

Influence of Removable Orthodontic Appliance on Oral Microbiological Status

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Summary:

Background: the placement of orthodontic appliances creates a favorable environment for the accumulation of microbiota, therefore this study is to assess the relationship between removable orthodontic appliance and oral microflora.

Materials and methods: a sample 45 patients who come to orthodontic department at the collage of dentistry/Baghdad university, divided into 3 groups: group 1 (15) without appliance, group2 (15) with appliance for 2 weeks-2 months, and group 3 (15) with appliance for 2 -4 months, then examine the oral microflora and compared between the 3 groups.

Results: the result showed eleven types of microorganisms appear in group 3 then followed by seven types in group 2 but only three types of microorganisms in group 1.

Conclusion: there is need to educate the patients who received orthodontic appliance about their oral hygiene because oral microflora were changed among orthodontic patients.

Keywords: removable orthodontic appliance, oral microflora.

*Fac Med Baghdad
2008; Vol. 50, No.2
Received March 2007
Accepted Oct.2007*

Introduction:

The normal flora of humans is the mixture of organisms regularly found at any anatomical site and it is exceedingly complex and consists of more than 200 species of bacteria. The makeup of the normal flora depends upon various factors, including genetics, age, sex, stress, nutrition and diet of the individual (1).

The removable orthodontic appliance is an appliance removable from the mouth consisting of wire and acrylic components. It may be active or passive and is used almost exclusively in the upper arch (2).

The placement of orthodontic appliances creates a favorable environment for the accumulation of microbiota and food residues, which, in time, may cause caries or exacerbate any pre-existing periodontal disease (3).

The appliances may interfere with oral hygiene practice and cover considerable parts of the tooth surfaces, so an increase of the total microbial population as well as an altered microflora have been reported in relation to orthodontic treatment (4).

Patients need to understand and be aware of the implications for their oral health, when accept recommended orthodontic treatment. On the other hand, accepting removable appliance orthodontic therapy has important implications for patients' home care. Acceptance of orthodontic treatment means patient commitment to a regimen of increased attention to oral hygiene and oral health (5).

The purpose of the present study was to compare microbiological status between children with and without removable orthodontic appliances.

Materials and methods:

Forty five patients attended to the department of orthodontics at the collage of dentistry \Baghdad University, their age ranged from 6-10 years and they were in good general health. Those patients divided into 3 groups:

Group1: consist from 15 patients without removable orthodontic appliance as control group.

Group2: consist from 15 patients wearing removable orthodontic appliance for 2 weeks - 2 months.

Group3: consist from 15 patients wearing removable orthodontic appliance for 2 – 4 months.

The samples were collected from each group using sterile swabs from the hard palate and the dorsum of the tongue, then streaked on different type of media such as Blood agar, Chocolate agar, MacConkey agar and Sabouraud media then incubated aerobically for 24 hours at 37 C in order to be examined under light microscope with gram's stain and biochemical tests.

Results:

Different types of microorganisms are shown in table (1) when the greatest percent of microorganisms in all groups are and *Moraxella catarrhalis* when counted (100%) in group 1 and group 3 while counted (73, 33%) in group 2, then followed by *Streptococcus viridans* when counted (100%, 73, 33%, 80%) in group 1, 2 and 3 respectively and followed by *Staphylococcus epidermidis* when counted (60%) in group 3.

In group 1 only three types of microorganisms were found, but in group 2 found seven types of microorganisms, while in group 3 found eleven different types of microorganisms like *Lactobacilli*, *Acinetobacter*, *Entrobacter*, *E-coli*, *Alpha-hemolytic Streptococcus*.

Discussion :

This study showed eleven different types of microorganisms appear in group 3, seven types of microorganisms were isolated in group 2, and only three types of microorganisms in group 1, this in agreement with Scheie (4) because the duration of treatment will effect in oral microflora. Any appliance or device placement in the oral cavity causes increased retention sites of plaque and microorganisms and will be affected the overall microflora (6).

Subjects undergoing orthodontic treatment are exposed to higher bacterial plaque accumulation and subsequently higher risk for dental caries (7).

This can be attributed to the irregularity and dealignment of teeth which cause plaque accumulation and bacterial adherence and proliferation (8).

The most predominance bacteria isolated from group (1, 2 and 3) are *Streptococcus viridans* (100%, 73, 33% and 80%) respectively, and *Moraxella* (100%, 73, 33% and 100%) respectively this in agreement with AL-Assadi (9). Oral *Streptococci* species are present in skin and mucous surfaces constituting the majority of the oropharyngeal microbial population (10). *Moraxella* are normal parasites of the mucous membranes, principally of the respiratory tract and the eye, and occurs most commonly and the greatest numbers among the oral bacteria of children ranging in age from 5 months to 10 years, their pathogenic potential seems to be low (6).

Staphylococcus epidermidis was isolated from group 2 and 3 (40% and 60%) respectively when *Staphylococcus epidermidis* is normal microflora found in mouth, pharynx, nose and skin which is adapted to the diverse environments of its human host (1).

Pseudomonas was isolated from group 2 and 3 (6, 66% and 26, 66%) respectively this bacteria cause upper respiratory tract infection (10).

In present study the *Streptococcus pneumonia* counted (6, 66%) in both groups 2 and 3, which is pathogenic bacteria colonize in the pharynx and leads to upper respiratory tract infection (10).

Candida was found in groups 2 and 3 (13, 33% and 20%) respectively, this agrees with Cazzolla (10). May be due to the rough surface of acrylic makes a favorable area for candidal accumulation (11).

While *Lactobacilli* were found only in group 3 (6, 66%), this in agreement with Menzaghi (12). This can be attributed to the acrylic plates in the palate mean food entrapment and favor the establishment and growth of *Lactobacilli* (11). *Lactobacilli* commonly involved in dental caries and deep dentin cavities (13).

Acinetobacter found in group 3 (6, 66%), these bacteria mostly found in soil and water, but it is often isolated from human body sites or

fluids including skin, conjunctiva, urine and saliva (6).

One of the bacteria that found in group 2 in small proportion is *Veillonella* (6,66%) this agree with Aas et al (13), which is gram-negative bacteria isolated from the dorsum of the tongue of healthy individuals but on lower proportion.

Other types of microorganisms like *Entrobacter*, *E-coli* and *Alpha-Hemolytic Streptococci* isolated from group 3 only (6, 66%) for all bacteria, this in agreement with AL-Assadi (9).

Table 1: Distribution of Microorganisms among Children With and Without Orthodontic Appliance

Types of Microorganisms	Group 1 Control		Group 2 2weeks-2months		Group 3 2months-4months	
	Frequency	%	Frequency	%	Frequency	%
Streptococcus viridans	15	100%	11	73,33%	12	80%
Moraxella catarrhalis	15	100%	11	73,33%	15	100%
Staphylococcus epidermidis	–	–	6	40%	9	60%
Pseudomonas	–	–	1	6,66%	4	26,66%
Streptococcus pneumonia	–	–	1	6,66%	1	6,66%
Actinobacillus	1	6,66%	–	–	–	–
Candida	–	–	2	13,33%	3	20%
Lactobacillus	–	–	–	–	1	6,66%
Acinetobacter	–	–	–	–	1	6,66%
Enterobacter	–	–	–	–	1	6,66%
E-coli	–	–	–	–	1	6,66%
Alpha-hemolytic Streptococcus	–	–	–	–	1	6,66%
Veillonella	–	–	1	6,66%	–	–
Numbers of Microorganisms	3 types		7 types		11 types	

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