

Prevalence of gingivitis in 6-year-olds in Reykjavik, Iceland

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As part of a wider investigation of malocclusion, the aim of this study was to determine the prevalence of gingivitis in 6-year-olds in Reykjavik. Parents and guardians of the 401 children in 8 schools were invited by letter to have their children take part. There were 230 positive replies (57%). The Gingival Bleeding Index was used to determine the condition of the gingiva on mesiobuccal and buccal surfaces of 6 selected teeth (totaling 12 surfaces). The results showed that 26% had healthy gingivae, 23% showed bleeding from one surface, 20% from two, 17% from three, and 15% from four to eight surfaces. There were no statistically significant differences in the number of bleeding surfaces between boys and girls. The mean GBI for the whole group was 16%. Gingivitis in this group was therefore prevalent but usually slight.
□ Children; gingival hemorrhage; pedodontics; periodontics

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The dental health of Icelandic children has long been considered worse than that of their agemates in nearby countries (1, 2), although it appears that the prevalence of caries has been reduced in recent years (3). The prevalence of gingivitis in 12-year-old children in Iceland has recently been surveyed and found to be comparable to the figures from neighboring countries (2, 4). On the other hand, no research has been carried out on the gingival health of Icelandic children younger than 12 years since Möller's results were published in 1963 (5), followed by the results of Dunbar et al. in 1968 (6).

The purpose of the present study, therefore, was to determine the prevalence of gingivitis in 6-year-old children in Reykjavik, Iceland. This project was part of a wider investigation on malocclusion among individuals of the same group.

Subjects and methods

During the 1987–88 school year, 1461 children were enrolled in the 24 preschools in Reykjavik (Office of Primary Schools in Reykjavik, October 1987).

The parents and guardians of all the 401 6-year-olds enrolled in 8 schools were asked to have their children take part in the research. Positive answers were received from the parents and guardians of 230 children, a response rate of 57%. The investigation was carried out in January 1988, by inviting two classes to meet simultaneously at the Faculty of Odontology at the University of Iceland, together with their teachers. The investigation was therefore carried out under optimal conditions in the faculty's dental offices.

The Gingival Bleeding Index (GBI) (7) was used to assess the condition of the gingiva at the mesiobuccal and buccal surfaces of six selected teeth, as follows (with

the substitute tooth given second in each case): 55/54, 52/53, 64/65, 84/85, 72/73, 75/74.

The selection of the teeth was based on the reliability of using comparable teeth in adults as representative of the whole dentition, and the use of these same teeth for assessing periodontal disease in children (8, 9). If the child did not have the index tooth or it could not be used, a substitute tooth was used; if this tooth also was not usable or had been lost, examination of that area of the mouth was omitted. Teeth that were clearly loose and ready to come out were not used. A periodontal probe (Michigan 'O' with Williams marking; Hu-Friedy Instrument Co., Chicago, Ill., USA) was inserted with light pressure into the sulcus two or three times at each place. If bleeding was observed within 10 sec, the result was recorded as a positive bleeding response.

Results

Two hundred and thirty 6-year-old children were examined, 118 boys and 112 girls. Fig. 1 shows that 26% of the children had healthy gingivae as determined by the scoring system used. There was no significant difference between the number of bleeding surfaces in boys and girls ($t(228) = 0.832$; $p > 0.05$), even though the girls more often bled. Significantly more boys than girls had one bleeding surface, and more girls than boys had three bleeding surfaces. In other respects the distribution of the number of bleeding surfaces was almost the same among the boys and the girls.

Fig. 2 shows that the GBI for five index substitute teeth (55/54, 52/53, 64/65, 72/73, and 75/74) was similar or in the range of 23%–29%, which is not a significant difference given the confidence limits of $\pm 5\%$ – 6% . On the other hand, there was a significant difference between teeth 84/85 and the others, as the

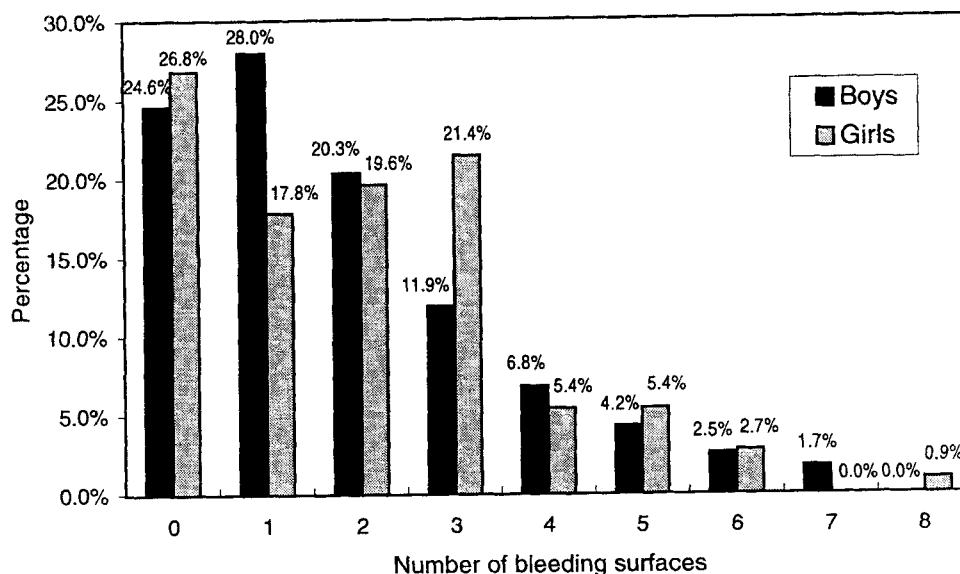


Fig. 1. Percentage of bleeding surfaces by sex.

GBI for those teeth was 42%. The confidence limits for these teeth were $\pm 6.5\%$. The confidence limits of the difference between 42% and 29% (13%) are $\pm 8.7\%$, or an amount less than the difference; there was therefore a significant difference between 42% (84/85) and 29% (72/73, the next highest).

Bleeding was observed more often from the facial surfaces than the mesial surfaces, but there was no significant difference.

Teeth 53 and 73 were much more often used as substitute teeth than others—that is, in 33 and 66 instances, respectively—whereas other substitute teeth

were used in only 3 or fewer instances. Bleeding occurred relatively more frequently from the substitute teeth than the index teeth but the difference was not statistically significant (chi-square (1.230) = 1.84; $p > 0.05$).

Discussion

Participation in the study was rather poor as only 57% of those invited accepted the invitation. In the letter to the parents and guardians it was explained that the

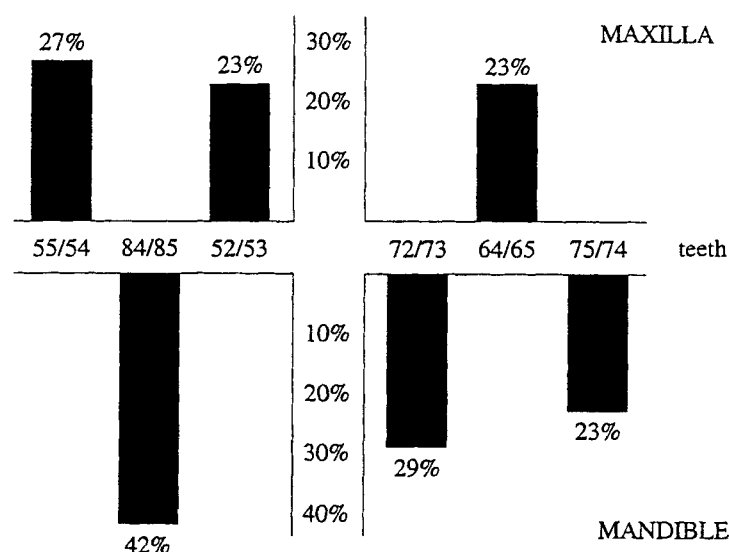


Fig. 2. Percentage of teeth with surfaces that bled on probing.

children's gingivae would be examined, the degree of malocclusion assessed, and a cephalometric radiograph taken of their heads. The poor response level may perhaps be explained by the fact that at the time of the study dental care for children in Reykjavik, aged 16 years or less, was completely reimbursed, and therefore a study such as the present involved no potential financial gain for those responsible for the children. It could also be that some were worried by the fact that a cephalometric radiograph was included in the examination.

The results of this study showed that gingivitis in 6-year-old children in Reykjavik was common but, in by far the largest number of cases, slight. Möller, in his 1961 study (5), used the Cheraskin and Langley system to assess the prevalence of gingivitis in Icelandic children. Only 23% of the 6-year-olds in his study were found to have gingivitis. Dunbar et al. (6), on the other hand, used the Russel Index (10) in their study of Icelandic children a few years later and found that 75% of the sample of 5- to 9-year-old children had mild periodontal disease (gingivitis without the formation of pockets), or almost the same proportion as in the present study. It has been pointed out that research on the prevalence of gingivitis in 5- to 7-year-old children has yielded very different results, the figures varying from 9% to 85% (11). The question therefore arises as to whether there is a real difference between the study groups or whether the differences are the result of the different methods used to test for gingivitis.

The results of this study are similar to the results of recent studies in Australia (9), Sweden (12), and The Netherlands (13), which show a considerably higher rate than the results of recent studies in Britain (14) and in the USA (15). It has been thought that the prevalence of gingivitis increases from the age of 3–5 years until puberty (16, 17) and that this increase is associated with increasing populations of microorganisms associated with periodontal disease in adulthood (18–20). Comparison of the results of the present study with those showing the prevalence of gingivitis in 12-year-old children in Iceland seems to confirm this tendency (2, 4). In reality, there is as yet no answer as to whether or to what extent gingivitis in children is dangerous for their teeth and their periodontium. The association between gingivitis and plaque in children is not as strong as among adults, although there is some relation (21–23).

Although gingivitis is common in children, periodontitis is very rare, and it is not clear whether there is any association between childhood gingivitis and periodontitis later in life. An association has been shown between tooth irregularity and plaque accumulation in children (24, 25). Moreover, certain malocclusion traits present at adolescence (increased overjet, cross-bite, and crowding), which may impede oral hygiene, were also shown in a prospective study to increase the risk of periodontal disease in adulthood (26). Gingivitis should be regarded as a disease that can

be kept under control with good oral hygiene, both in children and in adults. It is therefore a desirable goal to warn children at a young age to practice good dental hygiene to keep their gingivae healthy, and to hope that this habit will follow them through adulthood.

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