International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2002, Vol 4 No 1, Poster 113

Clinically Undetected Occlusal Dentine Caries in 15-Year-Old German Adolescents

Language: English

Authors: Roswitha Heinrich-Weltzien[a], Karin Weerheijm[b], Jan Kühnisch[a], Lutz Stößer[a]
[a]Department of Preventive Dentistry, Dental School of Erfurt, University of Jena, Germany
[b]Department of Cariology Endodontology Pedodontology, ACTA, Amsterdam, The Netherlands

Date/Event/Venue:
July 2001
ORCA 2001
Graz/ Austria

Aim

Determination of the prevalence of clinically undetected occlusal dentine caries of first and second molars in German 15-year-olds

Material and Methods

- Analysing of clinical and radiographic data of 78 German 15-year-olds
- Collection of the clinical observations in a longitudinal study of caries risk assessment conducted from 1993 to 1999
- Clinical examination was conducted by a calibrated dentist using the WHO system (1987) for diagnosing dental caries. White spots on smooth surfaces and fissures as well as discoloured fissures/pits were registered as initial caries lesions.
- Bite-wing radiographs were taken with E-speed films (Ektaspeed Plus EP 21 P, Kodak, Germany) with a Philips Oralix 65 kV machine using Hawe Kwik-bites (Hawe-Neos, Switzerland), with an exposure time of 0.4 s.
- Films were developed under standardised conditions using a Dürr Periomat machine (Dürr Dental, Germany).
- Bite-wing radiographs were judged by 3 examiners (table 1) under standard conditions of illumination with a 2x magnification X-ray viewer (Kentzler & Kaschner-Dental, Germany); inter-examiner agreement: kappa = 0.76.
- Radiographic evaluation was only performed in 1999.

Score	Criteria
0	No radiolucency visible in the dentine below the occlusal enamel
2	Circumscribed radiolucency visible in the dentine below the occlusal enamel; only distinct radiolucencies were scored
3	Occlusal restoration without radiolucency visible in the dentine connected to the restoration or occlusal surface
4	Occlusal restoration and circumscribed radioluceny visible in the dentine, but not connected to the restoration
5	Occlusal surfaces and circumscribed radioluceny visible in the dentine connected to the restoration
X	No judgement can be made

Table 1: Radiographic criteria for assessment of occlusal surfaces.

Results

1. The clinically scored caries prevalence of 5.6 D_{3-4}MFS increased to 7.5 D_{3-4}MFS after radiographic examination (figure 1, 2).

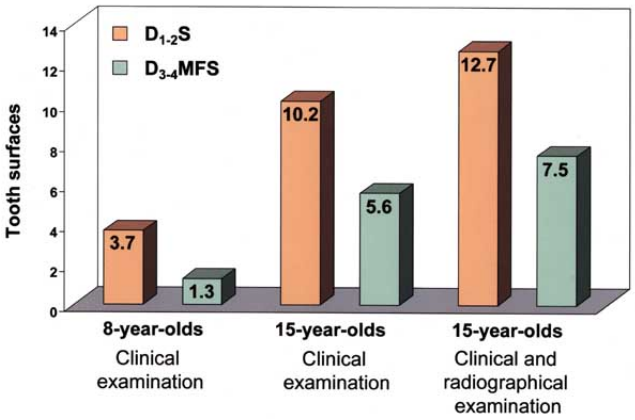


Figure 1: Caries prevalence of the study population according to clinical and radiographic assessment during a longitudinal study

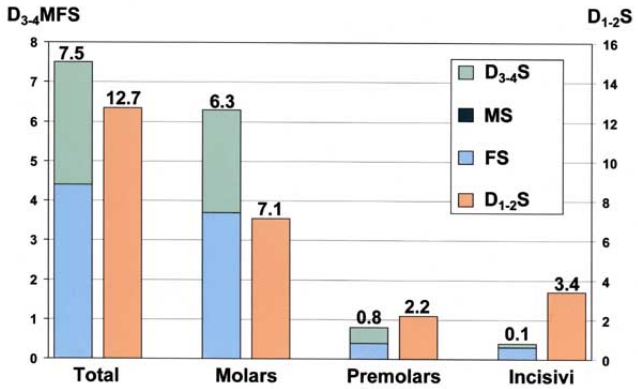


Figure 2: Clinical and radiographic assessed caries prevalence in German 15-year-olds

2. 610 molars were examined (table 2, 3, figure 3).

Occlusal surface	Total	1. Molar	2. Molar	Premolars
Mean number	15.4	4.0	3.8	7.6
Sound	6.2	0.1	0.3	5.8
Fissure sealant1)	3.2	1.3	1.3	0.6
$D_{1-2}S$1)	2.9	0.7	1.4	0.8
$D_{3-4}S$	1.8	0.7	1.1	0.0
FS	2.7	1.7	0.7	0.3

1) repeated soring was possible

Table 2: Mean number of sound, sealed, carious and filled occlusal surfaces according to clinical and radiographic caries detection.

Occlusal surface	1. Molar		2. Molar		
Examination	Clinical	Radiographic	Clinical	Radiographic	Total
D_{3-4} lesion	0.2	0.5*	0.3	0.8*	1.8
Primary lesion	0.1	0.1	0.2	0.4	0.8
Combined with fissure sealant	0.05	0.1	0.05	0.3	0.5
Combined with restoration	0.05	0.31	0.05	0.1	0.5

)* Mann-Whitney-Test: $p<0.001$

Table 3: Distribution of clinical and radiographic detected occlusal lesions in molars,)1 exclusion of false positive scorings regarding non-radioopaque filling materials.

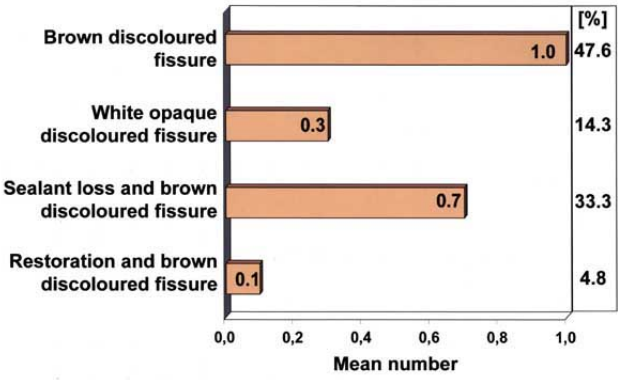


Figure 3: Clinical appearance of occlusal initial caries lesions .

3. 0.4 D_{3-4} lesions were found in sealed and in filled molars, resp. 0.2 D_{3-4} lesions were detected on clinically judged sound surfaces and 0.3 $D_{3-4}S$ in brown discoloured fissures. 11% of all and 14% of the sealed molars revealed clinically undetected dentine caries (table 4, 5).

Occlusal surface with	$D_{3-4}S$	Molars (%)
Clinical sound fissure	0.2	2.0
Brown discoloured fissure	0.3	3.8
White discoloured fissure	0.0	0.7
Fissure sealant	0.4	4.6
Total	0.9	11.1

Table 4: Mean number and distribution of radiographic detected occlusal lesions - hidden caries - in molars

Retention of sealants	Clinical	$D_{3-4}S$ Clinical-Bite-wing
Fissure sealant intact	45.1 %	3.9 %
Sealant loss combined with non discoloured fissure	23.0 %	3.9 %
Sealant loss combined with brown discoloured fissure	26.5 %	5.9 %
Sealant loss combined with white opaque fissure	2.0 %	0.0 %
Fissure sealant with clinical detected caries lesion	3.4 %	-
Total	100 %	13.7 %

Table 5: Radiographic detected occlusal lesions in sealed molars according to sealant retention

4. More than 70% of all occlusal D_{3-4} lesions were exclusively detected by bite-wing radiographs (table 6).

	Diagnostic method		
$D_{3-4}S$	Clinical	Clinical-Bite-wing	Bite-wing
1. Molar	23.2 %	7.1 %	69.7 %
2. Molar	15.8 %	9.8 %	74.4 %

Table 6: Frequence of clinical and radiographic detected lesions

Conclusion

- Clinically undetected occlusal lesions seem to be not only a problem in adolescents with low but also with high caries experience.
- The results suggest that occlusal caries detection should be improved before sealant application.

This poster was submitted by Prof. Dr. Roswitha Heinrich-Weltzien.

Correspondence address:
Prof. Dr. Roswitha Heinrich-Weltzien
University of Jena
Department of Preventive Dentistry
Dental School of Erfurt, Germany
Nordhäuser Straße 78
D - 99089 Erfurt

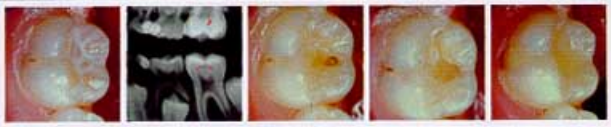
Poster Faksimile:

Clinically Undetected Occlusal Dentine Caries in 15-Year-Old German Adolescents

50

R. Heinrich-Weltzien[a*], K. Weerheijm[b], J. Kühnisch[a], L. Stösser[a]

[a]Department of Preventive Dentistry, Dental School of Erfurt, University of Jena, Germany,
[b]Department of Cariology Endodontology Pedodontology, ACTA, Amsterdam, The Netherlands



AIM Determination of the prevalence of clinically undetected occlusal dentine caries of first and second molars in German 15-year-olds

MATERIAL AND METHODS

- Analysing of clinical and radiographic data of 78 German 15-year-olds
- Collection of the clinical observations in a longitudinal study of caries risk assessment conducted from 1993 to 1999
- Clinical examination was conducted by a calibrated dentist using the WHO system (1987) for diagnosing dental caries. White spots on smooth surfaces and fissures as well as discoloured fissures/pits were registered as initial caries lesions.
- Bite-wing radiographs were taken with E-speed films (Ektaspeed Plus EP 21 P, Kodak, Germany) with a Philips Oralix 65 kV machine using Hawe Kwik-bites (Hawe-Neos, Switzerland), with an exposure time of 0.4 s.
- Films were developed under standardised conditions using a Dürr Periomat machine (Dürr Dental, Germany).
- Bite-wing radiographs were judged by 3 examiners (table 1) under standard conditions of illumination with a 2x magnification X-ray viewer (Kentzler & Kaschner-Dental, Germany); inter-examiner agreement: kappa = 0.76.
- Radiographic evaluation was only performed in 1999.

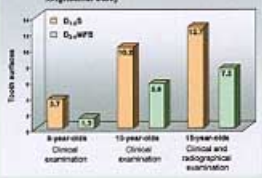
Table 1: Radiographic criteria for assessment of occlusal surfaces

Score	Criteria
0	No radiolucency visible in the dentine below the occlusal enamel
1	Circumscribed radiolucency visible in the dentine below the occlusal enamel, only distinct radiolucencies were scored
2	Occlusal restoration without radiolucency visible in the dentine connected to the restoration or occlusal surface
3	Occlusal restoration and circumscribed radiolucency visible in the dentine, but not connected to the restoration
4	Occlusal surfaces and circumscribed radiolucency visible in the dentine connected to the restoration
5	No judgement can be made

RESULTS

1. The clinically scored caries prevalence of 5.6 D_{3-4}MFS increased to 7.5 D_{3-4}MFS after radiographic examination (figure 1, 2).

Figure 1: Caries prevalence of the study population according to clinical and radiographic assessment during a longitudinal study



2. 610 molars were examined (table 2, 3, figure 3).

Table 2: Mean number of sound, sealed, carious and filled occlusal surfaces according to clinical and radiographic caries detection

Occlusal surface	Total	1. Molar	2. Molar	Premolars
Mean number	15.4	4.8	3.8	7.8
Sound	6.8	0.1	0.3	6.4
Fissure sealant*	2.5	1.3	1.2	0.0
$D_{3-4}S^{1}$	3.8	0.7	1.4	0.8
$D_{3-4}S$	1.8	0.7	0.1	0.0
FS	0.7	1.7	0.7	0.3

*Repeated scoring was possible

Table 3: Distribution of clinical and radiographic detected occlusal lesions in molars, [1] exclusion of false positive scorings regarding non-radiopaque filling materials

Occlusal surface	1. Molar		2. Molar		
Examination	Clinical	Radiographic	Clinical	Radiographic	Total
D_{3-4} lesion	0.2	0.8*	0.2	0.6*	1.8
Primary lesion	0.1	0.1	0.2	0.1	0.5
Combined with fissure sealant	0.00	0.1	0.00	0.2	0.3
Combined with restoration	0.00	0.7*	0.00	0.1	0.8

(Kruskal-Wallis-Test: p<0.05)

Figure 2: Clinical and radiographic assessed caries prevalence in German 15-year-olds

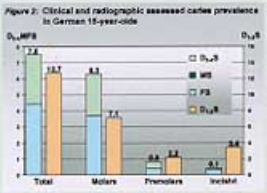
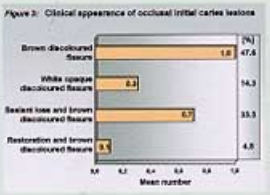


Figure 3: Clinical appearance of occlusal initial caries lesions



3. 0.4 D_{3-4} lesions were found in sealed and in filled molars, resp. 0.2 D_{3-4} lesions were detected on clinically judged sound surfaces and 0.3 $D_{3-4}S$ in brown discoloured fissures. 11% of all and 14% of the sealed molars revealed clinically undetected dentine caries (table 4, 5).

Table 4: Mean number and distribution of radiographic detected occlusal lesions = (false+ caries + in sealants

Occlusal surface with	$D_{3-4}S$	Molars (%)
Clinical sound fissure	0.2	2.8
Brown discoloured fissure	0.3	3.8
White discoloured fissure	0.0	0.7
Fissure sealant	0.4	4.8
Total	0.9	11.1

Table 5: Radiographic detected occlusal lesions in sealed molars according to sealant retention

Retention of sealants	Clinical	$D_{3-4}S$ Clinical-Bite-wing
Fissure sealant intact	46.1 %	2.8 %
Sealant loss combined with non discoloured fissure	23.8 %	2.9 %
Sealant loss combined with brown discoloured fissure	26.8 %	5.8 %
Sealant loss combined with white opaque fissure	2.8 %	0.0 %
Fissure sealant with clinical detected caries lesions	3.4 %	-
Total	100 %	12.7 %

4. More than 70% of all occlusal D_{3-4} lesions were exclusively detected by bite-wing radiographs (table 6).

Table 6: Frequence of clinical and radiographic detected lesions

	Diagnostic method		
$D_{3-4}S$	Clinical	Clinical-Bite-wing	Bite-wing
1. Molar	31.2 %	7.1 %	68.7 %
2. Molar	13.8 %	9.8 %	76.4 %

CONCLUSION

- Clinically undetected occlusal lesions seem to be not only a problem in adolescents with low but also with high caries experience.
- The results suggest that occlusal caries detection should be improved before sealant application.