

Systemic disorders in patients with periodontal disease

Maria Lagervall¹, Leif Jansson¹
and Jan Bergström²

¹Department of Periodontology at Skanstull, Folk tandvården i Stockholms län AB, Stockholm; ²The Institution of Odontology, Karolinska Institutet, Stockholm

Lagervall M, Jansson L, Bergström J: Systemic disorders in patients with periodontal disease. *J Clin periodontol.* 2003; 30: 293–299. © Blackwell Munksgaard, 2003.

Abstract

Background, aims: Over the past 10 years several studies have been published pointing towards a relationship between periodontal disease and various systemic disorders or diseases. The purpose of this retrospective study was to investigate the occurrence of self-reported systemic disorders in patients referred to a specialist clinic for periodontal treatment and to explore possible relationships between general health and periodontal disease severity in this population.

Material and Methods: Data were collected from the dental records and the health questionnaires of 1006 subjects. Stepwise multiple linear regression analyses were adopted to calculate correlations between systemic disorders as independent variables and number of remaining teeth and the relative frequency of periodontal pockets of 5 mm or more, respectively, as the dependent variable.

Results: The number of remaining teeth was significantly and positively correlated to the presence of cardiovascular disease, diabetes and rheumatoid disease after adjustment for age, sex and smoking. The relative frequency of diseased sites, however, was not significantly correlated to any one of the investigated systemic health disorders.

Conclusion: No significant associations between investigated systemic disorders and periodontal disease severity were found if the relative frequency of deep periodontal pockets was used as the clinical parameter for periodontal disease severity. However, cardiovascular disease, diabetes and rheumatoid disease were found to be significantly correlated to number of lost teeth, which may represent one aspect of periodontal health. This result held true in nonsmokers only.

Key words: cardiovascular disease; diabetes; health questionnaire; periodontitis; rheumatoid disease; systemic disorder; tooth loss

Accepted for publication 2 July 2001

Over the past 10 years, several studies have been published pointing towards an association between periodontal disease and some systemic disorders or diseases (for a review, see Garcia et al. 2001). Significant associations have been reported between periodontal disease and cardiovascular disease (Mattila et al. 1989, 1993, 1995, 1998, Mattila 1993, Paunio et al. 1993, Beck et al. 1996, 1998), cerebral infarction (Syrjänen et al. 1989, Loesche & Lopatin 1998), diabetes (Kinane & Chestnutt 1997, Grossi et al. 1998), rheumatoid arthritis (Mercado et al. 2000) and all-cause mortality (Garcia et al. 1998).

A large proportion of patients with periodontal disease are affected by systemic disorders (Brasher & Rees 1970, Rees & Brasher 1974, Eggleston 1977, Brady & Martinoff 1980, Nery et al. 1987, Peacock & Carson 1995). The

disorders most commonly encountered in patients with periodontal disease are allergy (Rees & Brasher 1974), cardiovascular disorders (Rees & Brasher 1974, Nery et al. 1987, Peacock & Carson 1995), endocrine disorders (Rees & Brasher 1974, Nery et al. 1987, Peacock & Carson 1995), blood vascular disorders (Rees & Brasher 1974) and orthopaedic diseases including arthritis (Rees & Brasher 1974) and rheumatoid arthritis (Mercado et al. 2000). The prevalence of diabetes in periodontal patients was reported to be about 4% (Brasher & Rees 1970, Peacock & Carson 1995). The prevalence of systemic conditions that could affect the outcome of periodontal therapy has been reported to vary between 39.9% (Rees & Brasher 1974) and 52.5% (Peacock & Carson 1995). The age distributions of the subjects vary in

different reports, and an advancing age of periodontal patients has been found to be significantly correlated to the prevalence of systemic disorders (Nery et al. 1987). A considerable proportion of patients suffered from more than one disorder (Nery et al. 1987).

Studies in this field show extensive variations in design, conduct and type of measurement of periodontal health, and procedures for capture of medical health data. Oral health has been evaluated by using clinical and radiographic variables as well as different indices (Mattila et al. 1989, 1993, 1995, 1998, Mattila 1993). The prevalence and severity of periodontal disease have been based on alveolar bone height (DeStefano et al. 1993, Beck et al. 1996, Garcia et al. 1998, Mercado et al. 2000), number of missing teeth (Paunio et al. 1993, Joshipura et al. 1996), oral hygiene

(DeStefano et al. 1993, Kweider et al. 1993, Syrjänen et al. 1989) and probing pocket depth (Beck et al. 1996, Garcia et al. 1998).

Medical health data have been collected from clinical examinations by physicians (Mattila et al. 1989, 1993, Mattila 1993, Joshipura et al. 1996), medical records (Garcia et al. 1998), self-reported questionnaires (Joshipura et al. 1996, Mercado et al. 2000) as well as combinations of these methods.

The purpose of the present investigation was to investigate the occurrence of self-reported systemic disorders in patients referred to a specialist clinic for periodontal treatment and to explore possible relationships between systemic disorders and the severity of periodontal disease in this population.

Material and Methods

The investigation was conducted as a retrospective study based on consecutive selection of patients at the Department of Periodontology, Skanstull, Stockholm. Patients referred during the time period from 1995 to 1999 were included in the study if they fulfilled the following inclusion criteria at the time of admission:

- at least 20 remaining teeth and at least 5 teeth with periodontally diseased sites with a probing depth of 5 mm or more;
- a minimum age of 40 years; and
- an adequately completed health questionnaire.

The final sample included 1006 individuals, referred by about 350 dentists. The subjects consisted of 426 males and 580 females, who met the above criteria. From the dental records and the health questionnaires, the following variables were recorded:

- age, sex and smoking habits;
- number of remaining teeth;
- number of periodontally diseased sites with a probing depth of 5 mm or more; and
- self-reported presence of cardiovascular disease, hypertension, diabetes, other endocrine disorders, rheumatoid disease, allergy, psychogenic disorders and self-perceived state of health.

Self-perceived state of health was evaluated by the patient by choosing one of three alternatives in the health questionnaire: good, moderate or bad. Periodontal disease severity was given by two measures: number or percentage of diseased sites and number of retained teeth.

Statistical analysis

Descriptive statistics and statistical analyses were performed with a computerised statistical package (SPSS PC+4.0, SPSS, Inc., Chicago, IL, USA). In the analyses, the variable smoking was coded 0 for nonsmokers or former smokers and 1 for smokers. Sex was coded 0 for female and 1 for male. A good state of health was coded 0, while a bad or a moderate state of health was coded 1. In addition, all self-reported diseases were coded as dichotomous variables (0 = no disease, 1 = self-reported disease). Spearman's correlation coefficient was calculated in order to examine the correlation between the independent variables. Forward stepwise multiple linear regression analyses were adopted to calculate partial correlations, and to investigate the influence of the independent variables on the two dependent variables number of remaining teeth and the relative frequency of periodontal pockets ≥ 5 mm. Results were considered to be statistically significant at $p < 0.05$.

Results

The mean age of the patients was 53.1 years (range 40–86 years). Altogether, 49% of the patients reported current smoking and 9% that they were former smokers, leaving 42% who were considered nonsmokers. The relative frequency of male smokers was 42.2%, while 53.3% of the women reported that they smoked. The mean age of the smokers was 50.5 years (SD 6.90) as against 55.4 (SD 9.50) years for nonsmokers.

The occurrences of self-reported systemic disorders as well as the subjects' self-perceived state of health are presented in Table 1. The most frequent disorder was allergy, which was reported by 24.2% of the patients, and the least frequent was rheumatoid disease (3.4%). The presence of cardiovascular disease was more frequently reported by men, while the prevalences of rheumatoid disease, diabetes, psychogenic disorders, endocrine disorders and allergy were found to be higher for women. 49.4% of patients had at least one of these disorders.

The mean number of remaining teeth for the whole sample was 25.3 (range 20–32). Patients who reported the presence of cardiovascular disease, hypertension, rheumatoid disease or diabetes had fewer remaining teeth as compared to those not reporting these diseases (Table 2). The mean relative frequencies of sites with periodontal pockets ≥ 5 mm in patients, according to the systemic disorders, are presented in Table 2.

The presence of cardiovascular disease, hypertension, diabetes or rheumatoid disease or a self-perceived bad state of health was found to be significantly associated with a decreasing number of remaining teeth when run together with age, sex and smoking as covariables (Table 3). Multiple correlations were found between the independent variables (Table 4). A significant correlation was found between increasing age and all self-reported disorders, while correlations between sex and the disorders were significant for all disorders except hypertension and rheumatoid disease. Smoking was significantly more prevalent among younger patients.

The results of the forward stepwise regression analysis, using the number of remaining teeth as the dependent variable, indicated that cardiovascular

Table 1. Occurrence of systemic disorders and self-perceived state of health in patients with periodontitis

Systemic disorder	Males (%)	Females (%)	Total (%)
Allergy	17.1	29.3	24.2
Cardiovascular disease	12.4	8.4	10.1
Diabetes	4.0	6.1	4.9
Hypertension	14.8	14.7	14.7
Other endocrine disorders	0.2	7.6	4.5
Psychogenic disorders	8.7	13.8	11.6
Rheumatoid disease	2.6	4.0	3.4
Bad or moderate self-perceived state of health	15.6	18.0	17.0

Table 2. Means (standard deviation) for number of remaining teeth and relative frequencies (standard deviation) of periodontal pockets ≥ 5 mm according to presence of investigated independent variables

Independent variable		<i>n</i>	Number of teeth mean (SD)	% of periodontal pockets ≥ 5 mm mean (SD)
Allergy	-	763	25.3 (3.49)	28.1 (16.2)
	+	243	25.4 (2.90)	26.5 (16.7)
Cardiovascular disease	-	899	25.5 (3.21)	28.0 (16.4)
	+	107	23.8 (4.30)	25.4 (16.0)
Diabetes	-	957	25.4 (3.34)	27.8 (16.4)
	+	49	23.8 (3.61)	26.0 (14.8)
Hypertension	-	858	25.5 (3.28)	28.0 (16.4)
	+	148	24.2 (3.69)	25.9 (16.1)
Other endocrine disorders	-	961	25.3 (3.40)	27.9 (16.4)
	+	45	25.2 (2.77)	22.5 (14.3)
Psychogenic disorders	-	889	25.3 (3.43)	27.8 (16.4)
	+	117	25.1 (2.94)	27.1 (16.2)
Rheumatoid disease	-	972	25.4 (3.39)	27.9 (16.4)
	+	34	24.2 (2.75)	22.3 (13.4)
Self-perceived state of health (- = bad or moderate, + = good)	-	171	24.6 (3.46)	28.1 (15.8)
	+	835	25.5 (3.29)	27.6 (16.6)

Table 3. Partial correlations between investigated variables and number of remaining teeth in a multiple regression model with age, sex and smoking included as independent variables

Independent variable	Partial correlation	<i>p</i>
Allergy	-0.009	NS
Cardiovascular disease	-0.090	0.004
Diabetes	-0.076	0.017
Hypertension	-0.064	0.042
Other endocrine disorders	0.029	NS
Psychogenic disorders	-0.046	NS
Rheumatoid disease	-0.075	0.017
Self-perceived state of health	-0.092	0.004

disease, diabetes and rheumatoid disease were significantly and positively correlated to the number of teeth lost in the final step after adjustment for age, sex and smoking (Table 5). After stratification according to sex, the presence of cardiovascular disease remained significantly and negatively correlated to number of remaining teeth in men (Table 6A), while in women, diabetes and rheumatoid disease remained significantly and negatively correlated to number of remaining teeth when adjusted for age and smoking (Table 6B). After stratification of the sample according to smoking, the presence of cardiovascular disease,

diabetes and rheumatoid disease remained significant factors for fewer remaining teeth in nonsmokers when adjusted for age and sex (Table 7A). In smokers, none of the investigated systemic disorders were significantly correlated to number of remaining teeth (Table 7B).

Stepwise multiple regression analyses using the relative frequency of diseased sites with pocket depths ≥ 5 mm as the dependent variable showed that men and smokers had significantly more diseased sites than women and nonsmokers, respectively. However, none of the investigated systemic disorders was significantly correlated to the relative frequency of diseased sites.

Discussion

In the present study, the relations between systemic health and periodontal condition in terms of number of remaining teeth and periodontal pocket frequency were investigated using the cross-sectional data of 1006 patients referred to a periodontal clinic from the private as well as the public dental care sectors. The study subjects were residents of the Stockholm metropolitan area, representing individuals with different levels of education and socioeconomic background. Since the main purpose of the study was to investigate the relation between systemic disorders and chronic adult periodontal disease, only individuals aged 40 years or older were included. Another criterion for inclusion was a minimum of 20 remain-

Table 4. Pairwise bivariate correlations between investigated variables

	Sex	Smoking	Cardiovascular disease	Hypertension	Rheumatoid disease	Diabetes	Endocrine disorders	Psychogenic disorders	Allergy	State of health
Age	0.071*	-0.265***	0.216***	0.254***	0.095**	0.113***	0.059*	-0.064*	-0.054*	0.009NS
Sex		-0.105***	0.075**	0.005NS	-0.038NS	0.059*	-0.174***	-0.082**	-0.134***	-0.017NS
Smoking			-0.140***	-0.141***	-0.040NS	-0.086**	-0.001NS	0.036NS	-0.005NS	0.030NS
Cardiovascular disease				0.364***	-0.025NS	0.102**	0.012NS	0.092**	0.038NS	0.173***
Hypertension					0.095**	0.096**	0.066*	0.073*	0.057*	0.134***
Rheumatoid disease						-0.007NS	0.014NS	0.069*	0.011NS	0.112***
Diabetes							0.028NS	0.022NS	-0.036NS	0.113***
Endocrine disorders								0.077**	0.032NS	0.080**
Psychogenic disorders									0.040NS	0.393***
Allergy										0.045NS

**p* < 0.05.

***p* < 0.01.

****p* < 0.001.

Table 5. Results of forward stepwise regression analysis using number of remaining teeth as the dependent variable

Independent variable	Coefficient	Standard error	<i>p</i>
Age	-0.150	0.012	<0.001
Sex	0.443	0.199	0.026
Smoking	-0.989	0.204	<0.001
Cardiovascular disease	-0.918	0.333	0.006
Diabetes	-1.02	0.457	0.026
Rheumatoid disease	-1.35	0.539	0.012
Constant	33.7	0.675	<0.001

n = 1006,
*R*² = 0.17.

Table 6. Results of forward stepwise regression analyses when stratified according to sex, using number of remaining teeth as the dependent variable

Independent variable	Coefficient	Standard error	<i>p</i>
<i>A. Males (n = 426, R² = 0.19)</i>			
Age	-0.143	0.019	<0.001
Smoking	-1.35	0.324	<0.001
Cardiovascular disease	-1.83	0.494	<0.001
Constant	33.6	0.735	<0.001
<i>B. Females (n = 580, R² = 0.17)</i>			
Age	-0.152	0.015	<0.001
Smoking	-0.725	0.262	0.006
Diabetes	-1.51	0.638	0.018
Rheumatoid disease	-1.51	0.633	0.018
Constant	33.7	0.868	<0.001

Table 7. Results of forward stepwise regression analyses when stratified according to smoking, using number of remaining teeth as the dependent variable

Independent variable	Coefficient	Standard error	<i>p</i>
<i>A. Nonsmokers (n = 423, R² = 0.23)</i>			
Age	-0.149	0.015	<0.001
Sex	0.734	0.268	0.006
Cardiovascular disease	-0.967	0.396	0.015
Diabetes	-0.967	0.347	0.006
Rheumatoid disease	-1.53	0.679	0.025
Constant	33.6	0.816	<0.001
<i>B. Smokers (n = 489, R² = 0.10)</i>			
Age	-0.149	0.020	<0.001
Constant	32.8	1.05	<0.001

ing teeth, in order to minimise the influence of tooth number on the total number of pockets.

The alveolar bone height was not assessed and, consequently, no information is available concerning the degree of periodontal bone loss in the present population. Previous observations in populations from the same clinic, however, demonstrated that the mean bone loss in those samples was approximately 5 mm (Jansson et al. 1993, 1995).

In a retrospective study, like the present, the reliability is not as high as for prospective studies since the inter-examiner variability is most likely higher. However, as long as there are no

systematic errors, a larger size of the sample studied may compensate for a high variance between the observations. The present results were based on self-reported data of systemic health conditions and self-perceived well-being. The response outcomes to the questionnaire items may therefore suffer from inaccuracy. Respondents may under-report, over-report or choose not to respond. This may lead to limitations regarding the validity when interpreting the results in this retrospective study. Some previous studies have explored the validity of a simple medical questionnaire in dentistry (Eggleston 1977, Brady & Martinoff 1980, Levy &

Jacobsen 1991, Bradford et al. 1993, Loesche & Lopatin 1998). The validity seems to vary within a rather wide range (66–95%) for different disorders and studies.

A great majority of the investigated variables were found to be significantly correlated to each other. In order to control for these collinear relationships as well as for confounding effects of age, sex and smoking, a multivariable analytical technique (stepwise multiple regression analysis) was adopted. In addition, stratification according to sex and smoking was performed to explore the possible influence of these factors on the investigated systemic health conditions.

Smoking is an established risk factor of periodontal disease (Bergström & Eliasson 1987, Feldman et al. 1987, Bergström & Flodérus-Myrhed 1983, Bergström & Preber 1994, Grossi et al. 1995, Bergström et al. 2000). The smokers of the present sample were found to have a significantly greater frequency of periodontal pockets compared to the nonsmokers. Consequently, the significant correlation between smoking and periodontal disease was also demonstrated in the present study. The sample of the present study was not randomly selected from a normal population but consisted of periodontal disease patients referred for periodontal treatment. Unlike smoking and sex, however, none of the systemic disorders investigated was significantly correlated to the frequency of periodontal pockets, suggesting that the systemic health variables investigated are not associated with periodontal disease severity.

In contrast, however, the number of remaining teeth was found to be significantly correlated to several systemic disorders. An important question is then whether or not the number of remaining teeth, or rather tooth mortality, is a valid measure or true endpoint of periodontal disease. In an earlier study in Scandinavia, periodontal disease was found to be one of the most frequent causes of tooth loss at ages beyond 40 (Klock & Haugejorden 1991). In addition, the number of remaining teeth was found to be strongly correlated to alveolar bone height (Lavstedt & Eklund 1975, Bolin et al. 1986). Thus, the variable of remaining teeth might be regarded as an approximate measure of the degree of periodontal bone loss. The mean periodontal pocket depth has also been found to be significantly correlated

to the mean alveolar bone height in patients with periodontal disease (Jansson et al. 1993).

In the present study, the presence of cardiovascular disease, diabetes and rheumatoid disease were significantly associated with an increased frequency of lost teeth. The regression model showed an additive effect of about one lost tooth for every systemic disorder, with a significant impact on tooth loss corresponding to an increase of less than 1% explained variance. A significant association between number of remaining teeth and presence of cardiovascular disease has been reported in several earlier studies (DeStefano et al. 1993, Mattila 1993, Mattila et al. 1993, Paunio et al. 1993, Joshipura et al. 1996, Jansson et al. 2001), while other studies report the absence of such correlations (Hujuel et al. 2000, Mattila et al. 2000). Diabetes is regarded as a risk factor of periodontal disease (Genco 1996, Gustke 1999), and a significant correlation between tooth loss and diagnosed diabetes type 1 has been reported (Moore et al. 1998).

The present results suggest a prevalence of 3.4% of rheumatoid disease in periodontitis patients. This is in accordance with a prevalence of 3.9% in periodontitis patients as compared to less than 1% in a general group of patients in a recently published study (Mercado et al. 2000). The prevalence of self-reported cardiovascular disease and diabetes was 14.2% and 6.1%, respectively (Mercado et al. 2000), while the corresponding prevalences in the present study were 10.1% and 4.9%. However, comparisons of prevalence of disorders between different studies may be biased due to factors such as different age groups and methods of data collection.

There are several possible explanations for significant correlations between tooth loss and systemic disorders. The main reason for tooth extractions among 60–80 year olds in Sweden was found to be caries (Fure & Zickert 1997). This is in accordance with the results from an epidemiological study (Ong 1998). However, increased associations between periodontal disease and tooth loss have been reported recently (Hamasha et al. 1998, Ong 1998), as well as a higher percentage of tooth extractions caused by periodontitis with increasing age (Haddad et al. 1999, Chestnutt et al. 2000). Tooth mortality has been found to be correlated to an

increased clinical attachment loss and alveolar bone loss in individuals with little or no periodontal disease at baseline (Machtei et al. 1999). Other possible explanations for tooth loss could be behaviourally related factors (Joshipura et al. 1998), such as lifestyle factors and the frequency of dental visits. Periodontal disease has been reported to be significantly associated with low levels of physical fitness and an impaired medical status (Wakai et al. 1999), which indicates that periodontal disease may be associated with poor general health. In addition, an increased risk of all-cause mortality has been found for individuals with periodontal disease (DeStefano et al. 1993, Garcia et al. 1998).

The correlations between systemic disorders and number of remaining teeth may have been even stronger if patients with a limited number of remaining teeth had been included. However, the main purpose of the present study was to investigate the relation between periodontal disease and presence of systemic disorders. In addition, tooth loss may be caused by factors other than periodontal disease. The associations between number of lost teeth and systemic disorders will be investigated in a future study from the same population without restrictions according to number of remaining teeth or age.

In conclusion, the present observations do not support associations between systemic disorders such as cardiovascular disease, diabetes and rheumatoid disease and periodontal disease as expressed in terms of number of deep periodontal pockets. Tooth mortality, however, was associated with the presence of cardiovascular disease, diabetes and rheumatoid disease. To what extent tooth mortality specifically captures periodontal disease morbidity in this population is currently unknown.

Acknowledgements

The authors wish to express their sincere thanks to Ms Birgitta Sunehed for technical and administrative assistance. This study was supported by Stockholm County Council (SLL).

Zusammenfassung

Systemische Erkrankungen bei Patienten mit Parodontitis

Hintergrund: Während der letzten 10 Jahre wurden zahlreiche Studien publiziert, die auf einen Zusammenhang zwischen Parodontitis

und verschiedenen systemischen Störungen und Erkrankungen hinweisen.

Zielsetzung: Feststellung der Häufigkeit von selbst angegebenen systemischen Erkrankungen bei Patienten, die an eine parodontologische Spezialklinik zur Parodontitistherapie überwiesen worden waren, in einer retrospektiven Studie und Untersuchung möglicher Zusammenhänge zwischen allgemeiner Gesundheit und dem Schweregrad parodontaler Erkrankungen in dieser Bevölkerungsgruppe.

Material und Methoden: Die Daten wurden aus den Behandlungsakten und Gesundheitsfragebögen von 1006 Personen gewonnen. Eine schrittweise multiple lineare Regressionsanalyse wurde verwendet, um Korrelationen zwischen systemischen Erkrankungen als unabhängigen Variablen und der Zahl verbliebener Zähne bzw. der relativen Häufigkeit parodontaler Taschen ≥ 5 mm als abhängigen Variablen zu berechnen.

Ergebnisse: Nach Korrektur für Alter, Geschlecht und Rauchen war die Zahl verbliebener Zähne signifikant positiv mit Herz-Kreislauf-Erkrankungen, Diabetes und rheumatischen Erkrankungen korreliert. Die relative Häufigkeit erkrankter Stellen war allerdings mit keiner der untersuchten systemischen Erkrankungen korreliert.

Schlussfolgerung: Wenn die relative Häufigkeit tiefer parodontaler Taschen als Maß für den Schweregrad parodontaler Erkrankung gewählt wurde, ließ sich keine Assoziation zwischen den untersuchten systemischen Erkrankungen und dem Parodontitisschweregrad zeigen. Allerdings waren Herz-Kreislauf-Erkrankungen, Diabetes und rheumatischen Erkrankungen signifikant mit der Zahl verlorener Zähne korreliert, die einen Aspekt parodontaler Gesundheit repräsentieren. Dieses Ergebnis ergab sich aber nur für Nichtraucher.

Résumé

Désordres systémiques chez les patients atteints de maladie parodontale

Références et buts: Au cours des 10 dernières années, plusieurs études ont été publiées pour souligner une relation entre la maladie parodontale et diverses désordres ou maladies systémiques. Cette étude rétrospective se propose de rechercher l'apparition de désordres systémiques racontés par des patients adressés à une clinique spécialisée pour traitement parodontal et d'explorer de possibles relations entre la santé générale et la sévérité de la maladie parodontale dans cette population.

Matériel et Méthodes: Les données furent récoltées des dossiers dentaires et des interrogatoires médicaux de 1006 sujets. Une analyse de régression multiple linéaire échelonnée a été utilisée pour calculer les corrélations entre les désordres systémiques en tant que variables indépendantes et le nombre de dents restantes et la fréquence relative de poches parodontales d'au moins 5mm, respectivement, comme variable dépendante.

Résultats: le nombre de dents restantes était significativement et positivement corrélé à la présence de maladies cardiovasculaires, de diabète et de maladie rhumatoïde après ajustement pour l'âge, le sexe, et le tabagisme. La

relative fréquence de sites malades, cependant, n'était corrélée à aucun des désordres systémiques étudiés.

Conclusion: Aucune association significative entre les désordres systémiques étudiés et la sévérité de la maladie parodontale ne fut trouvée lorsque la fréquence relative de poches parodontales profondes était utilisée comme paramètre clinique pour définir la sévérité de la maladie parodontale. Cependant, une maladie cardio-vasculaire, le diabète, une maladie rhumatoïde sont corrélées significativement au nombre de dents perdues qui peut être représentatif d'un aspect de santé parodontale. Ces résultats n'étaient valables que chez les non fumeurs.

References

- Bergström, J. & Eliasson, S. (1987) Cigarette smoking and alveolar bone height in subjects with a high standard of oral hygiene. *Journal of Clinical Periodontology* **14**, 466–469.
- Bergström, J., Eliasson, S. & Dock, J. (2000) A 10-year prospective study of tobacco smoking and periodontal health. *Journal of Periodontology* **71**, 1338–1347.
- Bergström, J. & Flodérus-Myrhed, B. (1983) Co-twin control study of the relationship between smoking and some periodontal disease factors. *Community of Dentistry and Oral Epidemiology* **11**, 113–116.
- Bergström, J. & Preber, H. (1994) Tobacco use as a risk factor. *Journal of Periodontology* **65**, 545–550.
- Beck, J. D., Garcia, R., Heiss, G., Vokonas, P. S. & Offenbacher, S. (1996) Periodontal disease and cardiovascular disease. *Journal of Periodontology* **67**, 1123–1137.
- Beck, J. D., Offenbacher, S., Williams, R., Gibbs, P. & Garcia, R. (1998) Periodontitis: a risk factor for coronary heart disease? *Annals of Periodontology* **3**, 127–141.
- Bolin, A., Lavstedt, S. & Henrikson, C. O. (1986) Proximal alveolar bone loss in a longitudinal radiographic investigation. Some predictors with a possible influence on the progress in an unselected material. *Acta Odontologica Scandinavica* **44**, 257–262.
- Bradford, V. P., Graham, B. P. & Reinert, K. G. (1993) Accuracy of self-reported health histories: a study. *Military Medicine* **158**, 263–265.
- Brady, W. F. & Martinoff, J. T. (1980) Validity of health history data collected from dental patients and patient perception of health status. *Journal of American Dental Association* **101**, 642–645.
- Brasher, W. J. & Rees, T. D. (1970) Systemic conditions in the management of periodontal patients. *Journal of Periodontology* **41**, 349–352.
- Chestnutt, I. G., Binnie, V. I. & Taylor, M. M. (2000) Reasons for tooth extraction in Scotland. *Journal of Dentistry* **28**, 295–297.
- DeStefano, F., Anda, R. F., Kahn, H. S., Williamson, D. F. & Russell, C. M. (1993) Dental disease and risk of coronary heart disease and mortality. *British Medical Journal* **13**, 688–691.
- Eggleston, D. J. (1977) The value of a simple medical questionnaire in dentistry. *Australian Dental Journal* **22**, 160–164.
- Feldman, R. S., Alman, J. E. & Chauncey, H. H. (1987) Periodontal disease indexes and tobacco smoking in healthy aging men. *Gerodontology* **1**, 43–46.
- Fure, S. & Zickert, I. (1997) Incidence of tooth loss and dental caries in 60-, 70- and 80-year-old Swedish individuals. *Community Dentistry and Oral Epidemiology* **25**, 137–142.
- Garcia, R. I., Henshaw, M. H. & Krall, E. A. (2001) Relationship between periodontal disease and systemic health. *Periodontology 2000* **25**, 21–36.
- Garcia, R. I., Krall, E. A. & Vokonas, P. S. (1998) Periodontal disease and mortality from all causes in the VA dental longitudinal study. *Annals of Periodontology* **3**, 339–349.
- Genco, R. J. (1996) Current view of risk factors for periodontal diseases. *Journal of Periodontology* **67**, 1041–1049.
- Grossi, S. G. & Genco, R. J. (1998) Periodontal disease and diabetes mellitus: a two-way relationship. *Annals of Periodontology* **3**, 51–61.
- Grossi, S. G., Genco, R. J., & Machtei, E. E., Ho, A. W., Koch, G., Dunford, R., Zambon, J. J. & Hausmann, E. (1995) Assessment of risk for periodontal disease. II. Risk indicators for alveolar bone loss. *Journal of Periodontology* **66**, 23–29.
- Gustke, C. J. (1999) Treatment of periodontitis in the diabetic patient. *Journal of Clinical Periodontology* **26**, 133–137.
- Haddad, I., Haddadin, K., Jebri, S., Ma'ani, M. & Yassin, O. (1999) Reasons for extraction of permanent teeth in Jordan. *International Dental Journal* **49**, 343–346.
- Hamasha, A. A., Hand, J. S. & Levy, S. M. (1998) Medical conditions associated with missing teeth and edentulism in the institutionalized elderly. *Special Care Dentistry* **18**, 123–127.
- Hujoel, P. P., Drangsholt, M., Spiekerman, C. & DeRouen, T. A. (2000) Periodontal disease and coronary heart disease risk. *Journal of American Medical Association* **284**, 1406–1410.
- Jansson, L., Ehnevid, H., Lindskog, S. & Blomlöf, L. (1993) Radiographic attachment in periodontitis-prone teeth with endodontic infection. *Journal of Periodontology* **64**, 947–953.
- Jansson, L., Ehnevid, H., Lindskog, S. & Blomlöf, L. (1995) The influence of endodontic infection on progression of marginal bone loss in periodontitis. *Journal of Clinical Periodontology* **22**, 729–734.
- Jansson, L., Lavstedt, S., Frithiof, L. & Theobald, H. (2001) Relationship between oral health and mortality in cardiovascular diseases. *Journal of Clinical Periodontology* **28**, 762–768.
- Joshi, K. J., Douglass, C. W. & Willett, W. C. (1998) Possible explanations for the tooth loss and cardiovascular disease relationship. *Annals of Periodontology* **3**, 175–183.
- Joshi, K. J., Rimm, E. B., Douglass, C. W., Trichopoulos, D., Ascherio, A. & Willett, W. C. (1996) Poor oral health and coronary heart disease. Rapid Communication. *Journal of Dental Research* **75**, 1631–1636.
- Kinane, D. F. & Chestnutt, I. G. (1997) Relationship of diabetes to periodontitis. *Current Opinion in Periodontology* **4**, 29–34.
- Klock, K. S. & Haugejorden, O. (1991) Primary reasons for extraction of permanent teeth in Norway: changes from 1968 to 1988. *Community of Dentistry and Oral Epidemiology* **19**, 336–341.
- Kweider, M., Lowe, G. D. O., Murray, G. D., Kinane, D. F. & McGowan, D. A. (1993) Dental disease, fibrinogen and white cell count; links with myocardial infarction? *Scottish Medical Journal* **38**, 73–74.
- Lavstedt, S. & Eklund, G. (1975) Some factors of significance for proximal marginal bone loss studied on an epidemiological material. *Acta Odontologica Scandinavica* **67**, 50–89.
- Levy, S. M. & Jacobsen, J. R. (1991) A comparison of medical histories reported by dental patients and their physicians. *Special Care Dentistry* **11**, 26–31.
- Loesche, W. J. & Lopatin, D. E. (1998) Interactions between periodontal disease, medical diseases and immunity in the older individual. *Periodontology 2000* **16**, 80–105.
- Machtei, E. E., Hausmann, E., Dunford, R., Grossi, S., Ho, A., Davis, G., Chandler, J., Zambon, J. & Genco, R. J. (1999) Longitudinal study of predictive factors for periodontal disease and tooth loss. *Journal of Clinical Periodontology* **26**, 374–380.
- Mattila, K. J. (1993) Dental infections as a risk factor for acute myocardial infarction. *European Heart Journal* **14** (Suppl. K), 51–53.
- Mattila, K. J., Asikainen, S., Wolf, J., Jousimies-Somer, H., Valtonen, V. & Nieminen, M. (2000) Age, dental infections and coronary heart disease. *Journal of Dental Research* **79**, 756–760.
- Mattila, K. J., Nieminen, M. S., Valtonen, V. V., Rasi, V. P., Kesaniemi, Y. A., Syrjala, S. L., Jungell, P. S., Isoluoma, M., Hietaniemi, K. & Jokinen, M. J. (1989) Association between dental health and acute myocardial infarction. *British Medical Journal* **25**, 779–781.
- Mattila, K. J., Valle, M. S., Nieminen, M. S., Valtonen, V. V. & Hietaniemi, K. L. (1993) Dental infections and coronary atherosclerosis. *Atherosclerosis* **103**, 205–211.
- Mattila, K. J., Valtonen, V. V., Nieminen, M. S. & Asikainen, S. (1998) Role of infection as a risk factor for atherosclerosis, myocardial infarction, and stroke. *Clinical Infectious Diseases* **26**, 719–734.
- Mattila, K. J., Valtonen, V. V., Nieminen, M. & Huttunen, J. K. (1995) Dental infection and the risk of new coronary events: prospective study of patients with documented coronary artery disease. *Clinical Infectious Diseases* **20**, 588–592.
- Mercado, F., Marshall, R. I., Klestov, A. C. & Bartold, P. M. (2000) Is there a relationship between rheumatoid arthritis and periodontal

- disease? *Journal of Clinical Periodontology* **27**, 267–272.
- Moore, P. A., Weyant, R. J., Mongelluzzo, M. B., Myers, D. E., Rossie, K., Guggenheimer, J., Hubar, H., Block, H. M. & Orchard, T. (1998.) Type 1 diabetes mellitus and oral health: assessment of tooth loss and edentulism. *Journal of Public Health Dentistry* **58**, 135–142.
- Nery, E. B., Meister, F. Jr., Ellinger, R. F., Eslami, A. & McNamara, T. J. (1987) Prevalence of medical problems in periodontal patients obtained from three different populations. *Journal of Periodontology* **58**, 564–568.
- Ong, G. (1998) Periodontal disease and tooth loss. *International Dental Journal* **48**, 233–238.
- Paunio, K., Impivaara, O., Tiekso, J. & Maki, J. (1993) Missing teeth and ischemic heart disease in men aged 45–64 years. *European Heart Journal* **14** (Suppl. K), 54–56.
- Peacock, M. E. & Carson, R. E. (1995) Frequency of self-reported medical conditions in periodontal patients. *Journal of Periodontology* **66**, 1004–1007.
- Rees, T. D. & Brasher, W. J. (1974) Incidence of certain systemic conditions among patients presenting for periodontal treatment. *Journal of Periodontology* **45**, 669–671.
- Syrjänen, J., Peltola, J., Valtonen, V., Iivanainen, M., Kaste, M. & Huttunen, J. K. (1989) Dental infections in association with cerebral infarction in young and middle-aged men. *Journal of Internal Medicine* **225**, 179–184.
- Wakai, K., Kawamura, T., Umemura, O., Hara, Y., Machida, J., Anno, T., Ichihara, Y., Mizuno, Y., Tamakoshi, A., Lin, Y., Nakayama, T. & Ohno, Y. (1999) Associations of medical status and physical fitness with periodontal disease. *Journal of Clinical Periodontology* **26**, 664–672.

Address:
 Maria Lagervall
 Department of Periodontology
 Folkandvården Skanstull
 Götgatan 100
 118 62 Stockholm
 Sweden
 email: maria.lagervall@ftv.sll.se