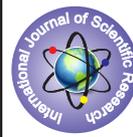


MOUTHWASH BRANDS VERSUS ACTIVE INGREDIENTS



Health Science

KEYWORDS: oral disease, oradex, mouthwash, oral B, listerine, gingivitis

Pallavi Jayavanth

Dept of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Ethiopia

Tamiru S D

Dept of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University

Mathan M

Dept of Diagnostic and Allied Health Sciences, Faculty of Health and Life Sciences, Management and Science University, Malaysia.

ABSTRACT

Oral hygiene is measured as a persistent public health dilemma. Periodontal diseases accounts for 20% morbidity globally. There is an increased inclination towards the use of commercially available mouthwash that are brand subjugated. In view of this, prospective study was undertaken to evaluate and compare the efficacy of different mouthwash brands on selected population. Based on respondents' study, Oradex, Oral B and cool mint Listerine antibacterial mouthwash were considered in the study. Mouth rinse samples were collected from subjects before and after mouthwash and subjected to standard isolation, identification and characterization procedures. 48.10 % respondents used cool mint Listerine, 25.32 % (Oral B) and 3.8 % (Oradex) respectively. *Bacillus cereus*, *Candida albicans*, *Streptococcus mutans* and *Lactobacillus buchneri* were isolated from pre mouth rinse and *Lactobacillus buchneri*, *Streptococcus mutans* were isolated from post mouth rinse (listerine), *Lactobacillus buchneri* from (oral B) and none from (oradex). Majority (48.1%) respondents used cool mint listerine mouthwash indicating brand dominance and less attention was given to key ingredients incorporated in the mouthwash. The mark of distinction is the ingredient chlorhexidine gluconate in oradex mouthwash. The active ingredients of mouthwash and vigilance concerning brand-glorified products should be emphasized and exercised. Use of mouthwash is not a stand-alone resolution; brushing technique, toothpaste, periodic dental check up and continuous education aid in improving oral hygiene.

1. INTRODUCTION

Good oral health is outlined as being free from chronic mouth pain and oral diseases¹. Oral hygiene measures have evolved from the Greek and Roman time, chewing sticks made from tree bark to formulations of modern toothbrush, floss and commercial mouthwash²⁻⁴. The current pharmaceutical scene of mouthwash marketing is exaggerated with taglines such as "minty taste" "daily fluoride rinse work really well" "spit don't rinse" "behind the label" and "magic mouthwash". Dental plaque is known since the late 16th century demonstrated by famous microscopist Anthony Van Leeuwenhoek⁵. Reports reveal more than 1010 bacteria per gram of dental plaque colonize the human oral cavity and plaque is the primary cause of gingivitis⁶⁻⁷. Contradicting numbers of bacterial species present in oral cavity in different age groups are reported by researchers⁸⁻⁹. Bacterial adhesins are known for binding and colonizing on oral surface, mouthwash is the commonly used oral antiseptic after toothpaste¹⁰⁻¹².

Oral flora is beneficial in food digestion and evading harmful microorganisms, some are known to cause oral disease under favorable conditions³. *Streptococci*, *Staphylococci*, *Corynebacteria*, *Neisseria*, *Lactobacilli*, and *Candida* species are reported to be few examples of oral microorganisms¹⁴⁻¹⁶. Dental caries, periodontal diseases and oral thrush are the consequence of extreme colonization and proliferation of microorganisms in oral cavity¹⁷⁻²². Oral hygiene is further toughened with relevant research and pharmaceutical formulations of mouth wash²³⁻²⁵.

Chlorhexidine gluconate research since early 1970's is regarded as "gold standard" due to its antimicrobial capability and extended duration of action²⁶⁻²⁸. Cetylpyridinium chloride, thymol, eucalyptol and methyl salicylate are the active ingredients incorporated in different mouthwash brands²⁹⁻³¹. Reports reveal the use of mouthwash in developed and developing countries especially for its claims in providing breath freshness and antiseptic properties is overwhelming³²⁻³⁶. Active ingredients incorporated in mouth wash is a continuous research pursuit³⁷⁻³⁹.

2. MATERIALS AND METHODS

2.1 Questionnaire distribution

A set of 100 subjects living in Section 13, Shah Alam, Selangor.

Malaysia were selected based on random sampling method. Questionnaire related to personal details, oral hygiene and commonly used commercial mouthwash brands were distributed to each and every individual in the target population.

2.2 Mouthwash

Three brands of mouth wash were used in the study *viz.*, Oradex, Oral B and Cool mint Listerine which were purchased from Guardian, a pharmaceutical outlet in Section 13, Shah Alam, Selangor, Malaysia.

2.3 Samples

Pre and post mouth rinse samples collected from selected subjects were used in the study.

2.4 Test Subjects

100 subjects that matched the inclusion and exclusion criteria were included in the *in vivo* study. A written informed consent was obtained from each test subjects prior to sampling. The inclusion and exclusion criteria were healthy oral cavity, no antibiotic treatment in past six months, no orthodontic treatment and no marked oral soft tissue pathology⁴⁰.

2.5 Sampling

The test subjects were randomly divided into three groups. Each group was allocated as below:

Group 1: Tested for the effect of oradex antibacterial mouthwash

Group 2: Tested for the effect of oral B mouthwash

Group 3: Tested for the effect of cool mint listerine mouthwash

10ml of sterile water was given to each test subjects to be swished for 30 seconds and spat back into a sterile Bijou bottle and sealed tightly. Next, the subjects were instructed to rinse with specified volume of mouthwash according to the manufacturer instructions. Sampling for post mouth rinse was done after 30 minutes. Both pre and post mouth rinse samples were diluted serially and plated on Blood agar. All the plates were labeled accordingly and incubated at 37°C for 18 hours. The isolates were biochemically characterized and identified in accordance with standard procedures.

3. RESULTS

Brand preference quotient indicated cool mint Listerine to be the most favored brand of mouthwash (48.1%), followed by Oral B mouthwash (25.32%) and Oradex antibacterial mouthwash was the least preferred mouthwash brand (3.8%). The familiar mouthwash brands recorded were cool mint Listerine was (44%), followed by Oral B mouthwash (25%) and Oradex as the least recognized brand (5%).

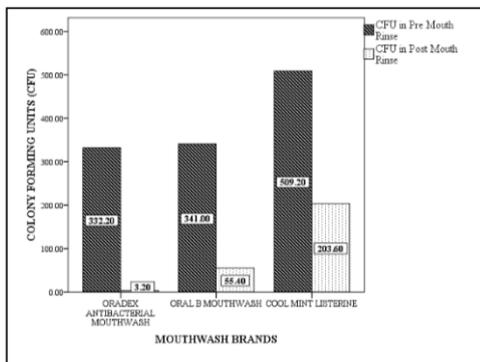


Fig 1 Bacterial load pre and post mouth wash

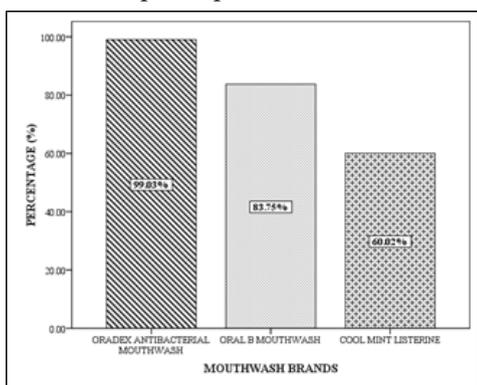


Fig 2 Percentage of reduction in the colony forming units (CFU) after mouth rinsing

Table - 1 Paired t - Test analysis on bacterial load in pre and post mouth rinse

	Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower			
Pair 1 Pre mouth rinse - Post mouth rinse	305.6000	180.39762	80.67627	81.60677	529.59323	3.788	.019

Table - 2 One-way ANOVA analysis on bacterial load in pre and post mouth rinse

		Sum of Squares	df	Mean Square	F	Sig.
Pre mouth rinse	Between Groups	99496.133	2	49748.067	1.064	.375
	Within Groups	561051.600	12	46754.300		
	Total	660547.733	14			
Post mouth rinse	Between Groups	108080.400	2	54040.200	13.825	.001
	Within Groups	46907.200	12	3908.933		
	Total	154987.600	14			

Oradex antibacterial mouthwash exhibited substantial decrease in

the bacterial load after mouth rinsing. The percentage of reduction was almost 100%, followed by oral B mouthwash (83.75%) and cool mint Listerine at (60.02%) as shown in Fig 1 and 2. The results exhibited oradex to be highly effective. Paired t-test value recorded $p < 0.05$ proving significant difference between pre and post mouth rinse as shown table 1. Based on one-way ANOVA test as indicated in table 2, the significant value was $p < 0.05$, signifying effectiveness amongst the three tested mouthwash.

Bacillus cereus, *Candida albicans*, *Streptococcus mutans*, *Lactobacillus buchneri* were isolated from pre and post mouth rinse samples.

4. DISCUSSION

Target population marked oral hygiene as important health priority. The brand preference quotient conceded wide variations between mouthwash brands and active ingredients indicating accentuated brand dominance and poor awareness of the benefit of active ingredients. Oradex antibacterial mouthwash was recorded to be effective in quelling the growth and colonization of microorganisms in the oral cavity. Oral B mouthwash exhibited a lesser efficacy compared to oradex. Low reduction rate of colony forming units was observed with cool mint Listerine in post mouth rinse. The variation in the efficacy could be due to the concentration of mouth wash used and the active ingredients.

The microbiological analysis yielded *Bacillus cereus*, *Candida albicans*, *Streptococcus mutans*, *Lactobacillus buchneri* which is in accord with other studies⁴¹⁻⁴³. The isolation of *Bacillus cereus*, a common soil bacterium was the unique finding of this research which distinguishes from other studies⁴⁴.

Oradex antibacterial mouthwash emerged superior compared to oral B mouthwash and cool mint Listerine. Chlorhexidine gluconate is the active ingredient of Oradex, many reports claim its broad spectrum antimicrobial capability⁴⁵⁻⁴⁷. Chlorhexidine gluconate is positively charged that binds to the negatively charged cell walls of microorganism leading up to destabilization of the osmotic balance resulting in apoptosis⁴⁸⁻⁵⁰. In addition, chlorhexidine gluconate exhibits prolonged duration of action, retention in the intraoral environment, released in its active form and displaced slowly by calcium ions within the saliva⁵¹⁻⁵³. However, some reports negate the claims of chlorhexidine⁵⁴⁻⁵⁹.

Cetylpyridinium chloride is a cationic surfactant with antiseptic property that does not appear as effective as chlorhexidine gluconate. Kamal, R.N (2009) reported chlorhexidine gluconate to be better compared to the mouthwash with cetylpyridinium chloride that has shorter duration of action. Sodium fluoride is the active ingredient in oral B mouthwash with insignificant antimicrobial property but prevents tooth decay⁶¹. Reports claim the essential oil combination viz., thymol, eucalyptol and methyl salicylate as antimicrobial agents in cool mint Listerine are ineffective in providing substantial antimicrobial activity⁶²⁻⁶³.

5. CONCLUSION

Mouthwash is an "every day hygiene" shelf product. The science of mouthwash is more critical than the taglines generated by pharma marketing. In addition, flavours and colours of mouthwash have masked the actual significance of active ingredients as they are more appealing to the consumers hence awareness about the active ingredients and their effect with coupled oral cleaning techniques such as brushing, tongue cleaning and flossing should be emphasized.

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