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## Comparative Evaluation of Antimicrobial Efficacy of Two Commercially Available Dentifrices (Colgate Total and Kidodent) Against Salivary Microflora.

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### ABSTRACT

Prevention of dental caries is one of the main strategies in contemporary pediatric dental practice. Toothpastes are widely used as an adjunct to maintain oral hygiene. It is important for these products to be effective and safe for regular use in children. The amount of fluoride present in these dentifrices can also have an impact on the mineralizing potential. Also, excess presence of fluoride could also lead to deleterious effects in children. This study investigated the antimicrobial efficacy of two commonly used toothpastes i.e. Colgate Total (Group A) and Kidodent (Group B) at various concentrations in salivary samples of children in the mixed dentition age group. The antimicrobial activity was assessed by measuring the inhibition zones by agar well diffusion method. Saliva was collected from children of age group 6-12 years having high caries activity. After statistical analysis, the results found indicated that Colgate Total has the highest antimicrobial activity at all concentrations. The higher antimicrobial activity of Colgate Total could be attributed to the presence of different components like triclosan and fluoride. These factors should be considered while recommending dentifrices in children of various age groups.

**Keywords:** Colgate total, Kidodent, antimicrobial efficacy, agar well diffusion.

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## INTRODUCTION

Dental caries in young children has a multifactorial etiology, therefore preventive measures involve a combination of dietary counseling, oral hygiene methods and fluoride applications [1].

Tooth brushing is the most commonly accepted method of oral hygiene practice. The success of any toothpaste partly lies on its ability to eliminate pathogenic oral microflora. In order to produce a direct inhibitory effect on plaque formation various antimicrobial agents have been added to major dentifrices. These substances kill microorganisms by disrupting their cell walls and inhibiting their enzymatic activity. They prevent bacterial aggregation, slow their multiplication and release endotoxins. Thus, they pose one of the possible measures of increasing the efficacy of mechanical tooth- cleaning procedures.

Fluoride is a preventive agent that has almost mesmerized dental research. Fluoride dentifrices have been widely used all over the world and have established their abilities in terms of caries resistance [2]. However, the most critical period of fluorosis risk is believed to be from approximately 19 to 26 months of age. Therefore, to avoid inappropriate fluoride intake in this period, studies have suggested the use of small quantities of toothpaste under parental supervision as well as reduction of fluoride (F) concentration in toothpaste (500 ppm F) [3].

In this context, this study was undertaken to analyze the antimicrobial effects of two commercially available dentifrices in caries active children.

## MATERIALS AND METHOD

### **Toothpaste used**

Toothpastes namely Colgate total and Kidodent were selected for assessment of their in vitro antimicrobial activity. The products were collected from local market, Pune.

### **Criteria for selection of patients**

In the present study, patients of 6-12 years of age, in mixed dentition period with high caries experience were included. These patients had no history of antibiotic therapy or use of chemical anti-plaque agents prior to six months of study initiation.

### **Method of saliva collection and storage**

The subjects were told to rinse with water; saliva was allowed to accumulate in the floor of the mouth for approximately two minutes and by asking the subject to spit in uricol container. By following the above mention method, 10 samples were collected in the early morning time. The samples were transported immediately to the laboratory.

### Minimal inhibitory concentration of toothpastes

All toothpaste samples were diluted in sterile water and prepared series dilution. The concentrations considered were - 25%, 50% and 100%.

### Antimicrobial Assay

The antimicrobial activity of different concentrations of the dentifrices was determined by modified agar well diffusion method. In this method, nutrient agar plates were seeded with 0.5 mL collected saliva sample for 24h. The plates were allowed to dry for 1 h. A sterile 8 mm cork borer was used to cut one central and two wells at equidistance in each of the plates. Dentifrice dilutions at different concentrations were introduced into each of the three wells. The plates were incubated at 37°C for 24 h. The antimicrobial activity was evaluated by measuring the diameter of zones of inhibition (mm).

## RESULTS AND DISCUSSION

The antimicrobial activity of Colgate total dentifrice has been consistently high at 25%, 50% and 100% concentrations as compared to Kidodent with a mean zone of inhibition of 14.4mm, 17.5mm and 21.8mm respectively (Tables and figures 1 & 2). When the results were subjected to ANOVA and post hoc tests the results showed that Colgate total had zones of inhibition that were significantly higher than the other group, at all concentrations. Colgate total due to the triclosan/copolymer along with the 1000ppm Fluoride provides a more effective level on plaque control and periodontal health than conventional fluoride toothpaste [4]. It has been suggested that triclosan blocks lipid biosynthesis by specifically inhibiting the enzyme enoyl-acyl carrier protein reductase (ENR). This feature of Colgate total can be attributed to the antimicrobial efficiency.

**Table 1: Comparison of antimicrobial activity at 25% in study groups**

Parameter	Antimicrobial activity at 25%		F Value	P Value
	Mean	SD		
Colgate <sup>R</sup> total	14.4	3.34	4.92	<0.05
Kidodent	10.8	3.08		

P=0.015, Colgate<sup>R</sup> total Vs Kidodent: P<0.05

**Table 2: Comparison of antimicrobial activity at 50% in study groups**

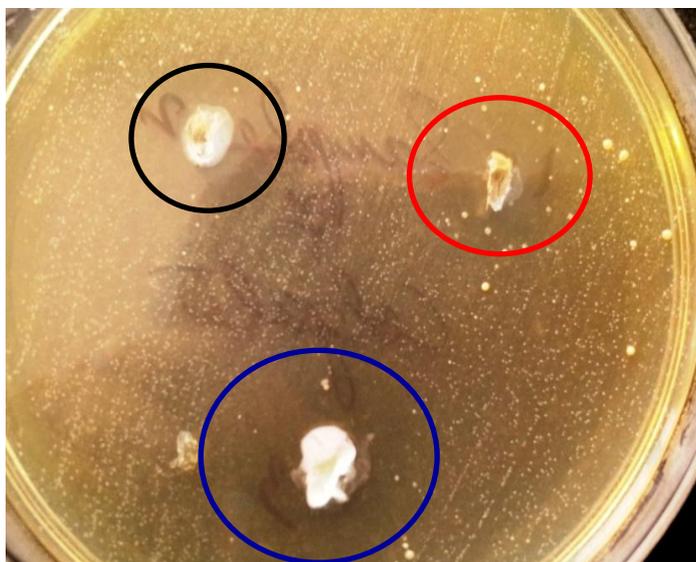
Parameter	Antimicrobial activity at 50%		F Value	P Value
	Mean	SD		
Colgate <sup>R</sup> total	17.5	4.01	3.67	<0.05
Kidodent	15.1	3.03		

P=0.039, Colgate<sup>R</sup> total Vs Kidodent: P<0.05

Maintenance of good oral hygiene is the key to the prevention of dental diseases. The primary etiological factor for dental diseases is dental plaque. The formation of plaque on the tooth surface is characterized by the progression from a limited number of pioneer microbial species to the complex flora of mature dental plaque. Ultimately, the tooth surface gets coated with a dense, complex micro community that ends up in the destruction

of hard enamel tissue. Hence there is a need to keep these oral organisms to low levels with judicious use of antimicrobial agents.

**Figure 1: Inhibition zones of Colgate<sup>R</sup> total at 25%,50%,100%. 25% Black ring, 50% Red ring and 100% Blue**



**Figure 2: Inhibition zones of Kidodent at 25%,50%,100% . 25% Black ring, 50% Red ring and 100% Blue ring**



**Table 3: Comparison of antimicrobial activity at 100% in study groups**

Parameter	Antimicrobial activity at 100%		F Value	P Value
	Mean	SD		
Colgate <sup>R</sup> total	21.8	3.58	7.28	<0.005
Kidodent	18.9	3.48		

P=0.003 Colgate<sup>R</sup> total Vs Kidodent: P<0.005

Colgate total, due to the triclosan/copolymer along with the 1000ppm Fluoride provides a more effective level on plaque control and periodontal health than conventional fluoride toothpaste [4]. It has been suggested that triclosan blocks lipid biosynthesis by

specifically inhibiting the enzyme enoyl-acyl carrier protein reductase (ENR). This feature of Colgate total can be attributed to the antimicrobial efficiency. Although the commonly used and recommended toothpastes by WHO, ADA, FDI are fluoride and triclosan containing, but the excess use of the fluoride can cause dental fluorosis so the recommended amount of the fluoride should be used as the ingredients in the toothpaste. It has also been established that for children under the age- group of 3 years, higher concentrations of fluoride can be detrimental.

Kidodent toothpaste had significant antimicrobial efficacy at 50% and 100% concentrations with 15.1mm and 18.9mm zones of inhibition respectively. The fluoride toothpaste reduces the number of streptococcal colony forming units of dental plaque [5] despite the fact that fluoride was added to the toothpastes first with aiming to preserve the product and then to protect the teeth [6]. The effectiveness of fluoride toothpastes as an antimicrobial agent is concentration dependent. Hence, Kidodent a 500 ppm fluoride containing toothpaste also has moderate antimicrobial efficacy, and can definitely be used in children around 2 to 5 yrs. of age to avoid fluoride toxicity.

### CONCLUSION

The level of pathogenic organisms in the oral micro biota is one of the etiological factors for dental caries and other periodontal diseases. There are a number of toothpastes available in the market, which claims to have antimicrobial potential. This study has proved that Colgate total remains a gold standard as far as antimicrobial efficacy is concerned. However, it must be recognized that a 1000-ppm fluoride containing toothpastes is not recommended for children. Kidodent has also shown considerable amount of antimicrobial activity along with lower concentration of fluoride, which makes it a good choice for use in children especially in the primary dentition age group.

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