GINGIVAL HEALTH
EFFECTS OF CROWN MARGIN LOCATION

ORIGINAL
PROF-1898

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ABSTRACT... Objectives: The location of crown margins is very important for the health of periodontal tissues. This study was designed to evaluate the gingival health of teeth before and six months after tooth crowning. **Design:** Cross sectional study. **Setting:** Islamic International Dental Hospital. **Period:** March 2010 to June 2011. **Method:** 50 patients were selected from the out patient department. Who were advised crowns for replacement of lost tooth structure and data was collected before and six months after crown insertion. Papillary Bleeding Index (PBI) was used to evaluate periodontal health. All recorded data was entered in computer and was statistically analyzed using SPSS version 17 data analyzer and comparisons were performed using chi square test. **Results:** Results showed that patients inserted with crowns had signs of periodontal disease. (p value = 0.03). **Conclusions:** It may be concluded from the study that sub gingival crown margins have detrimental effect on gingival health.

Key words: Crown margins, gingival health, papillary bleeding index

INTRODUCTION

Crown is a type of prosthesis which replaces lost tooth structure due to caries, trauma or other reasons in an attempt to restore comfort, function and confidence of patient. It is meant to stay in mouth for a good 10 years or more, so it is very important that crown margins should have no role in aggravating or initiating periodontal disease.

Periodontal tissues form the foundation for proper esthetics, function, and comfort of the dentition. All prosthetic and restorative therapies generally require a healthy periodontium as a prerequisite for successful outcome. The interplay between periodontics and restorative dentistry is present at many fronts, including location of restorative margins, crown contours, and response of the gingival tissues to restorative preparations. It is also important for clinicians and patients to understand that although crown margins may be placed subgingivally, it is highly likely that over time the margins will eventually be located supragingivally. A study was conducted in which 114 patients with 329 total crown restorations were evaluated[1]. It was observed that most of the crowns (59%) which were located sub gingivally at the begining of study after 5 years only 32% remained sub gingival. The study also proved that greater mean attachment loss was associated with sub gingival restorations compared to supragingival margins (1.2 versus 0.6 mm).

The aim of this study was to evaluate gingival health of patients before and six months after insertion of crowns.

MATERIALS AND METHODS

The study design was cross sectional survey in which 50 patients, 24 male and 26 female (fig 1), with age range of 25 years to 62 years and having a mean age of 42.04 (fig 2) were selected from out patient department of Islamic International Dental Hospital with inclusion and exclusion criteria mentioned in annexure I.

Papillary Bleeding Index (PBI) was used to evaluate gingival health of patients before insertion of crowns and six months later. Two house surgeons were trained on PBI and were assigned to collect the data. The data was collected using PBI and score was calculated using the formula in annexure II. All recorded data was entered in computer and was statistically analyzed using SPSS version 17 data analyzer and comparisons were

Fig-1. Gender distribution

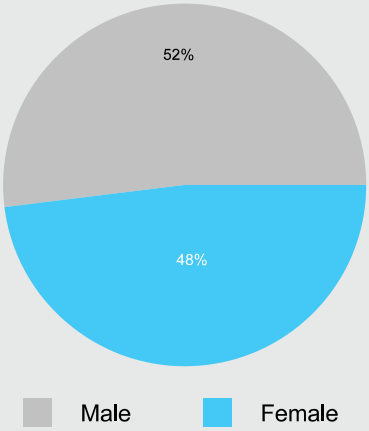
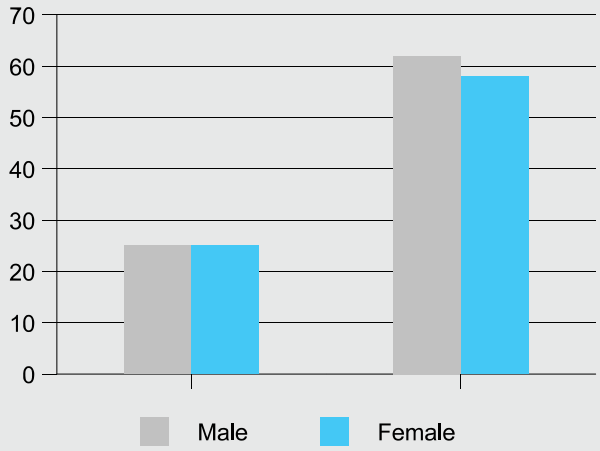


Fig-2. Age range of male & female patients



performed using chi square test.

RESULTS

The results are shown in table I and the frequency charts 1 and 2 also elaborate the results. The results show that patients scored higher PBI scores in 0.5 and 1 after insertion of crowns than the same patients before insertion of crowns.

The p value of 0.03 suggested that there is significant relationship in insertion of crowns and bleeding from gingival papillae.

Annexure-I. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Minimum six months after crown insertion	Less than six months after crown insertion
Minimum of one crown	Patient with bridge
At least 5 functional teeth in each quadrant	Less than 5 functional teeth in each quadrant
Good oral hygiene	Poor oral hygiene
No systemic complication	Edentulous patient
-	Systemic complications e.g. Diabetes Mellitus

Annexure-II. PBI score calculation

0	No bleeding in 30 sec of probing
1	Bleeding between 3 & 30 sec of probing
2	Bleeding within 2 sec of probing
3	Bleeding immediately upon probing

$$PBI = \frac{\text{Sum of scores}}{\text{Number of papillae examined}}$$

Table II shows crown margin location verses pre and post crown PBI scores.

DISCUSSION

In this study gingival health before and six months after insertion of crowns was evaluated in patients where crowns were indicated and inserted. Study was performed to evaluate the clinical health of gingiva around crown margins.

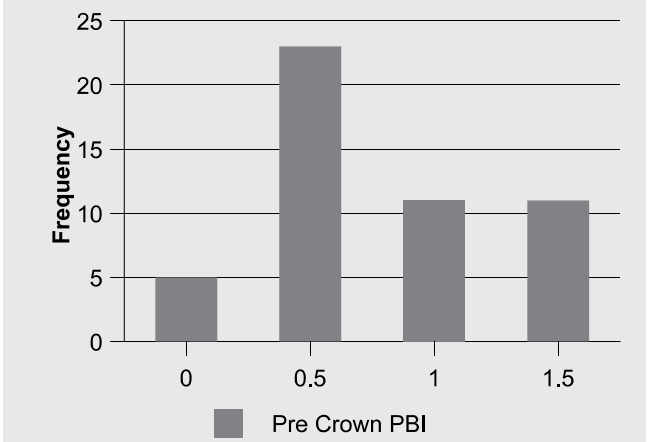
The hypothesis of study was that there is a change in the gingival health of the patients receiving crowns. The study results supported the hypothesis and showed a significant change in gingival health of the patients.

The study results showed a significant patient increase

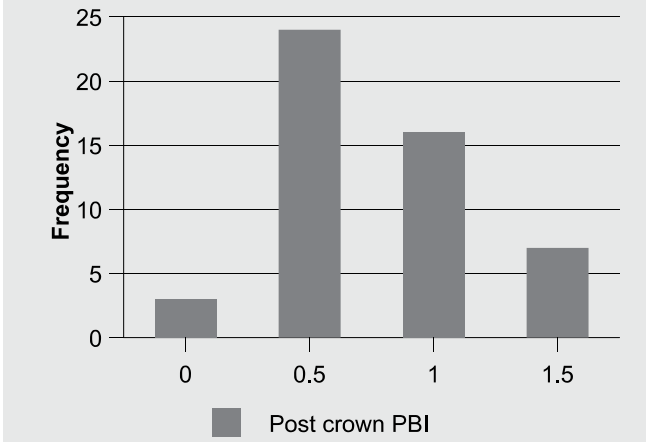
Table-I. Comparison of pre and post crown PBI scores

		Post crown PBI					
		0.00	0.50	1.00	1.50	Total	P-value
Pre crown PBI	0.00	1	2	2	5	5	0.03
	0.50	1	15	7	23	23	
	1.00	0	6	4	11	11	
	1.50	1	1	3	11	11	
	Total	3	24	7	50	50	

Frequency Chart 1 pre crown PBI



Frequency Chart 2 post crown PBI



falling in PBI score range of 1.00 and slight increase in number of patients in score range of 0.50 while there was a decrease in 0.00 and 1.50 group. A possible explanation could be that initially the patients scoring 0.00 might have scored 0.50 or 1.00 after crown insertion indicating deterioration of periodontal health. Interestingly there was also a decrease in patient number scoring 1.50 initially before the insertion of crown and this may be attributed to the fact that patients might have eliminated the local initiating and aggravating factors for periodontal diseases thus they improved their PBI score.

The data of patients receiving crowns showed a change ($p = 0.03$). There was a marked change in the PBI score after the placement of crowns.

This confirms with the study of Kosyfaki which states location of the crown margin, marginal fit, crown material, and crown contour all impact periodontal tissues[2].

Electronic and manual searches conducted for in vivo investigations in the English and German literature from 1953 to 2009 provided 64 studies. Findings indicate that the supragingival location remains the most advantageous from the periodontal point of view; esthetic demands, however, dictated an intracrevicular location of the margin in the anterior zone. This was proved by the study results which showed that sub gingival crowns were associated with higher number of patients scoring 0.5 and 1 which indicates deterioration of gingival health because of violation of biologic width. Padburry A Jr also showed a definite relationship between gingival health and margins of restorations[3].

The retraction agents used before impression of subginigval crowns can also cause injury to the gingiva

Table-II. Comparison of crown margin location with PBI scores

Comparison between location and pre crown PBI score

		precrownpbi				Total
		.00	.50	1.00	1.50	
location	supra gingival	0	1	0	2	3
	at gingival margin	2	6	4	7	19
	sub gingival	3	16	7	2	28
Total		5	23	11	11	50

Comparison between location and post crown PBI score

		precrownpbi				Total
		.00	.50	1.00	1.50	
location	supra gingival	0	0	2	1	3
	at gingival margin	2	7	7	3	19
	sub gingival	1	17	7	3	28
Total		3	24	16	7	50

and this was proved by Phatele who proved in his study that retraction pastes respect periodontium better than retraction cord[4].

Similarly Amiri Jazei M also pointed out that biologic width is an important structure and it should not be violated during construction of sub gingival crown margins and restorations[5].

The crown margin location also has significant effect on PBI scores as shown in table II. It has two parts the first part shows location of crown margins with pre crown PBI score and the second part elaborates post crown PBI score with crown margin location and it clearly shows that sub gingival margins of crowns are related with higher PBI scores in the scale of 0.5 and 1 indicating progression of disease. This is in line with the study of Felton DA who in his study "effect of in vivo crown margin discrepancies on periodontal health" evaluated 42 crowns after 4 years of insertion and showed a definitive relationship between sub gingival crown margins and deterioration of periodontal health[6]. In Felton study all the crowns were placed sub gingivally while in this study 3 crowns were supra gingival 19 were at gingival margin and 28 were sub gingival. Felton used the parameters of pocket depth, crevicular fluid volume and gingival index while in this study PBI was used to evaluate gingival health after six months of crowning.

In the study of Felton there was no analysis of data before the insertion of crowns and Felton showed a strong linear corelation between marginal discrepancy and gingival health, while this study showed a significant relation between pre crown and post crown PBI scores. This was also in line with the study of Reitmeier B who proved that intra crevicular crown margins caused twice as much gingival bleeding as compared to supra gingival crowns[7]. Scatzel M in his study "The influence of margins of restorations of the periodontal tissues" over 26 years confirmed that restorations placed below the gingival margins are detrimental to gingival and periodontal health[8]. He carried his study on middle class Scandinavian male patients only while 24 males and 26 females were included in this study. Further more in the study of Scatzel patients were included with moderate to good oral hygiene and regular dental check ups. Although in this study poor oral hygiene was an exclusion criteria as lack of oral hygiene directly effects periodontal tissues but the concept of regular dental check ups is still not very popular in Pakistan. The study of Scatzel was conducted over a span of 26 years which is quite significant while our study was conducted over a span of

six months after crown insertion.

Planicunas also proved that if margins are to be placed sub gingivally then they should not exceed 0.7 mm from free gingival margin otherwise it will effect the health of periodontal tissues[9].

Koke U showed that crown placement was a major factor for attachment loss and development of ginival recession[10]. The margins of restorations which are placed sub gingival are conducive to plaque accumulation and hence destruction of gingival and periodontal tissues. The location of restorative margins is determined by many factors, including esthetics, retentive factors, susceptibility to root caries, and degree of gingival recession. While many clinicians place restorative margins subgingivally, the detrimental effects of margins below the free gingival margin are obviously well documented. While most periodontists would prefer restorative margins to remain coronal to the sulcus, it is understood that certain conditions necessitate placement of subgingival margins. These may include esthetic concerns, need for increased retention form, refinement of preexisting margins, root caries, cervical abrasion, and root sensitivity. However, if none of these factors is of concern, it appears prudent to place restorative margins supra gingivally. The results of this study reveal that there is significant correlation between deterioration of gingival health in post crown patients compared to pre crown status. However there are other factors like dental plaque, oral hygiene frequency and affectivity also have there impacts on gingival health and these need to be studied separately as they are established factors in causing periodontal diseases while this study was designed to evaluate effects of crown margins on gingival health by keeping other factors constant. The crown contours, contact points and violation of biologic width are co morbid factors affecting the health of gingival tissues. The role of these factors is significant yet further separate studies are required to evaluate the role of these factors.

CONCLUSIONS

This study proves that sub gingival margins of crowns are detrimental to gingival and periodontal health.

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Liberty without learning is always in peril; learning without liberty is always in vain.

John F. Kennedy