

Management of Periodontitis With Oral-Care Products

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Chronic inflammatory periodontal disease is associated with bacteria. Gingivitis and periodontitis are still endemic, despite the fact that several antibacterial rinses are available for both prescription and over-the-counter purchase. Antibacterial rinses have not solved the problem. This article provides a retrospective analysis that documents the therapeutic capability of two new oral-care products in the management of periodontitis. The oral rinse and toothpaste are currently sold to dentists with no antibacterial claims.

Materials and Methods

Patients were studied from the dental hygiene recall practice of two

general dentists. A total of 2,085 periodontal pockets were evaluated in 79 periodontitis patients who had in previous visits received scaling, root planing, and curettage as needed. Patients were accepted into the study when, at baseline, there was no required immediate need for surgical intervention.

At baseline, 2,085 probe scores measuring ≥ 4 mm with a mean of 4.6 mm were recorded. Scores were measured at the deepest point between the line angles of each tooth. Thus, each tooth had four different scores, one from each surface. Only Michigan probes^a, which had been calibrated at baseline and at the next recall visit, were used by two hygienists. The only variance between the baseline evaluation and the subsequent recall was the addition of RetarDENT^{®b} toothpaste and RetarDEX^{®b} oral rinse. Both of these products contain 0.1% activated chlorine dioxide (ClO₂) with a phosphate as a detergent and stabilizer. Patients were instructed to use both products twice a day for regular home care. The toothpaste was to be used first, followed by the oral rinse.

At the next dental visit, after an interval of 2 to 6 months from

^a Hu-Friedy Mfg Co, Chicago, IL 60618

^b Rowpar Pharmaceuticals, Inc, Scottsdale, AZ 85260

Table 1—Recall Intervals for the 79 Patients

Patient Distribution	Number of Months in Recall Interval
2	2
49	2
24	4
2	5
2	6

Average between baseline and subsequent recall visit: 3.4 months.

baseline, all patients were rescored by the same hygienist using the same scoring technique and identical periodontal probes. Again, scores of ≥ 4 mm were recorded for each patient. The probe scores taken at baseline and at the next recall visit were compared to show the number of scores that were reduced from ≥ 4 mm to ≤ 3 mm. This study does not address the degree of intragroup change in the number probe scores of ≥ 4 mm. The data were analyzed for statistical evaluation.

Observations

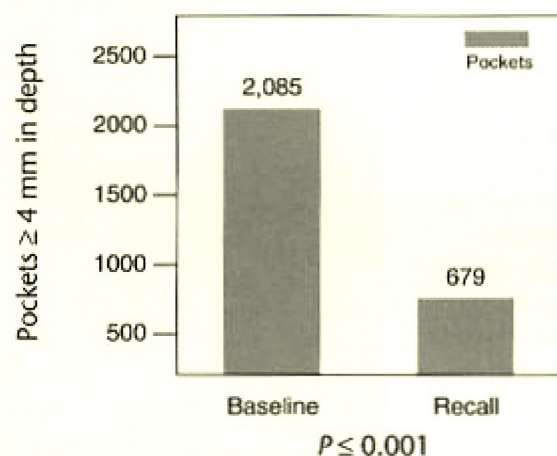
The time interval between recall visits was a range of 2 to 6 months

Table 2—Comparison of the Number of Pockets at Baseline and After Using RetarDEX® Oral Rinse and RetarDENT® Toothpaste

	Initial Visit	Next Recall Visit
Total Pockets ≥ 4 mm	2,085	679
Range of the number of pockets ≥ 4 mm per patient	2 to 76	0 to 43
Mean number of pockets ≥ 4 mm per patient	26.4	8.6

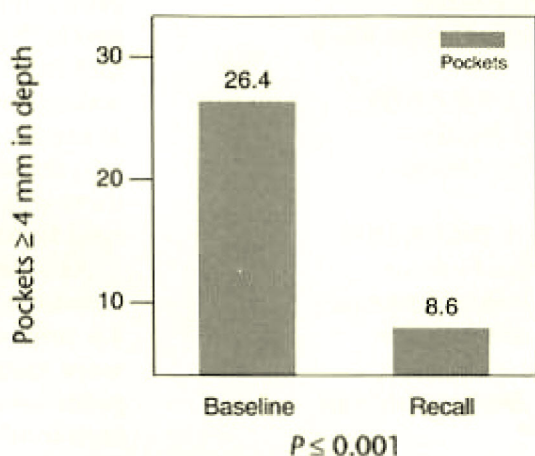
Table 3—Pocket Reduction Per Patient After Using RetarDEX® Oral Rinse and RetarDENT® Toothpaste

	Mean Number of Pockets ≥ 4 mm Per Patient	Percentile
Baseline visit	26.4	100%
Recall visit	8.6	32.58%
Reduction between visits	17.8	67.42%



* Patients' results at baseline and at the recall visit after using RetarDEX® oral rinse and RetarDENT® toothpaste.

Figure 1—Total pocket reduction in 79 patients.



* Patients' results at baseline and at the recall visit after using RetarDEX® oral rinse and RetarDENT® toothpaste.

Figure 2—Average pocket reduction per patient after 3.4 months.

with a mean of 3.4 months. At baseline, there were 2,085 probe scores measuring ≥ 4 mm. At the next examination, 1,406 areas of attachment loss had recovered to ≤ 3 mm, with only 679 probe scores remaining at 4 mm or more. The mean difference in probe scores from baseline to the next recall visit was a 67.42% reduction to ≤ 3 mm.

The mean number of probe scores of ≥ 4 mm was 26.4 per patient at baseline. At the next examination, the mean number of probe scores of ≥ 4 mm was reduced to

8.6 per patient or a 67.42% reduction to where attachment loss was ≤ 3 mm (Tables 1, 2, and 3, and Figures 1 and 2).

The mean scores of baseline pockets vs the recall scores after the use of RetarDENT® toothpaste and RetarDEX® oral rinse were compared for statistical analysis using a paired *t*-test in which $P \leq 0.001$ (Table 4). After the use of both the rinse and toothpaste twice a day, there was a statistically significant favorable change from the baseline visit to the next hygiene recall visit.

Discussion

The reduction in the probe scores to ≤ 3 mm in 1,406 of the 2,085 areas is very impressive. It is interesting to speculate on how this change might have occurred. It is unlikely that credit should be given to the antimicrobial capacity of the products used. While both RetarDENT® toothpaste and RetarDEX® oral rinse each have an antimicrobial capacity,¹⁻³ there are other products available that also have a high antimicrobial capacity. Although these other products have not demonstrated a compa-

able therapeutic effect.

The test products have at least four capabilities that make these formulations different from any other products available. RetarDENT® toothpaste and RetarDEX® oral rinse destroy thiols on contact, including hydrogen sulfide and methylmercaptan (volatile sulfur compounds); raise the oxygen tension (Eh) higher in saliva and plaque; remove dead organic solutes; and can neutralize bacterial proteolytic enzymes.

Page and Schroeder indicated that the first event in pocket formation is the initial damage to the tissue barrier.⁴ As shown by Rizzo,^{5,6} when volatile sulfur compounds are absent, bacterial antigens do not cross an intact epithelial barrier. Ng and Tonzetich, using [S³⁵]-H₂S as a substitute for labeled methylmercaptan, showed penetration through intact epithelium, the basal lamina, and into the underlying connective tissue,⁷ which leads to the series of events that create periodontal lesions. Thus, with no volatile sulphur compounds and an intact epithelial barrier, there are no antigens to stimulate the inflammatory reaction. Clinical studies show that both the oral rinse and the toothpaste have significant thiol neutralization effectiveness (research in progress).

Oxygen tension has important implications on whether inflammation arises from gram-positive or gram-negative bacteria.⁸ If the bacterial plaque mass is populated with aerobic, gram-positive bacteria, the disease will develop only into gingivitis. As larger numbers of aerobic bacteria use more and more oxygen, the oxygen tension lowers, allowing a microbial shift from aerobes to anaerobes. Only anaerobic bacteria induce periodontitis with pocket formation.

Oxygen supply to the plaque mass comes from saliva. There is a high oxidation-reduction capac-

Table 4—Paired Samples T-Test: Initial Recall Visit

Variable	Pockets ≥ 4 mm	Mean	Standard Deviation	Standard Error
Baseline	2,085	26.3797	16.252	1.829
Recall	679	8.6329	7.6555	.861
Mean Difference	Standard Deviation	Standard Error	Correlation	2-Tail Problem
17.7468	13.856	1.559	.525	.000
T Value	Degrees of Freedom	2-Tail Problem		
11.38	78	.000		

ity by activated, stabilized, chlorine dioxide as used in RetarDEX® oral rinse and RetarDENT® toothpaste. Thus, the high oxygen availability of the test products could inhibit the bacterial growth of periodontitis pathogens. This is done by breaking the polypeptide chains at the amino acids that contain thiol in the bacterial cell walls. An anaerobic to aerobic bacterial shift by a reduced antigenic stimulus could contribute to the repair and establishment of an intact epithelium as demonstrated to have occurred in 67.42% of the 2,085 pockets evaluated in this study.

Ratcliff and Chutter demonstrated sulcular penetration, by way of contiguous coronal and sulcular plaque using C¹⁴ labeled sucrose (unpublished data, 1994). It is known that sucrose is dissipated rapidly throughout the plaque mass. Thus, another possible means of action would be the diffusing of oxygen to raise the Eh of the plaque mass, because diffusion of oxygen into plaque comes only from surrounding saliva.⁸

Chlorine dioxide gas is used in water purification to remove organic solutes, the debris that cause turbidity in drinking water taken from surface streams. This treatment after chlorination for bacte-

rial kill makes the drinking water potable. In the mouth, the debris from dead epithelial cells, dead bacteria, and food provide a source for thiol production and further bacterial growth. The removal of this oral debris could play a role in improvement of the oral environment by reducing volatile sulfur compound production and by removing the nutrients needed for bacterial growth.

Conclusion

As shown in a private general practice setting, the formulations of RetarDENT® and RetarDEX® oral care products used twice a day significantly improved periodontal health with a healing of 1,406 of the original 2,085 pockets. Only 679 pockets that were ≥ 4 mm remained. A significant percentage of the probe scores (67.42%) were reduced from ≥ 4 mm to ≤ 3 mm in an average of 3.4 months. The regimen of using RetarDENT® and RetarDEX® oral care products as presented in this study could be an effective aid for the prevention of periodontitis and maintenance of recall hygiene patients, including implant patients. However, further research needs to be done to elicit mechanisms and to fully understand the processes involved in the

clinical observations in this study.

Acknowledgment

Drs. Chapek, Reed, and Ratcliff are all stock shareholders in Rowpar Pharmaceuticals, Inc.

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