

ORAL HYGIENE IN CHILDREN, ADOLESCENT AND ADULT ORTHODONTIC PATIENTS WITH MULTI BRACKET FIXED APPLIANCES

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ABSTRACT

To compare the plaque index among the children, adolescent and adult orthodontic patients receiving multi-bracket fixed appliance treatment. This cross sectional analytical study comprised of 90 subjects equally divided into three groups based on their age. Inclusion criteria was subjects with orthodontics multi bracket fixed appliance for at least three months. Exclusion criteria were restored teeth, mental disability and craniofacial syndromes. The plaque scores for subjects were recorded using Silness and Loe plaque index. The data were analyzed using SPSS version 20. One way ANOVA and Independent sample t test were applied for difference of plaque scores among various age groups and gender of subjects respectively. Kappa statistics were applied for inter examiner reliability. Level of significance was kept at ≤ 0.05 . The total sample comprised of 34 males and 54 females. There is insignificant difference of plaque scores between male and females (p value = 0.865). The comparison of plaque scores shows a significant difference among the various age groups (p value = .022). Post hoc Bonferroni test showed a statistically significant difference for plaque score between children and adults (p value = 0.035). The comparison of plaque scores between adults and adolescents showed a marginally significant difference (p value = 0.075). In conclusions, there was no difference for plaque accumulation among male and female orthodontic subject. The children have statistically significant increase in plaque levels as compared to adults during orthodontic treatment with multi bracket fixed appliances.

Key Words: Plaque scores, children, adolescent, adult

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INTRODUCTION

The correction of orthodontic malocclusion necessitates the placement of multi bracket fixed appliances on the teeth. However, the complex dimension of these brackets potentiates the accumulation of dental plaque around them. The reason is the inability of the patients to clean the teeth around the brackets. Various oral hygiene maintenance practices have been suggested to affect the cleaning ability of the patients. These include the demonstration of the brushing technique around and between the brackets, various designs of brushes such as the interdental and orthodontic electric brushes and mouth washes. Despite of these oral hy-

giene maintenance instructions, the clinical experience as well as literature¹⁻² has shown the accumulation of dental plaque on the teeth. The plaque accumulation is associated with other problems such as gingivitis, periodontitis, alveolar bone loss, white spot lesions and dental carries.³⁻⁴

A number of studies⁵⁻⁷ has been carried out to see the accumulation of plaque and the number of microbial factors involved with it. These microbes and their products are involved in demineralization of the enamel structure which then leads to the formation of white spot lesions, dental carries and periodontal loss. The plaque can be prevented by a number of oral hygiene protocols. The oral hygiene instructions are given to the patients at the time of fixed bracket placement. The various brushing techniques and oral hygiene protocols have been tested by investigators for their efficacy and efficiency.⁸⁻¹⁰ The caries-inhibiting effect of preventive measures during orthodontic treatment with fixed appliances confirmed the demineralization-inhibiting tendency. Such measures are, however, dependent on

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either frequent professional oral hygiene or patient compliance.

The compliance of the patients to follow the oral hygiene protocols during the long duration orthodontic fixed mechanotherapy is an important factor. The patients receiving orthodontic treatment are often children, adolescents or adults. The compliance of these patients of different age group differs. The adults follow the oral hygiene instructions more readily as compared to the children and adolescents.¹¹⁻¹³ Therefore it will be rational to find out the difference in the plaque index between the patients of these different age groups. This will provide the information about the compliance of these patients to oral hygiene protocols. If the difference exists, then a modification in the oral hygiene protocol is needed in order to avoid the accumulation of dental plaque and its associated consequences in non-compliant patients.

METHODOLOGY

This cross sectional analytical study was carried out at orthodontics department Peshawar dental college from February to August 2019. Ethical approval for study was granted by prime foundation ethical research board. A total of 90 subjects for the sample were recruited based on inclusion criteria of the patients who come to orthodontic department to receive treatment for crooked teeth with multi bracket fixed appliances for at least six months. The exclusion criteria were Subjects with restored teeth, mentally retarders and having craniofacial syndromes and anomalies. The subjects were divided into three age groups given as children aged 9 – 12 years, adolescents aged 14 – 16 years and adults aged 18 – 25 years.

The sample size was calculated by WHO calculator for sample size. We have calculated sample size by assuming that plaque index of 1.4 is observed in adults while 2 is observed in children/adolescents. By keeping alpha at 5% and power of study at 90% the sample size requirements turned out to be 30 in each group. Therefore the total sample size for the study was 90 subjects. Written consent of the subject was taken at the time of placement of fixed multi-bracket appliances. Plaque index (Silness and Loe)¹⁴ for each subject was recorded on three teeth of maxilla (11, 16, 25) and three teeth of mandible (41, 36, 45). The grading for plaque accumulation was done as grade 0 (no plaque), grade 1 (mild plaque disclosed with dental probe), grade 2 (moderate plaque around the gingival margin seen with naked eye) and grade 3 (abundant soft debris around the gingival margin and brackets). The plaque scores for the subject was calculated by summing up the plaque on each of the six teeth and divided by six. To rule out measurement errors 20 subjects were randomly selected and the plaque index

was recorded by another investigator at the same visit after the principle investigator has recorded.

The data were checked for normality and simple summary statistics were generated. Independent sample t test was applied for the difference of plaque scores in male and females. One way ANOVA was used to see the difference in plaque scores among the three age groups. Post Hoc Bonferroni test was used to see the difference between the three age groups. Kappa statistics was applied for assessing the intra examiner reliability. The p value of ≤ 0.05 was taken to be statistically significant.

RESULTS

The descriptive statistics and comparisons of plaque scores have been shown in table 1. The total sample comprised of 34 males and 54 females. There is insignificant difference of plaque scores between male and females (p value = 0.865). The comparison of plaque scores shows a significant difference among the various age groups (p value = .022). This statistically significant difference was further analyzed by post hoc Bonferroni test as shown in table 2. There is a statistically significant difference for plaque score between children and adults (p value = 0.035). The comparison of plaque scores between adults and adolescents showed a marginally significant difference (p value = 0.075). There was no statistically significant difference between the adolescents and children for the plaque scores. The plaque score were agreed on 90% of the first and second examinations, giving a Kappa value of 0.71 indicative of good agreement.

DISCUSSION

Oral hygiene maintenance has been the main focus of orthodontic treatment because of the biological inflammation involved with teeth movement. The more plaque retention will lead to more microbial concentration and resulting in demineralization and cavitation.³⁻⁴ Multibracket fixed appliances have been shown clinically to retain more food debris and the complex dimensions involve more difficulty in cleaning the teeth surface. Several studies have been carried out to determine the efficacy of various methods to keep optimum oral hygiene.^{9-10,15-16} Most of these studies have focused on the instructions, methods and habits to determine the measure of improvement in oral hygiene maintenance.¹⁵⁻¹⁶ The results of these studies varies considerably as some are in agreement over the findings while other have resulted in completely contrasting opinion and results. In this study, we have focused the subjects of various age groups whom are given the instructions for the use of these methods. The different age groups may follow the instruction differently because of their level of understanding,

TABLE 1: COMPARISON OF PLAQUE SCORES IN VARIOUS AGE GROUPS AND GENDER.

Variable	Sub variable	Number of subjects	Plaque index Mean \pm SD	p value
Gender	Male	34	1.43 \pm .57	.865
	Female	56	1.38 \pm .66	
Age Group	Child	30	1.55 \pm .64	.022
	Adolescent	30	1.50 \pm .66	
	Adults	30	1.14 \pm .51	

N = 90

Independent sample t test

One way ANOVA

Level of significance \leq 0.05

TABLE 2: COMPARISON OF PLAQUE SCORES IN VARIOUS AGE GROUPS

Variable	Vertical I	Vertical J	P value
Plaque Scores	Children	Adolescent	0.177
	Children	Adults	0.035
	Adolescent	Adults	0.075

N = 90

Post Hoc Bonferroni test

Level of significance \leq 0.05

compliance and attitude. This will result in modifying the methods differently in order to address the associated lack of compliance in various age groups.

In the present study there was significant difference in plaque scores between the children and adults. The children have more accumulation of plaque as compared to adults. The adolescent group has more plaque accumulation as compared to adults but the difference was marginally significant. There was no significant difference between children and adolescents. Therefore, the trend was increase improvement of oral hygiene as a factor of age. As the age of the subjects increases the ability of oral hygiene maintenance improves. This finding positively affects the newer trend of more adult subject seeking orthodontic treatment. However, the subject of younger age needs to be subjected to more vigorous care of oral hygiene maintenance.

Thikriat et al¹⁷ in their study reported an increase in compliance of adolescent subjects at five month time period after the start of orthodontic treatment. In another study by Thomson et al,¹⁸ the adolescent subjects were poor in maintaining the oral hygiene during orthodontic treatment with multi bracket fixed appliances when only verbal instructions were given. They suggested that adolescent subject should always be supplemented by visual and written instructions. Boyd et al¹² in their study has also shown an increase in supra gingival plaque in adolescents as compared to

adults. In our study we have found a marginally significant difference in plaque levels between adolescents and adults with adolescent having more plaque levels.

Regarding the gender of subjects we have found no statistically significant difference for plaque scores for all age groups. Although the mean values for plaque score were less in females than the males. Crocombe et al¹⁹ in their study found that females have better results than males for all five outcome indicators. Females were less likely to have periodontal pocketing as measured by the periodontal attachment loss. This shows that females are more compliant with the oral hygiene instructions and more inclined towards the importance of self-care.

There may be many factors which affects the accumulation of dental plaque during orthodontic treatment e.g. type of bracket material, verbal or written instructions, method of ligation, method and frequency of brushing and use of mouthwash etc. However, the most important is the compliance of the subjects with the use of various methods of oral hygiene maintenance. The age factor is much important as it determine the patient cooperation, behavior and attitude toward treatment. That is why it is most important that age of the patient must be considered while resorting to any treatment and method of oral hygiene maintenance.

CONCLUSIONS

There is no difference for plaque accumulation among male and female orthodontic subject

The children have statistically significant increase in plaque levels as compared to adults during orthodontic treatment with multi bracket fixed appliances

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