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## Original Article

### Comparison Of Zirconia- Ceramic And Metal- Ceramic In Posterior Teeth- A Clinical Study

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#### ABSTRACT

**Background:** Fixed prosthodontics has brought revolution in dentistry. The present study was conducted to compare metal- ceramic FPD's with zirconia- ceramic FPD's. **Materials & Methods:** The present study was conducted on 112 patients. They were divided into 2 groups. Group I received zirconia- ceramic FPDs and group II received metal- ceramic FPDs. Patients in which three units were required were selected. In both groups after giving FPD, probing pocket depth, probing attachment level and bleeding on probing index was measured after 2 years in abutment as well as contralateral teeth. **Results:** Common failure was due to veneer fracture seen in 4 in group I and 3 in group II, framework fracture seen in 3 in group I and 2 in group II and occlusal wear seen in 2 in group I and 1 in group II. The difference was non- significant ( $P > 0.05$ ). No significant difference was seen in both groups regarding PPD, PAL and BOP. **Conclusion:** No significant difference was observed in terms of PPD, PAL and BOP in both abutments as well as in contralateral teeth in both groups. Both zirconia- ceramic and metal ceramic exhibited similar properties.

**Key words:** Fixed Prosthodontics, Metal ceramic, zirconia- ceramic

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## INTRODUCTION

In the management of replacing missing teeth, fixed prosthodontics has brought revolution. Porcelain fused to metal (PFM) is one type of FPD. The ease of placing FPD and color matching of PFM with adjacent teeth are few benefits which make this treatment option favourite for patients. It has additional advantage of enamel-like translucency. The only disadvantage of PFM crown is poor strength as compared to metal crown and hence may be placed in area where less force is applicable such as in cases of anterior teeth. With advent of different ceramics, there are variety of options for dental surgeon.<sup>1</sup> Nowadays, new high strength ceramics such as zirconia and alumina is popular. Glass-ceramics possesses good optical properties whereas alumina and zirconia ceramics offer superior stability as compared to glass ceramics. All these properties are desired by good crowns and hence these materials may be placed in premolars and molars where high chewing forces are applied.<sup>2</sup> Several studies have been conducted so far depicting the survival rate of full coverage metal crown and metal- porcelain crown as well.<sup>3</sup> Most of them showed metal- ceramic crowns better in terms of strength as compared to all ceramics crown. They showed that most of them showed fractured at the site of connector area. Vult

Von<sup>4</sup> conducted a 5 year study of evaluation of posterior all-ceramic three-unit FPD and found that 10%- 12% fractures occur in these prostheses. The present study was conducted to compare metal- ceramic FPD's with zirconia- ceramic FPD's.

## MATERIALS & METHODS

The present study was conducted in the department of Prosthodontics, Bridge & Crown. It comprised of 112 patients (males- 62, females- 50) of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study. General information such as name, age, gender etc. was recorded in case history performa. They were divided into 2 groups. Group I received zirconia- ceramic FPDs and group II received metal- ceramic FPDs. Patients in which three units were required were selected. In both groups after giving FPD, probing pocket depth, probing attachment level and bleeding on probing index was measured after 2 years in abutment as well as contralateral teeth. Results thus obtained were subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

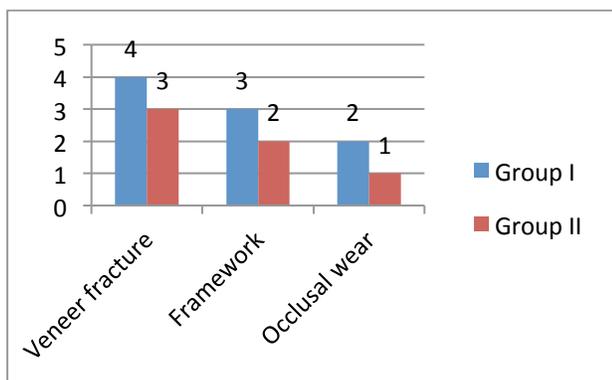
**RESULTS**

Table I shows that group I (zirconia- ceramic) had 30 males and 26 females and similarly, group II (metal- ceramic) had 30 males and 26 females.

**Table I Distribution of patients**

Total- 112			
Group I (zirconia- ceramic)		Group II (metal- ceramic)	
Males	Females	Males	Females
30	26	30	26

**Graph I Type of failure in both groups**



Graph I shows that common failure was due to veneer fracture seen in 4 in group I and 3 in group II, framework fracture seen in 3 in group I and 2 in group II and occlusal wear seen in 2 in group I and 1 in group II. The difference was non- significant (P> 0.05).

**Table II Comparison of Parameters in both groups**

Parameters	Group I		Group II	
	Abutment teeth	Contralateral teeth	Abutment teeth	Contralateral teeth
PPD	2.5± 0.4	2.3± 0.5	2.4± 0.4	2.2± 0.3
PAL	2.3± 0.6	2.0± 0.4	2.5± 0.2	2.1± 0.5
BOP	0.4± 0.3	0.2± 0.1	0.3± 0.2	0.3± 0.1

Table II shows that in group I, PPD was 2.5± 0.4 in abutment teeth and 2.3± 0.5 in contralateral teeth and in group II, 2.4± 0.4 in abutment teeth and 2.2± 0.3 in contralateral teeth. PAL was 2.3± 0.6 in abutment teeth and 2.0± 0.4 in contralateral teeth and 2.5± 0.2 in abutment teeth and 2.1± 0.5 in contralateral teeth in group II. BOP was 0.4± 0.3 in abutment teeth and 0.2± 0.1 in contralateral teeth in group I and 0.3± 0.2 in abutment teeth and 0.3± 0.1 in contralateral teeth. The difference was non- significant (P> 0.05).

**DISCUSSION**

There is variety of materials available for FPD. Few prefer, PFM, zirconia- ceramic and full metal FPDs. The choice of materials

depends upon site of placement, expertness of dentists and preference of patients. In cases of anterior teeth, PFM or full ceramic is preferred as there is limited occlusal overload and only biting force is applied whereas in case of premolar or molar where large, heavy occlusal chewing force is required, the choice is either full metal crowns or porcelain fused to metal (PFM).<sup>5</sup> In present study, we compared metal- ceramic FPD's with zirconia- ceramic FPD's. We classified patients who need three unit FPDs in posterior region into 2 groups of 56 patients each. Group I was zirconia- ceramic group comprised of 30 males and 26 females and similarly, group II was metal- ceramic group consisted of 30 males and 26 females. In present study, we found that most common cause of failure of treatment was veneer fracture, framework fracture and occlusal wear. Veneer fracture was observed in 4 in group I and 3 in group II, framework fracture in 3 in group I and 2 in group II and occlusal wear in 2 in group I and 1 in group II. This is in agreement with Scurria et al.<sup>6</sup> Various authors have showed several factors as leading cause of failures. Among the factors studied were the different surface treatments of the frameworks, thermal compatibility of the veneering ceramics and the zirconia frameworks, the flexural strength of the veneering ceramics, and the bond strength between veneering ceramics and zirconia frameworks.<sup>7</sup> In the study by Irena et al.<sup>8</sup>, 53 patients with 67 FDPs were evaluated after a mean observation period of 40.3 ± 2.8 months which comprised 36 zirconia-ceramic and 31 metal-ceramic crowns. Author found 100% survival rate in both FDPs. No significant difference was observed regarding technical and biologic outcome. In 26% cases, minor chipping of the veneering ceramic was seen in zirconia-ceramic group while metal-ceramic FDPs showed 19.4% of the chipping. Extended fracturing of the veneering ceramic was seen only in zirconia-ceramic FDPs. In this study, mean PPD, PCR, and BOP was calculated which revealed no statistical difference in abutment as well as in contralateral teeth in both groups.<sup>9</sup> In present study, non- significant finding in terms of PPD, PAL and BOP were seen in both abutment teeth as well as in contralateral teeth in both group I and group II. This is in agreement with Sadan et al.<sup>10</sup> The TEC appears to play a vital role whereas the strength of the veneering ceramic and the bond between the veneering ceramic and the framework were of limited importance. In a study by Raigrodski A<sup>11</sup>, 184 patients were treated with 692 ceramic-veneered zirconia FDPs. 32 FDPs in 31 patients showed complication. Core fractures were seen in 2 (1.1%) FDPs. 2 (1.1%) FDPs exhibited adhesive veneer fractures. Cohesive veneer fractures were seen in 10 (5.4%) FDPs. 82.3% and 95.2% success and survival rates were seen respectively in 3 years.

**CONCLUSION**

Both zirconia- ceramic and metal ceramic exhibited similar properties. No significant difference was observed in terms of PPD, PAL and BOP in both abutment as well as in contralateral teeth in both groups.

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