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An Evaluation of Marginal Fit and Aesthetics in FPD Is Achieved During Graduate Training

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Abstract

Background : The survival of fpd depends on the state of the marginal adaptation.The longevity of fpd depends on the condition of marginal fit and esthetics is also major concern during restoration of anterior partial edentulous areas.Hence, adequate marginal fit and esthetics is a goal of a conscientious prosthodontists. The aim of this study is to evaluate the marginal fit and aesthetics in fpd, achieved during graduate training. **Materials and methods :** A Retrospective study was conducted using the records of the patients. 3178 case sheets were reviewed which were dated between june 2019 to march 2020.the data was collected by the patient records of saveetha dental college and hospitals.**Results:** The total sample size of this study was 603, in which 4.3% were 3rd years, 40.1% were 4th years and 55.5% were interns. Tables were distributed based on USPHS criteria in which Marginal adaptation were smooth margin 63.3%, all margins closed 26.5% and obvious crevice at margin 10%.Based on Colour match, very good colour match were 33% ,good colour match were 54% , slightly mismatch of colour were 10% , obvious mismatch were 1% and gross mismatch were 0.2%. **Conclusion :** Therefore from this study, we observed that better Marginal adaptation and Colour match in fpd was achieved by the interns and the most frequent anatomical site was upper anterior teeth.

***Keywords:** Esthetics ; Marginal adaptation; Fixed Prosthesis*

Introduction

The Role of dental professionals is to promote oral health and dental esthetics.[1] Increased life expectancy and increase in population, creates high demand in dental care especially in the field of prosthodontics.[2] Nowadays, the problem of missing teeth continues to be more prevalent.[3,4,5] Fixed partial dentures have been the treatment of choice for the replacement of missing teeth. [6] Missing teeth can damage mastication,self-esteem and also social interactions due to its effects on appearance and the ability to have a conversation. [7] Recently fixed prosthesis is more popular than removable prosthesis due to comfort, function and aesthetic. [8,9] The survival and longevity of fixed prosthesis mainly depends on the state of marginal adaptation. Marginal gaps can create favourable conditions for biofilm deposition, which contributes to the development of caries and periodontal diseases.[10] Marginal fit in fpd is one of the significant factors influencing the clinical acceptability.[6,11]Inadequate marginal fit in fpd will lead to marginal leakage , plaque accumulation , bone loss that will end up in fpd failure.[12,13] Various local intervention methods suggested for preventing oral diseases and suggested in prosthetic associated maintenance phase.[14] The best method to measure marginal gaps is still a controversial topic .Several techniques have been described like replica technique, light and scanning electron microscopy, micro computed tomographic evaluation.[15] Few investigations revealed that the most common and adequately used treatment for replacement

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of missing teeth is removable partial dentures but more than 90% of patients were satisfied with having missing teeth replaced with FPDs from a functional and aesthetic point of view .[2,3]

Esthetics is a major concern during restoration of any anterior partial edentulous areas. When overall dental appearance is considered , several factors are of significance especially of anterior teeth that are colour match, shade, position , restoration quality and arrangement of dentition.[16] All ceramic dental materials claim to provide optimal mechanical and aesthetic characteristics mainly in anteriors , namely glass ceramics and polycrystalline zirconium dioxide ceramics. Zirconia ceramics provide a natural looking appearance compared to metal ceramics ,as zirconia is highly biocompatible metastable material and can hinder crack propagation[17]. Several studies investigated the maximum clinically acceptable marginal gap width and different values were proposed according to the type of restoration used for both lithium disilicate and zirconia copings showed clinically acceptable accuracy of fit.[18] The long term success of fpds depends on the crowns longevity which is strongly related to the quality of marginal fit[19]. Marginal openings of no more than 100mu are considered clinically acceptable. Francesco Riccitiello et al, reported that zirconia and lithium disilicate crowns showed better marginal adaptation and good esthetics.[20, 21] This study is designed in assessing the success rate of fixed prosthesis treatment based on marginal adaptation and aesthetics treated by undergraduates.

Materials and Methods

Study design and setting:

A Retrospective study was conducted using the records of the patients.603 case sheets were reviewed which were dated between june 2019 to march 2020.The data was collected by the patient records of saveetha dental college and hospitals. After screening the search was narrowed to 603 fixed dental treatments. Relevant data such as year of training, teeth number ,colour match, marginal adaptation were collected. Based on United States Public Health Services (USPHS criteria), the marginal adaptation and colour match was graded.

Inclusion criteria:

The study included only patients who underwent fixed partial dentures replacing single or double units treated by graduate trainee students.

Exclusion criteria: Complex multi unit fixed partial dentures were not considered in the study. Incomplete data without notes and photographs that did not give expected details were excluded.

Statistical Analysis

Data was recorded in Microsoft Excel and later exported to IBM SPSS (version 20.0 Chicago USA) and subjected to Statistical analysis. Chi Square test was then employed with a level of significance set at $P<0.05$.The statistical analysis between clinic type, teeth number, colour match, marginal adaptation was carried out in SPSS software. Chi square test was done to compare the parameters. The outcome was represented in a form of tables and bar charts.Ethical clearance was obtained. Ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320.

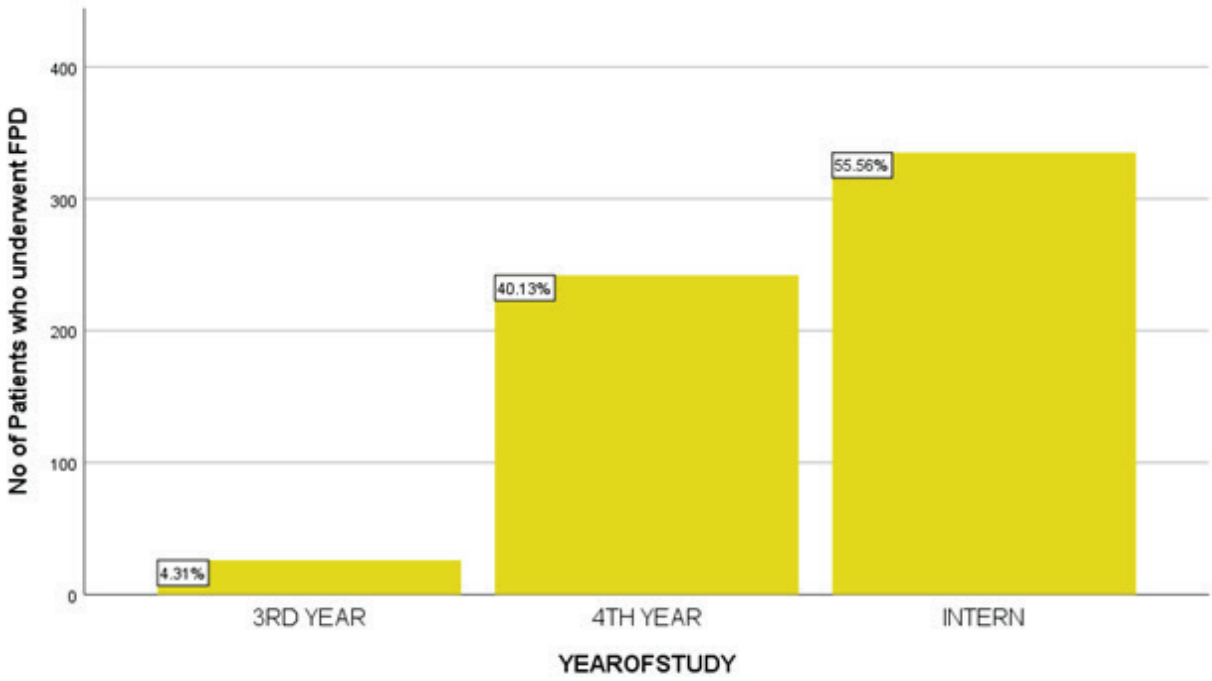
Results & Discussion

The total sample size of this study was 603, the Year of study (UG) were divided into 3rd years, 4th years and interns which was 55.5% (n=335) followed by 4th years 40.1% (n=242) and 3rd years 4.3% (n=26) as shown in **(graph 1)**.Distribution of teeth number and number of fpds performed by the undergraduates was given in **(graph 2).**It shows that the most common anatomical site performed by the undergraduates was upper anteriors (sextant 2). Correlation between the year of study and frequency of marginal adaptation based on USPHS criteria as shown in **(graph 3)**.Marginal adaptation in fpd were divided into smooth margin in which interns 35.82%,4th years 25.3% and 3rd years 2.16%, all margin closed in which interns 14.7%, 4th years 10.9% and 3rd years 0.83% and Obvious crevice at margin in which interns 4.9%, 4th years 3.8% and 3rd years 1.33%.This shows that better marginal adaptation in FPD was achieved by the interns.Chi square test was done and association was found to be statistically significant. Correlation between the year of study and frequency of marginal adaptation based on USPHS criteria as shown in **(graph 4)** Colour match were divided into Very good colour match in which interns 18.5%, 4th years 13.2% and 3rd years

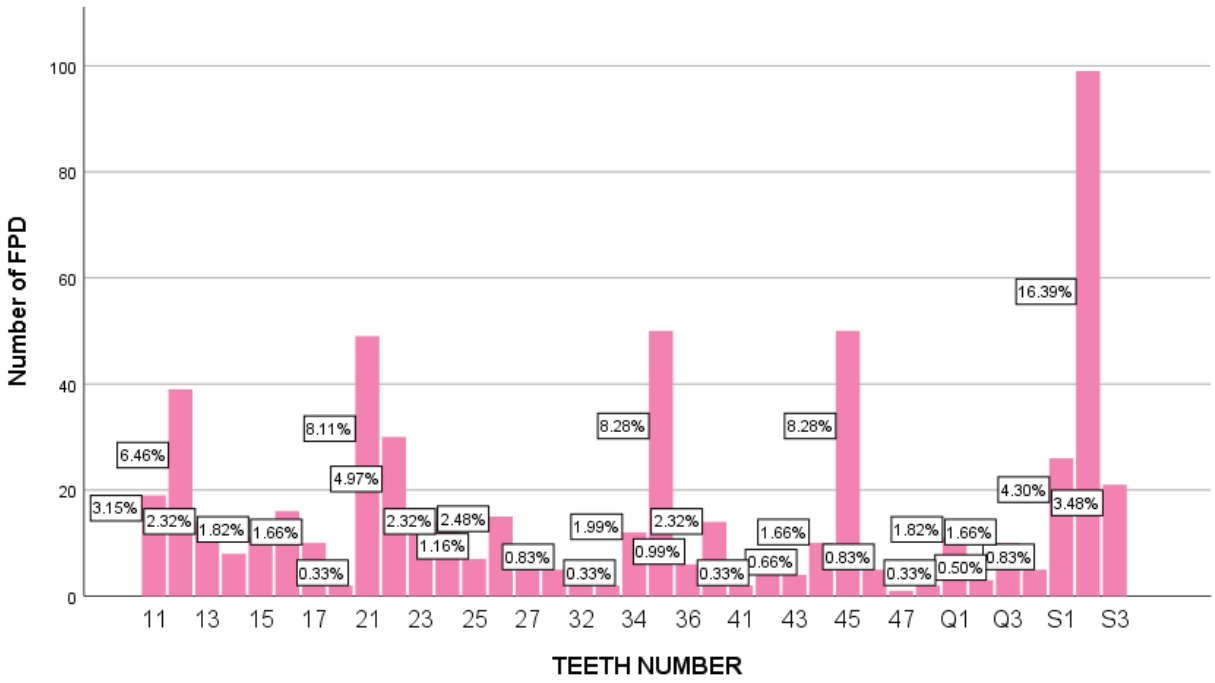
1.82%,Good colour match in which interns 30.4%,4th year 21,8% and 3rd years0.6% ,Slightly mismatch of colour in which interns 5.31%,4th years 4,96% and 3rd years 1%,Obvious mismatch in which interns 0.1% and Gross mismatch in which interns 1%**.**This shows that good colour match in FPD was achieved by the interns. Chi square test was done and association was found to be not statistically significant.The study was aimed at finding out by evaluating the marginal fit and aesthetics in fixed prosthesis treated by undergraduates in Saveetha Dental college and Hospitals. The present study reveals that although operators are novice they tend to achieve accuracy with more exposures, similar reports were found in other studies too.

A study conducted by Sharanya et al, reported that out of 100 dental interns , 33.18% were confident about fpd procedures , 20.5% were very confident , 16% were not confident about fpd procedures. Though fpd has become an important part of undergraduate teaching programs, the level of understanding and awareness among graduate training students regarding fpd is important.[22]According to Ranganathan et al,reported that the veneers fabricated using pressable ceramic processing systems exhibited less marginal discrepancy than the veneers fabricated using CAD/CAM milling technique. Cervical marginal discrepancy was observed to be lesser than the incisal marginal discrepancy in all the experimental groups. [23,24] A study conducted by Baiget al, reported that crown longevity is strongly related to quality of marginal fit, there were significant differences in marginal values between chamfer and shoulder margins.[25] Nakamura et al., 2005, evaluated the marginal and internal adaptation of all-ceramic crowns fabricated using the CAD/CAM system. A master die of maxillary first bicuspid was prepared, and experimental crowns were fabricated. The marginal gap for all experimental crowns met the clinically acceptable criteria.[26] Quintas et al. have reported an increase in the marginal discrepancy following luting with resin cements. [26,27] Borges et al.also evaluated in vitro marginal fit of three all-ceramic crown systems before and after cementation and observed that both resin-modified glass ionomer and resin cements induce increase in marginal discrepancy.[23]

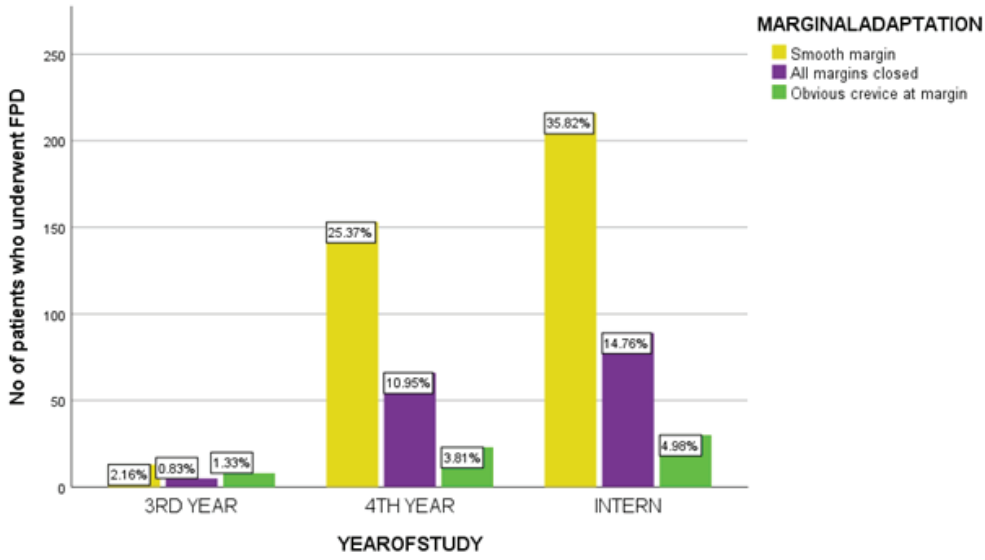
A study conducted by bronson et al, reported that surfaces associated with greater margin gaps tended to have a greater proportion of ratings of "clinically unacceptable." The proportion of prosthodontists and predoctoral students rating a margin "clinically unacceptable" were highly correlated.[28]In 2016, Ghada et al, reported that shade and colour match in fpd play an important role in patient satisfaction in which 805 of patients are pleased with the esthetic outcome of their treatment and 20% of the patients reported that they are not being satisfied with esthetic results. The highlights the importance of esthetic parameters in fpd design and construction.[25,29]Sakrana et al, reported that a good marginal fit seems to be one of the most important technical factors for the long term success of any restoration, clinicians should strive to minimise the marginal misfit.[30] A study conducted by Smitha et al, reported that shade matching was found to be the most challenging for undergraduate students and they have to understand the various aspects to consider before selecting a shade for a patient.[30,31]



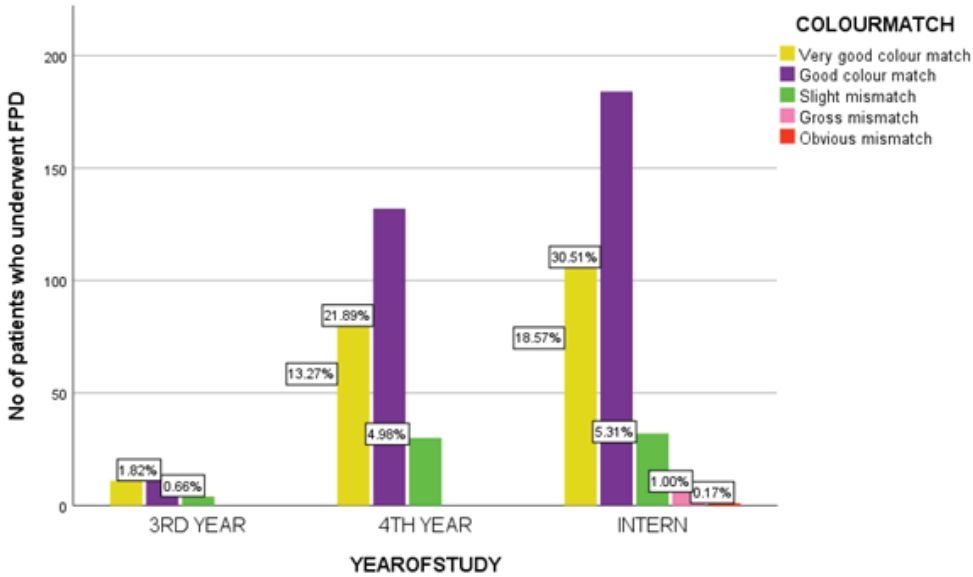
Graph 1 :This graph represents the distribution of year of study (UG), where X-axis denotes the year of study and Y-axis the number of patients who underwent FPD.



Graph 2:Bar graph represents the distribution of teeth number, X-axis denotes the teeth number and Y-axis denotes the number of FPDs performed by the undergraduates.The graph shows that the most number of FPDs performed by the undergraduates was upper anteriors(sextant 2).



Graph 3:Bar graph represents the association between the year of study and frequency of marginal adaptation based on USPHS criteria, where yellow denotes the smooth margin, violet colour denotes all margins closed and green colour denotes the obvious crevice at margin.X axis represents the year of study and Y axis represents the number of patients who underwent FPD(Marginal Adaptation).Chi square test was done and association was found to be statistically significant.Pearson Chi square value:12.871,DF:4, p value:0.01(<0.05)hence statistically significant,proving that better marginal adaptation in FPD was achieved by the interns.



Graph 4:Bar graph represents the association between year of study and frequency of Colour match in FPD based on USPHS criteria, where yellow colour denotes the very good colour, violet colour denotes the good colour match,green colour denotes the slight mismatch,pink colour denotes the obvious mismatch and orange colour denotes the gross mismatch.X axis represents the year of study and Yaxis represents the number of patients who underwent FPD(colour match). Chi square test was done and association was found to be not statistically significant.Pearson Chi square value:8.452,DF:8,pvalue-0.39(>0.05) not statistically significant,proving that the FPDs done by interns were better in terms of color matching.

Conclusion

Within the limits of this current study, we observed that better marginal adaptation and colour match based on USPHS criteria in fixed partial denture was achieved by the interns when compared to the 3rd years and 4th years of undergraduate study. The most frequent anatomical site treated by the undergraduates was upper anterior teeth replacement.

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Conflict of Interest: The authors would like to declare that there is no conflict of interests.

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Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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