健康保険のデータを活用した歯周病と循環器疾患とその医療費との関係に関する研究

Abstract

Study of the relationship between periodontal disease, cardiovascular diseases and its medical expenses using health insurance records

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Introduction

Periodontal disease is known to affect various diseases. Among the diseases affected by periodontal disease, cardiovascular disease has many patients, and it is ranked at the top of the cause of death among Japanese peoples, accounting for high medical costs. Cardiovascular diseases include cerebrovascular disease and ischemic heart disease. Another study examining the effects of periodontal disease on stroke reported that the risk of developing cerebral infarction increases in proportion to the severity of periodontal disease and the number of remaining teeth (Lafon et al., 2014). A study that examined the effect of periodontal disease on ischemic heart disease, especially myocardial infarction, has reported that the risk of developing myocardial infarction is increased by the presence of periodontal disease (Xu et al., 2017) .

Risk factors affecting cardiovascular disease such as cerebrovascular disease (cerebral infarction) and ischemic heart disease (myocardial infarction) include hypertension, diabetes, dyslipidemia, and smoking (Kaye et al., 2016). It has been reported that each risk factor affects periodontal disease, and periodontal disease also affects each risk factor, so it is difficult to clarify the exact effect of periodontal disease on cardiovascular disease. It is necessary to conduct the analyses adjusting other risk factors as confounding factors for clarifying the exact impact of periodontal disease on cardiovascular disease.

In a meta-analysis that examined the effects of periodontal disease on cerebral infarction (Lafon et al., 2014), there are few studies adjusting for confounding factors such as age, sex, smoking, medication status (Hypertension, diabetes, dyslipidemia), and metabolic syndrome. Therefore, it is necessary to study the effects of periodontal disease on cardiovascular disease thoroughly adjusting the confounding factors.

Medical expenses for cardiovascular diseases account for about 20% of medical expenses, but few studies have investigated the relationship between periodontal disease and medical expenses for cardiovascular diseases. In a previous study examining the relationship between periodontal disease and medical expenses (Albert et al., 2006),

confounding factors were not adjusted. It is necessary to adjust confounding factors to accurately examine the impact of periodontal disease on medical expenses.

Purpose

The purpose of this study was to examine the effects of periodontal disease and its treatment on cardiovascular disease, and the risk factors associated with medical expenses for cardiovascular disease using health insurance receipt data.

Methods

This study was conducted using retrieved data from the National Health Insurance Association Hokkaido Branch from 2014 to 2016. Subjects in this study were followed up between 2014 and 2016 after excluding subjects not visiting dentistry in 2014, having diagnosis with myocardial infarction and cerebral infarction in 2014, who had medical ventilation in 2014 or who had undergone dialysis treatment in 2014. As a result, a total of 235,779 subjects were included in the analysis from the all subscribers of 1,729,316. The medical examination data, medical receipt data, and dental receipt data of the subjects were anonymized and combined. The subjects were classified into 3 groups based on the 2015 dental receipt: 1) “No dental visit”, targeted at persons who did not have dental visits in 2015 (187,148, 79.4%), 2) “Mild periodontal disease”, targeted at persons received periodontal treatment in 2015, with 1 to 4 dental visits per year (23,746, 10.1%), 3) “Moderate or severe periodontal disease”, targeted at persons with 5 or more dental visits per year (12,368, 5.2%). “No periodontal treatment” (12,517, 5.3%) was excluded from the subjects of this study because it may include those who need periodontal treatment but did not receive periodontal treatment.

Cerebral infarction and myocardial infarction were extracted as outcome variables from medical receipt data, and metabolic syndrome, hypertension, diabetes and dyslipidemia were extracted as risk factors for cerebral infarction and myocardial infarction from

medical examination data. Regarding medical expenses, the number of insurance claims related to cardiovascular disease was extracted from medical receipt data.

Logistic regression analyses were conducted to determine whether periodontal disease is a risk factor for developing cerebral infarction and myocardial infarction. In these analyses, outcomes are cerebral infarction and myocardial infarction in 2015 and 2016, and explanatory variables were periodontal disease classification and confounding factors such as age, gender, smoking, medication status (hypertension, diabetes, dyslipidemia) and metabolic syndrome in 2015. Similarly, the logistic regression analyses, were conducted to determine whether periodontal disease is a risk factor for the developing hypertension, diabetes, dyslipidemia and metabolic syndrome. In these analyses, outcomes are hypertension, diabetes, dyslipidemia and metabolic syndrome in 2015 and 2016, and explanatory variables is periodontal disease classification and confounding factors in 2015.

Analysis of covariance with cardiovascular disease medical expenses as a dependent variable, periodontal disease classification and year as independent variables, and age and gender as covariate variables were conducted to examine the relationship between cardiovascular disease medical expenses and periodontal disease.

Results

Results of logistic regression analysis with cardiovascular disease as outcomes variables showed that “mild periodontal disease” was associated increased odds ratio of cerebral infarction in 2015 and 2016, and periodontal disease classification were not associated with myocardial infarction in 2015 and 2016.

Results of logistic regression analysis with the onset of the risk factors for cardiovascular disease as outcomes variables showed that “mild periodontal disease” and “moderate or severe periodontal disease” were associated increased odds ratio of metabolic syndrome, hypertension, and dyslipidemia in 2015 and 2016, and periodontal disease classification were not associated with diabetes in 2015 and 2016.

Results of logistic regression analysis with the sustaining the risk factors for cardiovascular disease as outcomes variables showed that “mild periodontal disease” was associated increased odds ratio of metabolic syndrome, hypertension, diabetes, and dyslipidemia in 2015, and “mild periodontal disease” were not associated with metabolic syndrome, hypertension, diabetes, and dyslipidemia in 2016.

Result of analysis of covariance with the medical expenses for cardiovascular disease showed that cardiovascular disease medical expenses of “mild periodontal disease” was higher than that of “no dental visit” in 2015. In “moderate or severe periodontal disease”, the medical costs for cardiovascular disease in 2015 and 2016 were higher compared with “no dental visit”.

Conclusions

Results of this study suggests that the presence of periodontal disease may increase the risk of cerebral infarction and metabolic syndrome, hypertension, dyslipidemia, and the continuing risk of metabolic syndrome, hypertension, diabetes, and dyslipidemia. Regarding medical expenses for cardiovascular disease, it is suggested that the presence of periodontal disease may increase medical expenses. On the other hand, periodontal treatment for mild periodontal disease can reduce the continuing risk of metabolic syndrome, hypertension, diabetes mellitus and dyslipidemia, possibly leading to reduce the incidence of cardiovascular disease in the future.