

Risk Factors of Fixed Partial Denture Failure in Patients Visiting Prosthodontic Care

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Abstract

The focus of this study is on the risk factors for fixed partial denture (FPD) failure in patients at (BKCD) Mardan for improving clinical results and patient satisfaction. Failure of the FPD can result in various issues affecting oral function and aesthetics. Investigating these risk factors helps improve treatment protocols and resource allocation in prosthodontic practice and promotes a preventative dentistry approach. The study's location at (BKCD) Mardan provides local relevance and may provide insights particular to the regional population, adding vital knowledge to the larger field of dentistry research. With an enormous sample of 134 participants, gender distribution in our research study showed a somewhat balanced representation, with 65 people (48.5%) presenting as male and 69 (51.5%) responding as female. The bulk of participants, 64.9% of the total, are between the ages of 15 and 45, and in contrast, 35.1% of our participants are between the ages of 46 and 60. Our study looked at two essential factors: wear duration and failure duration. Regarding wear length, 39.6% of participants said they had worn their FPDs for less than a year. Furthermore, 30.6% of participants said they had used their FPDs for 1 to 6 years. 29.9% of participants had worn their FPDs for more than six years and the length of failure. FPD failures were reported by 38.1% of participants within the first six months of usage. A further 19.4% of patients failed between 7 and 12 months. Surprisingly, 42.5% of patients experienced failures after more than a year of FPD usage. Regarding oral hygiene, 38.1% of participants reported good oral hygiene practices, whereas 61.9% reported poor oral hygiene habits. In conclusion, this study has shed light on the risk variables related to fixed partial denture (FPD) failure among patients.

Keywords: Fixed Partial Denture, Periodontal Disease, Oral Hygiene, Abutments, Retainer.

Introduction

A fixed partial denture is any dental prosthesis that is luted, screwed, or mechanically attached or otherwise securely retained to natural teeth, tooth roots, and or dental implants, abutments that provide primary support for the dental prosthesis and restoring teeth in a partially edentulous arch; the patients cannot remove it (Gopal & Subhashree, 2020).

A fixed partial denture (FPD), often known as a bridge for dental purposes, is a restorative dental prosthesis used to substitute for one or more missing teeth within the dental arch, restoring oral function, occlusal stability, and aesthetic appeal. This non-removable, custom-made restoration comprises one or more synthetic teeth (pontics) attached to the neighboring natural teeth or dental implants (abutments) using different fixation techniques, such as crowns or frameworks. An FPD's

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key goals are to enable normal mastication, preserve dental arch integrity, avoid unwanted tooth movement, improve speech clarity, and improve the patient's overall quality of life. FPD design, materials, and clinical practices have improved, reflecting improvements in dental technology and scientific knowledge. As a result, they have become an essential component of modern restorative dental procedures.

Fixed partial dentures (FPDs) have transformed the restoration of missing teeth in contemporary dentistry, improving both form and function for countless people worldwide. However, the durability of FPDs continues to be a matter of concern despite the tremendous improvements in dental materials and procedures. In addition to posing clinical obstacles, the initial malfunction of these prosthetic appliances affects the patient's oral health, well-being, and overall level of life. As a result, a crucial field of study into the risk factors for fixed partial denture failure has evolved, illuminating the complexities of this complex problem. These FPDs have been demonstrated to be patient-acceptable and permanent, unlike veneers. They can be used for both the management of severely decaying teeth and for the substitute of teeth that are absent (Poojar et al., 2017).

A three-unit FPD with one mesial and one distal abutment tooth can replace an individual lost tooth. A three-unit FPD comprises a pontic, two retainers on either side of the Pontic, and connectors that link the pontic to the retainers. The pontic fills the gap left by the lost tooth. The retainers are affixed to the treated abutment teeth with cement. Cantilevered FPDs are those in which just one side of the Pontic connects to a retainer. An individual abutment cantilever has an undesirable long-term prognosis. Periodontal tissues best accept forces directed along the long axis of the teeth. A three-unit FPD is employed in such instances. A cantilever will exert lateral stresses on the supporting tissues, which may be harmful and result in abutment tilting or rotation. Laboratory testing has proven the potentially hazardous character of such FPDs. Clinical experience with resin-retained FPDs suggests that cantilever designs may be favored, mainly because adhesion after failure is substantially easier and typically results in predicted success over the long term. Cantilevers can be utilized effectively with implant-supported prostheses (Prakash & Parmar, 2019).

RBFPDs (resin-bonded fixed partial dentures) were first used in dentistry in the 1970s. Rochette was the first to explain the design of this prosthesis in 1973. To improve retention, his design featured holes in the metal framework of the retainers. The initial goal of these prostheses was to splint periodontally deficient teeth. Their use soon grew to replace lost front teeth in younger patients (Alraheam et al., 2019).

The condition of the abutments, along with the surrounding periodontal tissues, is critical to the RBFPD's effectiveness. The central premise is that any pressure levels imparted to the pontics should be surpassed by the stiff support supplied by abutments. This fact can be interpreted as the requirement for enough healthy abutments to compensate for the lost tooth/teeth. Biting pressures and the periodontal membrane area must be addressed while selecting the abutment tooth, according to Robert's Law and Ante's Law. RBFPDs should have two stiff ends on the abutments; in rare circumstances, a cantilever RBFPD can be utilized when replacing only one tooth (Santos et al., 2023).

Absent teeth can be substituted with prostheses that increase patient comfort and masticatory performance while preserving the dental arches' wellness and stability (Subhashini et al., 2018). Patients have been proven to suffer from edentulism and dental disease. Patients with dental problems have a negative self-image. Dentofacial issues have been shown to reduce the patient's satisfaction with their dentition by affecting esthetics, performance, and functions. For many years, fixed partial dentures (FPDs) have been the treatment for replacing lost teeth. There are almost

10,000 papers about FPDs in the dental literature. However, Only a few studies are concerned with patients' assessments of clinical results and degree of satisfaction with FPD therapy. FPD is suggested in edentulous arches with a limited span and healthy teeth that can provide enough support next to the edentulous area (Khan et al., 2022).

Plaque collects more underneath pontics in people with average oral hygiene than axial surfaces of fixed partial dentures (FPDs). The loose pontics designs and the voids between the interproximal sections might cause plaque buildup. Bacterial and plaque buildup can cause gingival inflammation and periodontal breaks. Even with the most excellent pontic design and material partial dentures, the best oral hygiene practices are required for eradicating the bacterial plaque and preventing mucosal irritation. In addition to regular teeth cleaning, specific aids such as super floss, interdental brush, and water flosses can improve the biological maintenance of permanent partial dental prostheses. The dentist is also essential in teaching proper oral hygiene and encouraging patients (Bharathi & Sivakumar, 2020).

A fixed partial denture is one of the most significant and popular final treatment choices for an individual's lost tooth. FPDs were considered the best option for replacing a single lost tooth for many years. The main arguments for recommending FPDs are their clinical simplicity and lessened treatment time and expenses (Karpagam et al., 2021).

Fixed prosthodontic therapy may be immensely satisfying for the patient and the dentist. To achieve such success, however, meticulous attention to every detail is required, beginning with the first patient interview and continuing through the active treatment period to a scheduled program of subsequent care. Fixed prosthodontic failures can be challenging to identify and resolve and can occur at any moment. As a result, it is critical to be aware of both prominent and hidden signs of prosthesis failure and have a working understanding of the procedures required to rectify the situation (Chandrakala et al., 2019).

Specific tooth preparation standards must be followed for the restoration to be retentive, appropriate, and durable. Among these are the following principles:

- *Biologic Considerations:* These impact the oral tissues' health by preserving dental structure, avoiding over contouring, supragingival margins, harmonic occlusion, and protecting against tooth fracture.
- *Mechanical Consideration:* These impact the restoration's quality and endurance.
- *Esthetic Consideration:* These impact an individual's appearance (Narula et al., 2011).
These, like any other prosthesis, are subject to difficulties. Failures are often characterized as esthetic, mechanical, or biological. These malfunctions might be observed during or after the installation of the prosthesis (Poojar et al., 2017).

Background Knowledge

Reconstruction of lost teeth in a largely edentulous arch requires various treatment options, including removable, fixed, and implant prostheses. Fixed prosthodontic therapy may immensely satisfy the patient and the dental professional. In light of the continuous high prevalence of caries and periodontal disorders in the adult and elderly populations, restoring and replacing teeth with FPDs is an essential therapy method in dental practice (Patel & Tippadamppally, 2020).

The prosthesis would only succeed if the required design standards for function and esthetics were met. Most malfunctions are caused by problems that develop before or after fixed prosthodontic treatment operations. The fixed prosthesis might fail in a variety of ways. Failure causes can be classified as biological, mechanical, or esthetic failures. Mechanical problems are significantly affected by the physician. Physical issues are more challenging to manage and, in some cases, may

be unrelated to the therapy or prosthesis. Caries, uncemented restorations, over-contoured restorations, inadequate occlusal plane, periodontal disease, periapical involvement, failed post-retained crowns, poor esthetics, crown perforation, and improper treatment margins can all be reasons for failure (Chandranaik & Thippanna, 2017).

The amount of abilities and academic understanding of the doctor will impact the duration and complication rate of FPDs. Academic institution reports presented reports on FPDs incorporated by undergraduate students, graduate students, and junior and senior faculty members under supervision. In contrast, patient cohorts from independent clinics may also reflect a variety of operator expertise, but conditions differ from educational organizations. As a result, failure and complication rates will always be limited to the patient subgroup administered and analyzed under the stated conditions. Data from case-cohort investigations should never be utilized to extrapolate conditions found in settings that do not meet the criteria followed in the specific patient cohort. Patients treated at organizations, in particular, may differ from those handled in the private sector since they may have stricter oral hygiene requirements and be part of a tight continuation care program (Tan et al., 2004).

A crown is one of the most excellent alternatives for restoring an endodontically treated tooth. It is also extensively utilized to restore shape and function after significant tooth structure loss owing to cavities, trauma, or parafunctional behaviors. The purpose of these restorations is to restore the patient's beauty, functioning, and comfort. After adequate treatment planning, lost teeth can be replaced with fixed partial dentures, giving satisfactory function, esthetics, value for money, and lifespan. However, if treatment is well planned, they will likely succeed early, causing irreparable harm to the teeth and surrounding tissues. Several researchers have recently expressed an interest in studying permanent dental prostheses' life duration and long-term quality.⁸ Loose retainers, fractured fused joints, fractured porcelain, fractured abutment teeth, and holes in retainer or pontic are all typical problems in fixed bridge prosthodontics. Failure of these prostheses may result in recurrent cavities or tooth loss (Naz et al., 2020).

This is especially important when developing and producing an FPD since the pontic, connections, and retainers pass the stresses ordinarily absorbed by missing teeth. Abutment teeth are required to bear stresses generated at the missing plane teeth and those directed at the abutments. Restoring lost teeth in the posterior part of the mouth is just as crucial as in the front portion. It is critical to evaluate the essential requirement to fill a void and to do a cost-benefit assessment for any proposed restoration - not just in terms of economic worth but also in terms of biological value to tooth structure and surrounding structures. The most significant number of posterior teeth that may be replaced with an FPD is typically two. Three can be replaced in exceptional cases, but only under optimal conditions. Because abutment selection is critical to the success of fixed prostheses, this overview stimulates the assessment process (Subhashini et al., 2018).

Epidemiology

According to Ericson et al. (1995) the duration of an FPD is proportional to the number of retainers but not the number of units. This study discovered that when the number of units in an FPD rose, the mean years of service decreased. A three-unit FPD's average year of service was 8.6 years, whereas a six-unit FPD's average was just 4.2 years. In research conducted by Zavanelli & Zavanelli (2018) study informed that participants completed a questionnaire on their level of satisfaction with dental treatment and care maintenance for prosthesis conservation. The prosthesis was evaluated clinically and radiographically. A total of 9.67% of failures were discovered. Prosthesis loosening (57.14%), ceramic breakage (28.57%), and abutment tooth crack (14.29%)

were the most prevalent. 30.65% of the time, biological failures were detected. Gingival recession (52.00%), periodontal pockets (24.00%), support periodontal involvement (16.00%), and recurrent caries (4.00%) were the most prevalent failures. Radiographic testing revealed that 70.97% of those tested had some failure.

In their study, Chandranaik et al. (2017) evaluated individuals' 450 fixed partial denture failures. The fixed partial denture's failure variables (biological, mechanical, and esthetic) were investigated. Of 450 fixed partial denture failures, 33.3% demonstrated biological failure, 55.1% showed mechanical problems, and 11.5% demonstrated esthetic failure. Mechanical failure issues were the most common, followed by biological and esthetic failure factors. Caries were the most prevalent biological failure factor, loss of retention was the most common mechanically failing element, and the unsatisfactory color match was more important than other esthetic failure causes (Patel & Tippadampally, 2020).

Classification of Failures

By Bennard G.N Smith

1. Retention loss
2. Mechanical breakdown of crowns or bridge components results in a loss.
 - Porcelain
 - Failure of solder joints
 - Distortions
 - Occlusal wear
 - Lost facings
3. Alterations to the abutment tooth
 - Periodontal disease
 - Problems with the pulp
 - Caries
 - Fracture of the prepared
 - Natural tooth or root
- 4 Failures in design
 - Under prescribed FPDs
 - Over-prescribed FPDs
5. Insufficient therapeutic or laboratory testing
 - Positive ledge
 - Negative ledge
 - Defect
 - Poor shape and color
6. Occlusal issues (Amurdhavani & Ganapathy, 2020).

By John F Johnston

1. Discomfort
 - Malocclusion or excessive contact
 - Torque caused by bridge placement or occlusion
 - Excessive strain on the tissue
 - Positive or negative contact area
 - Overprotected or under protected gingival and ridge tissue. '
 - Thermodynamic shock

2. Looseness of FPD
 - The bending of the metallic sculpture on the abutment
 - Torque
 - Cementation technique
 - Cement solubility
 - Caries one or more abutments can move.
 - Inadequate occlusal coverage
 - Inadequate retention in abutment setup
 - The casting's first fit was poor
3. Recurrence of caries
 - Margin overstretching
 - Short-term castings
 - Margin gaps
 - Wear
 - A retainer that has become dislodged
 - A pontic shape fills the embrasure.
 - Oral hygiene issues
 - Use of the incorrect type of retainer, which promotes caries incidence
 - Because of temporary protection, the gingiva has been permanently displaced.
4. Degeneration of Pulp
5. Fractures of bridge components
 - A bad solder junction
 - Inadequate casting method
 - Metal becomes overworked owing to span length or insufficiently sized pieces
6. Loss of veneers
 - There is minimal retention
 - Metal shielding that is poorly designed
 - Metal distortion while safeguarding
 - Malocclusion
 - Incorrect fusing or method
- 7 Loss of function
 - They are unsuccessful in occlusion. ‘
 - They do not come into touch with opposing teeth.
 - They are in constant communication.
 - Over or under-cut occlusal surfaces may reduce the effectiveness
 - Loss of opposing or adjacent teeth
8. Loss of teeth tone or form
 - Pontic style
 - The size and location of the joints
 - Form of embrasure
 - Retainer over-contouring and under contouring
 - The dentist's regimen for oral hygiene
9. Failure to seat
 - The abutment constructions could or could not may not be identical.
 - The soldering component may have been faulty, or the retainer connection may have been changed during soldering (Amurdhavani & Ganapathy, 2020).

Complication and Failure of FPD

Complications that develop upon or following properly completed fixed prosthodontic operations are complications. However, categorization or classifying FDP-related difficulties has been perceived as complex and time-consuming. In independent investigations, cavities and loss of retention were identified as the key events impeding FDP success (Ghani & Memon, 2008).

Because of the continuous high prevalence of caries and periodontal disorders in the adult and elderly populations, repairing and recovering teeth with FPDs is an essential therapy method in dental practice. Furthermore, it is hard to predict the duration that a tooth with a crown or bridge would remain because failure might occur at any time. For example, loss of vitality may occur years after a bridge has been cemented and may result from persistent inflammation and degenerating pulp beneath an otherwise intact bridge... If the cement seal and the underlying abutment are both intact, effective endodontic treatment can be performed via the occlusal surface of the retainer without the bridge being removed. Caries, uncemented restorations, over-contoured restorations, occlusal plane, periodontal disease, periapical involvement, failed post-retained crowns, poor esthetics, crown perforation, and inadequate restoration margins can all be causes of the disaster. Understanding the clinical difficulties that can emerge in fixed prosthodontics improves the dental professional's capacity to make a reliable assessment and establish the best treatment strategy. It sets reasonable expectations for patients and helps to organize the periods for following therapy care (Raghunathan et al., 2020).

Complications often emerge during or after a correctly conducted fixed prosthodontic treatment operation. Failures are classified into three kinds. There are three types of failure: biological, mechanical, and aesthetic. Clinically, loss can happen during or after fixed prosthodontic therapy. Failure and problems associated with fixed dental prostheses include but are not limited to, cavities, endodontic issues, periodontal disease, tooth fracture or porcelain fracture, and inadequate prosthetic esthetics. It must be objectively evaluated before concluding that an existing restoration is flawed and needs substitution or repair (Chopra et al., 2020).

Failure of biology Caries tenderness on percussion, food lodgment, periapical disease, abutment movement, and occlusal problems are all aspects to consider. Caries can be identified by exploring the prosthesis edges and tooth surfaces with an explorer or by using dental floss interproximal until the floss string becomes shredded and intraoral periapical radiography to see interproximal caries. Tap the abutment with the probe/mirror end occlusal or incisal to rule out periapical disease. To rule out periodontal involvement, percussion should be done buccally or lingually. The sensation of touching the gums to rule out sinus openings, pus discharge, or soreness at the abutment to rule out periapical disease. The freedom of motion was tested by exerting pressure with the ends of two mirrors in the buccolingual direction. Interacting centric and eccentric occlusal problems were ruled out using the fremitus test, which involves placing the pointed end of the index finger on the front surface of the tooth and asking the patient to tap-tap if the sound is present, which indicates occlusal interference or evaluating the 100-micron thickness of articulating paper in between the teeth.

Mechanical breakdown Loss of continuation, crown or bridge dislodgement, bridge breakage or connector collapse, coronal tooth rupture, occlusal degradation of prosthesis or penetration of the prosthesis, and porcelain crack were all investigated. Cosmetic failure Inadmissible color match, as determined by analyzing neighboring teeth or by patient dispute, above or below the contoured border of restoration, and insufficient border fit were all investigated (Chandranaiik & Thippanna, 2017).

Aims and Objectives

The overarching goal of this study subject is to undertake a thorough analysis of the multiple risk factors contributing to fixed partial denture (FPD) failure in patients seeking treatment at the BKCD Mardan at Prosthodontic Department. The objectives of this study are:

- To investigate the impact of patient age, gender of patients, and the duration of wear and in how much time FPD has been failed.
- To analyze the type of failure, occur among patients and the frequency of oral hygiene, periodontal health, and the presence of neighboring teeth in FPD failure using oral health parameters.
- To assess the risk factors associated with FPD failure.

This multidimensional approach allows to investigate the complex interaction of numerous aspects that contribute to the success or failure of FPDs, thereby improving clinical results and patient satisfaction.

Material and Methods

A descriptive cross-sectional study was conducted to access the risk factors of fixed partial denture failure in patients visiting prosthodontic department at patient visiting Bacha Khan College Of Dentistry (BKMC) Mardan. Permission taken from the research committee of College Of Medical Technology (CMT) (BKMC) Mardan and then from administration of bacha khan college of dentistry Mardan. The sample size is 134 with justification and calculation

Nonprobability convenience sampling technique was used to achieve the exact sample size. We first introduce over self to participants and then they were informed about the aims and objectives of study. All volunteer patients and participants age ranges between 15-60 years who have undergone prosthodontic treatment were include in the study.

Exclusion criteria are critical in defining the scope of a research project and guaranteeing its integrity and relevance to the target audience. To begin, patients who are unwilling to engage in the study are often eliminated in order to respect the principles of voluntary participation and informed consent, both of which are important ethical concerns in research. Second, those with congenital dental problems may be omitted since their unique dental conditions may contribute characteristics that are considerably different from the study's primary focus, thereby distorting the results. Finally, because of their unique oral traits, growth patterns, and treatment demands, children may be omitted from the study, necessitating a new examination targeted to pediatric dentistry. These exclusion criteria assist researchers in maintaining the study's internal validity and ensuring that the findings are applicable to the specific population of interest while adhering to ethical norms and scientific rigor.

While taking history the question and given option were read to subject who were illiterate and who did not understand English language. participant is examined while seated on the dental chair under the light of dental unit.

The obtained data were putted and analyzed on SPSS version 22.

Study Setting: The study is conducted in Bacha Khan College of Dentistry (BKCD) Mardan. A concern form is taken from the medical superintendent and data collection has started.

Study Design: This is a descriptive cross-sectional study.

Study Duration: The study conducted approximately 6 months.

Sample Size: A total 134 sample size were selected for the study.

Sample Size Calculation

Calculated by WHO's Sample calculation formula (Cochran Formula)

$$n = p(1-p) \left(\frac{Z}{E}\right)^2$$

n = sample size

P = proportion which is 9.67% = 0.0967 (Patel & Tippadampally, 2020)

Z = confidence interval for 95% = 1.95

E = standard Error is = 0.05

P = 0.0967

E = 0.05

Z = 95% = 1.96

$$n = 0.0967 \times (1 - 0.0967) \times \left(\frac{1.96}{0.05}\right)^2$$

$$n = 0.0967 \times (0.9033) \times \left(\frac{1.96}{0.05}\right)^2$$

$$n = 0.0873 \times (1.96/0.05)^2$$

$$n = 0.0873 \times (39.2)^2$$

$$n = 0.0873 \times 1536$$

$$n = 134$$

So, the required sample size for the study is 134.

Sampling Technique

Using a nonprobability convenience sample approach to investigate risk factors for fixed partial denture failure among patients at the Prosthodontic Department of (BKCD) Mardan has practical advantages such as accessibility and cost efficiency. This method enables researchers to effectively collect data from readily available volunteers in a clinical environment. The study is restricted, however, by the possibility of sampling bias, as individuals seeking treatment at this specific hospital may not be representative of the larger community experiencing denture failure. The lack of random selection limits the generalizability of findings, necessitating cautious interpretation and recognition of the sampling method's inherent limitations, particularly in establishing causal relationships and the applicability of findings beyond the sampled population.

Inclusion Criteria

- Patient visiting prosthodontic department only.
- The study includes individuals aged between 15 and 60 years.

Exclusion Criteria

- The patient is not willing to participate in the study.
- Patient with congenital disabilities.
- Children.

Data Collection Procedure

First, the approval was taken from the research committee (CMT)(BKMC) Mardan and then from the Bacha Khan College of Dentistry (BKCD) Mardan. We first introduced ourselves to the participants, and then they were informed about the aims and objectives of the study. All volunteer patients and participants aged between 15-60 years who have not undergone prosthodontic treatment were included in the study.

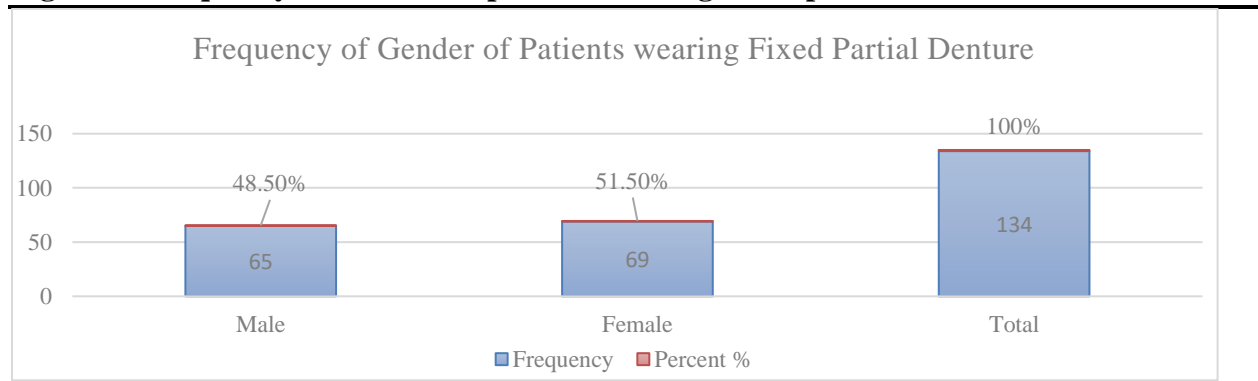
While taking history, the questions and given options were read to illiterate subjects who did not understand the English language. The participant is examined while seated on the dental chair under the light of the dental unit. The data is statistically analyzed through SPSS version 22 using tables, graphs, and pie charts.

Results

The research study, which aimed to research the risk variables linked to fixed partial dentures (FPD) failure among patients seeking care at the Prosthodontic Department of (BKCD) Mardan, offered essential insights into this vital element of oral health.

Gender of Patients with an enormous sample of 134 participants, gender distribution in our research study showed a somewhat balanced representation, with 65 people (48.5%) presenting as male and 69 (51.5%) responding as female. This distribution demonstrates approximately equal involvement by both genders, ensuring that our study reflects various opinions and experiences. These findings add to our study's overall robustness and inclusiveness, allowing us to get insights that reflect a diverse group of people.

Figure 1: Frequency of Gender of patients wearing Fixed partial Denture

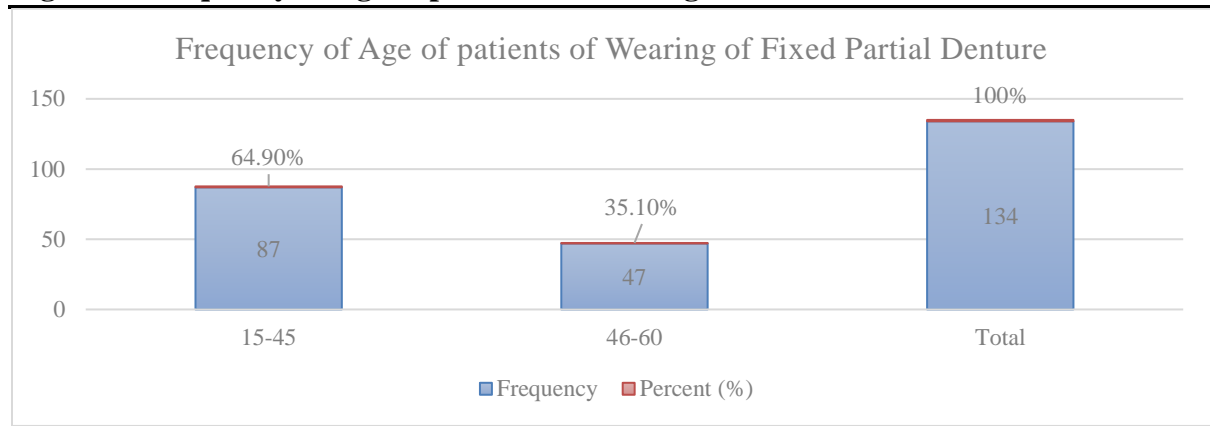


Age of Patients

The age distribution among our research subjects gives intriguing insights regarding the demographic mix of our group. The bulk of participants, 64.9% of the total, are between the ages of 15 and 45. This group accounts for a sizable proportion of our study population, indicating that the majority of our research participants are in their twenties to thirties. In contrast, 35.1% of our participants are between the ages of 46 and 60, indicating a significant representation of persons in the older age range. This age variety within our sample broadens the scope of our study findings by allowing us to investigate possible differences in viewpoints and experiences across various phases of life. This age variety demonstrates our dedication to gaining a comprehensive grasp of the subject matter, while also recognizing the possible effect of age-related factors on our study.

findings.

Figure 2: Frequency of Age of patients of Wearing of Fixed Partial Denture

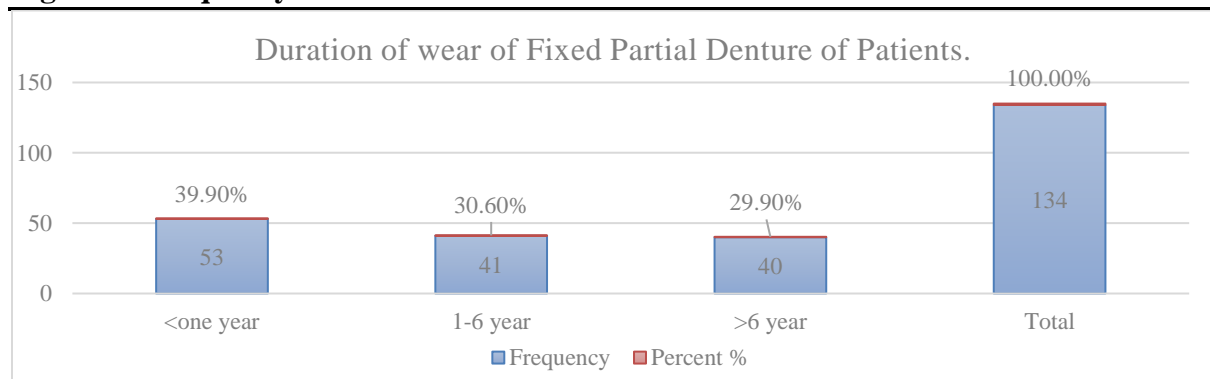


We investigated the duration of wear and failure of fixed partial dentures (FPDs) across an extensive sample of participants in this study, offering comprehensive insight into the performance of these dental prosthesis.

Duration of Wear

Our research of wear time demonstrated that users' experiences with FPDs differ greatly. A significant 39.6% of participants said they had worn their FPDs for less than a year, demonstrating that these prostheses efficiently meet acute restorative needs while also offering functional and cosmetic gains in the short term. Furthermore, 30.6% of participants said they had used their FPDs for 1 to 6 years. This research emphasizes FPDs' capacity to retain their functioning and aesthetic benefits over time. The 29.9% of participants who had worn their FPDs for more than 6 years is also remarkable, indicating the significant longevity and durability of FPDs as long-term treatments for dental issues.

Figure 3: Frequency of Duration of wear of Fixed Partial Denture of Patients

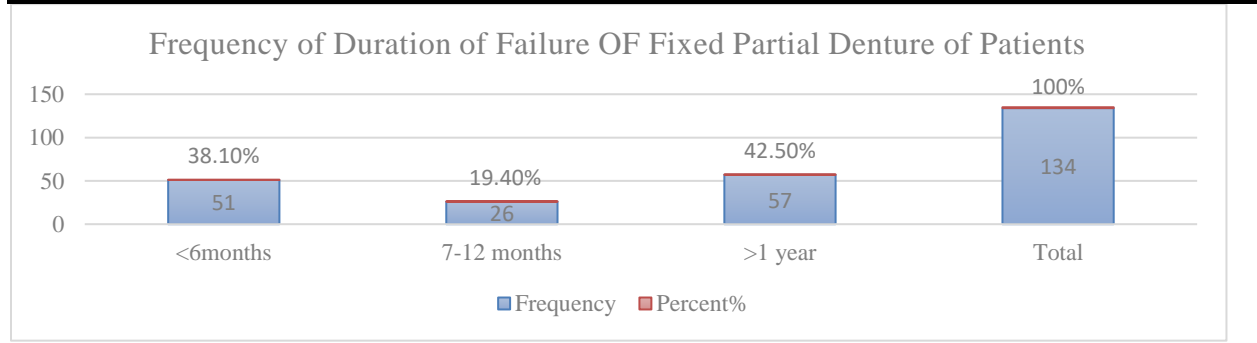


Duration of Failure

we examined the length of failure. FPD failures were reported by 38.1% of participants within the first six months of usage. This early beginning of problems emphasizes the significance of close monitoring and prompt intervention in the post-placement period. A further 19.4% of patients

failed between 7 and 12 months, highlighting the importance of careful tracking throughout this key stage of FPD adaptability. Surprisingly, 42.5% of patients experienced failures after more than a year of FPD usage, emphasizing the importance of continued maintenance and surveillance, since difficulties might arise over time, even in instances initially judged stable

Figure 4: Frequency of Duration of failure of Fixed Partial Denture of Patients



Type of Failure

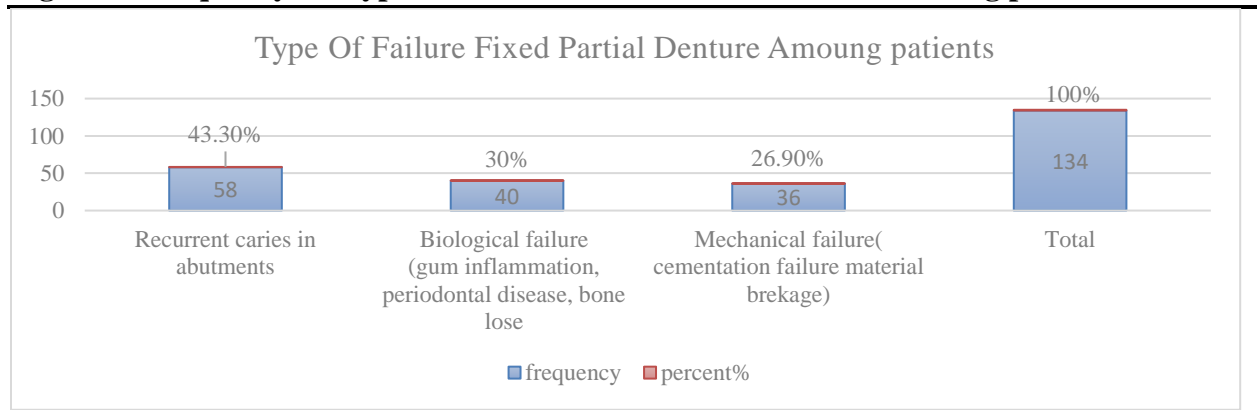
Our investigation provided light on significant components of our study by investigating the sorts of failures and oral hygiene practices of our participants. In terms of failure kinds, we discovered three main groups:

Recurrent Caries in Abutments: Recurrent caries in abutments was the most common kind of failure, reported by 43.3% of individuals. The present work emphasizes the significance of regular dental care and maintenance in preventing deterioration around dental restorations.

Biological Failure (Gum Inflammation, Periodontal Disease, Bone Loss): Biological failures, such as gum inflammation, periodontal disease, and bone loss, were reported by almost 30% of individuals. These findings highlight the critical relationship between oral wellness and the durability of dental restorations.

Mechanical Failure (Cementation Failure, Material Breakage): 26.9% of the respondents experienced mechanical problems such as cementation failure and material breakage. These challenges highlight the need of using long-lasting materials and ensuring correct setting up and upkeep of dental restorations.

Figure 5: Frequency of Type of Failure of Fixed Partial Denture Among patients

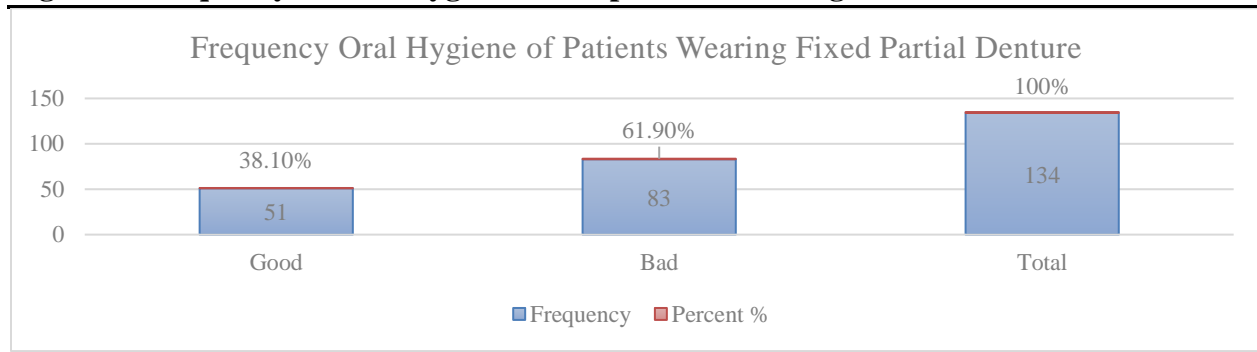


Oral Hygiene of Patients

In terms of oral hygiene, 38.1% of participants reported good oral hygiene practices, whereas 61.9% reported poor oral hygiene habits. This variation in oral hygiene practices across our group highlights the possible role of cleanliness in the incidence of various types of failures.

With 134 participants, our study gives useful insights into the most common types of failures and oral hygiene routines among individuals. These findings add to our awareness of the elements that influence the longevity and effectiveness of dental restorations, allowing us to make more educated suggestions for better dental maintenance as well as care.

Figure 6: Frequency of Oral Hygiene of the patients Wearing Fixed Partial Denture



Discussion and Recommendations

A multifaceted approach is recommended to address the risk factors associated with fixed partial denture (FPD) failure identified in our research. Firstly, there is a critical need for enhanced patient education initiatives, encompassing comprehensive guidance on the significance of proper oral hygiene practices, routine dental check-ups, and dietary habits to minimize the risk of recurrent caries and biological failures. Dental professionals should prioritize using high-quality materials for FPDs, coupled with stringent quality control measures during fabrication and installation, to reduce the incidence of mechanical failures. Regular follow-up appointments are essential to monitor FPD condition and should be encouraged, with dentists assessing fit, integrity, and overall health to detect and address issues early.

One study included one individual between the ages of 18 and 30, 33 persons between the ages of 30 and 50, and 56 people between the ages of 50 and 85. Ninety patients between 18 and 85 had their fixed prosthetic restorations examined. The participants' educational experiences and occupations are as follows: 40 people (44%) had a primary school education, eight people (9%) had an elementary school education, twenty people (22%) had attended high school, 15 people (17%) had higher education, six people (6%) had a doctorate or master's degree, and an individual (1%) was illiterate. Twenty-six people (29%) were housewives, 26 people (29%) were retired, ten people (11%) worked, 17 people (19%) were public servants, and 11 people (12%) were self-employed. There was no correlation between educational attainment and failing class. 10% of patients were classified as Class 1, 10% as Class 2, 23.3% as Class 3, 20% as Class 4, 14.4% as Class 5, and 22.2% as Class 6 (Kavaz, 2021).

Another study included 62 patients, with a mean age of 47.40 years and a standard deviation of 9.90, with 40 females (65%) and 22 males (35%). In terms of educational level, 18 patients had only completed elementary school (29.03%), 34 had completed high school (54.84%), and just ten had completed higher education (16.13%). When asked how satisfied they were with their

prosthetic therapy, 17 patients said it was unsatisfactory (27.42%), 23 said it was acceptable (37.10%), and 22 said it was fantastic (35.48%) (Zavanelli & Zavanelli, 2018).

The study's findings shed light on the risk factors for fixed partial denture (FPD) failure among patients attending the Prosthodontic Department at (BKCD) Mardan, providing significant insights for dental practitioners and researchers alike. Our sample's near gender parity, with 48.5% male and 51.5% female participants, guarantees a balanced representation of both sexes. Furthermore, the primary age group of 15-45 years (64.9%) emphasizes the importance of FPD failures among younger to middle-aged people. Our findings revealed differences in the length of FPD wear and failure, underscoring the multidimensional character of the problem, and indicated recurring caries in abutments, biological failures, and mechanical failures as critical reasons. Furthermore, investing in efforts to generate more lasting FPD materials and processes is critical, promoting collaboration among researchers, dental practitioners, and manufacturers. Public health campaigns supporting excellent oral hygiene habits should be launched, including community outreach programs and school-based activities for children. An interdisciplinary strategy including prosthodontists, periodontists, and general dentists is advised to address the reconstructive and periodontal elements of FPD treatment. Finally, patients should be actively encouraged to participate in their oral health treatment by asking questions, voicing concerns, and following prescribed examinations and oral hygiene habits. By applying these suggestions, we may considerably reduce the risk factors linked with FPD failure, eventually enhancing the lifetime and overall success of FPD restorations for dental patients.

Conclusion

In conclusion, this study has shed light on the risk variables of a fixed partial denture (FPD) failure among patients seeking treatment at the Prosthodontic Department of (BKCD) Mardan. With nearly equal gender participation and a prominent age range of 15-45 and 46-60 years, our findings underline the need to address the different demographic variables impacting FPD lifespan. Following a thorough examination of fixed partial dentures (FPDs), it is clear that FPDs serve as adaptable solutions for a broad spectrum of patients, providing both short-term and long-term advantages. This flexibility, however, is accompanied by various obstacles, such as recurring cavities in abutments, biological concerns, and mechanical failures, emphasizing the crucial need for careful patient education and thorough therapeutic procedures. Furthermore, patient oral hygiene is an essential element impacting FPD effectiveness. As a result, we advocate for a patient-centered strategy emphasizing education and regular monitoring while emphasizing the need to maintain excellent oral hygiene habits. Furthermore, continual developments in materials, procedures, and periodontal care are critical to improving the overall quality of FPD therapy and patient outcomes. This study contributes to a better knowledge of prosthodontic care and lays the groundwork for future research.

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