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Gingival health status of patients treated with full veneer crown and contra lateral natural tooth: A comparative study

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ABSTRACT:

Aim: The aim of this study was to compare the gingival health of patients treated with full veneer crown (FVC) restoration with the contralateral natural tooth of that patients in different stages of treatment. **Materials and methods:** This study compared the gingival health status of 30 endodontically treated posterior teeth with FVC and 30 contralateral natural teeth of 19 patients in terms of gingival index, and plaque index. These patients have been examined from July 2017 to June 2019 in the Dept. of Prosthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital. The gingival health was assessed with gingival index and plaque index by Leo H in different stages of treatment, also compared with the contralateral natural teeth. Collected data were analyzed using SPSS software (version 22) according to the study objectives. **Results:** Tooth with FVC restoration found high gingival index and plaque index compared to a contralateral natural tooth in different stages of treatment. The mean differences of the gingival index were not significant at baseline, 4th month visits, but it was significant, and highly significant at 8th month, 12th month follow-up visits respectively. The mean differences in plaque index were found significant in all visits except 12th month visit. The gingival index and plaque index increased from baseline to 4th, 8th,12th month visits gradually both in abutments and contralateral natural teeth. **Conclusion:** If the FVC is fabricated with maintaining proper anatomical contour, equigingival margin with proper marginal adaptation, despite maintaining oral hygiene as well as the general health of patients there is a chance of development of adverse effects on gingival health in comparison to the contralateral natural tooth.

KEY WORDS : Full veneer crown; Gingival health; Gingival index; Plaque index

INTRODUCTION :

Fixed dental prosthesis is one of the most commonly used prosthesis in dental clinical practice for restoring function and health of oral tissues. The long term prognosis of fixed dental prosthesis depends on establishing a physiologic periodontal environment and facilitation of maintenance of periodontal health.[1] In recent decades full veneer crowns (FVC) have been the major type of restoration used in fixed prosthodontics, as they serve as an excellent means of protection of a weakened tooth structure, as well as with the improvement of esthetics and restoration of tooth function [2]. There are many factors which may influence the long term biological success of FVC like the location of crown margin, marginal adaptations, the contour of the crown, maintenance of oral hygiene as well as the periodontal health through establishing a physiologic periodontal environment.[1,3,4] Moreover if the restoration is located in anterior zone, the aesthetic requirements should be fulfilled as well; also the adequate thickness of porcelain along with equigingival or subgingival margin placement need to consider.[5,6] Patients with FVC need to be instructed to maintain a good oral hygiene by using oral hygiene aids and supplementary cleaning instruments for effective removal of dental plaque.[7] Also these patients need a periodic recall to maintain an excellent health of the periodontium. Several studies reported that frequent careful cleaning and

maintenance of teeth by the patients with FVC help in maintaining a good gingival health.[7,8] As per searching experience most of the studies found in different countries focusing the relationship between the location of gingival margin of prosthesis and health of periodontium; even there is no such study found in Bangladesh. Moreover patients wearing fixed prosthesis in Bangladesh have lack of adequate knowledge about oral hygiene maintenance. Therefore present study aimed to evaluate the gingival status of tooth with FVC in terms of gingival index, plaque index and compared with the contralateral natural tooth in different stages of treatment.

MATERIALS AND METHODS : This prospective comparative study was carried out in the Dept. of Prosthodontics, Bangabandhu Sheikh Mujib Medical (BSMMU) Hospital for 2 years duration from July 2017 to June 2019 among 19 patients who were treated with FVC along with endodontic treatment. 30 endodontically treated posterior teeth with healthy periodontal tissue that needed FVC and 30 contralateral natural teeth of these 19 patients were included in this study to compare the gingival health between posterior teeth with FVC and contralateral natural teeth in different stages of treatment. The gingival health was assessed with gingival index and plaque index. These two indexes have used in different studies worldwide to assess the gingival health, which were scored as 0,1,2,3 for no inflammation, mild inflammation, moderate inflammation, severe inflammation respectively in case of gingival index and 0,1,2,3 for no plaque, mild plaque, moderate plaque, abundant plaque respectively in case of plaque index.[9]The selected endodontically treated teeth were examined, isolated and followed the standard principles of tooth preparation for FVC. Biological consideration was maintained by conservation of tooth structure, avoidance of over contouring, placing equigingival margins and providing harmonious occlusion. Retention and resistance form was given for mechanical consideration and to fulfill the aesthetic requirement minimum display of metal, maximum thickness of porcelain, porcelain occlusal surfaces, equigingival margin was provided. During margin placement care was taken for preservation of the periodontium and the gingival care was taken with placement of retraction cord. The gingival index and the plaque index were also recorded from the contralateral natural teeth, which was considered as control to compare the gingival health of posterior teeth with FVC and without FVC in follow up visits. The study subjects below 18 years, having very poor oral hygiene, having missing, treated or diseased contralateral natural tooth, congenitally malformed tooth and the patients with systemic diseases like diabetes mellitus which may influence the periodontal health were excluded from the study. Ethical clearance was taken from the Institutional Review Board (IRB) of BSMMU. The study subjects had full autonomy to withdraw themselves at any time from the study and written consent was taken. The collected data were analyzed using SPSS software (version 22) according to the study objectives. Both descriptive statistics (mean, SD, frequency, percentage) and inferential statistics were applied to obtain the results. Test of significance such as student's t test was performed to compare the mean differences of gingival index and plaque index between the study and control group in different stages of treatment (statistical significance was accepted at $p<0.05$).

RESULT:

Table 1: Socio demographic and occupational characteristics of the participants (N=19)

Socio demographic and occupational characteristics		N(%)
Age group (in years)	21-30	8(42.1)
	31 – 40	4(21.1)
	41-50	5(26.3)
	> 50	2(10.5)
	Mean (± SD) : 36.9 (±9.7), Range : 22-54 years	
Sex	Male	9(47.4)
	Female	10(52.6)
Occupation	Student	2(10.5)
	Housewife	7(36.8)
	Business	3(15.8)
	Service holder	4(21.1)
	Other	3(15.8)

Table 1 shows out of 19 (100.0%) participants, the mean age was 36.9 (±9.7) years with range 22 – 54 years, more than half 10 (52.6 %) were female, 7 (36.8 %) were housewives.

Figure 1 : Distribution of participants according to number of abutment involved (N =19)

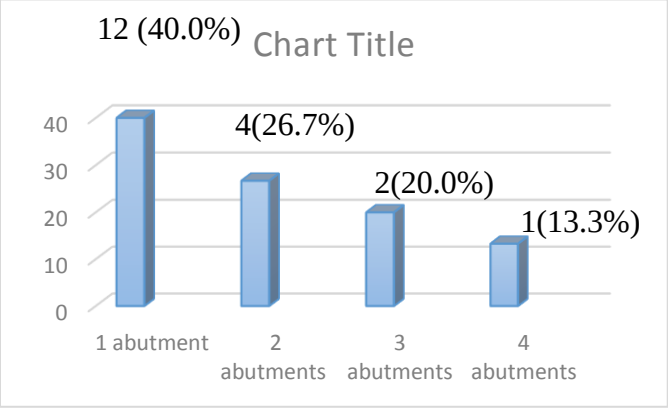

Figure 1 shows the teeth distribution among the participants. Total 30 teeth of 19 patients were evaluated. Out of those 60% teeth of 7 patients whose more than one tooth were treated and 40% (12) teeth of 12 patient whose single tooth was treated with FVC

Table 2 : Gingival index score and criteria

Score / Value	Gingival status (Grade)	Gingival index (criteria)
0	Grade 1	No inflammation (Normal gingiva)
1	Grade2	Mild inflammation (slight change in colour, slight oedema, no bleeding on probing)
2	Grade 3	Moderate inflammation (redness, oedema, glazing, bleeding on probing)
3	Grade 4	Severe inflammation (marked redness, oedema, ulceration and tendency to spontaneous bleeding)

Table 3 : Plaque index score and criteria

Score / Value	Plaque status (Grade)	Plaque index (criteria)
0	Grade 1	No plaque (absence of microbial plaque))
1	Grade2	Mild plaque (a thin film of microbial plaque along the free gingiva)
2	Grade 3	Moderate plaque (moderate accumulation of plaque in sulcus and free gingiva)
3	Grade 4	Abundant plaque (abundance of microbial plaque in sulcus or pocket along the free gingival margin)

Table 4 : Mean (± SD) of gingival index score and plaque index score in different stages of treatment

Different stages of treatment	Abutment teeth / With full veneer crown (n_1=30)	Contraleteral natural teeth / Without full veneer crown (n_2=30)
	Gingival index score	
	Mean (± SD)	Mean (± SD)
At baseline	1.13±0.35	1.13±0.35
At 4th month	1.20±0.41	1.10±0.31
At 8th month	1.37±0.49	1.10±0.31
At 12th month	1.67±0.61	1.10±0.31
Different stages of treatment	Plaque index score	
At baseline	1.20±0.41	1.23±0.43
At 4th month	1.17±0.38	1.27±0.45
At 8th month	1.53±0.51	1.33±0.48
At 12th month	1.97±0.41	1.67±0.55

Table 4 shows the Mean (± SD) of gingival index and plaque index at different stages of treatment in abutments and contralateral natural teeth. Here the mean values of gingival index were increased a bit in different stages of treatment in abutments; which was almost same rather decreased a bit in contralateral natural teeth. The mean value of plaque index increased from baseline to 4th , 8th, 12thmonth visits gradually both in abutments and and contraleteral natural teeth. Also the table shows the mean values of gingival index and plaque index were a bit higher in abutments compare to contraleteral natural teeth in almost every visits.

Table 5 : Comparison of gingival index between abutment and contra lateral natural tooth in different stages of treatment (N=60)

Different stages of treatment	Abutment teeth / With full veneer crown (n_1=30)	Contraleteral natural teeth / Without full veneer crown (n_2=30)	p value
	Gingival index score		
	Mean (± SD)	**Mean (± SD)**	
At baseline	1.13 (±0.35)	1.13 (±0.35)	1.000 ns
At 4th month	1.20 (±0.41)	1.10 (±0.31)	0.286 ns
At 8th month	1.37 (±0.49)	1.10 (±0.31)	0.014 s
At 12th month	1.67 (±0.61)	1.10 (±0.31)	0.001 hs

p value calculated by students t-test
s = significant, ns = not significant, hs = highly significant
p value was significant at <0.05.

Table 5 shows the comparison of mean values of gingival index between abutments and contraleteral natural teeth in different stages of treatment. At baseline the mean value was 1.13±0.35, at 4th month was 1.20±0.41, at 8th month was 1.37±0.49 and at 12th month was 1.67±0.61 in abutments; whereas in the contralateral natural teeth the mean values found 1.13±0.35, 1.10±0.31, 1.10±0.31 and 1.10±0.31 respectively. The mean differences of gingival index of abutments and contraleteral natural teeth was not significant at baseline and at 4th month follow up visits, but it was significant ($p < 0.05$) at 8th month and highly significant ($p < 0.01$) at12th month follow-up periods.

Table 6 : Comparison of plaque index between abutment and contra lateral natural tooth in different stages of treatment (N=60)

Different stages of treatment	Abutment teeth / With full veneer crown (n_1=30)	Contraleteral natural teeth / Without full veneer crown (n_2=30)	p value
	Plaque index score		
	Mean (± SD)	**Mean (± SD)**	
At baseline	1.20±0.41	1.23±0.43	0.759 ns
At 4th month	1.17±0.38	1.27±0.45	0.356 ns
At 8th month	1.53±0.51	1.33±0.48	0.122 ns
At 12th month	1.97±0.41	1.67±0.55	0.020 s

p value calculated by students t-test
s = significant, ns = not significant
p value was significant at <0.05.

Table 6 shows the comparison of mean values of plaque index between abutments and contraleteral natural teeth in different stages of treatment. At baseline the mean value was 1.20±0.41, at 4th month was 1.17±0.38, at 8th month was 1.53±0.51 and at 12th month was 1.97±0.41 in abutments; whereas in the contralateral natural teeth the mean values were 1.23±0.43, 1.27±0.45, 1.33±0.48 and 1.67±0.55 respectively. The mean differences of plaque index of abutments and contraleteral natural teeth was not significant at baseline, 4th month and 8th month follow up visits, but it was significant ($p < 0.05$) at 12th month follow up visit.

DISCUSSION :

This study examined and compared the gingival health status of posterior teeth with FVC and contralateral natural posterior teeth in different stages of treatment. According to the study result the mean age of the patients was 36.9 (±9.7) years, the male, female ratio found 1;1.1; 30 teeth with FVC of 19 patients were considered as case, where 15 (60%) teeth of 7 patients had more than one tooth treated with FVC; moreover 30 contralateral natural teeth considered as control among these 19 patients to compare the gingival health. The study result indicated that initially at baseline and after 4 months of treatment the mean differences of gingival index was non significant between abutments and contraleteral natural teeth ($p > 0.05$); but it was significant ($p < 0.05$) at 8th month and highly significant ($p < 0.01$) at12th month follow-up between the two groups. In a study Koth [10] showed gingival inflammation is irrespective either of a supragingival, equigingival or subgingival margin, when the patient attends a strict recall program, which is consistent with the present study as it did not show significant changes till 8th month. But after 8th month, significant changes occur as the patient might have not maintained oral hygiene instructions. Regarding plaque index it was observed that initially at baseline, after 4 months, after 8 months of treatment the mean differences of plaque index was not significant between abutments and contraleteral natural teeth ($p > 0.05$); but it was significant ($p < 0.05$) at 12th month follow up between the two groups. In a similar study Bader *et al*. [11] showed that an equi-gingival margin was most desirable location of a margin where the dentist can best control its adaptation and the patient can most effectively clean it. The margins of the FVC of the present study were placed equigingivally, that's why no significant impact of plaque index had been found till 8th month follow up between abutments and contralateral natural teeth. The result in terms of plaque index was consistent with the study conducted by Bader *et al.*[11] The results of present study showed that gingival index increased a bit in the area restored FVC in comparison to contralateral natural tooth, which supports the study results of Alqahtani et al.[12], Al-Sinaidi et al.[13] Also present study found the gingival index increased a bit in 4th,8th,12th month visits gradually in abutments, which was almost same rather decreased a bit in contralateral natural teeth. Regarding plaque index, the findings were almost same as gingival index, which indicates that higher gingival index and plaque index increase the progress of inflammation of the surrounding gingival tissue of abutments compare to contralateral natural teeth. Many clinical studies showed that the subgingival crown margin is more likely to cause gingival inflammation than equigingival and supragingival margin, [13-20] hence present study maintained equigingival margin in all FVC fabrication.

CONCLUSION : Based on the results of this study, it may be concluded that if the FVC is fabricated with proper anatomical contour, placed an equigingival margin with proper marginal adaptation, thorough removal of all cement remnants or even moisture control during cementation and oral hygiene as well as general health of the patient is maintained although less but there is a chance of development of adverse effects on gingival health in comparison to contralateral natural tooth.

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