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EVALUATION OF PATIENT ACCEPTANCE OF THE CHLROHEXIDINE MOUTH RINSE AND A COMBINATION MOUTH RINSE

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Abstract

Wide range of chemical formulations has proven to improve the oral health. Chlrohexidine is gold standard, due to its advantages. However the side effects of like dysgeusia,discolouration of tooth or restoration , hypogeusia and,sensation increased odontolithiasis can limit its use and patient acceptance. Therefore need for alternate agents.

Keywords:

Combination mouth Rinse, Patient acceptance of mouth rinse, Side effects of chlorhexidine Manufactures instructions of mouth rinse.

Introduction

The role Mutans streptococcus bacteria are well established in formation of plaque and dental caries. It's a known fact that mechanical mode is most effective method of plaque control. However, many chemical formulations have proved to improve the oral health in cases were conventional practice have lacked. Diversity of plaque formation has lead to need of many such chemical agents like antiseptics agents, antibiotics, enzymes, plaque-modifying agents, sugar substitutes and plaque attachment inference agents.

The commonly used mouth rinses can be categorised as [1]

- Category 1 solutions: These are substances with high specificity and efficiency, but low substantivity, such as phenol, quaternary ammonium compound, pyrimidine derivatives, plant essence and fluoride (excluding aminfluoride).
- Category 2 solutions: The antimicrobial mouthrinses have high specificity and efficiency, as well as high substantivity. They consist of group of Bis-biguanides (chlorhexidine, alexidin).
- Category 3 solutions: These mouthrinses are surface- active substances which causes a reduction in the adhesion of oral microflora on the enamel surfaces. These solutions have no specific antibacterial effect.

The requirements of a effective mouth rinses are efficient antibacterial impact, containment of bacterial proliferation, specificity opposite to oral bacteria[2], few side effects, a high substantivity and storage stability.[3]

Many of studies have evaluated their efficiency based on antibacterial effect, duration of time, and substantivity which has concluded that Chlorhexidine to be a "gold-standard" or positive control for comparison to other substances.[4] The side effects of category 2 rinses include dysgeusia, discolouration, burning tongue and increased odontolithiasis.[5] can limit its patient's acceptance and their by its efficiency. The high alcohol content means accidental or deliberate ingestion, of particular concern in children, can lead to intoxication or poisoning.

So, according to us many other subjective factors like regular use of rinse, to follow of manufactures instructions, patient's taste acceptance, their side effects and in children, the paternal supervision, interference with other rinse or paste, may govern efficiency of mouth rinses. Main aim of this comparative study between a combination mouthrinse and chlorhexidine gluconate was done to evaluate the patient acceptance of the mouth rinses with respect to the taste-sensation, burning sensationand residual taste.

Materials and methods

The study population consisted of thirty healthy children visited to the Department of Pedodontics and Preventive Dentistry, Bharati Vidyapeeth Dental College, Pune. Children of 8 - 10 years aged, with high caries risk experience of dmft of three or four (decay component) were selected for participation in the study. Exclusion criteria included:

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medically compromised patients and subjects with history of taking antibiotics three months prior to or during the course of study, children with intraoral soft tissue pathology, periapical pathology, undergoing orthodontic treatment, or with extensive intra oral prosthesis, children who had previously restored/ crowned teeth. Physical limitations in children, which might preclude the normal tooth brushing and mouth rinsing were excluded from the study.

The purpose of study was explained and consent obtained from the parent. Child's personal details, past dental history including recent fluoride treatment, frequency of brushing, sweets/snacks intake and consumption of sugared/energy drinks and the brand of toothpaste (to determine fluoride content), details of past medical history including any recent antibiotic exposure were obtained from parents in form of questionnaire.

The study was a randomized, controlled, double-blind study. Chairside test method (Dentocult SM Strip mutans Orion Diagnostica, Espoo, Finland) (Figure No1) was used to determine the Mutans streptococci count in plaque, which is based on the principle of use of a selective culture broth, the adherence and growth of bacteria on the test strip.

The procedure of using this test was in accordance to the manufacturer. The vials were brought down to room temperature one hour before use and shaken gently. Two bacitracin discs were placed using a forceps in the selective culture broth about 15 minutes before sampling (Figure No 2) and gently shaken for even distribution of bacitracin.

Isolation was achieved with cotton rolls. Toothpicks were used to collect the plaque samples from the four sites enamel, buccal surface of the maxillary right molar, labial surface of the maxillary incisor, labial surface of the mandibular incisor and lingual surface of the mandibular left molar. Thoroughly but gently these samples were spread on the four sites of the rough surface of the strip (Figure No 3). Then, the strip was placed in the selective culture broth and vials were labelled with the numbers. These vials were incubated at 37^0 C for 48hrs with one quarter of the cap turned open to allow growth of the organisms. The inoculated surfaces of the strips showed the presence of Mutans streptococcus which were confirmed by dark-blue to light- blue raised colonies following incubation. (Figure 4)

A magnifying glass was used in sideways against light to inspect the growth of the raised colonies. As suggested by manufacturers, colonies suspended in the culture broth were excluded for the evaluation. Manufacture's model density chart was used to interpret the results and classified as

Class 0: < 10,000 CFU/ml*
Class 1: < 100,000 CFU/ml
Class 2: 100,000 – 1,000,000 CFU/ml
Class 3: > 1,000,000 CFU/ml
* **CFU/ml** - Colony Forming Unit / millilitre

Inspection of the growth was done with the strip held sideways against light and magnifying glass. Epithelial cells on the strip surface can be differentiated from the S.mutans colonies by passing a gloved finger along the strip: the epithelial cells are smooth, while the S.mutans colonies are rough.

Baseline statuses of plaque samples were the collected and then subjects were randomly divided into two groups ((15 children each). Under the parent's supervision, the group 1 were advised to rinse with 10ml of 0.2% Chlorhexidine gluconate **(**Hexidine, ICPA products Ltd**)** and the group 2 was advised to rinse with 5ml of combination mouth rinse containing 0.03% Triclosan, 0.05% Sodium fluoride,5% Xylitol (Kidodent,Warren) in the morning and in the night after brushing for l minute for 15 days. Following rinsing the children was advised not to eat or drink for 30 minutes. During the course of the study, the children were asked to use the nonfluoridated tooth paste, the new brush (Colgate Zig Zig - Junior) which was provided to them to prevent microbial contamination. The subjects in both the groups were blinded about the division of group.

The plaque samples were again collected, incubated and interpreted in similar manner as taken for baseline status to assess change in count level of Mutans streptococcus after 15 days of use the mouth rinses. The subjects were questioned about taste acceptability, burning sensation and residual taste following the use of rinse and interpreted as

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SUBJECTIVE CRITERIA

1. Taste acceptability
   - 0- Acceptable
   - 1- Tolerable
   - 2- Unacceptable
2. Burning sensation
   - 0-Absent
   - 1- Present
3. Residual taste
   - Bitter
   - Sour
   - Coolness
   - Pleasant

The data obtained from the study was tabulated and analyzed statistically.

Figure 1:

Dent***ocult SM Strip mutans Orion Diagnostica, Espoo, Finland***

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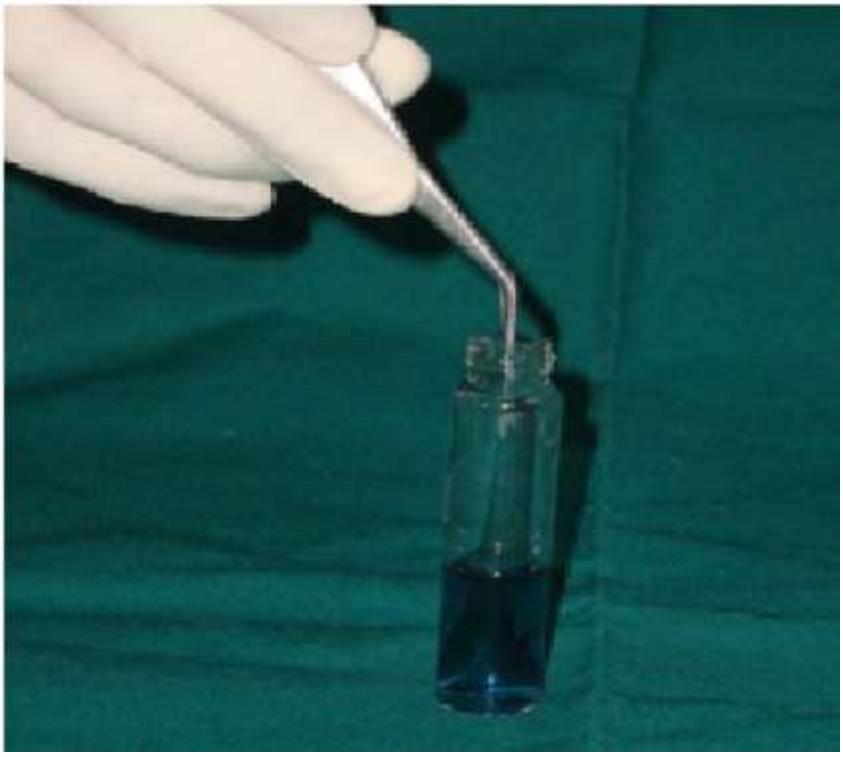
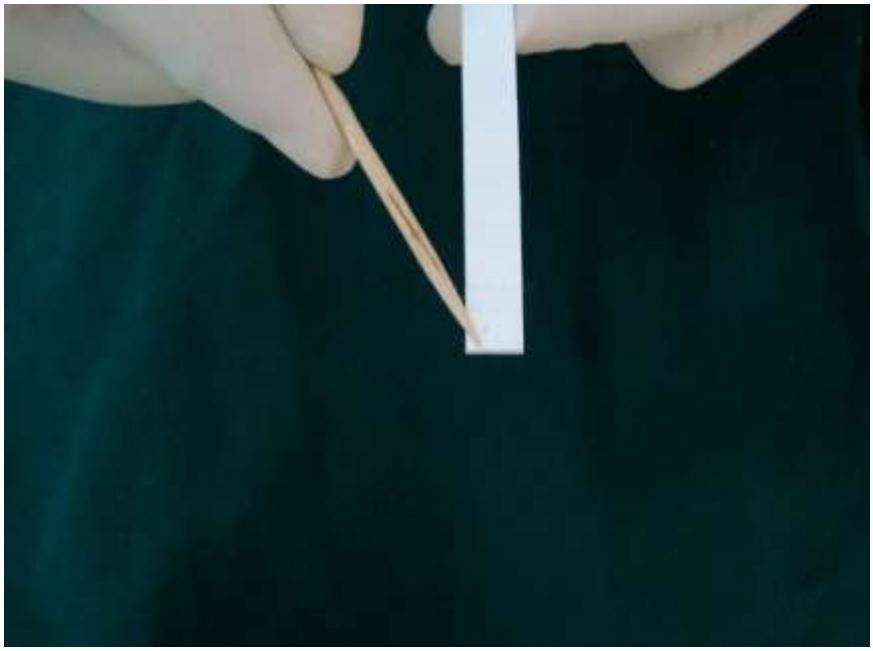
Figure 2:



Placement of bacitracin discs in the selective culture broth

Figure 3:



Gently the samples were spread on the four sites of the rough surface of the strip

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Figure 4:

Dark-blue to light- blue raised colonies of Mutans streptococcus

Results

(Graph 1) In group 1, none of children readily accepted its taste. 73.32% children felt it was unacceptable and 26.68% children felt it was tolerable. Whereas, 60% children of group 2 felt it was acceptable and none of them said that it was unacceptable.

80% children in group1 had burning sensation in contrast, group 2, 80% children had no burning sensation (Graph 2).

Graph 3 shows in group 1, 60%, 27%, 13% children felt bitter, sour and cool respectively and no child felt pleasant after the rinsing with Chlorhexidine. Where as in combination mouthrinse group no child felt bitterness or sourness, 66.67% children felt cool and 33.33% children felt pleasant after its use.

Graph 4 shows 30% children had higher level of Mutans streptococci count in lower arch than in upper arch.

Graph 5 shows Labial surface of lower incisor of maximum children had the highest level of Mutans Streptococcus count before rinsing procedure

Graph 6 shows that the buccal surface of upper right molar of most of the children had the lowest level of Mutans Streptococcus after rinsing procedure.

Table1. Shows no statistically significant difference (p-value = 0.302) in Mutans streptococci count when compared between males and females after rinsing.

Table 1: Gender wise comparison of Mutans streptococci with respect to post rinse

Gender	Number of patients (30)	Median Score	p-value*
Male	16	2.00	0.302
Female	14	1.87	

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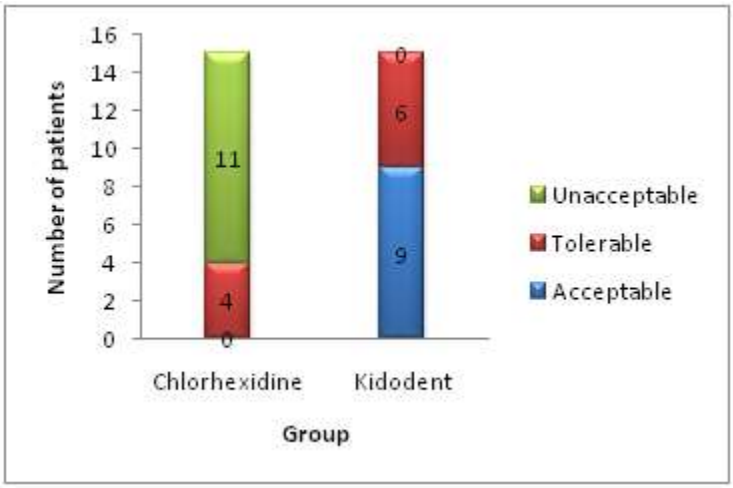
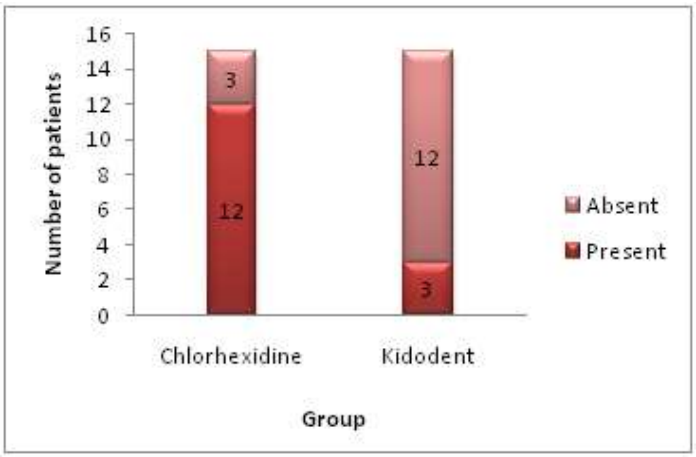
*Mann-whitney U test used to calculate the p value

Figure 1



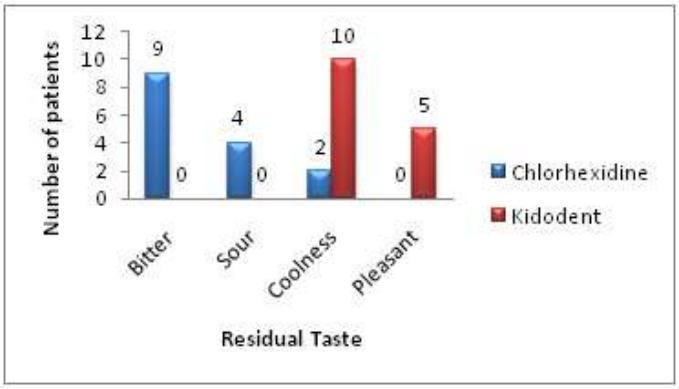
Distribution of patients with respect to criteria -Taste acceptance

Figure 2



Distribution of patients with respect to criteria-Burning sensation

Figure 3



Distribution of patients with respect to residual taste

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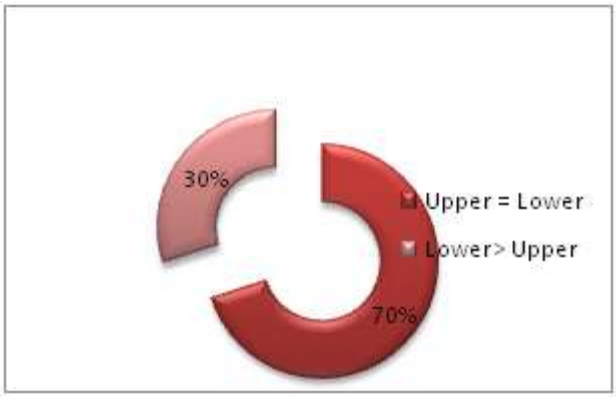
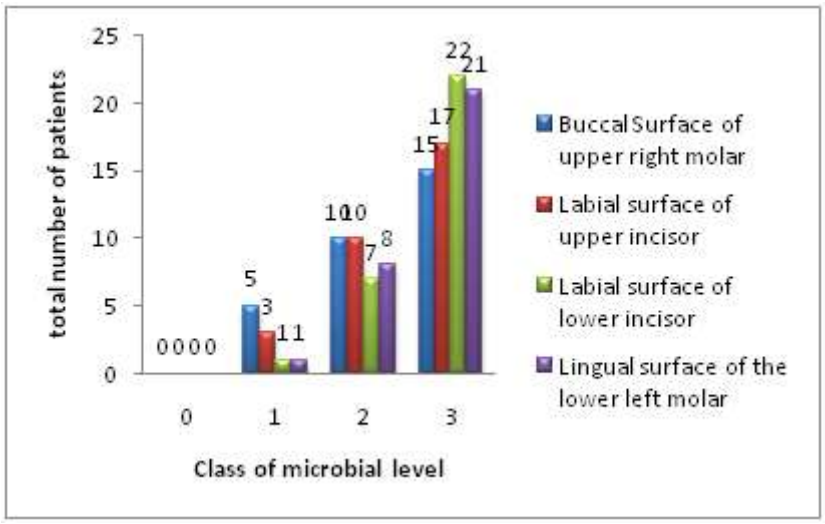
Figure 4



Distribution of patients with respect to Mutans Streptococci in maxillary and mandibular arches

Figure 5



Distribution of patients with respect to pre rinse Mutans streptococci count

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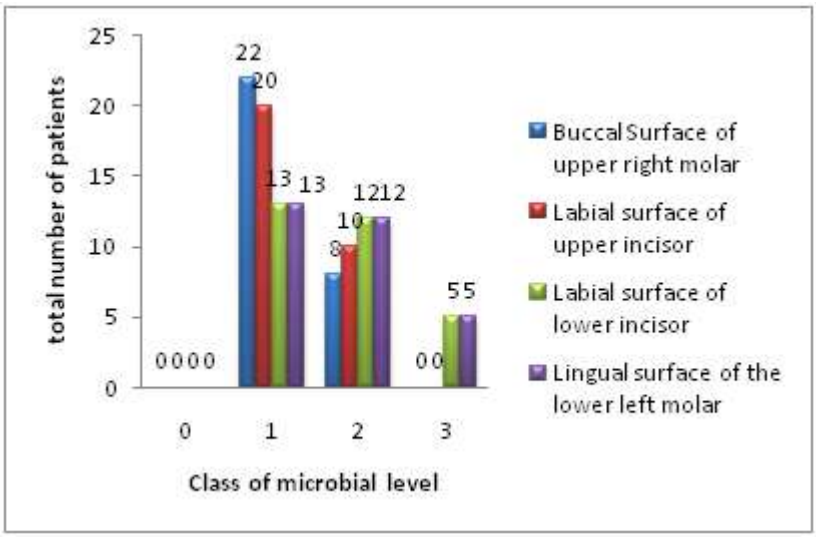
Figure 6



Distribution of patients with respect to post rinse Mutans streptococci Count

Discussion

Chlorhexidine is one of the most invested antiseptic agents in today's dentistry.[6] It has wide range of action on gram-positive and gram-negative organisms, yeast, fungi, facultative anaerobes, and aerobes. It displays high substantivity. At low concentrations it is bacteriostatic and at higher concentration it has bactericidal activity.[7] However it has various side effects. Plaque being a complex aggregation of various bacterial species, no single agent can be completely effective to eliminate plaque. Thus a combination rinse was chosen to have additive effects, with minimal adverse effects.

A combination mouth rinse of triclosan, fluoride and xyiltol was used for their known actions. Triclosan has broad spectrum antimicrobial activity and is effective against Streptococcus mutans at low concentration.[8] Effects of fluoride on bacterial metabolism are well-known. Fluorides inhibit several essential enzymes in oral bacteria.[9] Low potency-high frequency rinsing of fluoride may be more beneficial.[10] The action of Xyiltol as is stated as non-fermentability and non-cariogencity as passive effects while active caries prevention effects as bacteriostatic and cariostatic.[11]

Mutans streptococci in plaque are predominantly Streptococci mutans, with significant, but lesser number of Streptococci sorbinus.[12] Children with high DMFT have increased S. mutans count.[13] Streptococcus mutans colonizes at distinct sites of the teeth.[14] Various teeth and tooth surfaces show different caries susceptibility.[15] Therefore different teeth and surfaces are considered in our studied.

The conventional techniques [16] to quantify the level of S. mutans infection involve laborious laboratory steps. Hence it lacks wide-spread use in routine dental practice. Sara Karjalainen and co-workers[17] documented the sensitivity, specificity, accuracy of the Dentocult Strip Mutans to be better than those of conventional methods. They found that sensitivity and accuracy of plaque test surpassed the salivary strip test when compared. Considering the above fact and the feasibility to sample four sites simultaneously from the Dentocult SM kit, we decided to take supragingival plaque samples from four sites.

Our result showed that Chlorhexidine was less accepted then the combination mouth rinse. Bitterness or sourness and burning sensation following the use of Chlorhexidine was common. Were as, none of children experienced bitter taste in group 2. This is because of Xylitol, which is non-sugar sweetener.[18]

Chlorhexidine is bis-biguanide antiseptic, is the only known blocker of the human salty taste.[19] Studies have shown taste disturbance following use of chlorhexidine.[20,21] It not only interferes with gustatory sense but last for several hours.[21] A study has demonstrated that chlorhexidine decreased ability to identify salty and bitter taste perceptions.[19] Gangler and Staab[20] suffered from changes in their sense of taste for 2 years, mostly sweet perception was affected followed by salt and sour. Rushton's study reported change in taste sensation in one-third

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patients was reversible once rinsing was discontinued.[21] However Kulkarni VV and Damle SG [22] found no taste alteration and side effects with Chlorhexidine mouth rinse.
Frank *et al*[23] states that it reduces the bitter taste of a subset of bitter compounds, but has little effect on sweet and sour tastes. It blocks of all saltiness, and selectively blocks the taste of a subset of bitter stimuli.[24] The mechanism of inhibition of salty taste is unclear; but it may block ion channels in taste receptor cell membranes[24] or interfere with paracellular ion movements.[23]
Side-effects like tooth staining; especially composite restorations are noted with Chlorhexidine.[6,25,22,26] Direct relationship between staining and the frequency of exposure and the dose of Chlorhexidineis is found..[27] Rebstein and others [28] reduced the concentration of Chlorhexidine to 0.0025% in a pulsating device and still reported staining. Jensen[29] examined the binding of selected food dyes to hydroxyapatite with and without a coating of Chlorhexidine. He found that the binding of these dyes is mediated by an interaction between the anionic groups of the dye molecules and the cationic groups of Chlorhexidine molecules that may be related to staining. Addy[30] and others also favoured a dietary etiology for Chlorhexidine staining. Staining of teeth was not found in present study which could be due to Chlorhexidine mouth rinsing after brushing and the duration of this study is short. However, two-year clinical studies have also failed to detect any serious side-effects. [31] Chlorhexidine with an anti discoloration system has show evidence of the much less staining.[32]
Sensitivities of the oral mucosa[20], including redness, slight epithelial desquamation and burning[33] are also documented with chlohexidine. Due to hypersensitivity of mucosa, hairy tongue and interference in the taste, chlorhexidine should be applied for no longer than 4 weeks.[33] Other studies have shown that nearly every antiseptic mouthrinse cause tooth surface and composite restoration discoloration.[34] CHX may promote yellow-brown staining, calculus formation and mucosal desquamation, reduce patient acceptance.[35]
Barkvoll et al[36] suggested that Sodium lauryl sulphate and Sodium monofluorophophaste, additives of toothpaste would interact and reduce Chlorhexidine activity. In present study a non-fluorinated paste was used.
In present study 30% children had more Mutans streptococci level in lower arch as compared to upper arch. Sharma U et al[37] found that plaque was formed more on the mandibular arch than in the maxillary arch. This may be attributed to the ease of accessibility of the facial surface of the maxillary arch with a brush. The accessibility of the lingual surface of the mandibular arch could have been limited on an account of a limited access or obstruction by the tongue. Moreover, the stagnation of saliva on the floor of the mouth and the lower vestibule due to gravity lead to more plaque formation on the lower arch.[38]

The pre-rinse Mutans streptococci count was higher on the lower labial surface of the incisor when compared to other surfaces in maximum children. Sharma U et al[37] documented Mandibular lingual surfaces had more plaque than the maxillary palatal surface.
The post-rinse Mutans streptococci count was lowest on the buccal surface of upper right molar and labial surface of upper incisor level, showing rinse was most effective on these areas. Sharma U et al[37] found reduced plaque re-growth at the lingual and palatal when compared to the facial sites. Which could be due to close proximity of mouth rinse to lingual and palatal surfaces exerted a more profound antibacterial action on the plaque on this side and natural cleansing action of the tongue and saliva occurred more on the lingual/palatal surface.[39] Many of these differences appear to be a consequence of tooth contour and position which is subject to friction by food and the tongue.
There was no statistically significant difference found in Mutans Streptococci score when compared between males and females after rinsing with either mouth rinses. This could be due to tooth brushing and mouth rinsing done under parent's supervision.

Summary and Conclusions

The side-effects of chlorhexidine may limit its acceptance and its long-term use. Combination mouth rinse has better patient acceptance and serves as a good alternative, especially in children. But it is more preferred by the patients for its taste, convenience of use and taste duration (aftertaste) in their mouth. So it's is necessary to mask side effects that may affect outcome of treatment and influence treatment option the dentist will be able to offer to patients.
Conclusions of this study:

- Combination mouth rinse had better patient's acceptance than 0.2% Chlorhexidine mouth rinse with respect to the taste-sensation, burning sensation and residual taste.

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- 30% children had more Streptococci mutans count in plaque in the mandibular arch as compared to the maxillary arch.
- The pre-rinse Mutans streptococci count was higher on the lower labial surface of the incisor when compared to other surfaces in maximum children.
- Mouth rinses were most effective on buccal surface of upper right molar and labial surface of upper incisor than other surfaces
- Post rinse, no gender wise difference was found in the level of Streptococci mutans in plaque.

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