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**Review Article**

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# *Review on Fixed Prosthesis and its Influence on Periodontal Health, Literature Review*

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**ABSTRACT**

*Dental prosthetics are used to replace and deal with major intraoral problems especially in the posterior regions of the oral cavity. Although, advanced prosthetic materials with better polishing features show clinical satisfactory results however oral health-related issues remain controversial. However, many studies were done and provided successful osseointegration supporting the survival of implants data and also mentioned rare complications that developed during the process. This review aims to outline and analyze potential effects on the quality of life and oral health-related issues in patients with dental prostheses. A systematic review based on the electronic search database PubMed and Springer where the data was collected to identify only English published articles, observational clinical trials, and current literature reviews that were relevant to this subject was introduced in this review. Within the limited findings of this review many retrospective studies concluded that fixed dental prosthesis is clinically acceptable to maintain a normal patient profile, comfort, function, speech, health, and esthetics.*

**Key words:** *Prosthesis, Zirconium, Ceramics, Crown, Survival*

## INTRODUCTION

Some periodontal impairments may result in irreversible conditions that require dental prostheses. The prosthetic design has an important role to play in dental restoration and external aesthetics. During the prosthetic process inflammation of the periodontal surroundings may occur [1-3].

These inflammatory complications are mostly derived from hygienic possibilities and oral health in addition to possible iatrogenic complications that might result from dental preparation that is not accurately performed. Complications frequency regarding fixed constructions that were reported in the literature and ranged from 80% to 60% [3, 4]. Age, related to the complications is often present with new challenges in cases of chronic systemic medical conditions that may influence the prosthesis survival [5].

Although, advanced prosthetic materials with better polishing features like ceramics, metals, and zirconium show clinical satisfactory results however oral health-related issues remain controversial [6]. However, many studies were done and provided successful osseointegration supporting the survival of implants data and also mentioned rare complications that developed during the process [7-9].

This review will outline several published investigations regarding dental prothesis biological complications and survival rates of the fixed prosthesis, depending on various clinical trials done in this matter, and will help in early detection of complications with supportive care to lower chances of any future complications.

## MATERIALS AND METHODS

A systematic review of based on electronic search database PubMed and Springer where data was collected to identify published relevant articles, observational clinical trials, and current literature reviews using a combination of the following keywords: "Prosthesis, Zirconium, Ceramics, Crown, Survival, Fixed, Implants, Complications". However, no restriction was applied over the years of publications that are mentioned in this review. Only relevant observational clinical trials, articles, and systemic reviews that were in English are included after they were evaluated and met the needed criteria for this review.

### *Review*

#### *Clinical significance*

The main goal of dental prosthetic restoration is to maintain a normal patient profile, comfort, function, speech, health, and esthetics. Dental prosthetics are used to replace and deal with major intraoral problems especially in the posterior regions of the oral cavity. Understanding the different designs zone well can assess in discovering important areas for esthetic biological contouring as it supports better treatment outcomes in periodontal restorations [10].

#### *Preparation and placement*

The decision taken for dental preparation is based on the characteristics and types of restoration material. This decision is done to prevent any iatrogenic damages that are initiated from the surrounding periodontal tissues [11].

#### *Factors that influence and affects prosthetic restoration*

The most predominant cause of periodontal issues is dental caries with an estimated prevalence population of more than 90% globally. Dental caries and other invasive disorders such as (abrasion, erosion, fractures) impose the need for structural restorations. In this regard, these situations might require either minimal invasive covering such as (inlays without covering cusps, onlays covering one cusp, and overlays covering entire cusps) or dental implants (fixed or removable) [12].

Evaluation of periodontal health to maintain an acceptable condition for teeth restoration is usually assessed with Community Periodontal Index (CPI) that is ascribed in scores in **Table 1** and Modified Approximal Plaque Index (MAPI) as shown in **Table 2** [13, 14].

**Table 1.** Community Periodontal Index score

| Score | Signs and symptoms |
|---|---|
| 0 | No signs |
| 1 | Probing and Gingival bleeding |
| 2 | Presence of sub or supragingival or other plaque retentive factors |
| 3 | 4 to5 mm deep into the periodontal pockets |
| 4 | 6 or deeper into the periodontal pockets |

**Table 2.** MAPI interpretation

| Percentage of dental plaque | Classification based on oral hygiene |
|---|---|
| <30 | Good |
| 30-60 | Moderately poor |
| 60-100 | Poor |

*Survival rates of dental prostheses and comorbidity challenges*

Many studies are going for dental implants that are highly recommended for their 95% successful and unique long-lasting nature [15]. Other studies varied from 85.7% to 100% of survival rate in well, moderately, and poorly controlled diabetes. Dental implants and diabetic control are highly essential to maintain a satisfactory outcome [16]. In well-controlled diabetic patients a 6.5-year retrospective study reported an overall implants survival rate of 85.7% while one reported a rate of 93.8% [17, 18]. However, dental implant failure in poorly controlled patients is quite eventful as patients are vulnerable and can experience delayed wound healing and bone fragility [19]. A total of 11 studies suggested treating diabetic patients by conventional and flapless procedure to grantee the cumulative mean of implants expecting survival rates of 94.2% and 92%, respectively [16].

In a recent systemic review, several prospective or retrospective regarding the survival rate of all-ceramic resin-bonded fixed dental prostheses were analyzed. In 5 years, the estimated survival rate of all-ceramic resin-bonded fixed dental prostheses was 91.2%. Moreover, all-ceramic cantilever fixed dental prostheses are found to have high survival rates of a ($p<0.01$). However, when compared with two retainers, cantilever ceramics have lower debonding rates with a significant ($p<0.05$) at 5mm and fracture rate ($p<0.01$). Zirconia ceramic resin-bonded fixed dental prostheses had a higher debonding rate compared with glass-ceramics resin-bonded dental prostheses ($p<0.01$) [20].

As the number of edentulous people increases during the stages of life, there is limited information that supports the relationship between prosthetic associated risk factors in and implant fixed complete dental prostheses in edentulous patients. In a recent 5 years retrospective study, there were noticeable high survival rates regarding metal-acrylic resin and metal-ceramic with a cumulative rate of 88% [21]. In another similar study, implants survival rates regarding edentulous patients who are treated with dental implants supported fixed complete dental prostheses of 12 years and mean of 5.2 years exposure time has achieved 98.7%. This Implant-supported fixed complete dental prostheses trial was performed in two groups involving metal-resin and ceramic implants [22].

*Habitual challenges*

Habitual acts also have a greater impact on the survival rate and might increase the causes of biological fractures. Smoking and Bruxism are two of the main reasons why implant treatments might be contraindicated for their high risk of failure. Smoking has a risk mostly postoperatively as it can promote infection even for one cigarette smoker per day. Nevertheless, it also promotes marginal bone loss. On the other hand, bruxism has also significantly high rates of implant failure and implant-supported restoration complications [23, 24].

Drug use is a prominent factor for fixed implant failure. According to a recent 2016 research, antidepressants are found to have a dire effect on surgical restorations' procedures. Patients who are on long-term antidepressant use might be advised not to undergo any procedures to avoid any unexpected results [25].

*Complications of dental prostheses*

For all-ceramic resin-bonded fixed dental prostheses the most technical complications in 5 years, caused expected debonding and fracture that rated 12.2% and 4.8%, respectively [20]. In recent studies, metal-acrylic resin and metal-ceramic are the most major and minor technical complications, which include loss of scree access hole material and wear of the material which occurs in the range of 5.18% and 5.85%, respectively [21]. However, in other similar studies regarding edentulous patients who are treated with dental implants supported fixed complete dental prostheses the most frequent major and minor complications between the two groups and these complications were soft-tissue recession and peri-implantitis of the annual rate of 7.7% and 2.0%, respectively. In a 10-year interval of an implant-based mucosa of soft tissue, recession rates were 77% while in peri-implantitis recession rates were 20%. There was also an expected presence of plaques and a significant appearance of bone loss [22]. The above table shows the most frequent complications over 5 years of observation in all implanted-supported restorations **(Table 3)** [26].

**Table 3.** Most frequent complications [26]

| Frequent complications of implant-supported restoration | Percentage of complications over 5 years |
|---|---|
| Veneering material fractures | 13.5 |
| Soft tissue/ Peri-implantitis complications | 8.5 |

| | |
|---|---|
| Loss of hole access restoration | 5.4 |
| Screw loosening | 5.3 |
| Loss of retention of cemented | 4.7 |

*Imaging technology*

The current technologies using 2D,3Dx-rays, and cone-beam computed tomography (CBCT) that are applied by software programs could be of great use to document and illustrate radiographic imaging for morphological evaluation. Usually, conventional x-rays are not as efficient as computed tomography because of its of high dose of radiation. However, further studies are needed to cover radiographical technology for more efficient use in restoration and retrieving procedures [27].

## CONCLUSION

Within the limited findings of this review many retrospective studies concluded that fixed dental prosthesis is clinically acceptable to maintain a normal patient profile, comfort, function, speech, health, and esthetics. However, the process of improving the surrounding soft tissue and oral-related impact profile must be assessed through the procedure. The performance of each preparation material differs from one person to another. Alas, dentists must expect prosthetic vulnerability and deterioration due to systemic illness and habitual challenges.

To date, the data presented regarding radiographic technology for diagnostic and therapeutic procedures is insufficient, and therefore further researches are needed to explore more information and add it to the existing literature.

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