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Original Article

Inflammatory bowel disease as a risk factor for periodontitis under Taiwanese National Health Insurance Research database

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KEYWORDS
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Abstract *Background/purpose:* Inflammatory bowel disease (IBD), comprised Crohn's disease and ulcerative colitis, is a mucosal immune response that affects gastroenterological tract. The association between IBD and periodontitis was inconclusive. In this study, we aimed to investigate the association between IBD and periodontitis by using a register-based dataset.
Materials and methods: The dataset conducting in this retrospective cohort study was obtained from the National Health Insurance Research database (NHIRD) in Taiwan. For IBD group, conditionally selected control subjects were matched in 1:4 ratio from general population. The risk of periodontitis among IBD group comparing with non-IBD group was calculated by multivariable Cox proportional hazards model.
Results: In IBD cohort, 27 IBD patients (7 Crohn's disease and 20 ulcerative colitis) with catastrophic illness registry were identified. 108 controls were selected as non-IBD cohort. The median follow-up period was 3.00 years in the IBD group and 3.15 years in the non-IBD group. The cumulative incidence of IBD was 4.32 per 100,000 persons. After adjusting for several confounding factors, IBD group had higher risk for developing periodontitis than non-IBD group (adjusted HR: 1.82; 95% CI: 1.09–3.03). To further stratification with subtype, Crohn's disease group had significantly higher risk of periodontitis (adjusted HR: 3.95; 95% CI: 1.59–9.82).
Conclusions: Taken together, this retrospective cohort study showed that patients with IBD increase risk of having periodontitis comparing with non-IBD group, especially in Crohn's disease subgroup.

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Introduction

Inflammatory bowel disease (IBD) is a mucosal immune response mainly located in the gastroenterological tract. IBD comprises two type of inflammatory disease: Crohn's disease and ulcerative colitis.[1,2] Ulcerative colitis is characterized by recurring inflammation episodes limited to the mucosal layer of colon. It commonly involves the rectum and may extend in continuous lesion to other parts of the colon.[3] Crohn's disease is characterized by transmural inflammation of the gastroenterological tract. Both types of IBD occur in the genetic susceptible individuals with antigenic effect of intestinal microbiota.[1]

Periodontitis is an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth formation, recession, or both. The net result of these inflammatory changes can breakdown the fibers of the periodontal ligament, leading to clinical loss of attachment, resorption of the alveolar bone and even tooth loss.[4]

In 1999, an international workshop for the classification of periodontal diseases refined periodontitis as a manifestation of several hematologic and genetic disorders which have been associated with the development of periodontitis in affected individuals.[5] Nowadays, the associations between periodontitis and other systemic diseases such as preterm low birth weight,[6] chronic obstructive pulmonary disease,[7] and diabetes[8] have been established in support of the concept of perio-systemic disease connection.

The pathogenesis of both IBD and periodontitis is multifactorial leading to a substantial defect of the mucosal barrier, deregulation of the immune response and chronic inflammation of the mucosa.[9] The common oral manifestations in IBD are indurated tag-like lesions, cobblestoning, mucogingivitis, aphthous stomatitis, and pyostomatitis vegetans.[10,11] In addition, severe periodontitis has been observed in individuals with IBD who suffer from secondary neutrophil impairment.[12,13]

Although previous studies have pointed toward an association between IBD and periodontitis,[4,9,14,15] most of data were small sample size with inconclusive results. Population-based epidemiological investigations regarding the association between IBD and periodontitis are lacking. The aim of this study was to evaluate the association between IBD and periodontitis in nationwide population according to National Health Insurance Research database (NHIRD) in Taiwan.

Materials and methods

Data collection

The dataset conducting in this cohort study was retrieved from NHIRD. The Longitudinal Health Insurance Database 2005 (LHID2005) was created and released to the public by the National Health Research Institute (NHRI), and it includes all the original claims data and registration files from 2000 to 2009 for one million individuals randomly sampled from the Registry for Beneficiaries of the National Health Institute (NHI) program on 2005 in Taiwan. Many studies have been published based on the release of claims dataset from NHIRD for population-based longitudinal studies of supporting its validity.[16–20]

This study was approved by the Chung Shan Medical University Hospital Ethics Review Board. The data retrieved from NHIRD was with proper de-identification and anonymous for patients' information. There were no specific ethical considerations in this study.

Patient identification and measurement

We use outpatient data between 2000 and 2009 from NHIRD of a sub-dataset of one million for the year 2005 (n = 993,232). The disease diagnoses were defined according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). We used ICD-9-CM Diagnosis codes to identify the subjects of IBD patients. Ulcerative colitis (ICD-9-CM code 556) and Crohn's disease (ICD-9-CM codes 555.0, 555.1, 555.2, and 555.9) were retrieved from the database between January 1, 2000 and December 31, 2009. To increase the validity of the IBD diagnosis, we only included subjects with identification of catastrophic illness registry for the accuracy. The patients with diagnosis of periodontitis before the diagnosis of IBD, age less than 18 years old, age older than 65 years old, withdrew from program or with missing data were excluded. Total numbers of 625,056 people were included and we identified 27 patients with IBD. The initial disease diagnosis date was set as the index date. For IBD group, we conditionally selected control subjects in 1:4 ratio by propensity score method from general population with matched sex, age, urbanization level, socioeconomic status, and index year. Those confounding variables matched between cases and controls in order to ensure that cases and controls were reasonably similar in terms of baseline demographic characteristics. We identified periodontitis based on ICD-9-CM diagnosis code (ICD-9-CM codes 523.3, 523.4, and 523.5). To ensure the criteria of indication and the accuracy of diagnosis for periodontitis, ICD-9 procedure code 9654, 2431, and 2439 were also defined. Information about the collection of radiographic and pocket depth data in the patient's record has been described for each periodontal treatment. The medical experts designated by National Health Insurance Administration (NHIA) would regularly review patients' chart for ensuring medical quality and accuracy. The designated medical experts are recommended by the Taiwan Hospital Association and the Specialist Medical Association such as Taiwan Medical Association and Taiwan Dental association.[21] It is a reliable data for the conditions of the periodontitis of the selected patients in the present cohort. The flowchart of the study was showed in Fig. 1.

Statistical analysis

Statistical analyses were performed using the Student's t-test for continuous variables and the chi-squared test for categorical variables. The Kaplan–Meier analysis and log-rank test were used for calculating the difference of the cumulative incidence rates of periodontitis between IBD

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