Salivary levels of putative cariogenic organisms in patients with eating disorders


The present study examined the hypothesis that women with eating disorders associated with a history of chronic vomiting can be characterized by a salivary flora with high levels of aciduric organisms, such as, mutans streptococci, lactobacilli and yeast. Three groups of female subjects were studied: vomiting bulimics (G1; n = 14), and comparison groups selected for high Streptoeooes mutans (G2; n = 13), and low S. mutans levels (G3; n = 12). The prevalence and bulimics (G1; n = 14), and comparison groups selected for high Streptoeooes mutans (G2; n = 13), and low S. mutans levels (G3; n = 12). The prevalence and bulimics had significantly higher levels and higher prevalence of Streptococcus sobrinus than the non-bulimics. A high S. sobrinus colonization may be a marker for a history of vomiting in bulimia.

Material and methods

Salivary levels of aciduric organisms were measured in 39 women. This was a university based sample of comparable age and social-demographic status which was further divided into 3 groups: Group 1 (n = 14) - patients seeking psychological treatment at the Eating Disorders Clinic at the University of Michigan Hospitals; Group 2 (n = 13) - a positive control group which had been selected, based on a high level of Streptococcus mutans, i.e., an average of more than 10^5 S. mutans/ml of saliva; Group 3 (n = 12) - a low S. mutans control group which had an average of less than 10^5 S. mutans/ml of saliva. The average age of the 3 groups was 23.4 ± 5.7; 23.4 ± 5.7 and 24.5 ± 6.1 respectively.

Microbiological procedures

Stimulated saliva samples (by chewing paraffin) were obtained from all subjects. The saliva was dispersed by a vortex mixer for 30 seconds and 0.1 ml was serially diluted at the ratios of 1:10, 1:100 and 1:1000 in reduced transport fluid and subsequently placed onto three selective culture media by means of a spiral plating system (Spiral Systems, Cincinnati, OH). TYSB medium (23) for S. mutans and Streptococcus sobrinus, LBS agar (18) for lactobacilli, and Sabouraud dextrose agar (SAB) (Difco Laboratories, Detroit, MI) for yeast, were used as the selective media for these aciduric organisms. After 2 to 3 days of anaerobic incubation at 35°C (TYSB and LBS) and aerobic incubation at 37°C (SAB), the colony-forming units (CFU) were enumerated, and levels of these organisms per ml of saliva were calculated. S. mutans and S. sobrinus could usually be differentiated by colony morphology, but when the identity of a colony was in doubt, raffinose and melibiose were used as confirmatory biochemical tests to discriminate between these species (20).

Clinical and patient investigation

The number of decayed, missing and filled teeth and surfaces (DMFT and DMFS) was recorded from all patients. Group 1 (G1) patients were asked about their frequency of vomiting, duration of symptoms, the age of onset and usage...
The eating disorder group (G1) had significantly higher levels of aciduric organisms per ml of saliva in the groups were submitted to analysis of variance (Table 2). The eating disorder group had significantly higher levels of S. sobrinus than the control groups. The 8 eating disorder individuals with S. sobrinus had levels above 10⁷/ml and four subjects had over 10⁸/ml. In contrast the 2 G2 and 3 G3 subjects with S. sobrinus had levels below 10⁵/ml of saliva. Saliva levels of lactobacilli and yeast tended to be higher in the bulimics. However, the low S. mutans group had higher levels and prevalence of yeast in their saliva than did the high S. mutans group (Tables 1, 2).

The prevalence of a high-level mutans streptococci infection in the eating disorder group suggested that these individuals were at risk for developing decay, or that they had experienced more decay than the other groups (G2 and G3). The eating disorder group (G1) had a DMFS of 12.1±14.1 which was higher than G3 (DMFS = 7.2±7.2) but lower than G2 (DMFS = 20.5±21.9). The overall difference in DMFS scores among G1, G2 and G3 was not statistically significant.

**Discussion**

This study is the first to investigate the salivary flora of patients with eating disorders. Our hypothesis that these subjects would have an increased occurrence and levels of aciduric organisms such as the mutans streptococci, lactobacilli and yeast was confirmed (Tables 1, 2). An unexpected finding was the increased frequency of occurrence of S. sobrinus in the salivas of the patients with eating disorders.

There is no obvious explanation why S. sobrinus should be uniquely selected for in these patients. S. sobrinus is not as aciduric as S. mutans (13), so that frequent acid regurgitation should select for both S. mutans and S. sobrinus as indeed was the case (Table 2). S. sobrinus is more dependent than S. mutans for sucrose mediated attachment to the pellicle on the tooth surface so that frequent sucrose ingestion would favor its colonization (13).

The prevalence of a high-level mutans streptococci infection in the eating disorders group (G1) could not be associated with active decay since only 2 of 14 women presented with decay, showing 1 and 2 decayed surfaces respectively. This low occurrence of decay is in agreement with other studies (8, 17). There may be several explanations for the observed low levels of active decay in patients with bulimia. The mean age of onset (bulimia with vomiting) was 17.0 years ± 4.6 at which age surfaces susceptible to decay are either past the risk to decay or may have been filled with restorative materials (13). In regard to the placement of restorations, it was possible that this treatment was very recent. Thus, although vomiting may have selected for a mutans streptococci infection, this infection may have been on surfaces no longer at risk to decay. It is also possible that vomiting per se, may have altered the virulence of S. mutans and S. sobrinus. Likewise it is possible that we were culturing the patients prior to the development of clin-
ical decay and the high levels of mutans streptococci actually indicated an active infection.

Another possibility is the composition of the food that the bulimics consumed during an eating binge which includes fats as well as sugars, i.e., ice cream, chocolate, cookies, pastries, and other desserts (1). Studies have shown that consumption of fats, e.g., in dairy products has a protective effect on decay (7, 21). It may be that the fat content of foods consumed during eating binges exerts a similar protective effect.

There is no simple, objective way to determine whether a bulimic individual is actively emetic other than by supervision, as history taking is unreliable in these individuals. If the finding that the frequency of detection of S. sobrinus or that the salivary levels of S. sobrinus are consistently elevated in bulimics can be reproduced, then a salivary culture for S. sobrinus could have implications for the diagnosis and/or management of certain eating disorders. In this regard it would be necessary to distinguish whether the high salivary S. sobrinus levels are a marker for past eating disorders or reflect current emetic activity.

This study has demonstrated that the frequency and levels of S. sobrinus was clearly higher in bulimics than in non-bulimics. Although no correlation was found between eating disorders (bulimia) and decay, the identification of these individuals on the basis of a high S. sobrinus colonization, may have implications for both dentists and physicians in the early diagnosis and management of eating disorders. However, future studies utilizing larger numbers of individuals are necessary to confirm these findings.

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References
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