

# EVALUATION OF ABUTMENT TEETH IN FIXED PARTIAL DENTURE- A RETROSPECTIVE ANALYSIS OF THE PATIENT RECORDS

G.Nithya Karpagam<sup>1</sup> , Visalakshi Ramanathan<sup>2</sup>, Dinesh Prabu<sup>3</sup>

## Abstract

*The aim of this study is to evaluate the abutment teeth selection in fixed partial denture (FPD) done by undergraduate students. For this, patient records of those who underwent replacement of missing teeth with fixed partial denture were collected. A total of 50 patient radiographs were evaluated. The data on the following parameters: gender and age of the patient, crown root ratio, pocket depth, mobility, axial alignment of the abutment tooth, existing caries and periapical lesion or pulpal involvement and alveolar ridge form were collected. The data was tabulated in excel sheet. After data collection descriptive statistical analysis was done in SPSS software. In the current study the most prevalent gender in the study population to undergo FPD treatment were males (66%) than females (34%). The most prevalent age group opting for FPD treatment was between 41-50 years (52%). 38% of the evaluated FPD abutments had a Crown root ratio of 1:1, 40% of the abutments chosen for FPD construction were detected to have caries. Periapical lesion was present in 13% of the abutment teeth evaluated. Axial alignment of the tooth showed mostly normal alignment representing (65%); pulpal involvement and root canal treatment were done in 17% of the evaluated abutments. The alveolar ridge form of the evaluated patients showed flat ridge (58%). The present study shows appropriate parameters that have to be evaluated by undergraduate students during abutment selection for treatment planning of FPD.*

**Keywords:** *Crownroot ratio; fixed partial denture; Probing depth*

## Introduction

Fixed prosthodontic treatment deals with the replacement of teeth by artificial substitutes that are not readily removable from the mouth. Its focus is to restore function, esthetics and comfort[1]The fixed partial denture (FPD) is one of the most commonly preferred treatment options for a single missing tooth.[2] FPDs were considered to be the best treatment choice for replacing a single missing tooth[3] Fixed prosthodontics treatment can range from the restoration of a single tooth to rehabilitation [4]

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Dentofacial problems are known to cause negative effects over the patients satisfaction with their dentition[5,6].Single teeth can be restored to full function, and improvement in cosmetic effect can be achieved. Missing teeth can be replaced with prostheses that will improve patient comfort and masticatory efficiency, maintain the health and integrity of the dental arches[7]Conventional crowns and bridgeworks make up a major element of general and prosthodontic dental practice, especially in developing countries[8][9]The fixed partial denture is one of the most commonly preferred definitive treatment options for a single missing tooth. For many years, FPDs were considered to be the best treatment choice for replacing a single missing tooth. The primary reasons for suggesting FPDs are its clinical ease and reduced treatment time and costs[10]The replacement of missing teeth with fixed partial dentures is largely dependent upon the health and stability of the surrounding periodontal structures[11]

Various studies were done in our department on different fields like determination of correlation of width of maxillary anterior teeth[12],periodontal health status in groups wearing temporary partial denture[13],study on implants[14,15],studies on microorganisms[16,17],effect of resin bonded luting cement[18],cervical incisal marginal discrepancy[19,20]The other studies are done on the natural products like aloe vera[21]Various studies are also done on awareness about all ceramic restoration in rural population[22],review on retraction cords[23].oral hygiene status in pregnant women[24]

As abutment selection places an important role in the success of fixed prosthesis, this study invigilates the evaluation of factors influencing abutment selection of FPD constructed in undergraduate wing.The aim of this study is to evaluate the abutment teeth selection in fixed partial denture (FPD) done by undergraduate students.

## **MATERIALS AND METHODS:**

### **Study Setting:**

The study was conducted with the approval of the Institutional Ethics Committee [SDC/SIHEC/2020/DIASDATA/0619-0320]. The study consisted of one reviewer, one assessor and one guide.

### **Study Design:**

The study was designed to include patients who underwent fixed prosthodontics. The patients who did not fall under this inclusion criteria were excluded.

### **Sampling technique:**

The study was based on the random sampling method. To minimise the sampling bias, all the cases were reviewed priorly and included.

### **Data Collection And Tabulation:**

Data collection was done using the patient database with the timeframe work of 1st June 2019 to 30th April 2020. About 50 patient radiographs were reviewed and those fitting under the inclusion criteria were included. Cross verification of data was done by a reviewer. The collected data was tabulated based on the following parameters:Gender,Age, Crown root ratio, Presence or absence of caries,Presence or absence of periapical pathology,Axial alignment of the teeth over a scale of parallel/normal, supraerupted,mesially drifted,distally drifted, Probing depth of pockets in abutment teeth in millimetres, Mobility in abutment teeth over a scale of grade 0,1,2,3, Presence or absence of Pulpal involvement in abutment teeth(vital/nonvital), Alveolar ridge form of the edentulous span.

### **Statistical Analysis:**

The variables were coded and the data was imported to SPSS. Using SPSS Version 20.0 categorical variables were expressed in terms of frequency and percentage and bar graphs were plotted. The statistical significance of the associations were tested using the Chi-square test.

## RESULTS

A total of 50 Patient records and OPGs were assessed to evaluate the 100 abutments in FPD. In this study it is shown that the most prevalent gender in the study population to undergo FPD treatment were males (66%) than females (34%). The most prevalent age group opting for FPD treatment was between 41-50 years (52%). 38% of the evaluated FPD abutments had a Crown root ratio of 1:1, 40% of the abutments chosen for FPD construction were detected to have caries and periapical lesion was present in only 13% of the abutment teeth evaluated. Axial alignment of the tooth showed mostly normal alignment (65%); pulpal involvement and root canal treatment were done in (17%) of the evaluated abutments. The alveolar ridge form of the majority patients in the study represented a flat ridge (58%).

## DISCUSSION:

This study has provided information on the parameters of abutment teeth chosen for fixed partial denture. In the study population 66% participants who opted for FPD as a treatment option to replace missing teeth were males and 34% were females. (Figure 1) In the current study, the majority of the patients who underwent fixed partial denture treatment fall into an age group of 41 to 50 years (52%) followed by 30 to 40 years (24%), 51 to 60 years (22%) and 61 to 70 (2%). (Figure 2)

Periodontal tissues play a major role in support and function of abutments. Healthy periodontium is a primary requirement for all prosthetic and restorative therapies as it is considered as a prerequisite for a probable prognosis after restorative therapy [25]. About 52% of the abutment teeth in this study demonstrated 3mm pocket depth, 6% showed 4mm, 26% depicted 5mm and 16% showed 6mm of pocket depth. (Figure 3)

In the past studies have shown that the indications and contra-indications for extensive tooth-supported fixed prosthodontic treatment in periodontally compromised patients are highly dependent on the mobility of the remaining teeth, affecting patient comfort and chewing ability. [11] In the present study, only 4% of the participants represented grade (II) mobility, 14% of the abutment demonstrated grade (I) mobility and mostly about 82% were ideal abutments with no mobility. (Figure 4)

Abutment teeth with healthy periodontium and ideal crown root ratio provide a suitable biomechanical factor in fixed partial denture construction. Thus, it is important to choose a periodontally healthy abutment in rehabilitating compromised dentition [26] Crown root ratio is considered a primary variable in the selection of a tooth as an abutment for the various types of prosthetic restorations, such as fixed dental prostheses removable partial dentures or overdentures. In this study about 22% of the abutments represented an ideal crown root ratio of 2:3, 21% depicted a crown root ratio of 1:2, 38% showed 1:1 ratio and 19% showed 2:1. (Figure 5)

Dental caries and periodontal diseases are considered the most common causes of the tooth loss. In this study, dental caries of existing abutments were assessed both clinically and radiographically. It is observed that the majority of the abutments were non carious 60% and 40% showed carious lesions. (Figure 6) The most apparent reason for re-treatment and replacement in restorative failures is recurrent caries under restorations which risks the abutment of periapical pathology and abutment becomes non vital and requires Root canal treatment. In the current study 13% of the evaluated abutments had periapical pathology whereas 87% of the abutment teeth were free from periapical lesion. (Figure 7) Vital teeth are often preferred to non vital teeth as an abutment. (Figure 8) shows about 83% showed no pulpal involvement and only about 17% showed involvement of pulp and were indicated for root canal treatment [27]

Alveolar ridge form also plays an important role in fixed partial denture fabrication. In this study the majority showed flat ridges 58% and 42% showed resorbed ridges. (Figure 9)

Management of drifted abutments involves uprighting the drifted teeth with orthodontic treatment. Orthodontics is an integral component of multidisciplinary therapy frequently enhancing the aesthetics and function of the final restoration. In this study 65% of the abutment teeth showed normal axial alignment, 12% abutments showed supraeruption, 14% were mesially drifted and 9% demonstrated a distal drift. (Figure 10)

(Figure 11) shows the association between the gender and carious lesion in the abutment teeth. The P Value <0.05(chi square value ) was statistically significant.(0.041) and (Figure 12) shows the association between the age and carious lesion in the abutment teeth.The P Value <0.05(chi square value ) was statistically significant.(0.031)As abutment selection plays an important role in the success of fixed prosthesis, this study invigilated the evaluation of factors influencing abutment selection for FPD.

The present study shows appropriate parameters that have to be evaluated during treatment planning for fixed partial denture. Proper abutment selection influences the prognosis of the prosthesis. The prognosis of the prosthesis depends on abutment evaluation and treatment planning. Henceforth academically dental undergraduates need to be trained not only to have an overall picture of abutment evaluation but also a thorough knowledge on the parameters for abutment selection to aid in decision making towards treatment choices and treatment planning for their patients which surely is an eye opener towards understanding and practising the interdisciplinary approach in patient care.

### **CONCLUSION:**

Within the limits of the present study it is concluded that the majority of the participants who opted for FPD as a treatment option were males than females, and most of them fall into the age group of 41-50 years. Majority of the evaluated abutments were non carious, with minimal periapical involvement, Probing depth, pulpal involvement, showed normal alignment of the abutment and depicted a crown root ratio of 1:1 with the majority having flat alveolar ridge form.

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### **AUTHOR CONTRIBUTION:**

**G. Nithya Karpagam** has contributed to study design, data collection,analysis of the data,tabulation of results,manuscript typing .

**Dr. Visalakshi Ramanathan** has contributed to study design, data collection,analysis of the data,tabulation of results,manuscript typing and formatting and critical reviewing.

**Dr. Dinesh Prabu** has contributed to formatting and proofreading

### **CONFLICT OF INTEREST:**

This research project is self funded.There is no conflict of interest.

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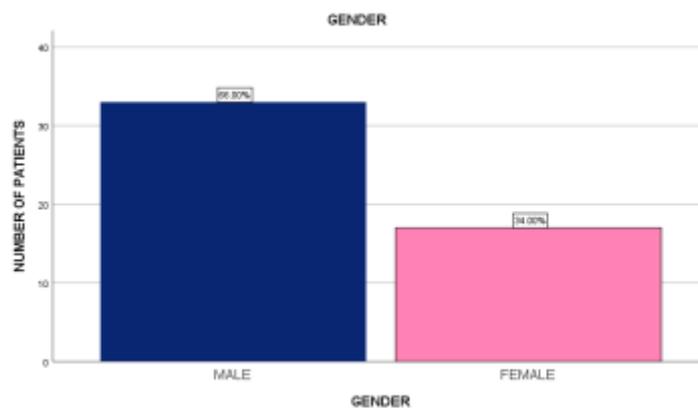


Figure 1: Bar chart showing Gender distribution among the study population. X axis represents Gender of patients undergoing FPD; Y axis represents the number of patients undergoing FPD. Majority of the patients were males - 66%, females - 34%.

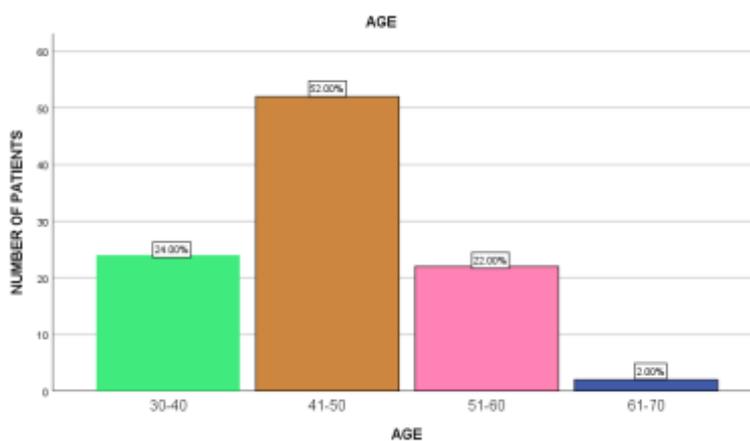


Figure 2: Bar chart representing the age distribution of the study population. X axis represents age of study participants; Y axis represents the number of patients undergoing FPD. The majority of the patients who underwent fixed partial denture treatment fall into the age group of 41-50 years.

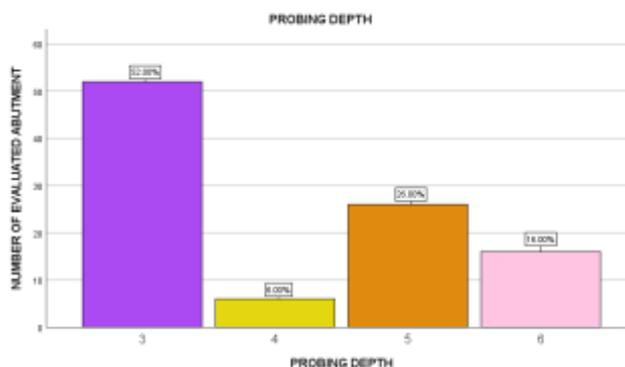


Figure 3: Bar chart showing the distribution of probing depth in FPD abutments. X axis represents the distribution of probing depth in mm; Y axis represents the number of evaluated abutments. Majority of the evaluated abutment showed probing depth of 3mm (52%) with the least at 4mm (6%).

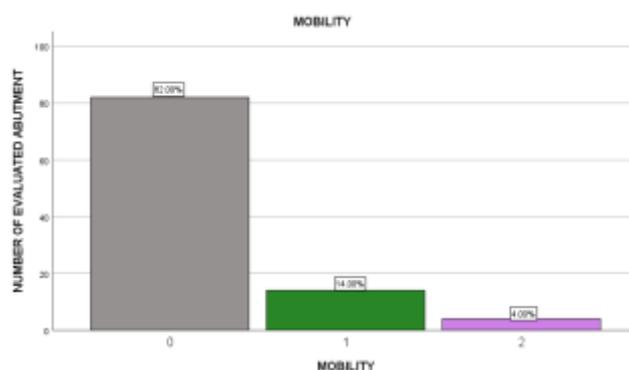


Figure 4: Bar chart showing the distribution of FPD abutments based on their Mobility. X axis represents the distribution of mobility (grade 0,1,2,3); Y axis represents the number of evaluated abutments. Majority of the evaluated abutments were not mobile (82%) whereas only 4% showed grade 2 mobility.

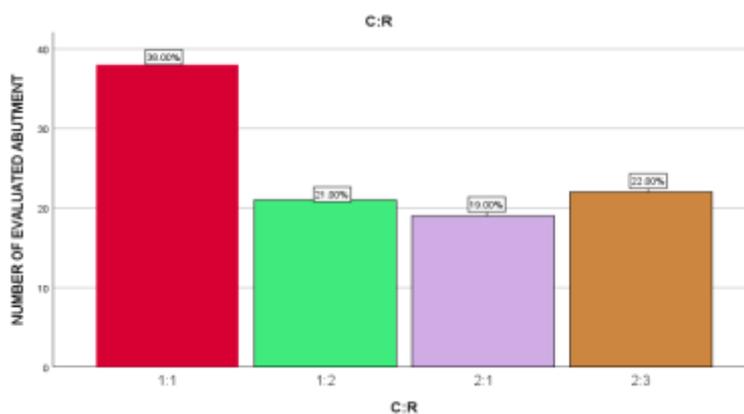


Figure 5: Bar chart showing Crown root (C:R) ratio distribution of FPD abutments. X axis represents crown root ratio; Y axis represents number of evaluated abutment. Majority of the abutment represented a C:R ratio of 1:1.

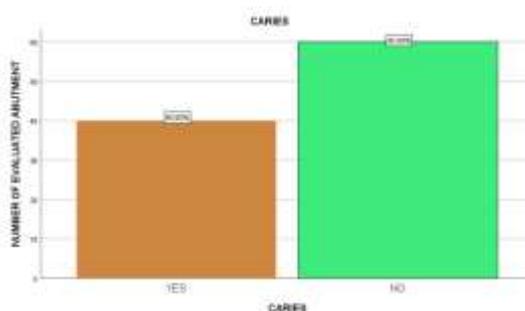


Figure 6: Bar chart showing the distribution of FPD abutments based on their carious state. X axis represents presence or absence of caries; Y axis represents the number of evaluated abutment. Majority of the abutments were healthy and only 40% had carious lesions.

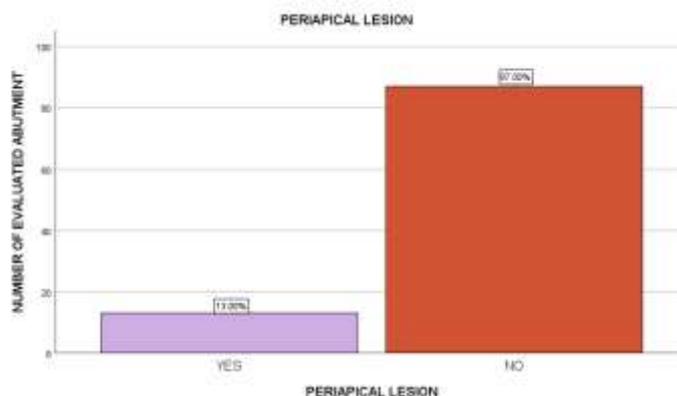


Figure 7: Bar graph showing the distribution of FPD abutments based on periapical lesion. X axis represents presence or Absence of periapical lesions;Y axis represents number of evaluated abutment.Only 13% of the abutments required endodontic therapy whereas 87% demonstrated satisfactory periapical health.

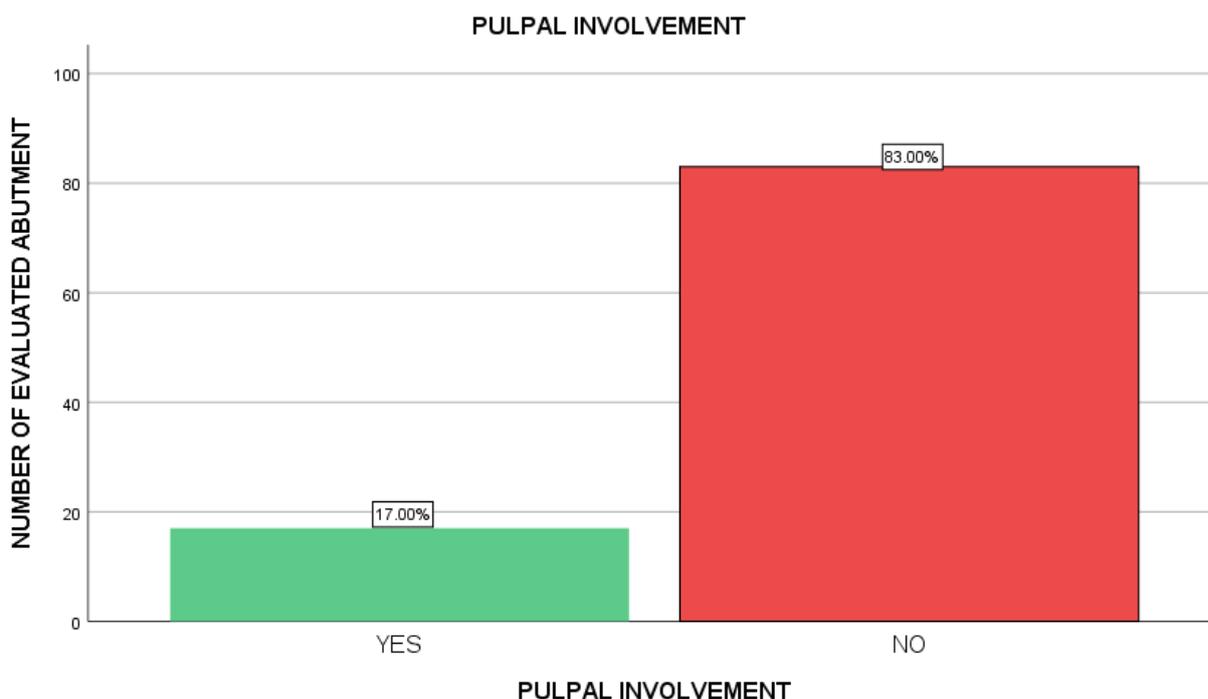


Figure 8: Bar graph showing the distribution of study population based on the pulpal involvement. X axis represents the presence or absence of pulpal involvement;Y axis represents the number of evaluated abutments.Majority of the abutments were healthy and only 17% had pulpal involvement..

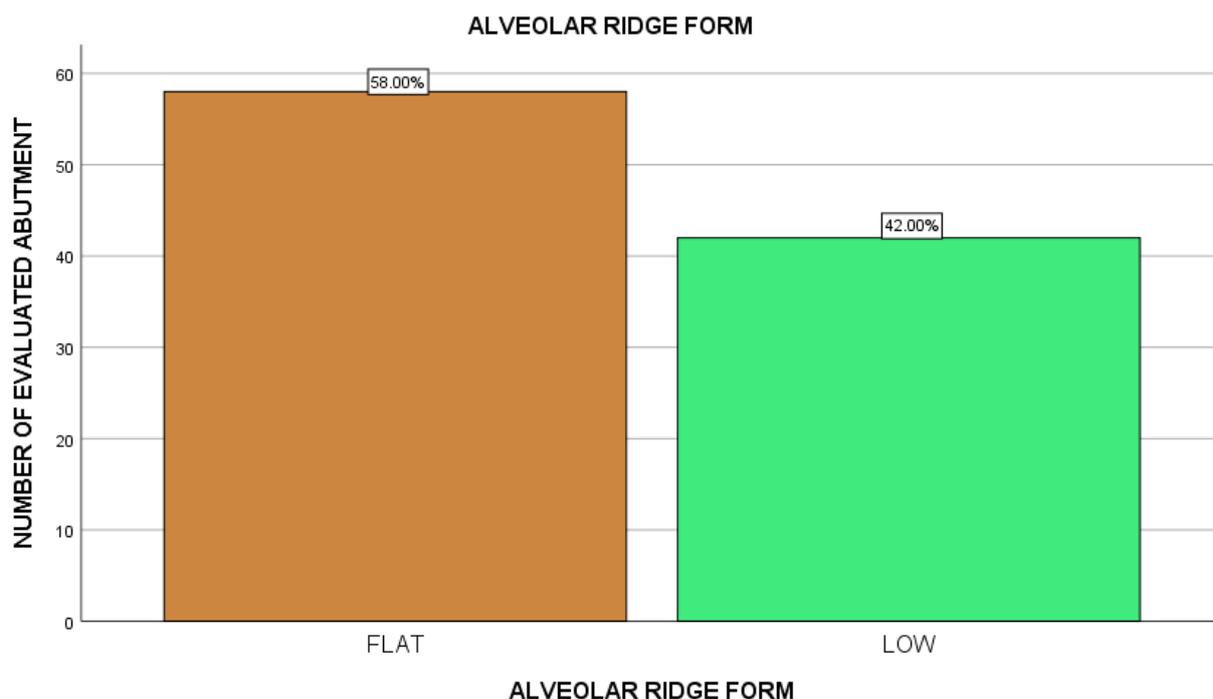


Figure 9: Bar graph showing the distribution of study population based on the alveolar ridge form of edentulous span. X axis represents the alveolar ridge form; Y axis represents the number of evaluated abutments. Majority of the alveolar ridge showed flat ridge 58% whereas 42% showed low ridge.

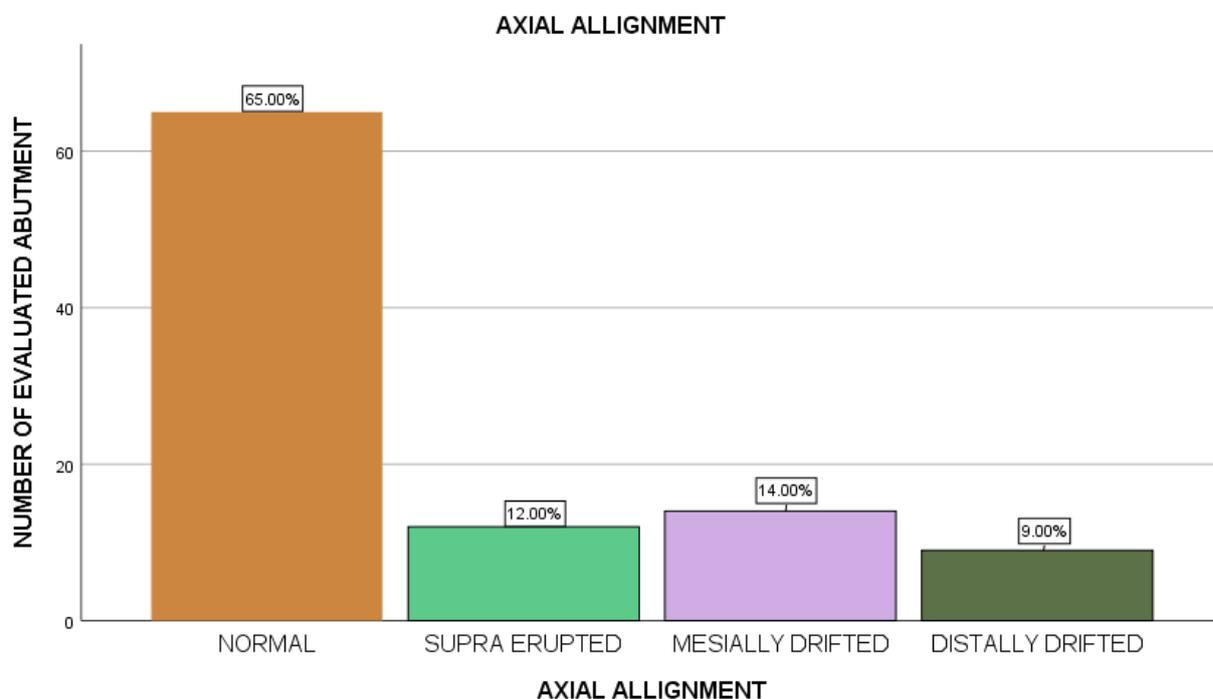


Figure 10: Bar chart showing the distribution of FPD abutments based on the axial alignment. X axis represents the distribution of axial alignment (over a scale of normal or parallel, supraerupted, mesially drifted, distally drifted); Y axis represents the number of evaluated abutment. About 65% of the abutment showed normal alignment.

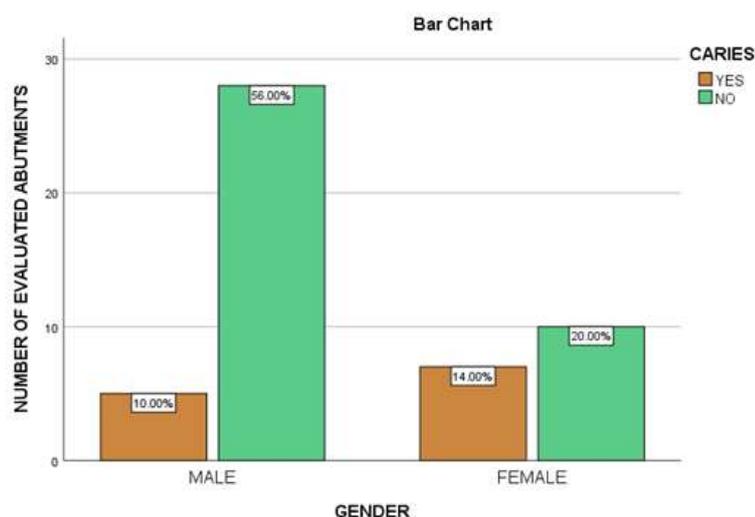


Figure 11: Bar graph depicting the association between the gender and carious lesion in the abutment teeth. X axis represents the distribution of gender and Y axis represents the number of evaluated abutment. From this we infer that majority of the evaluated abutments were healthy without any carious lesion and it was higher in the male population. The P Value <0.05 (chi square value) was statistically significant. (0.041) There is a significant association between gender and Carious lesion.

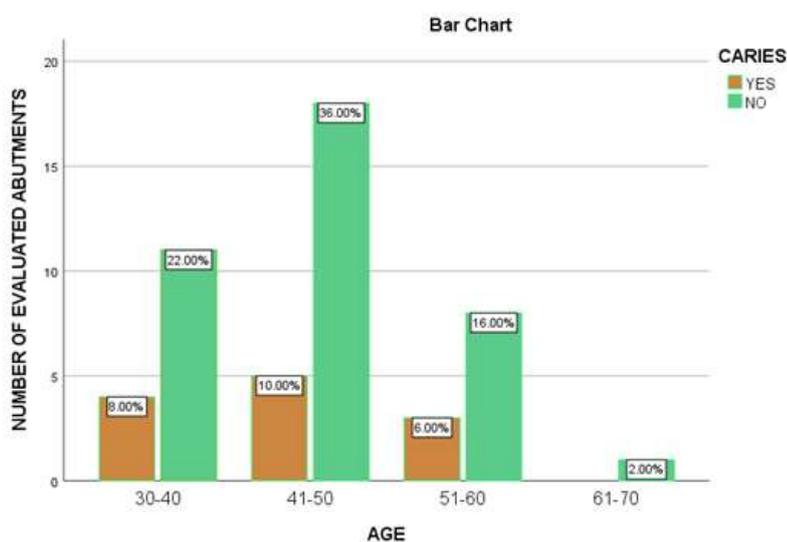


Figure 12: Bar graph depicting the association between the age and carious lesion in the abutment teeth. X axis represents the distribution of age and Y axis represents the number of evaluated abutment. From this we infer that majority of the evaluated abutments were healthy without any carious lesion and it was higher in the age group of 41-50 years. The P Value <0.05 (chi square value) was statistically significant. (0.031). There is a significant association between Diabetic status and Tooth wear.