UNIVERSITY OF ROCHESTER MEDICAL CENTER

ABSTRACT

The purpose of this study was to examine a mouthwash containing essential oils and herbal extracts, effect on whole mouth and posterior dorsum tongue malodor over a 90 day period. Sixty healthy adults were randomly assigned to three groups: an essential oil/herbal extract mouth rinse (Tooth & Gums Tonic – Dental Herb Company, TGT); a placebo containing mainly water (PL); and 0.12% chlorhexidine (CHX). At baseline, day 1,14, 30, 60 and 90 days, an organoleptic evaluation was performed of both whole mouth and tongue malodor using a scale from 0 to 5. In addition the mouth air was evaluated with a Halimeter and OralChroma gas chromatography to measure the volatile sulfide compounds. The PI and GI scores decreased from the baseline to the 90-day evaluation in both the TGT and CHX groups. There were no statistically significant differences in PI and GI scores between TGT and CHX at any stage of the evaluation ($P>0.05$). The effect of TGT and CHX was more evident in patients with moderate to severe gingivitis. In patients with a baseline GI score >1.5, both TGT and CHX reduced the GI and PI scores significantly more than PL ($P<0.05$). Neither rinse demonstrated any significant effect on PD during the three-month evaluation period. Both TGT and CHX reduced the whole mouth malodor significantly at the 90-day evaluation when compared to baseline scores ($P<0.05$). No such effect was found in the PL group. TGT, CHX and PL were not effective in reducing the tongue malodor scores. The essential oil/herbal extract rinse can be effective in reducing gingival inflammation and plaque in adult patients with GI scores greater than 1.5 in addition to reduce whole mouth malodor.

INTRODUCTION

While it is theoretically possible to maintain a level of oral hygiene sufficient to control gingivitis using mechanical methods alone, data indicate a vast majority of people are unable to accomplish this on an ongoing basis *(Barnett M.L, 2006).* As the majority of people fail to maintain an adequate level plaque control the daily use of antimicrobial measures may have a significant antiplaque antigingitis activity which would be meaningful cost effective addition to mechanical hygiene methods. *(Barnett 699-704*). There are many products marketed, but the most researched are chlorhexidine gluconate and a rinse with combination of essential oils (Listerine , Pfizer inc.) Studies of the 0.12% chlorhexidine gluconate has demonstrated plaque reduction of 21.6 – 60.9% and gingivitis reduction of 18.2-42.5%. Combination of essential oils (Listerine products) have demonstrated plaque reduction of 13.8-56.3% and gingivitis reduction ranging from 14-35.9%. *(Charles et al;Grossman E;Lamster IB;Overholser et al.2006*)

Another commonly used product is cetylpyridinium chloride in concentrations from 0.05-0.07%. These products have demonstrated plaque reduction of 15.8-28.2% and gingivitis reduction of 15.4-24% (Allen et. al 2006)

The majority of mouth rinses contain pharmaceutical grade denatured alcohol as a vehicle to deliver antimicrobial ingredients.

Although, many published studies have demonstrated the safety of alcohol containing mouth rinses (*Ciancio SG 1992*), some patients have reported oral burning or irritation after using an alcohol containing mouth rinse. Mouthrinses without alcohol have been developed for patients that dislike the taste of an alcohol containing mouth rinse, who come from alcohol abuse or have a burning or an irritation. Natural products have been suggested as an alternative to effectively reduce the plaque and gingivitis.

OBJECTIVE

To examine the effect of an essential oil/herbal extract mouthwash on gingival index (GI), plaque index (PI), pocket probing depth (PD) and reducing the levels of whole mouth and tongue malodor over a three month period.

METHODS

Sixty healthy adults were randomly assigned into three groups: a placebo containing mainly water (PL –Group A), an essential oil/herbal extract rinse (Tooth and Gums Tonic, TGT-Dental Herb Company –Group B), and 0.12% chlorhexidine (CHX – Group C). GI, PI, PD , organoleptic evaluation of whole mouth air and tongue and volatile sulphur compounds with Halimeter (Interscan inc.) and Oral Chroma gas chromatography (Abilit – Japan) was measured at baseline, day 1,14, 30, 60 and 90 days.

On day 0 (baseline), a medical history, dental history, and a bad breath questionnaire was completed by one of the investigators. Thereafter an intra and extra-oral examination was performed by one operator including plaque index according to Löe and Sillness, gingival index according to Löe and Sillness , bleeding index , depth of periodontal pockets measured with a Michigan O probe (HuFriedy, Chicago, Illinois), visual and tactile caries exam and soft tissue examination. . Subjects with gingival and plaque indices $\geq$1 and organoleptic score of 2 or more (slight but clearly noticeable) were offered to enroll in the study. After completing the baseline measurements the patients rinsed with 10cc of test solution (B-EO) and 15cc of placebo (A-PL) and chlorhexidine (C-CHX). All intra oral and extra oral measurements were repeated on day 14, 30, 60 and 90. In addition plaque score was performed on day one.One investigator performed the intra and extra oral examinations . All measurements were performed at the same time of the day (morning), in the Clinical Research Center of the Eastman Dental Center at the University of Rochester.

RESULTS

BASELINE DATA

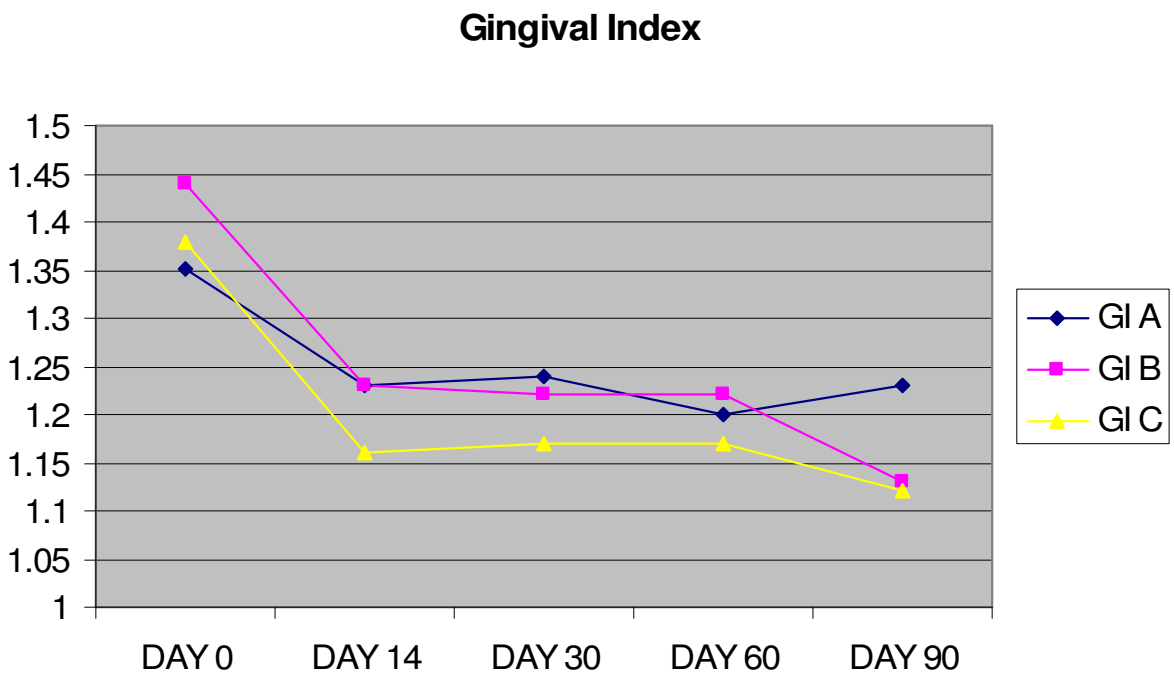
		A	B	C	p*
Sex	Male	8	6	10	
	Female	13	14	11	0.5103
Age	Mean (SD)	35.5 (11.8)	39.2 (12.4)	36.8 (10.9)	0.5901
PI	Mean (SD)	2.42 (0.42)	2.45 (0.56)	2.27 (0.43)	0.4520
GI	Mean (SD)	1.35 (0.15)	1.44 (0.16)	1.39 (0.17)	0.2329
PD	Mean (SD)	2.56 (0.18)	2.69 (0.19)	2.63 (0.17)	0.0774
BANA-tongue	Positive	2	4	3	
	Negative	19	16	18	0.3655
BANA-subgin.	Positive	13	13	6	
	Negative	8	7	15	0.8017
VSC-H	Mean (SD)	146.3 (91.0)	168.7 (124.5)	127.7 (49.2)	0.3798
VSC-OC	Mean (SD)	582.9 (455.3)	813.9 (678.8)	632.4 (674.7)	0.4616
Mouth odor	Mean (SD)	2.40 (0.64)	2.50 (0.79)	2.68 (0.52)	0.4107
Tongue odor	Mean (SD)	3.03 (1.07)	3.35 (0.69)	3.38 (0.65)	0.3326

*ANOVA Two Tailed Test

The PI and GI scores decreased from the baseline to the 90-day evaluation in both the TGT and CHX groups. There were no statistically significant differences in PI and GI scores between TGT (Group B) and CHX (Group C) at any stage of the evaluation (P>0.05). The effect of TGT and CHX was more evident in patients with moderate to severe gingivitis. In patients with a baseline GI score >1.5, both TGT and CHX reduced the GI and PI scores significantly more than PL (P<0.05). Neither rinse demonstrated any significant effect on PD during the three-month evaluation period. Both TGT and CHX reduced the whole mouth malodor significantly at the 90-day evaluation when compared to baseline scores (P<0.05). No such effect was found in the PL group (Group A). TGT, CHX and PL were not effective in reducing the tongue malodor scores.

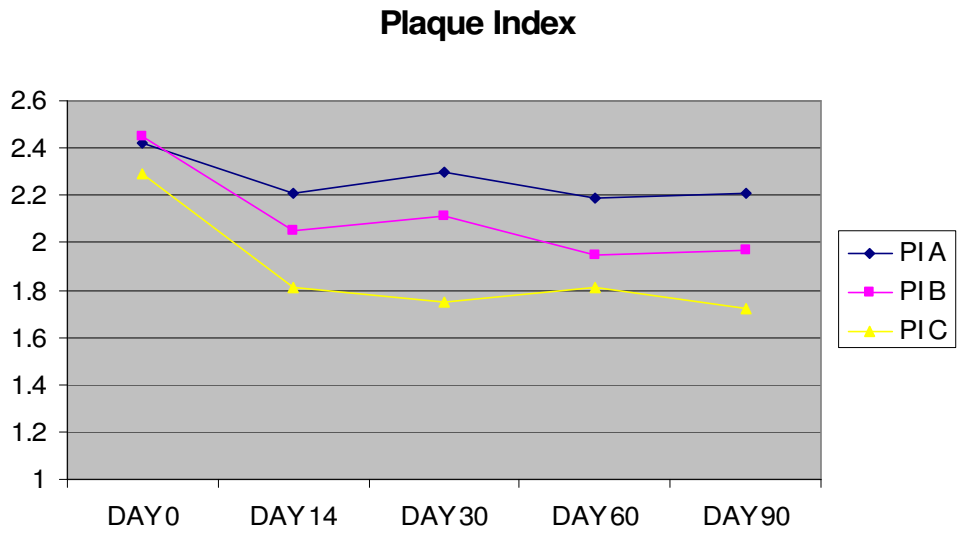
Gingival index – all subjects

	DAY 0	DAY 14	DAY 30	DAY 60	DAY 90
GI A	1.35	1.23	1.24	1.2	1.23
GI B	1.44	1.23	1.22	1.22	1.13
GI C	1.38	1.16	1.17	1.17	1.12



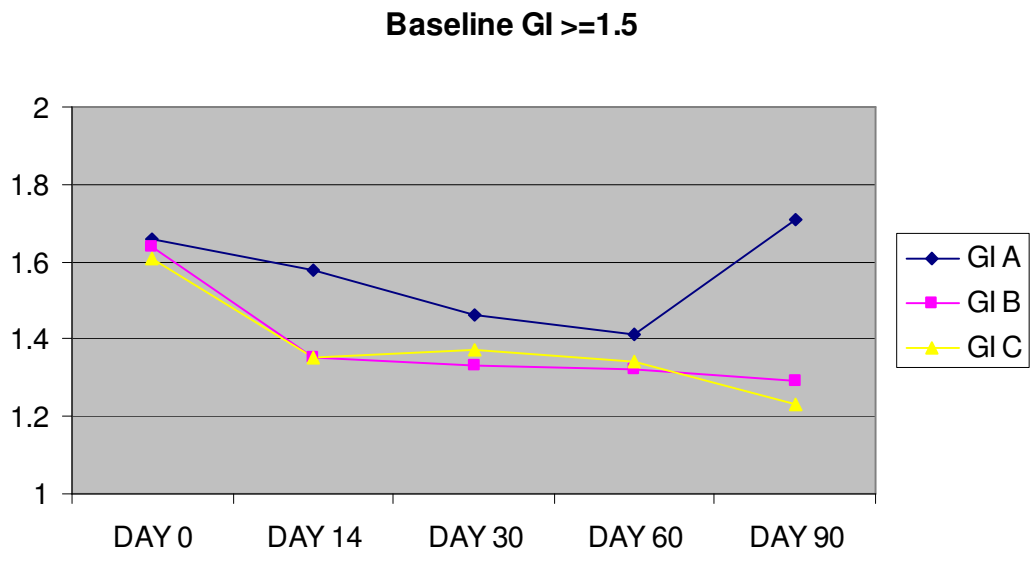
Plaque index – all subjects

	DAY 0	DAY 14	DAY 30	DAY 60	DAY 90
PI A	2.42	2.21	2.3	2.19	2.21
PI B	2.45	2.05	2.11	1.95	1.97
PI C	2.29	1.81	1.75	1.81	1.72



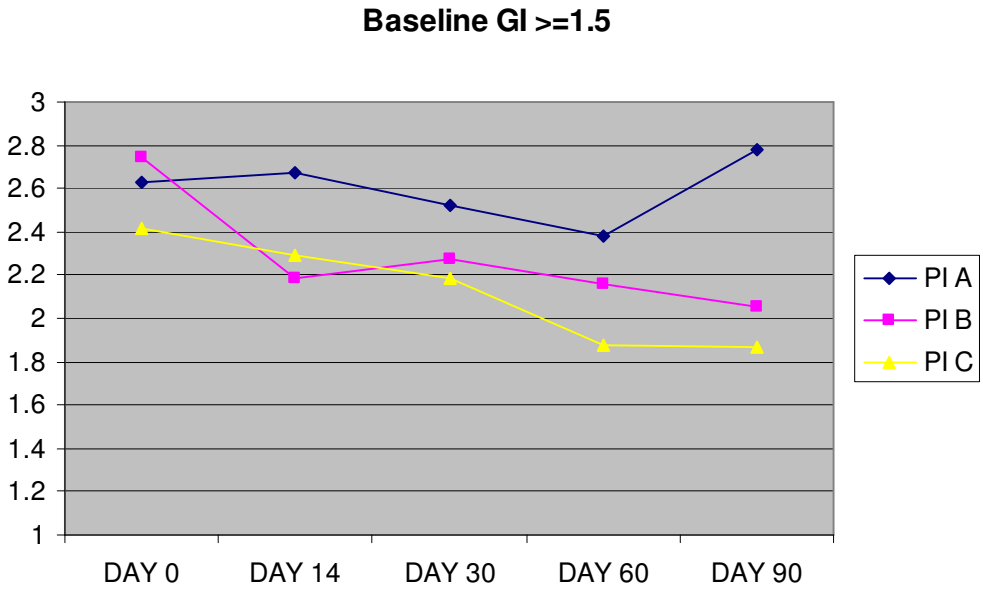
Gingival Index – Baseline GI >1.5

	DAY 0	DAY 14	DAY 30	DAY 60	DAY 90
GI A	1.35	1.23	1.24	1.2	1.23
GI B	1.44	1.23	1.22	1.22	1.13
GI C	1.38	1.16	1.17	1.17	1.12



Plaque Index – Baseline GI >1.5

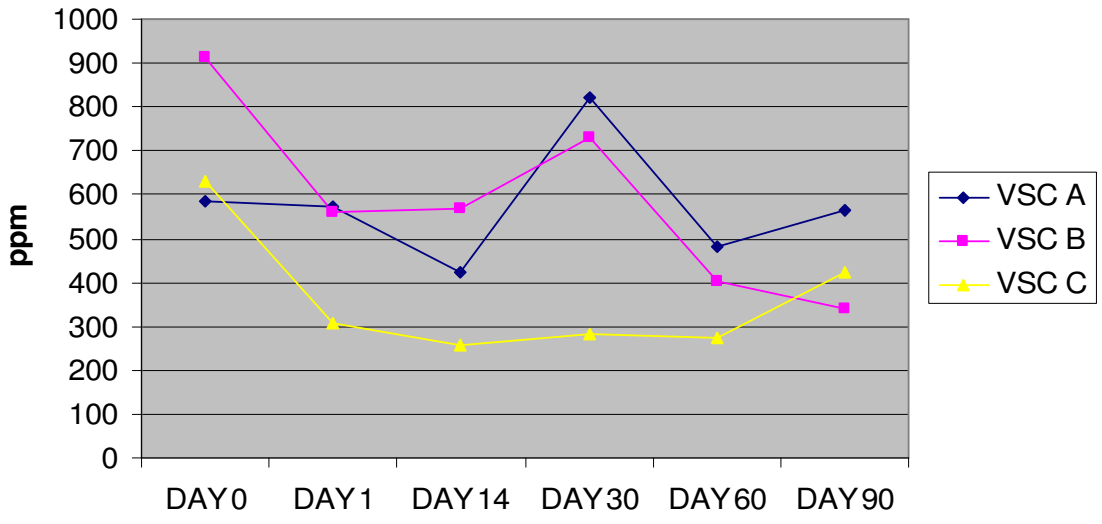
	DAY 0	DAY 14	DAY 30	DAY 60	DAY 90
PI A	2.63	2.67	2.52	2.38	2.78
PI B	2.74	2.19	2.27	2.16	2.05
PI C	2.42	2.29	2.19	1.88	1.87

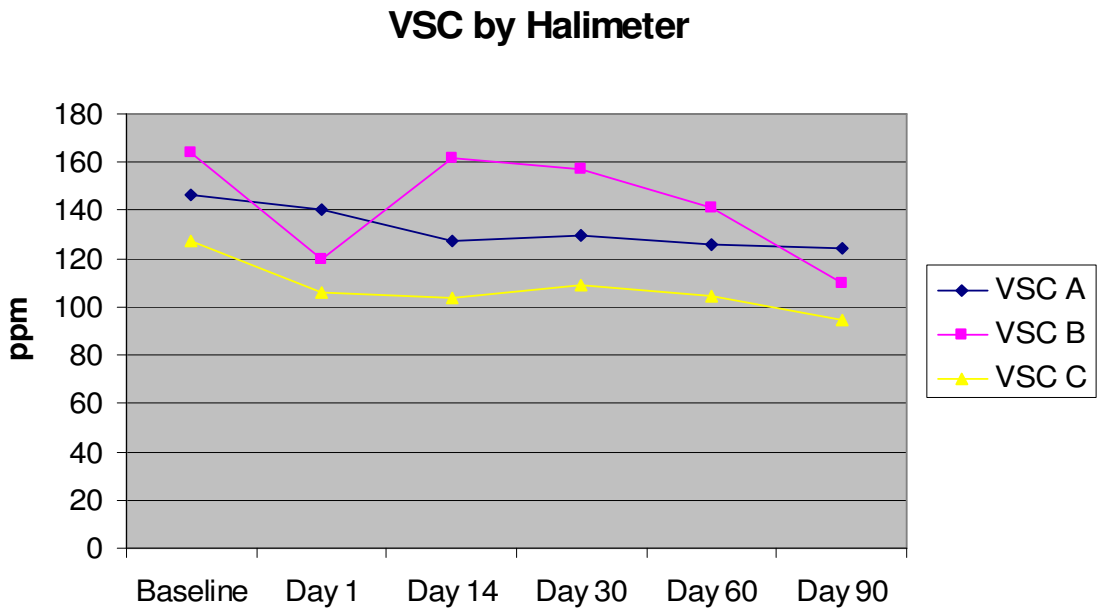


Final Evaluation at Day 90

		A	B	C	p*
PI	Mean (SD)	2.21 (0.43)	1.97 (0.52)	1.72 (0.32)	0.0025
GI	Mean (SD)	1.23 (0.26)	1.13 (0.22)	1.12 (0.16)	0.1986
PD	Mean (SD)	2.49 (0.14)	2.58 (0.30)	2.54 (0.17)	0.4027
BANA-tongue	Positive	1	3	1	
	Negative	20	17	20	0.7014
BANA-subgin.	Positive	17	13	10	
	Negative	4	7	11	0.0718
VSC-H	Mean (SD)	124.4 (69.9)	109.8 (53.7)	94.7 (44.1)	0.2491
VSC-OC	Mean (SD)	564.1 (503.5)	340.8 (352.6)	281.3 (423.2)	0.0936
Mouth odor	Mean (SD)	1.93 (0.65)	1.76 (0.69)	1.79 (0.82)	0.7503
Tongue odor	Mean (SD)	2.88 (0.99)	2.47 (0.89)	2.31 (0.98)	0.1608

VSC by OralChroma





Comparison (mean differences) between baseline and day 90 measurements of oral health and oral odor variables

	A	B	C
PI	0.21*	0.50***	0.57****
GI	0.12**	0.32****	0.26****
PD	0.07*	0.11*	0.09**
VSC-H	21.9	58.9*	33.1*
VSC-OC	18.9	473.1*	351.1*
Mouth odor	0.50**	0.74***	0.88***
Tongue odor	0.23	0.87***	1.08***

Paired t-test: *p<0.05, **<0.01, ***<0.001, ****<0.0001

CONCLUSIONS

The result from this study indicates that the essential oil/herbal rinse studied (Tooth and Gum Tonic) is as effective as chlorhexidine in reducing dental plaque, gingival inflammation, oral VSC and malodor. The essential oil/herbal rinse is more effective in adult patients with GI scores greater than 1.5 as compared to those with less gingival inflammation.

ACKNOWLEDGEMENT

This study is supported by Dental Herb Company®, Inc.