

Original papers

EFFECTS OF ORTHODONTIC ADHESIVE MATERIALS ON *S. MUTANS* AND *LACTOBACILLI* LEVELS IN HUMAN SALIVA

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ABSTRACT

The aim of this study was to evaluate the functions of bracket pellicles as the binding receptors for Streptococcus mutans and Lactobacilli. Different composites used as orthodontic direct bonding adhesives have a polymeric matrix that can host and nurture a variety of aerobic and anaerobic microorganisms acting alone or in combination. Their accumulation can lead to the weakening of the bond and possibly the attacking of the tooth. A number of microorganisms have been identified as present on the removed direct bonding brackets. Four different types of orthodontic adhesives were used: Transbond XT, Kurasper F, Ideal 1, Relly A Bond. Samples were evaluated with Ivoclar bacteria Kit. There were significant differences in group evaluation that was include 0,1,2 and 6. months control ($P < 0.05$). But Between these groups we didn't find any significant differences ($P > 0.05$). Practicing satisfactory oral hygiene, such as adequate tooth brushing, mouth rinsing, and dental flossing, plays a vital role in maintaining healthy teeth, especially in the orthodontic patient.

Introduction

It is well known that oral salivary pellicles are mediators of a biologic response that permits the adhesion of microbial cells. This adhesion involves stereospecific interaction between receptors on the salivary pellicles and adhesins on the microbial cell surfaces. Therefore, knowledge of the composition of salivary pellicles on specific surfaces improves our understanding of microbial adherence to those surfaces (1, 2). In this study we aimed to evaluate *S. mutans* and *lactobacilli* levels during orthodontic treatment and to find whether or not there is any effects of some adhesive's release flour for this microorganism account in saliva.

Metallic orthodontic brackets have been found to cause ecological changes in the oral environment, such as decreased pH,

elevated *S. Mutans* and *Lactobacilli* colonization, and increased plaque accumulation, which adversely affect orthodontic patients who are susceptible to enamel white spot formation (3, 4). Recently, the biophysical properties and chemical constituents of orthodontic bracket pellicles were reported by Eliades et al. (5) However, no information is available on the molecular identification of adsorbed salivary pellicles on orthodontic materials, including brackets, and this limits our understanding of the mechanism of initial microbial adherence to the surfaces of orthodontic materials (5).

Some reseachers reported that *St. Mutans* can occur after tooth eruption and it's infection effect can be related with age and plac accumulation (6-8).

Fibrin level can be increase if there is a



Figure. S.mutans and lactobacilli reproductive kit.

GIC restoration in any tooth according to some invivo reseach (9). Some time this rising reaches to decade in same in-vivo study (10). It have been reported in the same study consantration of the flour is enough for protection of reminaralization balance and decreasing the number of st,mutans in salivary (9).

Understanding of the s.mutans and lactobacilli levels in patients before and during orthodontic therapy may help to determine caries risk levels and may thus lead to appropriate preventive or antimicrobial therapy. The aim of our study was to evaluate the functions of metal bracket pellicles as the binding receptors for Streptococcus mutans and Lactobacilli with using four different types of orthodontic adhesives.

Materials and Methods

Samples for this study were selected from Dicle University Dentistry Faculty Orthodontics clinic. The treatment group comprised 20 subjects, 17 to 20 years of age, who were at the beginning of orthodontic treatment with attachments on at least 20 teeth.

Exclusion criteria included the use of oral antimicrobials or antibiotics within the past 3 months, the presence of prosthodontic appliances, any amalgam or composite restoration and significant systemic disease.

We used stainless steel brackets with a .018-in slot 3M UNITEK foil mesh base.

Both of two jaws were devided to two piece from the midline to have four half jaws. Brackets were bonded with four different adhesive materials to four half jaws with taking note of the producters description. Each of the adhesives were applied to different half jaws regularly in different patients to obtain homogen result. The orthodontic adhesive system used for bonding all were Ideal 1 self etching light cure (GAC Int. Inc.,USA), Kurasper F light cure (Kuraray Medical Int. ,Japan), Rely a bond total etching no-mix (Reliance ortodontic product Int. ,USA) and mixture of transbond XT light cure (unitek,3M,Germany) and 3M-Espe Adper-prompt-L pop self etch (unitek,3M,Germany).

The CRT Bacteria Test (Vivadent Ets., Lichtenstein)] was used to determine the measured the Streptococcus mutans (S. mutans) and lactobacilli count in saliva by means of selective culture media (**Figure**).

Before collecting liva for the CRT Bacteria Test, the patients were asked not to eat or drink for at least an hour. The research material was removed from central,canine and molar tooth buccal surface by a sterile prob. Then a NaHCO_3 - tablet was placed at the bottom of the vial. The protective foils were removed carefully from the agar surface. Using these prob , material was put on the agar surface. The agar carrier was placed back into the vial, which was closed tightly. The vials were incubated at 37°C for 48 hours. Data was evaluated as it was

TABLE 1
Results of the S. Mutans Wilcoxon Singned Ranks Test. Comparision of different four adhesives effect to S. Mutans level

GROUPS	BM-M1	BM-M2	BM-M6	M1-M2	M1-M6	M2-M6
TRANSBOND-XT	.035 *	.058	.200	.739	1.000	.739
IDEAL-1	.157	.083	.414	.480	1.414	.012 *
KURASPER-F	.414	.014 *	.083	.102	.206	1.000
RELY-A-BOND	.102	.020 *	.102	.317	1.000	.180

*<.05; BM: Initial measurement of S. Mutans level; M1: First month result; M2: Second month result; M3: Sixth month result.

TABLE 2
Results of the Lactobacilli Wilcoxon Singned Ranks Test. Comparision of different four adhesives effect to lactobacilli level

GROUPS	BL-L1	BL-L2	BL-L6	L1-L2	L1-L6	L2-L6
TRANSBOND-XT	.046 *	.257	.013 *	.739	.096	.580
IDEAL-1	.046 *	.248	.034 *	1.000	0.317	.480
KURASPER-F	.317	.035 *	.034 *	.157	.317	.705
RELY-A-BOND	.102	.035 *	.096	.317	.705	.527

*<.05; BL: Initial measurement of lactobacilli level; L1: First month result; L2: Second month result; L3: Sixth month result.

bigger than 10^5 or not as to product description scala. The salivary level of mutans streptococci and lactobacilli was detected before the treatment (Bt) firsth, second and sixth months of the treatment.

Results and Discussion

According to statistical evaluation that was Wilcoxon Singed Ranks test for S. Mutans there was statistical differences between Bt-first treatment months and Bt-sixth treatment months in 3M group ,in kurasper F group differences was found between Bt-second months and in group Rely a bond was used before treatment-second months results showed statistical differences. No effects on the other parameters in ideal 1 group were found during the research. (Table 1)

In account of lactobacilli determination there was statistical differences between Bt-first and Bt-sixth months in 3M group ,in kurasper F group differences was found between Bt-second and Bt-sixth months and in group Rely a bond was used Bt-se-

cond months results gave statistical differences and for ideal 1 Bt-firsth and Bt-sixth months sample was significantly differ. Results of statistical analyses were nonsignificant in all other months samples (Table 2).

There was no significant difference between the four composite groups for S.mutans and lactobacilli account. (Table 3)

This study was performed to identify the composition of salivary pellicles on the surfaces of orthodontic materials and to determine whether the composition profile is dependent on the material type.

Some alteration in the oral flora may be a factor in the increase in enamel decalcification often seen during orthodontic therapy (11-12). Likewise, the proportional shift in the microbial population characterized by the elevated percentage of s. Mutans and lactobacilli in those same subjects is in agreement with the findings of Corbett and Richard (13-14).

Habitovic-Kofman and Koch's (9) studies results were similar to our Kurasper

TABLE 3
Result of the S. Mutans and Lactobacilli level comparison of four different adhesive materials in 0-1-2-6 months according to Kurskal Vallis analysis

	S. Mutans		Lactobacilli	
K0	1.000	n.s	1.000	n.s
K1	.458	n.s	.985	n.s
K2	.958	n.s	.465	n.s
K6	.398	n.s	.594	n.s

n.s : Not significant; K0: Initial result of different four adhesive material; K1: First result of different four adhesive material; K2: Second result of different four adhesive material; K6: Sixth result of different four adhesive material.

group. According to their research, after GIC application the flourid concentration increased to 4-6 times of the initial so these is enough to decrease the S. Mutans level and to have remineralization (9).

Besides of the antibacterial effects flouride has a buffer capacity when is released indirectly (15).

Between the four composite groups, S.mutans and lactobacilli accounts didn't change.

Richard (14) reported that in the retention phase the levels of S.mutans did not differ significantly from those in the untreated control subjects, which suggests that S. Mutans levels tend to decrease to pretreatment levels after active treatment. This results were similar to our findings in some check-up.

Conclusions

Orthodontic treatment requires high compliance, especially by teenagers, whose compliance is generally low. Furthermore, the ability of the orthodontist to continuously monitor patients' oral hygiene is limited. When one considers that knowledge of the salivary pellicle components on a

specific surface is a prerequisite to the understanding of bacterial adhesion to the surface, the present study provides valuable information for the understanding of bacterial colonization on the surfaces of orthodontic materials and for the development of orthodontic materials with enhanced surface properties.

Practicing satisfactory oral hygiene, such as adequate tooth brushing, mouth rinsing, and dental flossing, plays a vital role in maintaining healthy teeth, especially in the orthodontic patient.

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