

# FREQUENCY OF CARIES IN LOWER ANTERIOR TEETH BONDED WITH FIXED ORTHODONTIC RETAINER

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## ABSTRACT

*Objective was to determine the frequency of caries in lower anterior teeth bonded with fixed orthodontic retainer. It was a randomized controlled trial. This study was carried out at Department of Dentistry, Faryal Dental College, Sheikhpura from February 2022 to July 2022. Total 120 patients having age 15 to 25 years (permanent dentition) & orthodontically treated were enrolled in this study. Patients in Group I received bonded canine-to-canine retainers for their lower front teeth following orthodontic treatment. Group II comprised of patients who had removable retainers. Collected data was entered in SPSS for data analysis.*

*The results demonstrated an increased frequency of caries among our research participants for central (38.33%) and lateral incisors (31.66%) in Group I when compared to Group II (20.0% & 18.33%) respectively.*

*It may be stated that the experimental group's mandibular central and lateral incisors experienced an equivalent amount of caries compared to one another but more frequently than canines.*

**Keywords:** Incidence, Caries, Fixed Orthodontic Retainer, Lower Anterior Teeth.

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## INTRODUCTION

One of the most challenging issues an orthodontist faces is post-orthodontic retention. After active orthodontic tooth movement, retention is frequently required to keep the teeth in their fixed positions and avoid their propensity to revert to their original positions.<sup>1,2</sup> The gingival forces occlusal variables, periodontal, orofacial soft tissue forces, post-treatment facial growth and development are all related to the cause of relapse. Even if there isn't agreement on a single retention method in the research, the orthodontist is the best person to decide on a retention plan that's tailored to each individual patient.<sup>3,4</sup>

Several types of removable and fixed retainers are available for use after orthodontic treatment has been completed.<sup>5</sup> The bonded fixed retainer is one of the most popular retention options. Bondable fixed

retainers are made of a length of orthodontic wire that is bonded with composite resin between a canine and a canine or a premolar and a premolar in the mandibular arch.<sup>6</sup> Although lingual bondable retainers have the advantage of requiring no patient cooperation, they also pose some risks, including iatrogenic harm to teeth and supporting structures due to an increase in plaque collection and a decrease in regular brushing and flossing. It is important to assess the impact of newly available bonded retainer wires and bonding materials on patients' oral hygiene practises.<sup>7,8</sup>

The placement process is time-consuming and the technology is delicate, which are both significant drawbacks. Constant bond failure is one of the issues that arise because of the method used. One possible explanation for these failures is distortion that occurs during the setup process in the bond strength, too little adhesive or direct trauma to the retainer.<sup>9</sup>

Caries, or dental decay, is the localised chemical disintegration of tooth surface induced by metabolic events in a biofilm that forms over the affected area. It is well-known that caries manifests itself as a reversible white spot lesion on teeth. Even though it's an irreversible disease once it reaches the cavitation stage.<sup>10</sup>

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The purpose of this research was to assess the incidence of caries development in lower anterior teeth that have been bonded with a fixed orthodontic retainer. Examining how gender plays a role in dental caries is another focus of the study.

**PATIENTS AND METHODS**

This was a randomized controlled trial which was carried out at the Department of Dentistry Faryal Dental College, Sheikhpura from February 2022 to July 2022. Total 120 patients having age 15 to 25 years were enrolled in research having (1) patients who received orthodontic treatment (2) patients without a background of chronic illness or periodontitis (3) Patients are given fixed or moveable retainers (4) and at the time of presentation, the patient who had good oral health. Subjects with improper oral hygiene, active periodontal disease requiring restorative/surgical treatment were excluded from the study Patients with missing or removed lower incisors and carious lower anterior teeth were not included in the study. Patients in Group I included those who underwent orthodontic treatment and then had a bonded canine-to-canine retainer fitted in their lower front teeth. Group II patients comprised who had removable retainers. Both clinical and radiographic evaluations of the lower anterior teeth of three to three in all the patients from each group were performed.

**Data Analysis**

SPSS (version 13.0) used for statistical analysis, and Chi-square test was applied and a P value of < 0.005 was regarded to be statistically significant when comparing the carious lesion’s distribution of the two groups.

**RESULTS**

Subjects in Group I, who had lower-bonded retainers, and Subjects in Group II, who had detachable retainers were shown to have a similar range of ages and sexes in Table 1. The incidence of cavities among the study’s various groups is seen in Table 2. Among Group I patients, canine teeth were less likely to develop caries than the central or lateral incisors. However, there is no significant difference between the sexes (P value; 0.8341). Group II showed a similar trend, with central and lateral incisors being more prone to caries than canines and insignificant difference observed

TABLE 1: DISTRIBUTION OF AGE AND GENDER OF ENROLLED PATIENTS, N=120

Variable	Characterstics	Incidence
Age	≤ 10 y	79(65.83%)
	≥ 10 y	41(34.46%)
Gender	Male	60(50.0%)
	Female	60(50.0%)

TABLE 2: GENDER WISE CARIES FREQUENCY IN STUDY GROUPS

Carious Teeth	Patients involved		Total	P-Value
	Male	Female		
Group-I (Lower bonded retainer, 3-3)				
Central Incisor	13(43.33%)	10(33.3%)	23(38.33%)	0.8341
Lateral Incisor	8(26.6%)	11(36.6%)	19(31.66%)	
Canine	4(13.3%)	3(10.0)	7(11.6%)	
Group-II (Removable retainer)				
Central Incisor	5(16.5%)	7(23.3%)	12(20.0%)	0.9126
Lateral Incisor	6(20.0%)	5(16.6%)	11(18.33%)	
Canine	2(6.66%)	4(13.33%)	6(10.0%)	

Chi-square test  $\chi^2=0.8341, & 0.9126$ , observed difference was statistically insignificant

TABLE 3: INTER-GROUP ASSESSMENT OF FREQUENCY OF CARIES

Teeth involved	Group-I (Lower bonded retainer, 3-3)	Group-II Removable retainer	Total
Central Incisor	23	12	35
Lateral Incisor	19	11	30
Canine	7	6	13
Total	49	29	78

Chi-square test  $\chi^2$  observed difference was statistically insignificant

between gender (p value; 0.9126). Incidence of caries was also insignificant among the two groups across all teeth in Table 3 (p value 0.6534).

## DISCUSSION

Orthodontic patients have a harder time keeping up with their dental hygiene than the general population because of the malpositioned teeth, the fixed appliance component, and the recurrent ulcerations. Tooth decay begins with plaque, and areas where plaque tends to stick around are at increased risk for cavities. Plaque buildup is especially severe in orthodontic patients, according to Hriday.<sup>11</sup> This study's results are consistent with the significant incidence of dental caries in orthodontic patients reported by other studies.<sup>12,13</sup> The purpose of this research was to determine the incidence of caries in lower anterior teeth bonded with fixed orthodontic retainer after one year of orthodontic treatment completion. In order to maintain the results of orthodontic treatment, many people utilize fixed lingual retainers. All sorts of bonding methods and materials can be used to create these retainers from a variety of wires.<sup>14</sup>

Our results demonstrated an increased incidence of caries among our research participants for central (38.33%) and lateral incisors was 31.66 percent in Group I when compared to Group II (20.0% and 18.33%) which are similar to findings of Gupta et al.<sup>15</sup> & Axelsson et al.<sup>16</sup> In contrast, Artun et al.<sup>17</sup> discovered that long-term use of a lingual fixed retainer caused no visible damage to the enamel. Caries was also not an issue, as was found by Artun et al.<sup>18</sup> despite the fact that plaque and calculus could build up along the edges of such retainers on occasion.

Our results also imply that there weren't statistically significant differences in the occurrence of carious lesions between the sexes in either set of participants. Previous research has shown that there are gender differences in the incidence of enamel debridement around bracket bases, but data on the incidence of caries around bonded retainers is extremely limited.<sup>19</sup> Consistent with the findings of Al - Kuwari HM et al<sup>20</sup> canines in the present investigation had the lowest frequency of carious lesions across all groups. In contrast, Birdsall and Robinson<sup>21</sup> reported on a patient who wore a lower Essix retainer and later suffered substantial demineralization because to his habit of drinking huge quantities of carcinogenic beverages. Better home care, frequent prophylaxis recalls for patients using retainers, and perhaps orthodontist-influenced patient attitudes and motivation are all possible explanations for the absence or low incidence of caries reported by Booth et al.<sup>22</sup>

While previously removable retainers were the

norm for long-term aesthetic retention, today lingual attached retainers are the norm. Iatrogenic injury to soft and hard tissues should still be evaluated during semi-permanent and permanent retention. Dentists and orthodontic specialists have a professional obligation to inform their patients about the potential for tooth demineralization and cavities while using bonded fixed retainers. Before a definitive assessment can be reached, more in-depth, long-term research with a bigger sample size is necessary.<sup>19</sup>

Carious lesions were more common in one group than the other, but this difference did not reach statistical significance. Plaque and calculus scores were not measured by using an oral hygiene index, which is a limitation of our research. More research is needed to address the limitations of the current study, as well as to account for other variables and the maxillary arch, so that the final product is more comprehensive and accurate.

## CONCLUSION

It may be stated that the experimental group's mandibular central and lateral incisors experienced an equivalent amount of caries compared to one another but more frequently than canines. Despite the increased plaque buildup surrounding their bonded orthodontic retainer, patients can protect their teeth by practising proper oral hygiene and using any number of readily accessible oral hygiene solutions.

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| <b>1 Muhammad Zeeshan:</b> | Data Collection, perform experiment al work, paper writing |
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| <b>3 Sana Akram:</b>       | Complied the paper   |
| <b>4 Nadia Irshad:</b>     | Data analysis and review and paper                         |
| <b>5 Saadia Bano Lone:</b> | Literature Review  |
| <b>6 Aisha Zia Butt:</b>   | Proof reading and data collection                          |