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Original Article

Correlation between caries prevalence and chronic perodontitis

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Abstract

Introduction: Periodontitis and dental caries may be synergistically associated, negatively associated, or completely independent. The aim of this study was to evaluate the correlation between these two diseases and investigate the prevalence of dental caries in periodontitis.

Methods: This cross-sectional study has been performed in 180 samplesin two groups: periodontal and control group; during 2012-2013 in Babol Dental School. All 180 patients were divided into two groups, including 90 cases with chronic periodontitis as the periodontal group (PG) and 90 cases with healthy gums as the control group (probing depth between 2-3mm) (HG). Clinical measurments in cluding Gingival Index (GI), Bleeding Index (BI), Clinical Attachment Loss (CAL), Periodontal Pocket Depth (PPD) were used to assess the severity of periodontal disease. The clinical features of control group were healthy gums, probing less than 3mm in depth, and CAL<1mm. The examination to measure AL was conducted using a Williams's periodontal probe. In chronic periodontitis group, the patients had GI≥1 and CAL≥1. The assessment of caries of patients was conducted using bitewing radiography for proximal caries detection, dent on the use of explorer and direct observation**.** A p-value≤0.05 is considered as significant.

Results: The results of this study showed that the mean number of decayed and filled teeth (DFT) in periodontal group was 4.32±0.17, and in healthy group was 2.16±0.17. DFT in males with periodontitis was 4.85±0.17 and in females was 4.3±0.17,while the healthy males was 2.54±0.17, and females was 2.25±0.17; therefore, the mean DFT in the periodontal group was more than the healthy group (p≤0.05).

Conclusion: Based on our findings, in patients with periodontitis, more dental carries were more significant than the healthy group.

Keywords: Periodontal disease, Dental caries, Prevalence

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ارتباط میان شیوع پوسیدگی دندانی و پریودنتیت مزمن

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چکیده

مقدمه: پریودنتیت و پوسیدگی دندانی می توانند در یک سو و به صورت دو عامل همکار، معکوس یکدیگر و یا کاملاً مستقل از هم عمل کنند. هدف از این مطالعه بدست آوردن رابطهٔ بین این دو بیماری است و میزان شیوع پوسیدگی در بیماران پریودنتالی را مورد بررسی و مقایسه قرار می دهد.

مواد و روش ها: این مطالعه به روش Cross sectional بر روی ۱۸۰ نمونه در دو گروه پریودنتال و کنترل در طی سالهای ۹۲-۹۱ در دانشکده دندانپزشکی بابل انجام گرفته است. در این تحقیق ۱۸۰ نمونه شامل ۹۰ نمونه گروه پریودنتال (بیماران مبتلا به پریودنتیت مزمن) و ۹۰ نمونه گروه کنترل که شامل افراد با لثه های سالم (عمق پاکت دندانی بین ۳-۲ میلی متر) می باشند در سنین بین ۶۰-۳۰ سال انتخاب شدند. اندازه گیری GI، BI، CAL و PPD برای ارزیابی شدت بیماری پریودنتال استفاده شد. لثه های سالم، عمق پروپینگ کمتر از ۳ میلی متر و CAL<1 mm از ویژگیهای بالینی برای گروه کنترل بود. بررسی کلینیکی با استفاده از پروب پریودنتال Williams برای ارزیابی AL انجام شد. در گروه پریودنتیت مزمن، بیماران دارای GI≥1 و CAL≥1 بوده اند. ارزیابی وضعیت پوسیدگی بیماران با استفاده از رادیوگرافی بایت وینگ جهت تشخیص پوسیدگی های پروگزیمال، سوند و مشاهده مستقیم صورت گرفته است. $p \leq 0.05$ معنی دار در نظر گرفته شد.

یافته ها: نتایج این مطالعه نشان می دهد که میانگین تعداد دندان های پوسیده و ترمیم شده (DFT) در گروه پریودنتال۰/۱۷±۴/۳۲ و در گروه سالم۰/۱۷±۲/۱۶ می باشد.DFT در بیماران پریودنتال در گروه مردان ۰/۱۷±۴/۸۵ و در گروه زنان ۰/۱۷±۴/۳ می باشد، در حالیکه در افراد سالم در گروه مردان ۰/۱۷±۲/۵۴ و در گروه زنان۰/۱۷±۲/۲۵ می باشد. بنابراین میانگین DFT در گروه تست بیشتر از گروه کنترل می باشد.

نتیجه گیری : بر اساس یافته های این مطالعه بیماران پریودنتال دارای پوسیدگی بیشتری نسبت به گروه سالم بوده اند.

واژگان کلیدی: بیماری پریودنتال، پوسیدگی دندانی، شیوع

Introduction

Dental caries and periodontal disease are the two most common oral diseases in human. They may be related to each other in some way since they both occur in the mouth, particularly in teeth or tooth-surrounding tissues. Dental caries and periodontal disease are thought to share common contributory factors with each other and with a number of chronic systemic conditions, such as cardiovascular diseases, diabetes and obesity (1). Dental caries or tooth decay is one of the most common preventable diseases. Dental caries is

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a multifactorial disease. The contributions of life style, environmental factors and hereditary factors have profound influence on their development. These include the frequent intake of fermentable carbohydrates, poor oral hygiene, high counts of cariogenicmicroorganisms, the inadequate use of fluoride and impaired salivary function (2). Periodontal disease refers to any disorder of the tissues surrounding and supporting the teeth, i.e. the periodontium. In principle, these disorders may be of developmental, inflammatory, traumatic, neoplastic, genetic, or metabolic origin (3).

Periodontal disease is considered multifactorial in nature, with a number of factors contributing to its initiation and progression. These include poor oral hygiene, specific plaque bacteria, smoking, systemic conditions (e.g. diabetes), aging and a susceptible host (4).

The study of the relationship between dental caries and periodontal disease has beenan interesting topic in research. Findings concerning the relation between periodontal disease and dental caries are contradictory. Positive association (Brandtzaeg and et al & Albandarand et al.(5, 6), negative association (Siciliaand et al.) (7), or no association (Frentzen et al., Kinaneand et al.)(8, 9) have been detected.

Positive association may relate to the microbiological aetiology of both diseases (Albandar and et al.)(6). However, the typical bacterial species responsible for these diseases differ largely from each other. On the other hand, plaque and biofilm formation are related to both diseases (Rosan& Lamont) (10). Furthermore, both diseases share many social and behavioural background factors in common, which have been related to their aetiology (Tervonen and et al. Hobdell and et al.) (11, 12).

Historically, skull remains from the Yayoi people who dominated the Japanese archipelago between the 5th century B.C. and the 3rd century A.D., exhibited a significant correlation between root caries and alveolar bone loss (13).

It is important for the evaluation of dental treatment needs and for the planning of comprehensive treatment and preventive strategies, to know the prevalence of dental caries in periodontal disease that these common diseases may occur in the same individuals. Thus, the aim of the present study was to evaluate the prevalence of dental caries in periodontitis.

Methods

In this case-control study, all 180 patients were divided into two groups, including 90 cases with chronic periodontitis as the periodontal group (PG) and 90 cases with healthy gums as the control group (probing depth between 2-3mm)(HG); all the samples were selected from 30 to 60 years old patients. Men and women were matched according to two age groups (30-40 and 41-60 years old).

The subjects were selected from the patients who referred for dental treatment to the Dental School of Babol University of Medical Sciences.

In this study, the data collection was performed by a dentistry student under the supervision of a periodontologist. The examinations were conducted using a dental mirror, a graded periodontal probe, and afiber optic light.

Ag-point probing of each tooth was performed: mesiobuccal, distobuccal, mesiolingual, lingual and distolingual, using a standardized force of 20 grams. Gingival Index (GI), Clinical Attachment Loss (CAL), Barnett Bleeding Index (BI), Plaque Index (PI), and Probing Pocket Depth (PPD) were recorded for each patient in both the periodontal group and healthy group.

The patients diagnosed with clinical attachment loss (CAL)>1mm were enrolled as periodontal group. All patients with periodontitis were candidates for non-surgical phase I periodontal therapy including oral hygiene instructions and SRP (Scaling and Root Planning).

The exclusion criteria were pregnancy, cigarette smoking, consumption of antibiotic one month ago, having systemic diseases, patients with less than 20 teeth, and teeth with a fractured alveolar crest or that were missing.

For comparison, healthy individuals with CAL<1 mm, PPD<3mm, and without any clear and stable gingival inflammation were included as the healthy group.

All teeth surfaces were examined, but observations of the teeth were recorded. The teeth were blown dry, and the status of each tooth surface was diagnosed and combined into one recording. A tooth was recorded as decayed if there was evidence of caries lesion clearly extending to dentine.

The caries lesion was cavitated, penetrated the fissure and undermined the enamel, or the dentine walls were clearly softened. Interproximal carious

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lesions were assessed using bitewing radiography evaluation for each patient. The dental status of the subjects was described according the number of teeth and the number of decayed and filled teeth (DFT). The frequency of caries was defined as the percentage of those subjects with one or more teeth with caries or fillings, as themeanvalues of DFT.

Ethical considerations

The Ethics Committees approved the protocols for the study. All the participants were informed about the nature of the studies and gave their written informed consent prior to the participation.

They were also assured confidentiality with regard to the collected information and were informed about any necessary treatment they ought to seek according to the findings following the different examination procedures. All the respondents were given the choice of not participating or withdrawing from the studies at any time.

Statistical Analysis

Comparisons were accomplished using Mann-Whitney Test, Pearson correlation coefficient test was used to determine the correlation between the variables and $p<0.05$ was considered significant. SPSS software was used for all the analysis.

Results

In this research, 90 patients suffering from periodontitis and ninety healthy patients were studied. The statistical population was consisted of 53.3% women and 46.7% men in PG while it was 44.2% women and 55.8% men in the healthy group. Gender distribution did not differ in groups ($p>0.05$).

The mean age of periodontal and healthy group was 38.98±12.24 and 36.67±10.82, respectively ($p<0.001$). The results of correlation tests between CAL, PDD, BI, GI and DFT in PG and HG have shown significant difference ($p<0.001$, $p<0.002$, $p<0.001$, $p<0.0001$, $p<0.01$), which is a representative of relation between the variation of periodontal indexes and DFT (figure.1).

There was no significant difference in plaque Index in both periodontal and healthy groups ($p>0.05$). The mean number of decayed and filling teeth (DFT) in periodontal group was 4.32±0.17 and in healthy group was 2.16±0.17. The difference between periodontal and control groups in the mean number of DF teeth was statistically significant among both genders ($p<0.01$) in both age groups (table1). There was no significant difference in the mean values of teeth present between the compared groups ($p>0.05$).

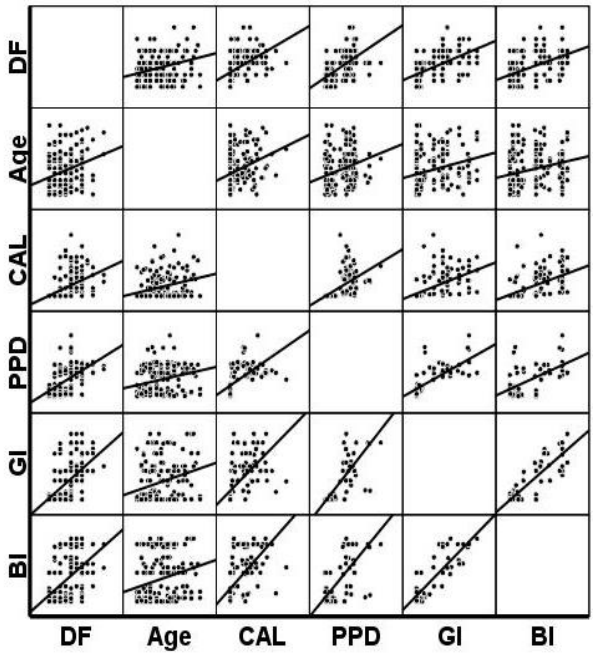


Figure 1.correlation between periodontal indexes and DF

Table 1. The mean DFT in 30-40y and 41-60y

	PG*		HG**	
	30-40 y	41-60 y	30-40 y	41-60 y
Women	5.4±0.17	5.72±0.17	2.18±0.17	2.56±0.17
Men	5.86±0.17	5.94±0.17	2.32±0.17	**2.89± 0.17**

* PG:Periodontal Group ** HG:Healthy Group

Discussion

The current study demonstrated a significant difference ($p<0.01$) that means the significant increase of caries in periodontal disease. The mean number of DFT was more in periodontitis.

The review of previous studies (table 2) reveals that in periodontal patients, the incidence of dental caries oscillates between, 35% and 81% (14-17). These fluctuations come from differences in design of studies, populations, exclusion criteria and also the severity of periodontal disease and dental caries; Factors such as fluoride and systemic health have been effective. In Fadel et al.'s study the yobserved no significant

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difference in root caries and fillings between the three periodontal disease groups, 25 of the 35 severe periodontitis individuals reported using fluoride toothpaste regularly on a daily basis (18). The sample in Fadel et al.'s study comprised a wide range of age groups, including those below 25 years of age (18). It can be assumed that the reason for observing no difference in the prevalence of root caries in periodontal patients compare to other studies is the lower age of participants in this study.

Table 2. Studies mentioning the prevalence of root caries in untreated patients with periodontal disease

Study	Population	Root caries Prevalence
El-Hadary et al., 1975 (14)	220 patients referred for periodontal treatment	Overall: 42% 30-39 yrs: 35% 40-49 yrs: 46% 50-59 yrs: 55%
Hix and O'Leary 1976 (15)	124 moderate to advanced periodontitis patients referred for treatment	Root caries and/or fillings: 58%
Ravald and Hamp 1981(16)	31 advanced periodontitis patients randomly selected from 195 consecutive patients referred for treatment	81%
Ravald and Birkhed1991 (17)	147 periodontitis patients referred for treatment	80%

In addition, the statistical samples of this study include people who live in areas with higher water fluoride levels. The results of the present study are in accordance with incidental findings of a study evaluating a nationally representative cross-sectional survey of the US population, conducted between 1988 and 1994 (Hyman & Reid)(19).

In that study, the subjects were selected among periodontal patients with attachment loss in at mesiobuccal and mid-buccal sites of the teeth in two quadrant jaws. In the conducted studies, it was found that a positive correlation exists between the averages of attachment loss and decayed surfaces.

Studies that found a negative relationship between dental caries and periodontitis (Barnettand et al & Fine and et al). (20, 21), have selected their statistical population among those with higher susceptibility to periodontal disease.

In contrary to our study, Sewonand et al. observed a higher number of caries-free teeth and molars in periodontitis-affected persons that indicated an inverse correlation between the appearances of these diseases (22). This hypothesis is also in agreement with the findings for juvenile periodontitis (11).and Down's syndrome patients (20).

The higher number of intact teeth in subjects may reflect their better remineralization capacity compared with that of the Po (periodontitis-free) group. Calculus, a well-known predisposing factor of adult periodontitis, and teeth free of caries may both be the consequences of a high potential for mineralization in the mouth. This suggestion is in accordance with Schroeder (23), who indicated that plaque mineralization may have a protective function for teeth.

Furthermore, several previous studies have reported an inverse correlation between the occurrence of calculus and caries (24, 25).

A recent study (26) has shown that streptococcus mutans inhibits spontaneous mineral precipitation of plaque fluid. One of the predisposing factors of adult periodontitis is calculus and this inhibition of calculus formation may exclude it. From the other point of view, the inhibitory effect of mineral precipitation may also lead to the demineralization of the teeth. However, the positive correlation found between caries-free surfaces and juvenile periodontitis (JP) (11) is

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apparently not connected with the mineralization process, because calculus is not a frequent finding in JP.

Fine and et al. (21) suggested that the inverse correlation between proximal caries and juvenile periodontal disease may be associated with some as yet undefined microbiologic or immunologic event. In fact, Lehner found an inverse effect from the immune responses of periodontal disease and caries (27).

Thus, there may be several mechanisms causing indirect or direct correlation between the occurrence of caries and periodontitis. In the different age groups, it was seen that there was a positive relation between increasing age and the mean DFT (30-40 years; 3.21±0.17 and 41-60 years; 4.63±0.17).

Similar findings have been reported by Mattila and et al. (28), where 71% root caries and filling teeth in subjects aged 55-64 years which increased to 81% in subjects aged above 65 years.

This finding was interpreted to be largely due to the increased incidence of exposed tooth surfaces in older individuals which allow more rapid plaque accumulation leading to more dental caries. Albander and et al. (6) found from their studies that the prevalence of dental caries and extent of attachment loss increased considerably with age.

Conclusions

The present cross-sectional data indicate that patients having periodontal disease had significantly more often dental caries than those without periodontal disease, but because of the cross-sectional data, no conclusions regarding causal relationship between periodontal disease and dental caries can be drawn on the ground of the present study.

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