

# Correlation Between Plaque and Bacterial Flora

by

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THE CHEMICAL AND BACTERIAL composition of plaque has been studied extensively, including bacterial changes related to the formation of plaque following an oral prophylaxis.<sup>1-9</sup> However, the relationship of bacterial flora to changes in plaque represented by a clinical scoring index has not been established even though there has been increasing use of scoring indices in clinical research.<sup>5, 10-13</sup> The purposes of this study were: (1) to study the changes in bacterial flora and dental plaque following a prophylaxis, (2) to determine what statistical correlation exists between salivary lactobacillus counts and dental plaque scores and (3) to study the relationship between lactobacillus and crevice depth, and plaque and crevice depth.

## METHODS AND MATERIALS

The 42 participants, 24 males and 18 females, ranged in age from 19 to 64 years, with a mean age of 28.0. Their individual plaque scores varied from 0 to 5. The modified Ramfjord Plaque Scoring Index used was scored on the basis of 0 to 5 with facial and lingual surfaces of the six representative teeth scored separately. Bacterial smears were taken from six contralateral teeth prior to use of a disclosing solution.

Twenty of the 42 subjects were selected at random for study of changes in the bacterial flora of plaque. The scoring method used to determine the relative amount of organisms found in the smears was based on the frequency of the following scores:

- 0: No organisms
- 1: A rare or occasional organism
- 2: Some or few organisms
- 3: Many organisms
- 4: Innumerable organisms

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Lactobacillus counts were determined by the Dental Caries Laboratory of the School of Dentistry. The subjects were scored for plaque, bacterial flora, and crevice depth at 0 day, 1, 2, 3, 7, 14, 21, 28 and 60 days following the prophylaxis.

## RESULTS

There was a statistically significant difference between 0 to 1, and 1 to 60-day scores, but no significant difference between 0 and 60-day scores for plaque at the 1 percent level. Similarly there was a significant difference between mean bacterial scores from 0 to 1, and 1 to 14 days, but there was no significant difference between 0 and 7 or 14-day mean bacterial scores at the 1 percent level. Figure 1 represents the numerical occurrences of organisms noted in smear preparations and mean plaque scores for the days of study. Cocci, variety of organisms (normal representation of oral flora) and other bacteria (predominance of some bacteria not usually found in large numbers in the usual oral flora) were numerically present in high numbers one day after prophylaxis, but after the second day decreased in number during the 14 days of study.

The bacterial types, variety of bacteria, epithelial cells and filaments which were recorded for each smear were counted and set in a table for each subject and each day. A Chi Square analysis of the table and each designated column was done to determine the significance of the occurrence of the bacteria for each day of the study. From the statistical analysis it was found that there was statistically significant change for the table ( $p = .001$ ). Only cocci from the individual row totals showed the change was not statistically significant.

Filaments were present in small numbers the first day, but increased rapidly until the 7th day after which there was a more gradual increase until the 14th day. The

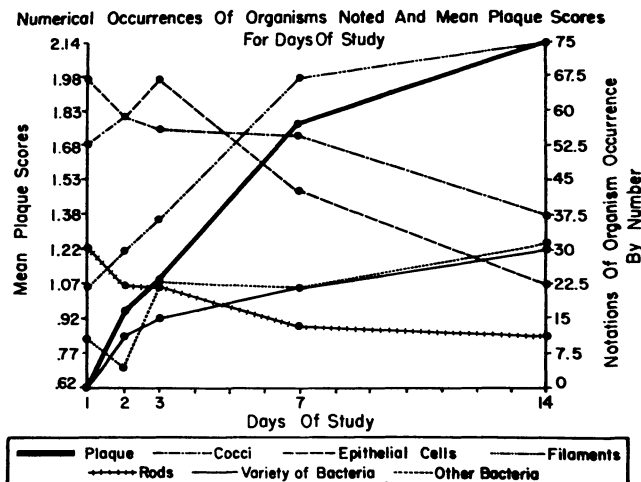


FIGURE 1.

rate of increase of filamentous organisms corresponds to the rate of plaque formation.

Mean lactobacillus counts showed a fluctuation in the number of lactobacilli present in saliva after prophylaxis. No statistically significant correlation existed between salivary lactobacilli counts and plaque scores for the days of the study.

An analysis of crevice depth measurements and plaque scores indicated no statistically significant correlation between these two measurements. The analysis of coefficients did not demonstrate a significant relationship between plaque and salivary lactobacilli, plaque and crevice depth, and crevice depth and salivary lactobacillus.

Compared mean plaque scores and bacterial scores showed a relative correspondence between plaque and bacteria and indicated that the numerical increase in plaque bacteria corresponds to reaccumulation of plaque measured by a clinical index.

The relationship of the number of times a certain organism occurred for each individual and the mean plaque scores indicated that plaque accumulation appeared to correspond principally to the numbers of filaments. Interproximal plaque was the first to return and showed an early marked increase. By the 14th day interproximal scores were the ones most often found. It could be assumed, then, that plaque returns in those areas least likely to be reached by personal home care and could account for the rapid increase in plaque scores by the third day following prophylaxis.

#### SUMMARY AND CONCLUSION

Correlation between plaque scores, bacterial flora, lactobacillus colonies and crevice depth were studied. No significant correlation existed between plaque and lactobacillus, lactobacillus and crevice depth, and plaque and crevice depth. Numerical increase for bacterial scores followed closely the numerical increase in plaque scores. Filamentous organisms followed plaque accumulation more closely than the other observed bacteria.

Within the limitations of this study, the following conclusions are made: (1) Following a prophylaxis, there appears to be a relative correspondence between amounts

of bacteria present in plaque and the amount of plaque scored by a clinical index. (2) The early rapid increase in plaque following a prophylaxis appears to be related to a dependent correspondence between filamentous organisms and/or a failure to adequately clean interproximal areas. (3) There is no apparent correlation between the amount of dental plaque and the number of salivary lactobacilli. (4) There is no statistically significant correlation between plaque scores and crevice depth in subjects without chronic destructive periodontal disease.

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