzed anonymously, no informed consent from participants was required.

Patient identification and measurements

OSF was diagnosed in accordance with the International Classification of Disease, Ninth Revision (ICD-9), code 528.8. The NHI routinely samples patient charts randomly to cross-check the quality of claims from all medical institutions and to minimize bias from miscoding or misclassification. To increase the validity of diagnoses in the administrative data set, the NHI has set a strict guideline that only board-registered dentists can perform dental treatments. In this study, we identified dental visit patients diagnosed with OSF during the period between January 1, 1996 and December 31, 2013 for the annual prevalence rate of OSF from the DN. We strictly ruled out other patients to lower the nondifferential misclassification bias.

Age stratification was done according to the percent distribution of population by a three-stage age group (people aged 0–14 years, 15–64 years, and over 65 years) by the Department of Household Registration Affairs, Ministry of Interior. The payroll bracket (monthly income) was categorized as follows: $\leq$ NT $21,900, NT $21,901–43,900, and $>$ NT $43,900. The urbanization of the locations of NHI registration was used as a proxy parameter for socioeconomic status. Urbanization was categorized into three levels: urban, suburban, and rural, based on the classification scheme proposed by Liu et al.[14]

Statistical analysis

For probing the trend, the annual prevalence rate of OSF by sex and age group in Taiwan from 1996 to 2013 was examined by trend test. Average age with standard deviation of population of OSF was presented with gender annually. The socioeconomic-specific estimates and prevalence rates by subgroups including distribution of urbanization and payroll bracket were calculated separately. A p value < 0.05 was set to declare statistical significance. The relative risk of OSF from 1996 to 2013 after adjusting for year, urbanization, or payroll bracket was evaluated by multivariate Poisson regression. All statistical analyses were performed using SPSS version 19 (SPSS Inc., Chicago, IL, USA).

Results

The sex-specific annual prevalence of OSF from 1996 to 2013 is presented in Table 1. The average male-to-female

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