

## To the importance of bottle-feeding habits for the transmission of *mutans streptococci* from mothers to infants and their caries status among German families

**Language:** English

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### Aims and Methods

Children are susceptible to infection by mutans streptococci (MS) between the ages of 1.5 and 3 years. The aim of the present study was to investigate those factors that could be correlated with MS transmission among German children aged 30 months.

- A questionnaire concerning the nutrition history and childhood nursing practice was completed by 155 mothers.
- The dental caries status (dmft) of 155 children was examined.
- The salivary MS of the children and their mothers were determined by Dentocult<sup>®</sup> SM strip mutans (Orion Diagnostica) (fig.1).



Fig. 1: Sampling of salivary mutans streptococci in children and their mothers by Dentocult<sup>®</sup> SM Strip Mutans

- Two isolates were picked from spatulas from 34 mother-infant-pairs. 128 isolates were identified as MS (fig. 2).
- Bacteriocine-fingerprinting was performed for all strains (n=128)

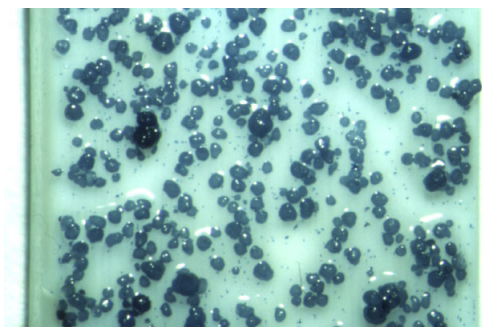


Fig. 2: Macrocolonies of mutans streptococci on the plastic spatula of Dentocult<sup>®</sup> SM Strip Mutans

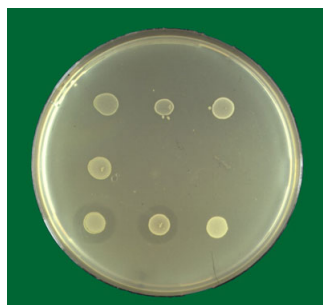


Fig. 3 Bacteriocin-Fingerprinting of mutans streptococci (strains of one mother and their child by inhibition zones against one indicator strain)

- Indicator strains were used:
  - S. sanguis* (n = 3)    *S. oralis* (n = 4)
  - S. gordonii* (n = 1)    *S. mitis* (n = 1)
  - S. salivarius* (n = 1)

## Results

- A graphical model (TETRAD III) was used for statistical analyses (p-value of 0.05 were considered statistically significant (fig. 4).
- It was apparent that MS and dmfs formed a separate set with the highest significance (phi 0.346).
- The caries decay of the children was registered at a mean dmft of  $0.6 \pm 2.0$ .
- Higher scores of MS correlated significantly with higher caries decay (Spearman's correlation coefficient 0.32712,  $\chi^2$ -test p 0.0001).
- In children the upper incisors showed significant frequent decay ( $\chi^2$ -test p 0.0001). 15% of the children had developed early childhood caries (fig. 5).
- A positive correlation could be found between high salivary MS counts in children and bottle-feeding at night ( $\chi^2$ -test p 0.003) (fig. 4, 6).
- 65% of the mothers and 24% of the children harboured high MS counts (scores SM 2 and 3). The levels of mothers of children with and without MS were not significantly different ( $\chi^2$ -test 0.741)
- 59% of the strains of the mother and 53% of the strains of children produced bacteriocins. *S. sanguis*, *S. oralis*, *S. gordonii*, *S. mitis* and *S. salivarius* were usually inhibited (fig. 7 and 8, tab. 1).
- 41% of mother-infant-pairs harboured bacteriocin producing strains. 10 profiles could be estimated for *S. mutans* and 3 for *S. sobrinus*. Furthermore, in the half of mother-infant-pairs strains with identical fingerprints could be determined (tab. 2, 3).

## Conclusion

The data suggest that bottle-feeding, especially at night, may support the fidelity of MS transmission from mothers to infant and that bottle-feeding at night may contribute to a higher caries rate.

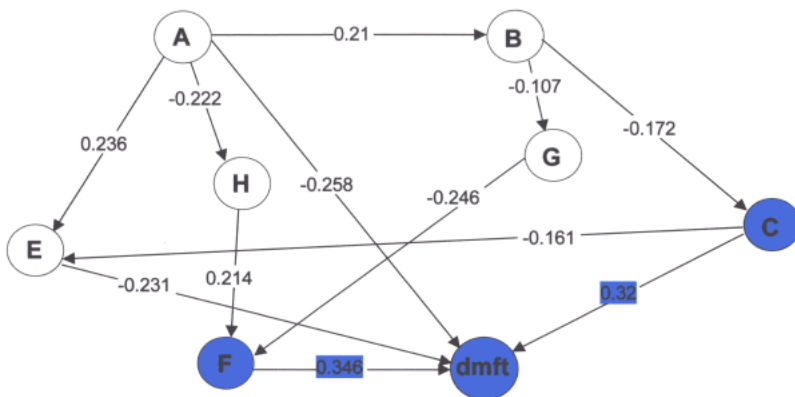


Fig. 4: Multifactorial Analyses Variables

### Variables

- A: Education of the mothers (1=at least class 10; 0=lower education)
- B: Occupation of the mothers (1=working; 0=no working)
- C: The child has the bottle at night (1=yes; 0=no)
- dmft: Caries index of deciduous teeth (0=healthy; 1=carious, to summarize d-, m-, and f-components)
- E: Visible plaque at anterior teeth (1=yes; 2=no)
- F: Scores of mutans streptococci (1=high; 0=low)
- G: Regular supervision of toothbrushing by the mothers of the children and additional toothbrushing (1=yes; 0=no)
- H: Cariogenicity of meals (1=cariogenic; 0=no cariogenic)

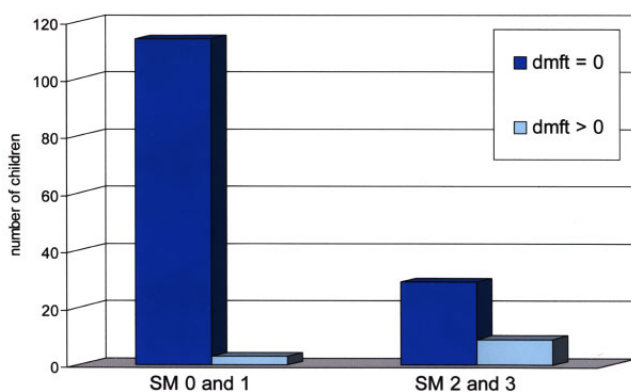


Fig. 5: Caries status of upper incisors and MS scores (n = 155 children)

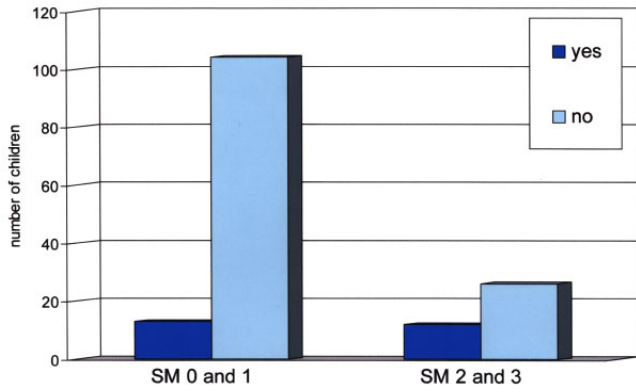


Fig. 6 Nursing bottle at night and MS scores (n = 155 children, p 0.003 s)

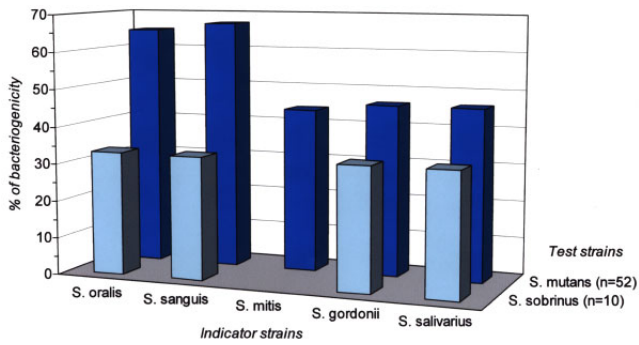


Fig. 7 Bacteriocinogeny of MS strains of mothers against indicator strains

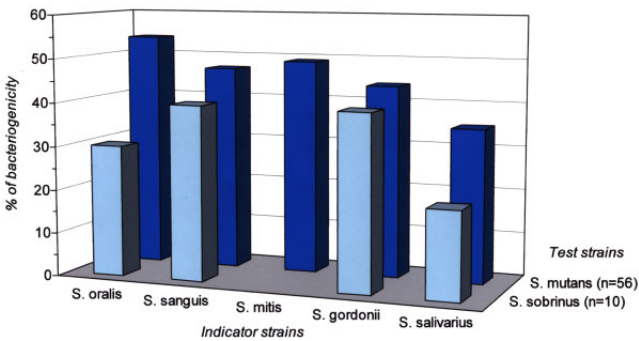


Fig. 8 Bacteriocinogeny of MS strains of infants against indicator strains

	Test strains	Indicator strains									
		S. sanguis		S. oralis		S. mitis	S. gordonii	S. salivarius			
		OMZ 9S	HG 1473	HG 1475	HG 1290	HG 1601	NS 30	NS 9	OMZ 8	HG 295	OMZ 47
MOTHERS	S. mutans (n = 5 of 52)	21 ± 6	20 ± 6	17 ± 4	18 ± 5	19 ± 5	17 ± 4	20 ± 5	18 ± 4	14 ± 3	14 ± 2
	S. sobrinus (n = 3 of 10)	-	20 ± 1	26 ± 3	20 ± 0	-	22 ± 1	20 ± 1	-	16 ± 1	16 ± 2
INFANTS	S. mutans (n = 31 of 56)	18 ± 5	18 ± 6	18 ± 6	16 ± 3	15 ± 3	18 ± 5	16 ± 4	17 ± 6	14 ± 2	16 ± 3
	S. sobrinus (n = 4 of 10)	11 ± 0	16 ± 4	22 ± 7	23 ± 3	-	22 ± 2	21 ± 1	-	14 ± 3	18 ± 0

Table 1: Diameter of inhibition zones ( $\bar{x} \pm S D$ , mm) of indicator strains of oral streptococci by MS strains of mothers and infants

The median of 100 macrocolonies were determined with mean of  $7.6 \pm 0.5$  mm around the macrocolonies indicated the presence of bacteriocines

Profile	Indicator strains	Indicator strains				
		S. sanguis	S. oralis	S. gordonii	S. mitis	S. salivarius
<b>S. mutans</b>						
I	(n = 34)	+	+	+	+	+
II	(n = 8)	+	+	+	+	
III	(n = 6)	+	+		+	+
IV	(n = 4)	+	+	+		+
V	(n = 1)	+	+	+		
VI	(n = 7)	+	+			
VII	(n = 1)	+				
VIII	(n = 2)		+	+	+	
IX	(n = 1)	+	+		+	
X	(n = 2)		+			
<b>S. sobrinus</b>						
XI	(n = 5)	+	+	+		+
XII	(n = 1)	+	+	+		
XIII	(n = 1)	+		+		

Table 2: Profiles of bacteriocinogeny of strains of *S. mutans* and *S. sobrinus* of 14 mother-infants-pairs

	MOTHERS										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XII
<b>INFANTS</b>											
I	6			1							
II						2					
III	1 (1) <sup>1</sup>		1 (1)		1 (13)						
IV									1 (31)		
V											
VI											
VII	1										
VIII						1 (13)					
IX	1 (33)	1 (33)									
XII											

Table 3: Identical profiles of bacteriocinogeny between MS strains of 14 mother-infant-pairs

<sup>1</sup>in bolds strains of mother-infant-pair-no. with different profiles

## Literature

- Kneist S, Scharff S, de Soet JJ, van Loveren C, Stöber L: Bacteriocin production by human strains of mutans and oral streptococci. *Caries Research* 2000, 34, S. 308
- Rupf S, Merte K, Eschrich K, Stöber L, Kneist S: Peroxidase reaction as a parameter for discrimination of *Streptococcus mutans* and *Streptococcus sobrinus*. *Caries Research* 2001, 35, S. 258-264

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