

# Is High Fluoride Toothpaste or Fluoride Mouthwash More Effective in Enhancing Cariostatic Activity among Patients of Orthodontic treatment?

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## ABSTRACT

**Objective:** The objective of current study was to compare the effect of fluoride containing toothpaste and fluoride containing mouthwash during orthodontic treatment.

**Method:** This randomized control trial was conducted in dental hospital of Lahore in the department of orthodontics for 6 months. Sample of 45 patients was taken in the study. Group A received treatment along with regular use of fluoride toothpaste whereas Group B received treatment along with regular use of fluoride mouth wash. Group C received treatment along with regular use of regular toothpaste. Data was entered and analyzed in SPSS version 25. Frequencies and percentages were calculated for gender and mean  $\pm$  std. deviation was calculated for age. Chi-square test was used to explore the effect of fluoride containing toothpaste and fluoride containing mouthwash during orthodontic treatment

**Results:** The results of chi-square test revealed a significant difference in the effectiveness of fluoride toothpaste, fluoride mouthwash and regular toothpaste in terms of dental caries prevention during orthodontic treatment ( $X^2=17.23$ ,  $P=.002$ ).

**Conclusion:** Fluoride containing toothpastes are more effective in preventing dental caries among patients undergo orthodontic treatment as compared to fluoride containing mouthwash.

**Keywords:** Mouthwash, Toothpaste, Fluoride, Dental caries

## INTRODUCTION

Side effects are always linked with orthodontic treatment in terms of higher possibility of caries development,<sup>1</sup> mainly white spot lesions which are preliminary stage of caries,<sup>2</sup> but also evident dental caries.<sup>3,4</sup> Complete remineralization could not be supported during dental caries.<sup>2,5</sup> The cite for lesions occurrence is often atypical, for instance, anterior teeth,<sup>3</sup> which becomes compromised esthetic condition. Worst malocclusions may resulted in case of terminating the orthodontic treatment due to the development of severe dental caries. So, it is important to prevent occurrence of dental caries during orthodontic treatment.

It is evident in the course of last 50 years that toothpastes which contain fluoride content showed accelerating decrease on the caries' frequency and severity in developed countries.<sup>6</sup> Reduction in demineralization with a progressive remineralization could resulted in reversal of preliminary dental caries due to the recurrent fluoride exposure.<sup>7,8</sup> In permanent teeth, the daily exposure of fluoride toothpaste averts dental caries.<sup>9,10</sup> Usually, patients who are at higher progression of dental caries are recommended the use of toothpastes and mouth washes containing higher quantity of fluoride. Many studies have reported that with the increase of fluoride concentration in toothpaste, dental caries prevention was the outcome.<sup>9,11,12,13</sup> A similar study reported a positive outcome in prevention of dental caries progression among children as well as adolescents of fluoride containing mouth wash.<sup>14,15</sup> But the effect of fluoride containing toothpaste as compared to fluoride containing mouthwash has not been fully explored in case of orthodontic treatment, so there is a dire need to explore this. Therefore, the aim of study was to compare the effect of fluoride containing toothpaste and fluoride containing mouthwash during orthodontic treatment.

## METHODOLOGY

This randomized control trial was conducted in dental hospital of Lahore in the department of orthodontics for 6 months. Sample of 45 patients was taken in the study among which 15 participants were grouped as Group A, 15 participants were grouped as Group B and rest of 15 participants were grouped as Group C using random sampling technique. Group A received treatment along with regular use of fluoride toothpaste whereas Group B received treatment along with regular use of fluoride mouth wash. Group C

received treatment along with regular use of regular toothpaste. Patients of class I malocclusion were taken. The age group was between 13 years to 17 years. Patients with any comorbidity or dental issues were excluded from the study sample. High Fluoride toothpaste and fluoride containing mouthwash were given to the participants and oral hygiene maintenance tips were explained along with the way of brushing. Approval from the institutional ethical board was acquired and written consent were taken from parents of all study participants as patients were under 18. Patients with dental caries (enamel decay level) were taken. Data was entered and analyzed in SPSS version 25. Frequencies and percentages were calculated for gender and mean  $\pm$  std. deviation was calculated for age. Chi-square test was used to explore the effect of fluoride containing toothpaste and fluoride containing mouthwash during orthodontic treatment.

## RESULTS

Among the 45 participants, mean age was  $15.16 \pm 0.67$ , whereas mean age of participants in Group A was  $15.0 \pm .89$ , in Group B was  $15.98 \pm 1.08$  and in Group C was  $14.50 \pm .78$ . Males were 21 (46.67%) whereas females were 24 (53.33%). In Group A, males were 7 (46.67%), females were 8 (53.33%). In Group B, 6 (40%) were males and 9 (60%) were females. In Group C, 8 (53.33%) were males whereas 7 (46.67%) were females.

Table 1: Demographic variables

Variables	Mean $\pm$ Std. Deviation
Age	15.16 $\pm$ 0.67
Group A mean age	15.0 $\pm$ .89
Group B mean age	15.98 $\pm$ 1.08
Group C mean age	14.50 $\pm$ .78
Gender (n=45)	Frequency(%age)
Male	21(46.67%)
Female	24(53.33%)
Gender in Group A (n=15)	
Male	7(46.67%)
Female	8(53.33%)
Gender in Group B (n=15)	
Male	6(40%)
Female	9(60%)
Gender in Group C (n=15)	
Male	8(53.33%)
Female	7(46.67%)

The results of chi-square test revealed a significant difference in the effectiveness of fluoride toothpaste, fluoride mouthwash and regular toothpaste in terms of dental caries prevention during orthodontic treatment ( $X^2=17.23$ ,  $P=.002$ ). Majority of patients of group A experienced remineralization 9(52.9%) followed by patients who do not had any progression of disease 4(23.5%) whereas patients who experienced demineralization were only 2(18.2%). Majority of patients of group B experienced remineralization 8(47.1%) followed by patients who do not had any progression of disease 6(35.3%) whereas patients who experienced demineralization were only 1(9.1%). Majority of patients of group C experienced remineralization 0(0.0%) followed by patients who do not had any progression of disease 7(41.2%) whereas patients who experienced demineralization were only 8(72.7%).

Table 2: Group Comparison in terms of dental caries prevention

		Dental Caries			X <sup>2</sup>	P
		Reminer-al-ization	Deminer-al-ization	No progressio n of disease		
Fluoride Toothpaste	Group A	9(52.9%)	2(18.2%)	4(23.5%)	17.23	.002
Fluoride Mouthwash	Group B	8(47.1%)	1(9.1%)	6(35.3%)		
Regular toothpaste	Group C	0(0.0%)	8(72.7%)	7(41.2%)		

## DISCUSSION

The finding of current study supported that it is good for patients undergoing orthodontic treatment to use fluoride containing toothpastes to prevent occurrence of dental caries as compared to normal toothpaste. Moreover, use of fluoride containing mouthwash have better caries preventive technique during orthodontic treatment as compared to regular toothpaste but it is less effective than fluoride containing toothpaste which could be due to the difference of exposure time of fluoride containing toothpaste and mouthwash in oral cavity. This statement is supported by a study conducted on the time of exposure of fluoride containing toothpaste. It was reported that before teeth brushing, dispersion of toothpaste and rinsing it directly after brushing produce more even distribution of toothpaste which ensures the higher spread of fluoride content on teeth.<sup>16</sup>

Tooth pastes containing fluoride element comprised of sodium fluoride, or monofluorophosphate, or stannous fluoride. It is possible to have all the three components together as well. It is found that concentration of fluoride in regular toothpaste is less as compare to fluoride containing toothpastes which is more than 5000ppm shows better results in caries prevention.<sup>17-19</sup> This recovery happens due to the formation of fluoroapatite crystal on the surface of enamel and the less solubility with hydroxyapatite. The reason for recommending fluoride containing toothpastes by orthodontics during treatment is the higher chance of developing white lesions. But good oral hygiene along with the use of fluoride containing toothpaste are required to achieve proper prevention and remineralization.<sup>20-23</sup>

Regular use of fluoride containing mouthwash reduced the formation of white lesions specially, under brackets during orthodontic treatment which later on turns to dental caries. Literature has evident that using fluoride containing mouthwash shows significant results in prevention of demineralization of enamel during fixed orthodontic treatment.<sup>24</sup> Mixing of antimicrobial agent with fluoride containing mouthwash are recommended as this amalgamation increases cariostatic phenomenon.

To conclude, fluoride containing toothpastes are more effective in preventing dental caries among patients undergo orthodontic treatment as compared to fluoride containing mouthwash.

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