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Research Article

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Clinical, Radiographical and Questionnaire Study of Failures of Fixed Partial Dentures/Crowns Fabricated in Fixed Prosthodontics Clinic in College of Dentistry, King Khalid University, Abha, Saudi Arabia

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Abstract

Fixed partial dentures/crowns have become the most common modality of treatment to replace missing teeth/tooth structure. They are also the most commonly preferred treatment option by the patients. The most important question to be answered is the success and failure rates of the fixed partial dentures/crowns. It is absolutely vital for us to know the reasons for the failure of the prosthesis so that adequate precautions and measures could be taken to avert the same. Failures could be mechanical, biological and esthetic. The following study will throw a light into the most common failures of the fixed partial dentures/crowns as well as the reasons for the failure of the prosthesis.

Keywords: Failures of fixed partial dentures, Questionnaire study

Introduction

Failure of Fixed partial dentures and crowns is a very vital question to be answered. One of the hurdles for us is to identify the failure and the best way to identify the failures is by first classifying the failures and then looking out which type of failure is most common and what could be the underlying reason for the failure. Over the years many authors have put forth various methods of classifying failures of crowns and FPDs [1,2]. Authors differ in their opinion of which type of failure is most common. Mechanical failures are more common than biological failures by some clinicians [1]. Cantilever type of prosthesis showed the least longevity of service when compared to other type of prosthesis. Resin veneered metal prosthesis fared well when compared to ceramic veneered metal prosthesis according to few studies [3]. But advancement of ceramic technology in recent years has dramatically reduced mechanical failure of the prosthesis. Few authors have reported failure of acrylic resin veneered metal prosthesis due to wear, discoloration and most importantly due to loss of retention [4].

Few studies have reported that the lowest incidence of clinical complications was associated with all-ceramic crowns followed by Posts and cores and conventional single crowns. Resin-bonded prostheses and conventional fixed partial dentures were found to have higher and comparable clinical complications incidences. The 3 most common complications encountered with all-ceramic crowns were fracture of crown, loss of retention and need for endodontic treatment. The 3 most common complications associated with posts and cores were post loosening, root fracture and secondary caries. Single crowns, had 3 most common complications which included need for endodontic treatment, fracture of porcelain veneer and retention loss when fixed partial denture studies were reviewed, the 3 most commonly reported complications were caries need for endodontic treatment and loss of retention. Complications associated with resin-bonded prostheses were prosthesis debonding, tooth discoloration and caries [4]. Some have emphasized the importance of preoperative diagnosis as well as proper plan of the design of the prosthesis to avert failure of the prosthesis [5].

So various studies have put forth different views on the failures of the prosthesis. This present study will bring into light the type of failures which are more common in FPDs and crowns fabricated in fixed partial denture clinic in college of dentistry, King Khalid University, Abha, Saudi Arabia.

Objectives

1. Identify potential failures of FPDs/Crowns
2. Identify the role of oral hygiene habits, oral habits and systemic diseases for the cause of failure of the FPDs/Crowns

Materials and Methods

For the present study a detailed questionnaire was planned to get patients response. The questionnaire is divided into 4 parts which include

1. Patients perception of failure of prosthesis
2. Patients oral hygiene habits
3. Patients oral habits
4. Patients medical history which could lead to failure of the prosthesis

Secondly, a clinical examination and radiographic worksheet was made ready to verify the failure of the prosthesis. In this way we can double check the authenticity of the failure of the prosthesis. Given below is the copy of

1. The questionnaire
2. The clinical and radiological worksheet
3. Statistical analysis determining the correlation between the cause and the effect

Part- 1 (Patients Perception of Failure)

Patient name: age: sex:

File number: iqama number: occupation:

SERIAL NUMBER	QUESTIONNAIRE	YES (SCORE=1)	NO (SCORE=0)
1.	Do you have frequent dislodgement of crowns/FPDs?		
	If **YES**, please explain…		
2.	Do you have pain in relation to crowns/FPDs?		
	If **YES**, please explain…		
3.	Do you have fractured/broken crowns/FPDs?		
	If **YES**, please explain…		
4.	Was the supporting tooth/teeth been broken/fractured?		
	If **YES**, please explain…		
5.	Was the patient dissatisfied with the appearance of the crown/FPDs?		
	If **YES**, please explain…		
6.	Was there any mobility in relation to crown/FPDs?		
	If **YES**, please explain…		
7.	Was there gingival bleeding in relation to crown/FPDs?		
	If **YES**, please explain…		
8.	Was there food lodgement in relation to crown/FPDs?		
	If **YES**, please explain…		
9.	Was there bad odour in relation to crown/FPDs?		
	If **YES**, please explain…		
10.	Was there high spots in relation to crown/FPDs?		
	If **YES**, please explain…		

Part- 2 (Oral Hygiene Habits)

SERIAL NO.	QUESTIONNAIRE	YES (SCORE=1)	NO (SCORE=0)
1.	Do you brush your teeth?		
	IF **YES** Twice daily Once daily		
2.	Do you rinse your mouth after taking food?		
	IF **YES** please explain		
3.	Do you use mouth rinse?		
	IF **YES** please explain		
4.	Do you use dental floss?		
	IF **YES** please explain		
5.	Do you undergo scaling procedures from dentist?		
	IF **YES** please explain		

Part- 3 (Habits)

SERIAL NO.	QUESTIONS	YES SCORE=1	NO SCORE=0
1.	**Do you have gum chewing habit?**		
	If **YES** please explain		
2.	Do you have miswak chewing habit		
	If **YES** please explain		
3.	Do you have nail biting habit?		
	If **YES** please explain		
4.	Do you have pen nibbling habit?		
	If **YES** please explain		
5.	Do you experience teeth grinding during night/day?		
	If **YES** please explain		

Part- 4 (Systemic Diseases)

SERIAL NO.	QUESTIONS	YES SCORE=1	NO SCORE =0
1.	Do you have diabetes mellitus?		
	If **YES** please specify the details of the diabetes status and medicines taken……		
2.	Do you have hypertension?		
	If **YES** please specify the details of the hypertension status and medicines taken……		
3.	Do you have depression/anxiety /sleep disorders?		
	If **YES** please specify the details		
4.	Do you take any medicines ?		
	If **YES** please specify the details		

2) Clinical and Radiographical Worksheet

S. No.	Tooth No.	No. Of units	Prosthesis Type	Duration Of prosthesis In service	Mechanical Failure			Biological Failure					Esthetic failure		Radiographical Findings		
					M1	M2	M3	B1	B2	B3	B4	B5	E1	E2	R1	R2	R3
1.																	
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	

Clinical Classification of Failures in FPD/Crowns

1. Mechanical Failures

a) M1-----POOR RETENTION OF THE PROSTHESIS
b) M2-----BREAKAGE/FRACTURE OF THE PROSTHESIS
c) M3-----OCCLUSAL DISCREPANCIES DUE TO PROSTHESIS

2. Biological Failures

a) BI ------PAIN IN RELATION TO THE PROSTHESIS on PERCUSSION
b) B2------BREAKAGE/FRACTURE OF THE TOOTH STRUCTURE
c) B3------FOOD IMPACTION IN RELATION TO THE PROSTHESIS
d) B4------BAD ODOUR/HALITOSIS
e) B5------PERIODONTAL BREAKDOWN determined by PROBING

3. Esthetic Failures

a) E1----SHADE/COLOUR OF THE PROSTHESIS NOT SATISFACTORY
b) E2----EXPOSURE OF METAL IN THE MARGINS OF METAL CERAMIC RESTORATIONS

Radiographical Findings

1. R1----BONE LOSS INRELATION TO ABUTMENT TEETH
2. R2----PERIODONTAL LIGAMENT WIDENING/ DIRUPTION
3. R3----CARIES IN RELATION TO ABUTMENT TEETH

Prosthesis Type (Abrreviations)

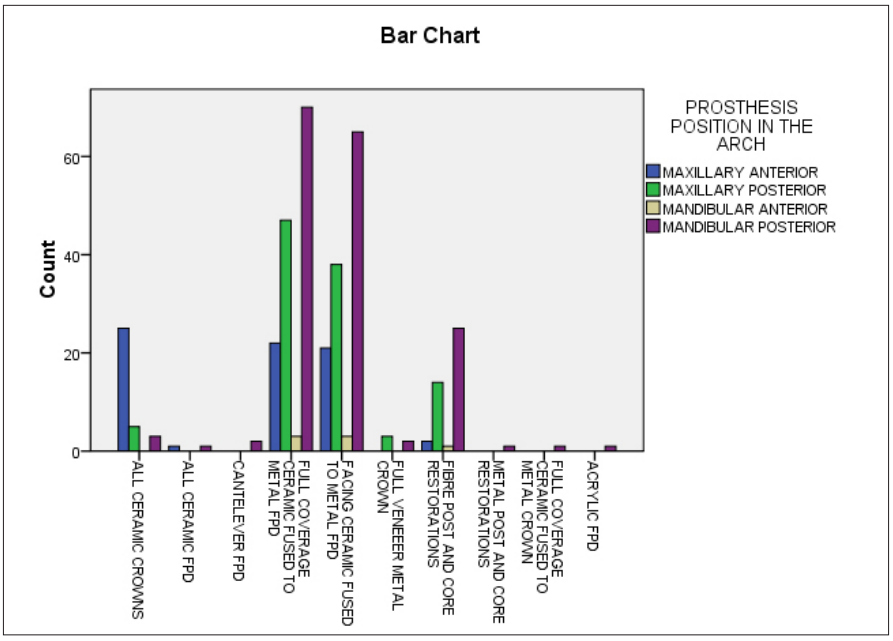
1.	ONLAY	**ON**
2.	PARTIAL VENEER METAL CROWN	**PV-MC**
3.	FULL VENEER METAL CROWN	**FV-MC**
4.	PORCELAIN FUSED TO METAL CROWN-CERAMIC FACING	**F-PFMC**
5.	PORCELAIN FUSED TO METAL CROWN-FULL CERAMIC COVERAGE	**PFMC**
6.	POST AND CORE RESTORATIONS	**PC**
7.	ALL CERAMIC CROWNS	**AC**
8.	ALL CERAMIC CAD CAM CROWNS	**CAD-C**
9.	ALL CERAMIC CAD CAM ONLAYS	**CAD-O**
10.	ALL CERAMIC VENEERS	**ACV**
11.	FPD BRIDGES-FULL METAL	**M-FPD**
12.	FPD BRIDGES-FULL COVERAGE CERAMIC FUSED TO METAL	**CC-FPD**
13.	FPD BRIDGES-CERAMIC FACING ON ONE OR MORE TEETH	**FC-FPD**
14.	ALL CERAMIC FPD	**AC-FPD**
15.	CAD CAM FPD	**CAD-FPD**
16.	ACRYLIC CROWNS	**ACRC**
17.	RESIN BONDED FIBRE REINFORCED CROWNS	**RFC**

Results

Total number of patients taken (n=356). The number of patients with the type of prosthesis and position of the prosthesis in the maxillary and mandibular arch is illustrated in the Table 1.

Table 1: Prosthesis Type* Prosthesis Position in the Arch Cross Tabulation

Count						
		PROSTHESIS POSITION IN THE ARCH				Total
		MAXILLARY ANTERIOR	MAXILLARY POSTERIOR	MANDIBULAR ANTERIOR	MANDIBULAR POSTERIOR	
PROSTHESIS TYPE	ALL CERAMIC CROWNS	25	5	0	3	33
	ALL CERAMIC FPD	1	0	0	1	2
	CANTELEVER FPD	0	0	0	2	2
	FULL COVERAGE CERAMIC FUSED TO METAL FPD	22	47	3	70	142
	FACING CERAMIC FUSED TO METAL FPD	21	38	3	65	127
	FULL VENEEER METAL CROWN	0	3	0	2	5
	FIBRE POST AND CORE RESTORATIONS	2	14	1	25	42
	METAL POST AND CORE RESTORATIONS	0	0	0	1	1
	FULL COVERAGE CERAMIC FUSED TO METAL CROWN	0	0	0	1	1
	ACRYLIC FPD	0	0	0	1	1
Total		71	107	7	171	356

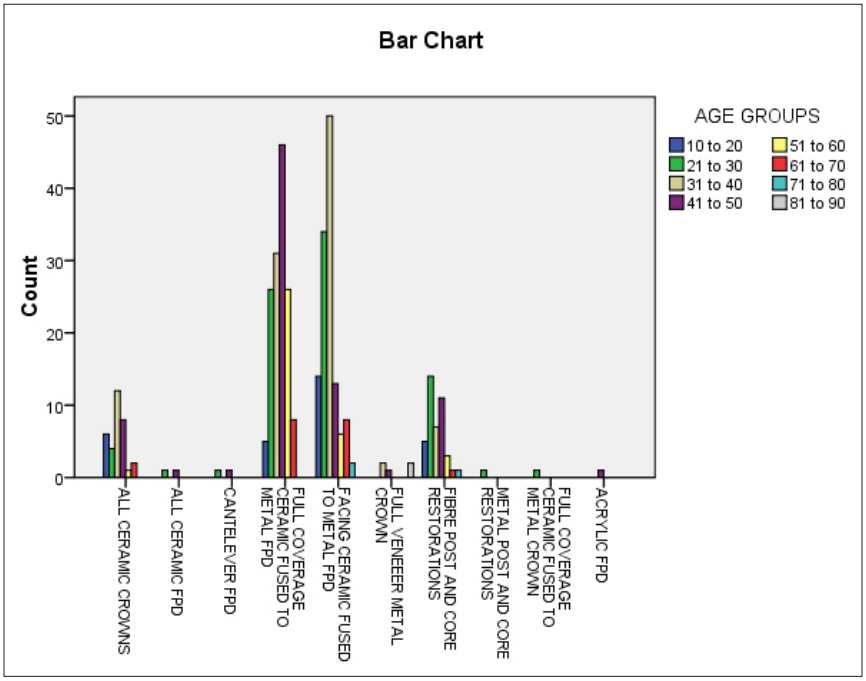


Graph 1

Prosthesis versus age groups is illustrated in Table 2 and Graph 2

Table 2: Prosthesis Type* Age Groups Cross tabulation

Count									
		AGE GROUPS							
		10 to 20	21 to 30	31 to 40	41 to 50	51 to 60	61 to 70	71 to 80	81 to 90
PROSTHESIS TYPE	ALL CERAMIC CROWNS	6	4	12	8	1	2	0	0
	ALL CERAMIC FPD	0	1	0	1	0	0	0	0
	CANTELEVER FPD	0	1	0	1	0	0	0	0
	FULL COVERAGE CERAMIC FUSED TO METAL FPD	5	26	31	46	26	8	0	0
	FACING CERAMIC FUSED TO METAL FPD	14	34	50	13	6	8	2	0
	FULL VENEEER METAL CROWN	0	0	2	1	0	0	0	2
	FIBRE POST AND CORE RESTORATIONS	5	14	7	11	3	1	1	0
	METAL POST AND CORE RESTORATIONS	0	1	0	0	0	0	0	0
	FULL COVERAGE CERAMIC FUSED TO METAL CROWN	0	1	0	0	0	0	0	0
	ACRYLIC FPD	0	0	0	1	0	0	0	0
Total		30	82	102	82	36	19	3	2

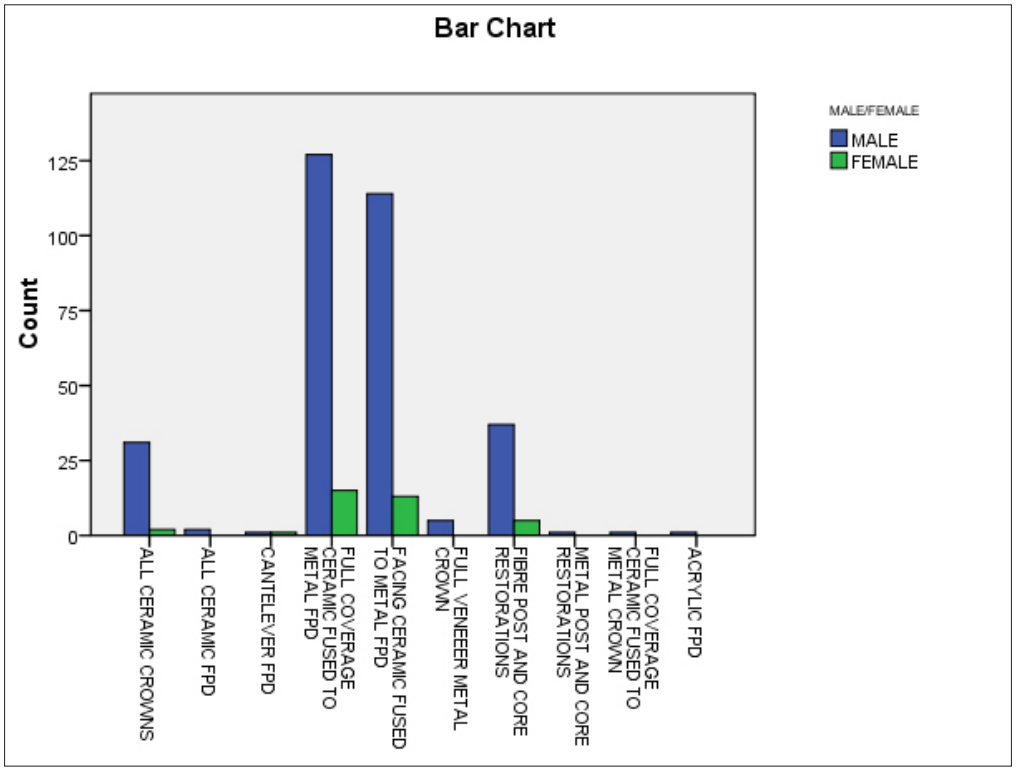


Graph 2

Male/female distribution and prosthesis type is illustrated in Table 3 and Graph 3

Table 3: Prosthesis type* male/female cross tabulation

Count				
		MALE/FEMALE		Total
		MALE	FEMALE	
PROSTHESIS TYPE	ALL CERAMIC CROWNS	31	2	33
	ALL CERAMIC FPD	2	0	2
	CANTELEVER FPD	1	1	2
	FULL COVERAGE CERAMIC FUSED TO METAL FPD	127	15	142
	FACING CERAMIC FUSED TO METAL FPD	114	13	127
	FULL VENEEER METAL CROWN	5	0	5
	FIBRE POST AND CORE RESTORATIONS	37	5	42
	METAL POST AND CORE RESTORATIONS	1	0	1
	FULL COVERAGE CERAMIC FUSED TO METAL CROWN	1	0	1
	ACRYLIC FPD	1	0	1
Total		320	36	356



Graph 3

Table 4: Presence of Failures and Prosthesis Type

PROSTHESIS TYPE	M1 (n)%	M2 (n)%	M3 (n)%	B1 (n)%	B2 (n)%	B3 (n)%	B4 (n)%	B5 (n)%	E1 (n)%	E2 (n)%
ALL CERAMIC CROWNS	(3) 9	(0) 0	(3) 9	(5) 15.1	(0) 0	(8) 24.2	(7) 21.1	(13) 39.3	(13) 39.3	(3) 9
ALL CERAMIC FPD	(0) 0	(1) 50	(1) 50	(0) 0	(0) 0	(2) 100	(1) 50	(0) 0	(2) 100	(1) 50
CANTELEVER FPD	(0) 0	(0) 0	(0) 0	(2) 100	(0) 0	(1) 50	(1) 50	(1) 50	(0) 0	(0) 0
FULL COVERAGE CERAMIC FUSED TO METAL FPD	(18) 12.7	(13) 9.2	(11) 7.7	(50) 35.2	(9) 6.3	(79) 55.6	(76) 53.5	(84) 59.1	(73) 51.4	(46) 32.3
FACING CERAMIC FUSED TO METAL FPD	(10) 7.8	(15) 11.8	(5) 3.9	(37) 29.1	(8) 6.2	(59) 46.4	(63) 49.6	(68) 53.5	(57) 44.8	(36) 28.3
FULL VENEEER METAL CROWN	(0) 0	(0) 0	(0) 0	(0) 0	(1) 20	(0) 0	(1) 20	(1) 20	(1) 20	(1) 20
FIBRE POST AND CORE RESTORATIONS	(1) 2.3	(7) 16.6	(1) 2.3	(10) 23.8	(11) 26.1	(16) 38	(20) 47.6	(22) 52.3	(20) 47.6	(7) 16.6
METAL POST AND CORE RESTORATIONS	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(1) 100	(1) 100	(1) 100	(0) 0	(0) 0
FULL COVERAGE CERAMIC FUSED TO METAL CROWN	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0
ACRYLIC FPD	(1) 100	(0) 0	(0) 0	(1) 100	(0) 0	(1) 100	(0) 0	(1) 100	(0) 0	(0) 0

Table 5: Prosthesis Type and Radiographic Changes

PROSTHESIS TYPE	R1 (n)%	R2 (n)%	R3 (n)%
ALL CERAMIC CROWNS	(17) 21.1	(6) 18.1	(0) 0
ALL CERAMIC FPD	(1) 50	(1) 50	(0) 0
CANTELEVER FPD	(2) 100	(1) 50	(0) 0
FULL COVERAGE CERAMIC FUSED TO METAL FPD	(135) 95	(57) 40.1	(42) 29.5
FACING CERAMIC FUSED TO METAL FPD	(112) 88.1	(55) 43.3	(18) 14.1
FULL VENEEER METAL CROWN	(5) 100	(2) 40	(0) 0
FIBRE POST AND CORE RESTORATIONS	(34) 76	(11) 26.1	(7) 16.6
METAL POST AND CORE RESTORATIONS	(1) 100	(1) 100	(1) 100
FULL COVERAGE CERAMIC FUSED TO METAL CROWN	(0) 0	(1) 100	(0) 0
ACRYLIC FPD	(1) 100	(1) 100	(0) 0

Table 6: Prosthesis Position in Arch and Radiographic Changes

PROSTHESIS POSITION IN THE ARCH	R1 (n)%	R2 (n)%	R3 (n)%
MAXILLARY ANTERIOR	(48) 67.6	(23) 32.3	(10) 14
MAXILLARY POSTERIOR	(96) 89.7	(36) 33.6	(19) 17.7
MANDIBULAR ANTERIOR	(6) 85.7	(4) 57.1	(3) 42.8
MANDIBULAR POSTERIOR	(158) 92.3	(73) 42.6	(36) 21

Table 7: Diabetic Status and Radiographic Changes

DIABETIC STATUS	R1 (n)%	R2 (n)%	R3 (n)%
NON DIABETIC	(275) 86.2	(118) 37	(63) 19.7
DIABETIC	(33) 89.1	(18) 48.6	(5) 13.5

Table 8: Hypertensive Status and Radiographic Changes

HYPERTENSIVE STATUS	R1 (n)%	R2 (n)%	R3 (n)%
NONHYPERTENSIVE	(272) 85.8	(118) 37.2	(58) 18.3
HYPERTENSIVE	(36) 92.3	(18) 46.1	(10) 25.6

With the help of the data collected using the worksheet (clinical and radiographical) as well as questionnaire statistical analysis was done. The various statistical tests performed were bivariate logistic regression, descriptive statistics and crosstabs using SPSS 16 software.

Discussion

Patients with night grinding have 4.690 times more likely of having (M2) which was statistically significant (p=0.003). Patients with night grinding have 3.628 times more likely of having (M3) which was statistically significant (p=0.043).

Patients with night grinding have 5.536 times more likely of having (B1) which was statistically significant (p=0.019). Patients with night grinding have 3.365 times more likely of having (B2) which was statistically significant (p=0.028). Patients who use mouth rinse are least likely to get B2 which was statistically significant (p=0.001).

Patients who brush twice have least chance of likely B3 which was statistically significant (p=0.024). Patients with Diabetes (type 1 and 2) have 58.97 times more likely of getting B3 which was statistically significant (p=0.001).

Patients who use prophylatic are less likely to get B4 which was statistically significant (p=0.004). Patients with nail biting are 11.39 times more likely to get B4 which was statistically significant (p=0.001). Patients with Diabetes (type 1 and 2) have 6.23 times more likely of getting B4 which was statistically significant (p=0.002).

Patients who use prophylactic mouth rinse and Miswak are least likely to get B5 which was statistically (p=0.001). Patients with Diabetes (type 1 and 2) have 5.128 times more likely of getting B4 which was statistically significant (p=0.002).

Patients who use gum are 1.950 times more likely to get E1 which was statistically significant (p=0.006) and Patients who have night grinding are 2.466 times more likely to get E1 which was statistically significant (p=0.021).

Patients who have undergone scaling are more likely to get E2 which was statistically significant (p=0.001).

Conclusion

Patients with night grinding have higher possibility of mechanical and biological failures. Patients with TYPE 2 diabetes have more chances of getting biological failures in the form of periodontal breakdown. Patients who have gum chewing habit and nail chewing habit have esthetic failures due to poor appearance of prosthesis due to these habits. Interestingly patients who have undergone scaling had esthetic failure in the form of metal exposure in cervical regions in metal ceramic restorations. To conclude it would be appropriate to say those patients who regularly execute oral hygiene habits as well as those who don't have any oral habits have lesser chances of getting mechanical, biological and esthetic failures. Systemically compromised patients like type 2 diabetes have greater chances of getting biologically failures. Further interventional studies would be needed to comprehensively prove that which factor could be significantly altered so as to reduce the failures in fixed partial dentures [6,7].

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