Dental care habits, oral hygiene, and gingival health in Swedish professional musicians

Jan Bergström and Sören Eliasson
Department of Periodontology and Oral Radiology, School of Dentistry, Karolinska Institutet, Stockholm, Sweden

Bergström J, Eliasson S. Dental care habits, oral hygiene, and gingival health in Swedish professional musicians. Acta Odontol Scand 1985;43:191–197. Oslo. ISSN 0001–6357.

The investigation covered 250 professional musicians employed in 3 leading national orchestras in Stockholm, Sweden. The aims were to describe dental care habits, such as frequency of dental visits and frequency and methods of oral hygiene, and to relate these habits to oral cleanliness and gingival health in wind and non-wind instrument musicians. The results showed that 81.2% visited their dentist at least once a year and that 82.8% had had such a regular habit for the past 5 years or more. All subjects claimed to brush their teeth daily, and 66.0% used supplementary oral hygiene aids. The clinical examination showed that oral cleanliness and gingival health were of good standard. Mean plaque index was 0.9 and mean gingival index 1.2. Both measures increased with age and were closely correlated ($r = 0.80$). The relationships between the dental care habits studied and the clinical conditions with regard to oral cleanliness or gingival health were rather weak, although trends towards better gingival condition and oral cleanliness were observed with increasing frequency of toothbrushing. The results indicate a high degree of dental conscientiousness in professional musicians. No differences were observed between wind and non-wind instrument musicians. □ *Dental care habits; gingival health; oral hygiene*

Jan Bergström, School of Dentistry, Box 4064, 141 04 Huddinge, Sweden

The prophylactic behavior, attitudes, and motivation of the individual are of great importance for the maintenance or improvement of periodontal health. Since these factors vary from one social group to another, it is reasonable to believe that periodontal health will vary accordingly. It is known, for example, that groups with comparatively high levels of education receive dental care more regularly and practice preventive activities more frequently than others (1). The periodontal health of such groups is likely to be of a comparably good standard.

Professional musicians are one group to whom periodontal health may be of special value. For musicians playing wind instruments the maintenance of periodontal health is of vital importance, since tooth hypermobility and/or tooth loss may have a devastating effect on professional ability. Few studies have been made of periodontal health conditions and dental care habits in various occupational groups in Sweden, and none is concerned with musicians. An investigation in Finland (2) showed that prophylactic activity and dental care frequency among professional musicians were above average as compared with the Finnish population at large. These results suggest a motivational readiness in this group.

The present investigation concerned professional musicians, and its aim was to describe the frequency and regularity of dental visits, to describe habits and measures of oral hygiene, and to relate these factors to the state of oral cleanliness and gingival health. Wind and non-wind instrument musicians were compared with regard to these variables.

Materials

All full-time musicians in the following Stockholm orchestras were asked to take part in the study: Royal Orchestra ($n = 107$), Swedish Radio Symphony Orchestra ($n = 103$), and Stockholm Philharmonic Orchestra ($n = 98$).

The investigation was carried out at the School of Dentistry, Stockholm, between January 1982 and February 1983. All 308

musicians were called, and a total of 250 (212 men and 38 women) appeared for examination. Table 1 shows the present study group by age and sex. The age groups were given Roman numerals I–IV.

Of the 58 individuals who did not appear for examination, 28 could be reached by telephone but did not want to take part because they had recently been examined by their own dentists. By further contact with the dentists in question, available clinical data and radiographs were collected and reviewed. These data were not included in the study but there seemed to be little evidence of any crucial differences between these individuals and those taking part. The other 30 individuals (6 wind instrumentalists and 24 non-wind instrumentalists, 9.7% of the total) could not be reached or did not allow further inspection of their dental records.

Methods

The total examination included collection of interview data, recording of clinical variables, and a full-mouth radiographic examination. The radiographic data will be treated elsewhere.

Interview

Before the clinical examination each subject was interviewed in accordance with a predetermined questionnaire with fixed alternative answers. The following five questions referred to dental care habits:

1) How often do you regularly visit your dentist?
2) For how many years have you had such regular care?
3) When was your last visit?
4) Have you received dental care from a dental hygienist?
5) Have you been informed about periodontal disease?

Another series of four questions was related to oral hygiene habits:

1) How many times a day do you brush your teeth regularly?
2) Do you regularly use a dentifrice?
3) Do you regularly use one or several of the following oral hygiene aids: dental floss, tooth pick, interproximal brush?
4) How do you brush your teeth? The subject was given a soft toothbrush and asked to show his toothbrushing technique *in situ*. For classification the following brushing techniques were distinguished: roll, vertical, Bass, horizontal, and varying.

Clinical examination

The amount of dental plaque was evaluated in accordance with the criteria of Silness & Löe (3). All mesial, buccal, and lingual surfaces were given a score. The plaque index (Pl I) of the subject was calculated as the mean of the sum of scores for the surfaces recorded, the mesial score duplicated. In addition, the relative frequency of surfaces with plaque scores 2 or 3 were given in percentage for each subject.

Supragingival dental calculus was recorded on maxillary and mandibular left and right molars and on maxillary and mandibular incisors. The amount of calculus formed was scored separately for each group of teeth by the criteria of Greene &

Table 1. The distribution of the material by age, sex, and instrument played

Age group, years	Male, *n*		Female, *n*		Total, *n*
	Wind	Non-wind	Wind	Non-wind	
21–30	19	16	5	9	49
31–40	20	29	1	11	61
41–50	30	39	0	4	73
51–60	27	32	0	8	67
Total	96	116	6	32	250

Table 2. Frequency of dental visits: percentage distribution of subjects by age

Age group, years	Frequency, %				Total
	> Once a year	Once a year	Once every 2 years	< Once every 2 years	
21–30	20.4	49.0	20.4	10.2	100
31–40	39.3	37.7	19.7	3.3	100
41–50	34.2	47.9	6.8	10.9	100
51–60	46.3	46.3	6.0	1.5	100
Total	36.0	45.2	12.4	6.4	100

Vermillion (4). The mean calculus score based on the six entities was designated the calculus index (CI) of the subject.

The inflammatory condition of the gingiva as shown by the clinical examination was evaluated by the gingival index method of Löe & Silness (5). The severity of inflammation was recorded at the mesial, buccal, and lingual sites of all teeth. The mean score, calculated in the same manner as for plaque index, formed the subject's gingival index (GI). In addition, the relative frequency of gingival sites with gingival score 2 or 3, denoting gingival bleeding on probing, was calculated for each subject and given in percentage. The occurrence of sites with gingival score 3 was rare.

Statistical testing was performed by means of Student's *t* test, two-tailed. The association between variables was expressed by the product-moment correlation coefficient, *r*.

Results

Dental care habits

The frequency of regular dental visits was high in all age groups (Table 2). On the average 81.2% visited their dentist at least once a year. The number of subjects visiting their dentist at least once a year increased with increasing age. Confirming the results in Table 2, 83.5% answered that they had visited their dentist within the last 12-month period. Only 4.8% had not visited their dentist during the last 3 years or more. In most subjects the stated regularity of dental care had prevailed for a considerable time; 82.8% had had a regular dental care habit for more than 5 years, and 60.0% for more than 10 years (Table 3).

On the average, 14.8% of subjects, varying from 10.2% in age group I to 17.9% in age group IV, had received dental care from a dental hygienist. Information as to the etiology and prevention of periodontal disease was reported by 30.0%. The proportion of subjects who had received information increased with age from 18.4% in age group I to 40.3% in age group IV.

The frequency of daily toothbrushing in accordance with age is shown in Table 4. There were only minor variations with age. On the average, 86.7% brushed their teeth twice a day or more. All respondents claimed to brush their teeth daily and to use dentifrice regularly.

Table 3. Duration of regular dental care: percentage distribution of subjects by age

Age group, years	Duration, %				Total
	< 2 years	2–5 years	6–10 years	> 10 years	
21–30	4.1	24.5	26.5	44.9	100
31–40	4.9	11.5	37.7	45.9	100
41–50	2.7	9.6	15.1	72.6	100
51–60	4.5	10.4	14.9	70.1	100
Total	4.0	13.2	22.8	60.0	100

Table 4. Toothbrushing frequency: percentage distribution of subjects by age

Age group, years	Frequency, %			
	Once a day	Twice a day	> Twice a day	Total
21–30	12.2	67.3	20.4	100
31–40	13.1	63.9	23.0	100
41–50	15.3	63.9	20.8	100
51–60	12.3	60.0	27.7	100
Total	13.4	63.6	23.1	100

Table 6. Percentages of tooth surfaces with plaque score 2 or 3 and percentages of gingival sites with gingival score 2 or 3 by age

Age group, years	Plaque score 2–3, %		Gingival score 2–3, %	
	Mean	SEM	Mean	SEM
21–30	13.8	2.59	25.8	2.96
31–40	15.9	2.61	30.5	2.80
41–50	21.9	2.19	35.3	2.45
51–60	23.0	2.40	42.4	3.48
Total	19.1	1.22	34.1	1.50

Use of supplementary oral hygiene aids was reported by 66.0% of the subjects (Table 5). Dental floss, being the most commonly used single aid, was used by 28.3% and tooth picks by 18.2%. A combination of these two aids, sometimes together with the use of an interproximal brush, was reported by 16.7%. Altogether, the use of supplementary oral hygiene aids became more frequent with increasing age.

Toothbrushing techniques as demonstrated by the subjects themselves showed only small variations among age groups. The most widely used brushing technique was the one classified as varying, which implied various combinations of vertical and horizontal strokes (40.4%). More subjects displayed horizontal brushing techniques (Bass, 17.8%; horizontal, 18.6%) than vertical ones (roll, 7.8%; vertical, 9.3%).

Oral hygiene and gingival health

The results concerning the amount of plaque and calculus and the severity of gingivitis are given in Fig. 1 and Table 6.

Plaque index, calculus index, and gingival index values increased with age in a parallel manner, with peaks in age group III. The means and standard errors of the means for the total sample were Pl I, 0.88 ± 0.03; CI, 0.38 ± 0.02; and GI, 1.24 ± 0.03. The increase in severity between age groups I and III and between I and IV was statistically significant with regard to Pl I, CI, and GI ($P < 0.01$). With regard to CI the increases between age groups I and II and groups II and III were also statistically significant ($P < 0.01$ and $P < 0.05$, respectively). The correlation coefficients between Pl I and GI, between Pl I and CI, and between GI and CI were 0.80, 0.32, and 0.37, respectively.

Similarly, the percentage of surfaces with plaque score 2–3 and the percentage of gingival sites with gingival score 2–3 increased with age, the means for the total sample being 19.1% and 34.1%, respectively (Table 6). The correlation coefficient was 0.60.

The relationships between the variables frequency of dental visits and frequency of daily toothbrushing and those expressing the state of oral hygiene and gingival health were rather weak. Although trends towards

Table 5. Use of oral hygiene aids: percentage distribution of subjects by age

Age group, years	Dental floss, %	Tooth pick, %	Interproximal brush, %	Combinations, %	None, %	Total, %
21–30	30.6	10.2	2.1	6.1	51.0	100
31–40	30.0	16.7	1.7	13.3	38.3	100
41–50	34.7	20.8	1.4	13.9	29.2	100
51–60	18.2	22.7	6.1	30.3	22.7	100
Total	28.3	18.2	2.8	16.7	34.0	100

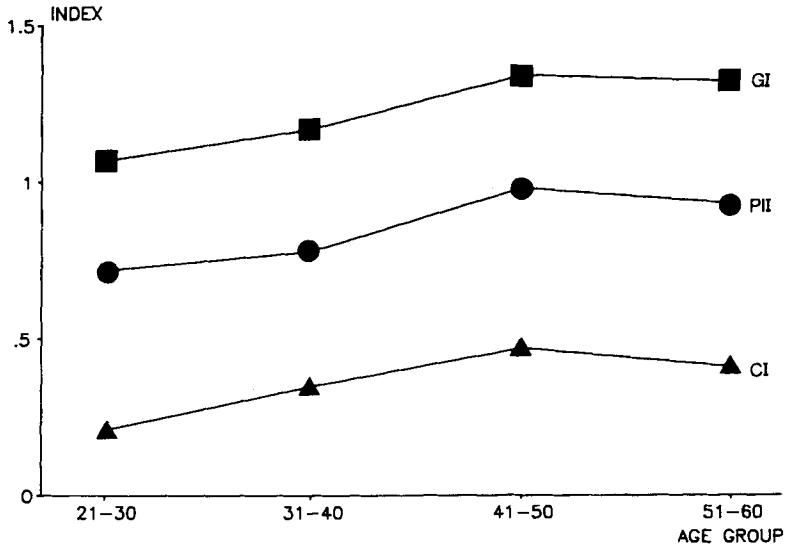

Fig. 1. Calculus index (CI), plaque index (Pl I), and gingival index (GI) in accordance with age.

decreasing values of plaque, calculus, and gingivitis were observed with increasing frequency of daily toothbrushing, the differences observed were small and not statistically significant.

Furthermore, only small differences in calculus, plaque, and gingivitis were observed with regard to toothbrushing technique. One exception was the Bass technique, which was often associated with significantly lower values of these variables than the other techniques (Table 7).

Comparison between wind instrumentalists and non-wind instrumentalists

The dental care habits described were similar in wind and non-wind instrument players, and no statistically significant differences were found. Furthermore, there were no statistically significant differences between wind instrumentalists and non-wind instrumentalists with regard to Pl I (0.85 versus 0.88), Pl score 2–3 (18.4% versus 19.5%), CI (0.36 versus 0.38), GI (1.23 versus 1.25), or gingival score 2–3 (33.8% versus 34.3%).

Discussion

According to the present results more than 80% visited their dentist for yearly checkups, and practically all had dental care or control with some regularity. This is 20% above the average for the Swedish population in general (6) and must be regarded as a high standard of dental care conscientiousness. The present sample seems to correspond quite closely to the high edu-

Table 7. Calculus, plaque, and gingivitis in accordance with toothbrushing technique

Technique	*n*	CI	Pl score 2–3 (%)	G score 2–3 (%)
Roll or vertical	48	0.31	** 21.9	30.2
Bass	46	* 0.27	*** 11.2	** 25.5
Horizontal	48	** 0.41	*** 24.2	*** 39.3
Varying	101	0.41	*** 21.6	38.1

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

cational level, as described (6). Furthermore, the present results indicating an above average dental care conscientiousness in musicians are concordant with the findings of Kilpinen (2) on professional musicians in Finland.

Furthermore, the dental care habits of the present sample seemed to have persisted for a considerable time, most subjects reporting regular dental visits for more than 5 years. It would seem that dental care had been part of most subjects' habitual standard throughout adult life and, with regard to the younger age groups, also during childhood and adolescence. The duration of dental care habits seems to have received little attention previously.

In keeping with the situation among professional musicians, men predominated (~85%) in the present investigation. This fact should be taken into consideration when comparing the results with those of other studies, since men usually have less regular and less frequent dental care habits than women in Sweden (6, 7).

Regular daily toothbrushing was practiced by everybody in the present study. This result is consistent with the observations of Kilpinen (2) but not entirely with those of Håkansson (6), who reported that about 20% of the male population did not brush their teeth regularly every day.

Use of additional dental hygiene aids was reported by some 60–70%. Dental floss was a fairly commonly used adjunct for dental hygiene. According to Chen & Stone (1), use of dental floss is an indicator of a well-motivated prophylactic behavior, thus confirming the impression of a high degree of dental care conscientiousness in the present sample. Thus the high levels of regularity and frequency of dental visits together with the frequency of toothbrushing and use of additional hygiene aids reflect a high motivational readiness and good prophylactic behavior in professional musicians.

The indication of a high motivational readiness was further substantiated by the findings of a high standard of oral cleanliness, as observed in the plaque index, percentage of plaque score 2–3, and calculus index. Plaque index was below 1.0 in all age groups, and the percentage of plaque score 2–3 was clearly below 20% in age groups I and II and only slightly above 20% in age groups III and IV. The 20% level has previously been used as a limit for an acceptable standard of oral cleanliness (8). The standard of oral hygiene observed in the present sample was in fact the same as that attained in subjects after having participated in a supervised continuous hygiene control program (9).

Supragingival calculus increased with age, which agrees with previous investigations in Sweden (10, 11) and elsewhere (12). The increase with age was concomitant with that of plaque, but the correlation between the two variables was rather weak, indicating that formation of supragingival calculus is not simply a function of plaque.

The measures describing gingival health showed an impairment in older age groups, which is consistent with the observations of others (2, 10). The relationship between plaque and gingival condition was rather strong. However, the general level of gingivitis severity was somewhat greater than expected with regard to the generally low plaque level and above that reported in another recent Swedish study (14). This may partly be explained by variations in the methods for assessing the gingival condition.

The correlations between frequency of dental visits and the variables describing gingival health and oral hygiene were weak. This suggests that dental care per se does not necessarily reflect the condition of gingival health or oral hygiene, as has been pointed out by others (6, 13). Furthermore, the correlations between toothbrushing frequency and these variables were not significant. This may be explained by the fact that toothbrushing frequency in this sample was generally high.

With the exception of the Bass technique, toothbrushing technique seemed not to influence oral cleanliness or gingival health. The Bass technique, however, was associated with significantly lower degrees of plaque and gingivitis, indicating a high cleansing efficacy by this method. Since the Bass technique has been widely recommended in Sweden during recent years, it is

also probable that those using this technique were those particularly concerned with their dental health.

Surprisingly few participants reported that they had been informed about the etiology and prevention of periodontal disease. Furthermore, only 15% had been treated by a dental hygienist. Since the number of subjects who had received such information increased with age and thus increasing proneness to disease, these findings might suggest that information is delivered as part of the therapy rather than as a primary prophylactic measure.

The present results indicate that dental care habits, oral hygiene status, and gingival health are similar in musicians playing wind instruments and those playing other instruments. The results are essentially in agreement with those of Kilpinen (2). Thus, wind instrument musicians, although occupationally dependent on healthy teeth and periodontia, do not seem to have a greater motivational readiness than other musicians.

To sum up, the results of the present investigation indicate a good standard of oral cleanliness and gingival health in professional musicians. All practiced daily toothbrushing, and many used additional aids for dental hygiene. They also visited their dentist frequently and regularly. Thus, there seemed to exist a high level of dental health awareness and motivational readiness in these subjects.

Acknowledgements.—The authors gratefully acknowledge the statistical advice of Prof. G. Eklund, Department of Cancer Epidemiology, Karolinska Institutet, Stockholm. Financial support was received from the Swedish Work Environment Fund, 81-0623.

Received for publication 9 October 1984

References

1. Chen M-S, Stone DB. Toothbrushing, flossing and dental visits in relation to socioeconomic characteristics of white American families. Community Dent Oral Epidemiol 1983;11:325–32.
2. Kilpinen E. Condition of teeth and periodontium in male wind instrument players in the city of Helsinki. Proceedings of the Finnish dental society 1976;72(suppl 3).
3. Silness J, Löe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. Acta Odontol Scand 1964; 22:121–35.
4. Greene JC, Vermillion JR. Oral hygiene index: a method for classifying oral hygiene status. J Am Dent Assoc 1960;61:172–8.
5. Löe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. Acta Odontol Scand 1963;21:533–51.
6. Håkansson J. Dental care habits, attitudes towards dental health and dental status among 20–60 year old individuals in Sweden [Thesis]. Lund, 1978.
7. Smedby B. Betydelsen av vissa faktorer för tandvårdskonsumtion. Socialmedicinsk tidskrifts skriftserie 1977;37.
8. Söderholm G. Effect of a dental care program on dental health conditions [Thesis]. Malmö, 1979.
9. Axelsson P, Lindhe J. Effect of controlled oral hygiene procedures on caries and periodontal disease in adults. J Clin Periodont 1978;5:133–51.
10. Hugosson A, Koch G. Oral health in 1000 individuals aged 3–70 years in the community of Jönköping, Sweden. Swed Dent J 1979;3:69–87.
11. Lavstedt S, Eklund G. Some factors of significance for proximal marginal bone loss studied on an epidemiological material. Acta Odontol Scand 1975;33(suppl 67):50–89.
12. Greene JC. Oral hygiene and periodontal disease. Am J Publ Health 1963;53:913–22.
13. Björn A-L. Dental health in relation to age and dental care. Odont Rev 1974(suppl 29).
14. Eneroth L, Sundberg H. Effekten av förebyggande tandvård utförd av specialutbildade tandsköterskor. Delegationen för social forskning, DsS 1984;13.