



Periodontal disease and systemic diseases in an older population



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ARTICLE INFO

Article history:

Received 15 February 2011
Received in revised form 26 May 2014
Accepted 28 May 2014
Available online 12 June 2014

Keywords:

Systemic diseases
Smoking
Periodontitis
Self-reports
Older adults

ABSTRACT

Objective: To evaluate the relationship between older adults' medical and oral conditions and their self-reports of periodontal conditions with clinically obtained data.

Background: Concerns about oral health of elders and its association with systemic diseases have been gaining more attention.

Methods: A total of 201 older subjects were interviewed about their previous medical and dental histories and were asked to complete a health questionnaire. Each subject received full mouth exam, including counting number of natural teeth remaining, gingival (GI) and plaque index (PI), CPITN and denture status.

Results: Elders who completed health questionnaires had mean age of 62.5. Mean CPITN score was 1.62(±1.12), PI was 1.57(±1.48), and GI was 1.55(±1.31). Women had higher prevalence of CVD and osteoporosis than men ($p = 0.008$, $p = 0.0001$, respectively). Subjects who reported bleeding upon brushing had higher PI and GI scores ($p = 0.03$, $p = 0.05$, respectively). Smokers were more likely to describe their periodontal tissues as unhealthy (72.3% vs. 27.7%, $p = 0.01$), whereas self-reports of healthy vs. unhealthy gums did not differ between non-smokers.

Conclusion: These findings suggest that a number of systemic conditions are associated with indicators of periodontal disease, and self-reports of oral conditions are independent of systemic diseases.

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1. Introduction

Concerns about the oral health status of older persons have been gaining attention in both developing and developed countries in the last decades as this population has increased, and as more elders retain their natural teeth. As with other countries, Turkey's aging population is increasing and more of them are keeping their teeth.

Older persons have more chronic conditions and use more medications than younger populations. On the other hand, economically and socially disadvantaged older adults and those with disabilities are more likely to experience tooth loss and have a greater risk for caries and periodontal diseases (Unluer, Gokalp, & Dogan, 2007). Inflammatory periodontal diseases exhibit an association with multiple systemic conditions. Although the evidence is correlational, patients who suffer from certain systemic diseases tend to be at greater risk for periodontal. Currently, there is

a lack of consensus among experts on the nature of these associations and confusion among health care providers and the public on how to interpret this rapidly growing body of science. The local and systemic effects of periodontal infections and inflammation are usually exerted for many years, typically among those who are middle-aged or older. Numerous epidemiological associations linking chronic periodontitis to age-associated and biologically complex conditions such as diabetes, cardiovascular disease, osteoporosis, respiratory diseases, rheumatoid arthritis, certain cancers, erectile dysfunction, kidney disease and dementia, have been reported (Otomo-Corgel, Pucher, Rethman, & Reynolds, 2012).

The progression of periodontal disease is influenced by variety of factors like microorganisms, host response, systemic background, and genetic makeup of the host. Amongst them, diabetes mellitus tops the list. Diabetes and periodontitis influence the clinical outcome of each other and control of both influences the clinical improvement of each (Daniel, Gokulanathan, Shanmugasundaram, Lakshmgandhan, & Kavin, 2012). Subjects with diabetes mellitus are 2.8 times more likely to have destructive periodontal disease (Emrich, Schlossman, & Genco, 1991) and 4.2 times more likely to have significant alveolar bone loss (Taylor, Burt, Becker, Genco, & Shlossman, 1998) compared to systemically healthy subjects.

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Williams (2008) reviewed the literature that demonstrates a link between cardiovascular disease and periodontal disease, while Cronin (2009) concluded that periodontal disease is a risk factor for CVD. Pihlstrom (2001) includes osteoporosis among the diseases associated with periodontal disease. In fact, a longitudinal follow-up of community-dwelling older adults enrolled in a clinical trial found that decline in periodontal status over five years was best predicted by osteoporosis and ethnicity (greater among whites and African Americans, less among Asian Americans) (Swoboda, Kiyak, Darveau, et al., 2008). Early systematic reviews and a definitive controlled clinical trial indicate that intensive periodontal therapy can reduce systemic inflammation (Tonetti, 2009).

Although the average lifespan in most western societies is increasing, both systemic and oral health deteriorates with aging, and can reduce quality of life, even while life span expands thanks to modern medicine (Crimmins & Beltrán-Sánchez, 2011; Mombelli, 1998). Hence, it is not surprising that the leading cause of death has shifted from infectious to chronic diseases. It is therefore important to examine and identify risk factors; including age, gender, smoking and medical conditions, that may have an impact on oral health and treatment needs.

The objectives of the present study were to assess:

- (a) the associations between systemic and oral conditions, and
- (b) older adults' self-reports of periodontal conditions vs. clinically obtained data.

The following hypotheses were tested:

1. Older males and females differ in their profile of systemic diseases and periodontal conditions.
2. Older adults with certain systemic diseases have signs of periodontal disease.
3. Older adults can accurately report periodontal conditions that are observable (i.e. healthy gums, bleeding upon brushing, teeth mobility).
4. Older adults with certain systemic diseases and who smoke are report more periodontal problems.

2. Materials and methods

2.1. Sample

A total of 201 older subjects from western Turkey participated, completing oral health assessments and health histories, and providing information on their demographic backgrounds. They were identified from adults who were patients of record at Ege University School of Dentistry. Subjects older than 55 years were included to the study. Data were collected from these patients over a period of 15 months between March 2008 and May 2009. Edentulous subjects were excluded. Eligible subjects gave written informed consent in accordance with the Helsinki Declaration. The study protocol was approved by the Ethics Committee of the Medical Faculty of Ege University.

2.2. Health history

All subjects were interviewed about their previous medical and dental histories, and were asked to complete a health questionnaire, which was then reviewed by project dentists. The validity of this information was confirmed by reviewing subjects' national health insurance records, and correcting self-reports of systemic diseases and medications as needed.

Based on the literature review presented above, diseases of interest in this study are: CVD, hypertension, diabetes, osteoporosis, high cholesterol, and kidney diseases. For each of these conditions, if the subject reported the condition, they were asked if they were currently using a medication for that condition.

2.3. Smoking habits

Because smoking habits have been associated with periodontal disease, all enrolled subjects were questioned about this behavior. They were asked if they had (1) never smoked, (2) quit smoking and when, or (3) if they were still smoking. Also, for current and former smokers, we asked the duration of smoking and number of cigarettes smoked per day.

2.4. Oral assessments

The oral examinations were performed by two experienced periodontists (Ö.Ö. and S.B.). The inter-examiner agreement for the measurement of clinical periodontal status showed good reliability, with an inter-examiner reliability coefficient alpha of 0.81. Each subject received a full mouth intraoral examination. Examiners also recorded the number of remaining teeth and dentures.

Six sites per tooth were assessed in the mesiobuccal (MB), midbuccal (B), distobuccal (DB), distolingual (DL), midlingual (L), and mesiolingual (ML) sites. Measurements of GI (Silness & Løe, 1964) and PI (Løe & Silness, 1963) scores on six Ramfjord teeth (right maxillary first molar, left maxillary central incisor, left maxillary first premolar, left mandibular first molar, right mandibular central incisor and right mandibular first premolar) were recorded. If any of these six teeth was missing, we assessed the opposing tooth, or if that tooth was also missing we examined one of the adjacent teeth. The full mouth recordings of probing depth (six sites per tooth) were also made and used for the assignment of sextant-based CPITN scores (Ainamo & Ainamo, 1985).

2.5. Self-reports of oral health

In addition to the clinical indicators of periodontal disease and missing teeth, we asked subjects if they had the following observable conditions:

1. Do your gums bleed when you brush? Yes/No
2. Are your teeth mobile? Yes/No
3. Are your gums healthy? Yes/No

3. Statistical analysis

The relevant data from patient surveys were collected and recorded on a pre-established spreadsheet using a code book with specific diseases, medications and oral conditions listed. A frequency distribution was created for each of the systemic diseases and medications. Descriptive statistics including frequencies, means, standard deviations, and ranges were conducted, using the SAS statistical program (SAS statistic software, version 8.2 (SAS Institute, Cary, NC).

In order to test the four hypotheses proposed above, we conducted a series of t-tests, chi square tests and Mann-Whitney *U* tests. To test the first hypothesis, chi square tests were conducted to assess the association between gender and systemic diseases to determine not just associations between and rates of disease, but also the direction of any observed differences. *T*-tests were used to compare men and women on their clinical oral health status, and

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