

Adult diabetic and nondiabetic subjects as users of dental services

A longitudinal study

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Utilization of dental services by 30 diabetic and 30 nondiabetic subjects was assessed by longitudinal monitoring over a period of 3 years. All subjects were examined clinically three times, and their treatment consisted mainly of cariologic and periodontal treatment. The treatment was delivered by a dentist and an expanded-duty dental hygienist. The study groups were similar with regard to the total number of dental visits needed. However, the treatment of diabetic subjects was more demanding in that more dentist's workload was needed for the diabetic group. They also missed more appointments without cancellation and therefore more office time had to be reserved for them. □ *Dental treatment; diabetes mellitus*

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Results of studies so far have indicated that people with diabetes mellitus (1, 2), especially those with poor metabolic control of the disease (3, 4), are at a greater risk of developing periodontal disease than nondiabetic individuals. Diabetics have been shown to have a caries prevalence as high as that of nondiabetic controls (5-8), but contrary findings have also been published (9, 10).

The awareness of oral health problems among diabetics may be low (9). With regard to the use of dental services, Thorstensson et al. (11) found that many diabetic patients did not visit their dentist annually and that diabetic subjects needed more emergency treatment than healthy controls. Kjellman et al. (6) found that diabetics who co-operated well with regard to their diabetes treatment experienced less oral disease than poorly co-operating diabetic patients.

The aim of the longitudinal study described here was to assess the number of dental treatment visits needed by diabetic and nondiabetic subjects during a period of 3 years. Division of the workload between a dentist and an expanded-duty dental hygienist (EDDH) and the failures of patients to attend office visits were also studied.

Materials and methods

The patient population and clinical methods used have been described in detail previously (3, 4, 8, 12, 13). Thirty diabetic adults (20 men and 10 women aged $34.7 \pm$ (SD) 9.3 years) and 30 nondiabetic adults (22 men and 8 women aged $34.2 \pm$ (SD) 8.1 years) participated in the study. At the base line the study groups were similar in terms of dental and periodontal health status (Table 1). The mean time that had elapsed since the last dental visit was 2.8 years (SD \pm 4.0 years)

in the diabetic and 2.7 years (SD \pm 2.9 years) in the nondiabetic group. Dental health status was assessed three times by the same examiners (L. Pohjamo and T. Tervonen): on entry into the study (base line) and after 1 year and after 2 years. The period between the base-line examination and the follow-up examination after 1 year was designated the first treatment period. The period between the examinations after 1 and 2 years was designated the second treatment period, and the time after the examination 2 years after entry into the study was designated the third treatment period. All subjects were treated by one dentist (H. Nurkkala). The treatments consisted of cariologic (fluoride prophylaxis and restorative and endodontic treatment) and periodontal therapy (oral hygiene education, scaling, and root planing). Visits for the dental examinations, urgent prosthetic treatment, tooth extractions, and treatment of temporomandibular joint disorders were counted as 'other visits' (Table 3). Each visit lasted 30 min, and a failure to attend a visit was recorded if the patient failed to cancel. The EDDH's work consisted of oral hygiene education, fluoride applications, scaling, and root planing. The significance of differences between the groups was determined with Student's *t* test.

Results

Six hundred and twenty dental visits were needed for the treatment of the diabetic and 646 visits for the nondiabetic subjects (Table 2). The EDDH workload corresponded to 12-14% of the visits in the two categories of subjects during the first treatment period. During the third treatment period, the EDDH work corresponded to 30% of visits by the nondiabetic subjects and only 16% of the visits by the diabetics. In both

Table 1. Base-line characteristics of subjects

	n	No. of teeth		Percentage of surfaces with pd \geq 4 mm		DMFT		Teeth to be treated endodontically		Teeth to be extracted	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Diabetic subjects	30	21.4	8.0	11.8	19.2	18.5	5.5	0	0	1.0	2.0
Nondiabetic subjects	30	21.0	8.0	7.6	10.8	18.4	7.0	0.2	0.4	0.7	1.2

Table 2. Percentage distribution of dental visits between dentist and expanded-duty dental hygienist (EDDH)

	Diabetic subjects			Nondiabetic subjects		
	No. of visits	Dentist, %	EDDH, %	No. of visits	Dentist, %	EDDH, %
First treatment period	330	88	12	371	86	14
Second treatment period	163	82	18	173	82	18
Third treatment period	127	84	16	102	70	30
Whole study	620			646		

patient groups the need for cariologic visits was highest and the need for periodontal visits next highest (Table 3). During the second and third treatment periods the need for cariologic treatment was higher in the diabetic than in the nondiabetic subjects (2.6 versus 1.8 and 1.6 versus 1.0), whereas the periodontal needs were very similar. In both patient groups the mean number of all visits during the first treatment period was twice as great as that during the second period and about three times as great as that during the third period.

The need for emergency visits during the study was similar in the two groups (13 visits in the diabetic group, 12 in the control group). The diabetic subjects failed to attend 62 visits, and the control subjects 39 visits. During the second and third treatment periods the difference in mean number of failures to attend a visit per subject was statistically significant ($p < 0.05$).

Discussion

This study formed part of a longitudinal study of the oral health of adult diabetic and nondiabetic subjects. As both type-I and type-II diabetic subjects were included, the diabetic group here is heterogeneous when compared with other diabetic populations studied (1, 2, 7). The need for dental treatment at the base line was high in both the diabetic and the nondiabetic subjects because of poor oral health as a consequence of a long-term shortage of dental manpower in the area concerned. Owing to the similarities in the dental health status of the present subjects (Table 1), between-group

comparisons could be made of the use of dental health services.

Because of the lack of professional prophylactic treatment or dental health education before the study, the subjects were not able to take care of their teeth. Therefore the proportion of the dentist's workload remained

Table 3. Mean numbers of visits (\pm SD) during the three treatment periods by dental visit category

Visit category	Diabetic subjects		Nondiabetic subjects	
	Mean	SD	Mean	SD
Cariologic				
I	5.0	3.5	7.4	5.4
II	2.6	3.6	1.8	2.8
III	1.6	2.4	1.0	1.9
Periodontal				
I	3.6	2.4	3.2	2.4
II	1.5	1.7	1.8	2.0
III	1.5	1.5	1.3	0.8
Other visits*				
I	2.4	2.7	1.8	2.1
II	1.3	1.0	2.1	2.9
III	1.1	0.6	1.1	0.4
All visits				
I	11.0	5.0	12.4	7.1
II	5.4	4.8	5.7	4.1
III	4.2	2.8	3.4	2.3

I = first, II = second, and III = third treatment period.

* Visits needed for dental examination, tooth extractions, treatment of temporomandibular joint disorders, and prosthetic treatment.

fairly high, around 80% of all visits (Table 2) throughout the study. Another reason for the high proportion of dentist's workload is that the dental examinations in the beginning of each treatment period were made by a dentist and not by an EDDH. In both groups most dental treatments needed were cariologic and periodontal treatments. The percentage distribution of visits to the dentist and the EDDH (Table 2) showed that EDDH work was greater in relation to nondiabetic subjects. More dentist work was needed by the diabetics, mainly because of a higher caries increment in the group (12).

Diabetic patients did not turn up for appointments and failed to cancel them more often than the nondiabetic controls. This meant that more office time had to be reserved for diabetic subjects. The frequency of missed appointments obviously indicates that the care of diabetes is so demanding in terms of time and resources that attending a dental appointment is of secondary importance. Thorstensson et al. (11) also found that diabetics were not as willing as the nondiabetics to spend time and money on their teeth.

The need for dental visits in the third treatment period was about one-third of the initial need in both groups. An excessive accumulation of dental and periodontal disease could be prevented in a patient population of this kind by yearly examinations followed by mainly prophylactic and restorative dental treatment. Although no records of possible effects of dental treatment on diabetic status were available, elimination of oral infections could have improved metabolic control in these diabetics (5, 14).

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