

## Original Article



# The Effect of Fixed Partial Dentures on the Periodontal Status of Abutment Teeth

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### Abstract

**Background:** The fixed partial denture (FPD) is a common treatment available for restoring partially edentulous ridges. The gingival tissues should exhibit scalloped margins, a sulcus depth within the 1–3 mm range, and an adequate width of attached gingiva. The most important factor controlling the effects of restorations on gingival health is the location of the crown margin related to the gingival margin.

**Objective:** The study was to assess the periodontal status of adult patients at the Military Dental Center, Dhaka, who received regular oral prophylaxis following the insertion of fixed partial dentures.

**Materials and Methods:** The study sample included 78 adult patients with fixed partial dentures from the Military Dental Center in Dhaka. One calibrated examiner assessed and recorded the plaque index, the gingival index, probing pocket depth, and the crown margin locations.

**Results:** The abutment teeth scored significantly higher plaque and gingival indices and greater probing pocket depth than non-abutment teeth. In addition, the abutment teeth scored the greatest mean values of the clinical parameters in subjects who were 46 years old or older and those who had their functioning fixed partial dentures for more than 5 years. The teeth with supra-gingivally placed crown margins had significantly higher mean values of plaque index, gingival index and probing pocket depth than teeth with sub-gingival crown margins. The results of this study indicated that in subjects with fixed partial dentures, the abutment teeth are more prone to periodontal inflammation than the non-abutment teeth.

**Conclusion:** In subjects with fixed partial dentures, the abutment teeth are more prone to periodontal inflammation than the non-abutment teeth. Additionally, the individual's age, duration of insertion of fixed partial dentures, and location of the crown margins also affect the periodontal health of the abutments.

**Key words:** Fixed partial denture, Esthetics, Fixed prosthesis, functional ability, Oral hygiene, Abutment, The periodontium.

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## Introduction

One of the most common treatments available for the restoration of partially edentulous ridges and endodontically treated teeth is fixed partial denture, as it serves as an excellent means of replacing missing teeth because in this situation dental implants are relatively or contraindicated.<sup>1</sup> The gingival tissues should exhibit scalloped margins, sulcus depth within the 1–3 mm range, and an adequate width of attached gingiva.<sup>2</sup> The knowledge of the responses of periodontal tissues to fixed partial dentures is crucial in developing a treatment plan with a predictable prognosis. The most important factor controlling the effects of restorations on gingival health is the localization of the crown margin relative to the gingival margin.<sup>3</sup> Several studies indicated that poor marginal adaptation,<sup>4-6</sup> sub-gingival margin

placement<sup>7-9</sup> and over-contoured crowns<sup>10-12</sup> can contribute to localized periodontal inflammation.<sup>13-15</sup> These studies will force clinicians and researchers to focus on the qualities of FPDs and crowns to reduce periodontal inflammation.<sup>16</sup> This study is designed to investigate the status of the periodontium of abutment with fixed prosthesis and the problem related to it after placement of fixed prosthesis in them. This study aims to evaluate whether using fixed partial dentures affects the periodontal status of abutment teeth. The study aimed to assess the periodontal status of patients who will receive regular oral prophylaxis following the insertion of fixed partial dentures.<sup>17,18</sup> The effects of sub- and supra-gingivally placed crown margins will also be assessed. I have investigated patients with functional fixed prostheses in the present descriptive cross-sectional

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study. A discrete questionnaire was framed keeping in mind to cover all the functional and aesthetic aspects of the patients as well the oral hygiene Maintenance, comfort and a better life.

## Materials and Methods

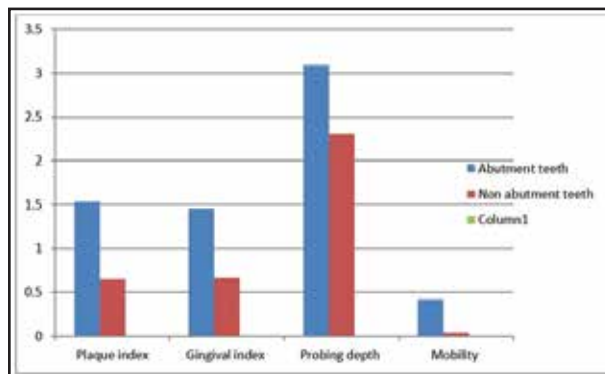
A cross-sectional study was conducted to find out the Effect of fixed partial denture on periodontal status of the abutment teeth. The study was conducted in the Department of Prosthodontics in Military Dental Centre (MDC) Dhaka. A total number of 78 patients were selected with history of fixed dental prosthesis treatment done prior to the study reporting in the Department of Prosthodontics, MDC Dhaka. The patient's previous dental history were taken thoroughly and the patient were clinically evaluated. Patients with having single or multiple fixed prosthesis will be selected following some inclusion and exclusion criteria. the sample size for this study was 120.

But, due to time limitations and resource constrain, a sample size of 78 was taken. A convenient sampling technique was used. Ethical clearance was obtained from the Research Committee of the Military Dental Centre (MDC) Dhaka. Permission to use the records was obtained from the Department of Prosthodontics, Military Dental Centre Dhaka. Written informed consent was obtained from the patients or legal guardians for this study. Patient confidentiality was strictly maintained. No names, addresses or contact details of the patients were divulged. A standardized structured data collection sheet was used to collect necessary information of the subject group. The data sheet included all of the variables regarding to the study. Data were stored and analyzed using the Statistical Package for Social Science (SPSS version 20) and descriptive statistics was presented with standard statistical test P(probability) was calculated.

## Results

Total 78 Patients were selected from the Department of Prosthodontics of Military Dental Centre Dhaka in respective of age and sex with abutment tooth and teeth following some inclusion and exclusion criteria. The results were furnished in tables according to the data found.

**Figure 1:** Mean values of the clinical parameters for the abutment and non-abutment teeth.



74 study subjects (94.9%) showed an increase in the plaque index with an average change of +0.85. In addition, the abutment teeth had significantly higher mean values of plaque index than the non-abutment teeth (1.53 versus 0.66; (p-value <0.05)

76 study subjects (97.4%) presented an increase in the gingival index. The average change was +0.76 and the mean gingival index for the abutment teeth was significantly higher than the non-abutment teeth (1.46 versus 0.67; (p-value <0.05)

All participants revealed an increase in the probing pocket depth. The average change was +0.77 mm. Additionally, the abutment teeth had significantly greater mean probing pocket depth than the non-abutment teeth (3.09 mm versus 2.3; (p-value <0.05)

The tooth mobility increased in 27 (34.6%) subjects. It increased from grade 0 to grade I in 25 individuals and from grade I to grade II or III in two individuals only. In comparison to the non-abutment teeth, the abutments show an insignificant increase in tooth mobility (0.42 versus 0.04; p-value >0.05) (Figure 1)

**Table I:** Mean values of the clinical parameters and individual's age (N =78)

Age (years)	clinical parameter	Mean $\pm$ SD		P -value
		Abutment	Non- Abutment teeth	
18 -30 ( N - 18)	Plaque index	1.15 $\pm$ 0.38	0.52 $\pm$ 0.31	<0.01
	Gingival index	1.29 $\pm$ 0.47	0.44 $\pm$ 0.23	<0.02
	Probing pocket depth	2.04 $\pm$ 0.82	1.22 $\pm$ 0.39	<0.01
	Tooth mobility	0.25 $\pm$ 0.45	0.00 $\pm$ 0.00	NS
31 -45 ( N = 38)	Plaque index	1.52 $\pm$ 0.52	0.62 $\pm$ 0.34	<0.02
	Gingival index	1.24 $\pm$ 0.42	0.83 $\pm$ 0.29	<0.01
	Probing pocket depth	3.00 $\pm$ 0.25	2.30 $\pm$ 0.30	<0.001
	Tooth mobility	0.42 $\pm$ 0.58	0.04 $\pm$ 0.20	NS
46 or more ( N = 22)	Plaque index	1.75 $\pm$ 0.47	0.71 $\pm$ 0.38	<0.001
	Gingival index	1.57 $\pm$ 0.47	0.83 $\pm$ 0.39	<0.001
	Probing pocket depth	3.69 $\pm$ 0.76	2.72 $\pm$ 0.31	<0.01
	Tooth mobility	0.57 $\pm$ 0.85	0.07 $\pm$ 0.27	NS

The abutment teeth of the study subjects who were 46 year-old or older had the highest mean values of plaque index, gingival index, probing pocket depth and increased tooth mobility. Furthermore, the abutment teeth in all age groups, recorded significantly higher means of plaque and gingival indices as well as probing pocket depth than the non-abutment teeth (p-value <0.05) (Table I)

**Table II:** Mean values of the clinical parameters and individual's age (N =78).

Duration (years)	clinical parameter	Mean $\pm$ SD		P - value
		Abutment teeth	Non - Abutment teeth	
1 -2 ( N=18)	Plaque index	1.38 $\pm$ 0.64	0.71 $\pm$ 0.29	<0.01
	Gingival index	1.42 $\pm$ 0.50	0.63 $\pm$ 0.34	<0.001
	Probing pocket depth	3.07 $\pm$ 0.82	2.21 $\pm$ 0.33	<0.01
	Tooth mobility	0.33 $\pm$ 0.45	$\pm$ 0.00	NS
> 2 -5 ( N = 36)	Plaque index	1.46 $\pm$ 0.51	0.56 $\pm$ 0.27	<0.001
	Gingival index	1.21 $\pm$ 0.63	0.55 $\pm$ 0.27	<0.001
	Probing pocket depth	3.22 $\pm$ 0.69	2.30 $\pm$ 0.29	<0.001
	Tooth mobility	0.21 $\pm$ 0.52	0.06 $\pm$ 0.21	NS
>5 ( N = 24)	Plaque index	1.62 $\pm$ 0.58	0.68 $\pm$ 0.29	0.00
	Gingival index	1.53 $\pm$ 0.64	0.68 $\pm$ 0.87	0.00
	Probing pocket depth	3.58 $\pm$ 0.42	2.33 $\pm$ 0.35	0.00
	Tooth mobility	0.53 $\pm$ 0.25	0.00 $\pm$ 0.00	NS

The abutment teeth in individuals who had their functioning FPDs for more than 5 years scored the highest mean values of all clinical parameters (Table 2). During all durations of insertion of FPDs, the abutment teeth revealed significantly higher mean values for plaque index, gingival index and probing pocket depth than the non-abutment teeth (p-value <0.05) (Table II)

**Table III:** Mean values of the clinical parameters for the sub and supra-gingivally placed crown margins.

Clinical parameter	Mean $\pm$ SD		P - value
	Sub – gingival margins	Supra - gingival margins	
Plaque index	1.61 $\pm$ 0.58	1.47 $\pm$ 0.51	<0.001
Gingival index	1.56 $\pm$ 0.62	1.38 $\pm$ 0.53	<0.001
Probing pocket depth	3.43 $\pm$ 0.88	2.87 $\pm$ 0.51	<0.01
Tooth mobility	0.55 $\pm$ 0.31	0.10 $\pm$ 0.83	NS

In 31 (39.7%) participants, the abutment teeth had sub-gingival crown margins and presented with significantly higher mean values of plaque index, gingival index and probing pocket depth in comparison to abutments with supra-gingivally placed crown margins (p-value <0.05) (Table III)

## Discussion

This study was designed to assess the periodontal status of a group of patients attending Military dental center, Dhaka following the insertion of FPDs. Such an assessment is considered valuable since the FPD is still a treatment modality for edentulous ridges and it seems essential to adequately understand the oral health status of such patients in order to establish effective preventive programs.<sup>19</sup> The study results showed an increase in the plaque and gingival indices in majority of the study subjects (>93%).

In addition, the abutment teeth scored significantly higher mean scores of plaque and gingival indices than the non-abutment teeth. These findings are consistent with several other studies reporting more plaque accumulation and gingival inflammation on the crowned teeth,<sup>20</sup> and there is a general acceptance of high correlations between the dental plaque and presence of gingivitis. The probing pocket depth increased in the abutment teeth compared to the non-abutments. This observation can be considered as an outcome of increased plaque accumulation and gingival inflammation.

Valderhaug and Birkeland suggested that factors related to crown fabrication could contribute to increased attachment loss. Although Silness and Bader et al. reported similar results, Ericsson and Marken, however, found no significant differences in the probing pocket depth between the abutment and non-abutment teeth. The highest scores of all clinical parameters were recorded in the study subjects who were 46 year-old or older and those who had their functioning FPDs for more than 1.5 years.

Similar observations were reported previously by Holm-Pedersen et al, Gros et al. and Kinane, who found that periodontal diseases were more prevalent in older age groups and they considered aging as one of the identified risk factors for periodontitis. However, periodontal diseases were more prevalent and severe in the elderly because of the cumulative destruction over a lifetime period rather than an age-related intrinsic deficiency or abnormality that affects susceptibility to periodontal infection. Considering the location of the crown margins, the present study showed that teeth with sub-gingivally placed crown margins had significantly higher mean scores of plaque and gingival indices in addition to greater mean values of probing pocket depth than teeth with supra-gingival crown margins.

A similar observation was reported previously.<sup>21</sup> It has been reported that the sub-gingival crown margins can contribute to localized periodontal inflammation because they can provide a protected environment where indigenous microbes mature.

## Conclusion

Within the limitations of the present study, it can be concluded that: 1. In subjects with FPDs, the abutment teeth are more prone to plaque accumulation, gingival inflammation and development of periodontal pockets than the non-abutment teeth. 2. The individual's age and duration of insertion of the FPD can affect the periodontal conditions of the abutment teeth.

3. The abutment teeth with sub-gingivally placed crown margins are likely to have higher scores of plaque and gingival indices and greater probing pocket depth than abutments with supra gingival crown margins.

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