

ORIGINAL RESEARCH

Evaluation of Effect of Fixed Orthodontic Appliances on Salivary Flow

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ABSTRACT:

Background: Orthodontic treatment of malocclusions can often resolve them, or at least prevent their progression. Changes in the saliva parameters such as decrease in pH, flow rate and buffering capacity of the saliva may contribute to enamel demineralization and increase the susceptibility to dental caries. Hence; under the light of above mentioned data, the present study was planned evaluation of effect of fixed orthodontic appliances on salivary flow. **Materials & Methods:** A total of 25 subjects scheduled to undergo fixed orthodontic treatment were included in the present study. Unstimulated salivary samples obtained from the subjects before the starting of the treatment, two months after the starting of the fixed orthodontic treatment and 4 months after the starting of the fixed orthodontic treatment. Unstimulated salivary samples were obtained and salivary flow rate was evaluated. **Results:** Mean unstimulated salivary flow rate at baseline was found to be 1.08 ml/min at baseline time, while at 2 months and 4 months, it was found to be 1.20ml/min and 1.31 ml/ min respectively. Significant results were obtained while comparing the mean salivary flow rate at different time intervals. **Conclusion:** Fixed orthodontic treatment alters the salivary flow rate to a significant extent.

Key words: Orthodontic, pH, Salivary

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INTRODUCTION

Orthodontic treatment of malocclusions can often resolve them, or at least prevent their progression. However, complex design of fixed orthodontic appliances can affect the oral hygiene by influencing several parameters including the saliva properties and microbial count.^{1- 3} Changes in the saliva parameters such as decrease in pH, flow rate and buffering capacity of the saliva may contribute to enamel demineralization and increase the susceptibility to dental caries. Among the diverse microflora of the mouth, Streptococcus mutans is the main culprit involved in this process.^{4,5} All these salivary properties become of utmost importance during orthodontic treatment with fixed appliances, when an increased chance of plaque retention and a greater difficulty in optimal oral hygiene maintenance are thought to predispose to enamel demineralization and white spot formation.^{6, 7} Hence; under the light of above mentioned data, the present study was planned to evaluate the effect of fixed orthodontic appliances on salivary flow.

MATERIALS & METHODS

The present study was carried out in the department of orthodontics to evaluate the effect of fixed orthodontic appliances on salivary flow. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 25 subjects scheduled to undergo fixed orthodontic treatment were included in the present study. Exclusion criteria for the present study included:

- Subjects with presence of any salivary gland pathology,
- Subjects with presence of any metabolic disorder,
- Diabetic and hypertensive subjects

Complete demographic details of all the subjects were recorded. Unstimulated salivary samples obtained from the subjects before the starting of the treatment, two months after the starting of the fixed orthodontic treatment and 4 months after the starting of the fixed orthodontic treatment. Unstimulated salivary samples were obtained and salivary flow rate was evaluated. All the results were recorded in

Microsoft excel sheet and were analyzed by SPSS software. Chi- square test was used for assessment of level of significance.

RESULTS

In the present study, a total of 25 patients were analyzed. Mean age of the patients of the present study was 25.8 years. 10 patients belonged to the age group of 15 to 25 years. 15 patients in the present study were males while the remaining 10 were females. Mean unstimulated salivary flow rate at baseline was found to be 1.08 ml/min at baseline time, while at 2 months and 4 months, it was found to be 1.20ml/min and 1.31 ml/ min respectively. Significant results were obtained while comparing the mean salivary flow rate at different time intervals.

Table I: Age-wise and gender-wisedistribution of patients

Parameter	Number	
Age group (years)	Less than 15	5
	15 to 25	10
	More than 25	10
Gender	Males	15
	Females	10

Table 2: Comparison of salivary flow rate

Time interval	Flow (mL/min)	P value
Baseline	1.08	0.01 (Significant)
At 2months	1.20	
At 4 months	1.31	

DISCUSSION

Fixed orthodontic treatment has been shown to cause an increased incidence of enamel demineralisation. Fixed appliance orthodontic treatment may affect local saliva secretion; however, there is limited information available about this respect in the literature. Understanding how fixed appliance orthodontic treatment affects local saliva secretion could provide insight on possible contributions of salivary changes towards decalcification.⁷⁻⁹

In the present study, a total of 25 patients were analyzed. Mean age of the patients of the present study was 25.8 years. 10 patients belonged to the age group of 15 to 25 years. 15 patients in the present study were males while the remaining 10 were females. Peros K et al determined the physiologic changes of salivary flow rate, pH, and buffer capacity and the levels of Streptococcus mutans and Lactobacillus spp in patients undergoing fixed orthodontic treatment. The study included 23 patients scheduled for fixed orthodontic therapy. All subjects received equal braces, bands, and brackets, bonded with the same material. Stimulated saliva samples were taken before placement of the appliance, and at weeks 6, 12, and 18 during the therapy. Salivary flow rate and salivary pH were measured, and the salivary buffer capacity was determined. Saliva samples were cultivated on selective microbial agar for microorganism detection. A significant (P < .05) increase in

stimulated salivary flow rate and salivary pH was found. The salivary levels of S mutans and Lactobacillus spp also increased significantly (P < .05), and the major peak was at week 12 of fixed orthodontic therapy. The 6th to 12th week of orthodontic therapy is the period of the most intensive intraoral growth of S mutans and Lactobacillus spp and a time of very intensive salivary functions and physiologic response.¹⁰

Mean unstimulated salivary flow rate at baseline was found to be 1.08 ml/min at baseline time, while at 2 months and 4 months, it was found to be 1.20ml/min and 1.31 ml/ min respectively. Significant results were obtained while comparing the mean salivary flow rate at different time intervals. The quality (defined as salivary protein content, viscosity, pH and buffer capacity) and the quantity of saliva (mostly related to flow rate) play a crucial role in the equilibrium between demineralization and remineralization of enamel in a cariogenic environment. Specific changes, such as increased pH, buffer capacity and flow rate, may contribute to decreased susceptibility to dental caries.⁸

Chang HS et al investigated the changes in stimulated salivary flow rate, pH, buffer capacity, and the levels of mutans streptococci (MS) and lactobacilli in patients undergoing therapy with fixed orthodontic appliances. Saliva samples, plaque index scores and dietary histories were taken from 21 sequential patients before the start of treatment, and one month and three months after placement of brackets and bands. There was a statistically significant increase in stimulated salivary flow rate, pH, buffer capacity, plaque index scores, and in the levels of MS and lactobacilli after three months of active treatment. It is postulated that the balance between the cariogenic challenge posed by high levels of MS and lactobacilli, and the reparative effects of concurrent increases in salivary flow rate, pH and buffer capacity, determines the likelihood of mineral loss or gain over time. A failure to follow basic preventive measures may increase the risk for some patients of enamel decalcification during orthodontic treatment with fixed appliances.¹¹

CONCLUSION

Under the light of above obtained data, the authors conclude that fixed orthodontic treatment alters the salivary flow rate to a significant extent.

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