

Failures in removable dentures (partial and complete)

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Abstract :

Background: Removable dentures, including complete and partial dentures, are widely used to restore oral function, esthetics, and patient comfort after tooth loss. Despite their benefits, various mechanical, biological, and patient-related factors can lead to denture failure, compromising treatment success. Understanding the common causes of removable denture failures is essential for improving prosthesis design, maintenance, and long-term clinical outcomes.

Objective: To identify the types and frequency of denture failures in complete and partial dentures.

Methodology: This cross-sectional observational study was conducted at the Prosthodontic Department, Specialized Dental Center, Babylon Health Directorate, Iraq, between January and June 2026. A total of 100 patients wearing complete or removable partial dentures were examined through clinical assessment and patient interviews. Data on demographic characteristics, prosthesis type, and denture-related failures were collected and categorized as biological or technical failures. Statistical analysis was performed using SPSS version 26, with descriptive statistics and Chi-square tests applied to evaluate the prevalence, patterns, and associated factors of removable denture failures, considering $p < 0.05$ as statistically significant.

Results: Among the 100 participants, the mean age was 52.1 ± 9.4 years, with a nearly equal gender distribution (51% males and 49% females). Successful prosthetic outcomes were observed in 72% of cases, while 10% presented with looseness, 9% with stability and retention problems, and 9% failed to attend follow-up visits. Complete dentures (29%)

and partial dentures (27%) were the most commonly used prostheses, and the maxillary arch was the most frequently treated site (56%). The findings indicate that removable prosthodontic success is influenced by prosthesis type, arch anatomy, and patient-related factors, with mandibular prostheses showing greater susceptibility to functional complications due to biomechanical limitations.

Conclusion: Removable prostheses demonstrated a high overall success rate, with most patients achieving satisfactory clinical outcomes. However, complications related to retention, stability, and follow-up compliance remain important causes of treatment failure. Prosthesis type, arch anatomy, and patient-related factors should be carefully considered to improve long-term prosthodontic outcomes.

Keywords: Prosthetic failure; Biological and Technical factors; Denture maintenance; Oral rehabilitation.

Introduction:

One of the most common and fundamental treatment options for partially or completely edentulous patients is the use of removable prostheses, including removable partial dentures (RPDs) and complete dentures (CDs) [1,2]. Despite the rapid advancements in implant-supported prostheses and digital dentistry, conventional removable prostheses continue to be widely utilized worldwide because of their cost-effectiveness, minimally invasive nature, and adaptability to a wide range of socioeconomic and clinical circumstances [1,5,8,9]. Tooth loss remains a major oral health problem that negatively affects patients' nutritional status, social interactions, and psychological well-being [4,6]. Consequently, the primary goal of prosthodontic rehabilitation is to restore masticatory efficiency, speech, and esthetics, thereby enhancing patients' overall quality of life [1,3,6,10]. The long-term success of removable prostheses is influenced by numerous biological, technical, and patient-related factors [2,5,7,12]. Failures may occur during any stage of denture fabrication, including impression procedures, recording maxillomandibular relationships, laboratory processing, and post-insertion maintenance. Such failures often result in discomfort, repeated adjustments or repairs, and premature replacement of the prosthesis [1,2,5,7,12]. In complete denture therapy, clinical failure is often multifactorial and may be associated with inadequate retention and stability, overextension or underextension of denture borders, inaccurate recording of vertical and horizontal jaw relationships, and poor adaptation of the denture base [1,3,4,6,13]. These deficiencies can lead to mucosal irritation, pain, discomfort, impaired function, and reduced patient satisfaction and acceptance of the prosthesis [1,3,4,6,13]. Likewise, removable partial dentures are susceptible to both biological and technical complications

[2,5]. Poor framework design, inappropriate clasp selection, and uneven distribution of occlusal forces may adversely affect the remaining dentition, particularly abutment teeth, as well as the supporting oral tissues [2,5,7]. Furthermore, denture base fractures, fracture or displacement of artificial teeth, and fractures of clasps and framework components are among the most frequently reported causes of prosthetic failure [5,12,15]. Given the continued widespread use of removable prostheses and the potential consequences of their failure on oral function and patient satisfaction, it is important to identify the factors associated with unsuccessful treatment outcomes. Therefore, the aim of this study is to investigate the prevalence and patterns of failures in removable dentures, including complete and removable partial dentures, among prosthodontic patients, and to identify the most common biological and technical factors contributing to these failures.

Methodology

Study Design and Setting

This cross-sectional observational study was conducted among patients attending the Prosthodontic Department at the Specialized Dental Center, Babylon Health Directorate, Iraq. The study was carried out over a period of six months from January 2026 to June 2026.

Study Population

A total of 100 patients wearing removable dental prostheses were included in the study. The study population consisted of patients rehabilitated with complete dentures (CDs) and removable partial dentures (RPDs).

Inclusion Criteria

Patients aged 18 years and older. Patients wearing complete or removable partial dentures. Patients who attended the clinic for examination, adjustment, repair, or follow-up of their prostheses. Patients who agreed to participate in the study.

Exclusion Criteria

- Patients with implant-supported removable prostheses.
- Patients wearing fixed prostheses only.
- Patients with incomplete clinical records.
- Patients unable to provide reliable clinical information.

Data Collection

Data were collected through direct clinical examination and patient interviews. A standardized data collection form was used to record demographic and clinical variables including age, gender, systemic health status, type of prosthesis, and dental arch involved. In addition, removable denture failures were clinically assessed and classified into biological and technical failures. Biological failures included mucosal ulceration, denture stomatitis, periodontal complications, and discomfort during function. Technical failures included denture base fracture, artificial tooth fracture or loss, clasp fracture, loss of retention, loss of stability, and occlusal discrepancies. Outcome Measures The primary outcome of the study was to determine the prevalence and pattern of failures associated with removable dentures. Secondary outcomes included evaluating the relationship between denture failure and patient-related factors, prosthesis and prosthetic related factors.

Statistical Analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics were used to summarize the data and were presented as frequencies, percentages, means, and standard deviations. The Chi-square test was used to assess associations between categorical variables. Statistical significance was set at a p-value of less than 0.05.

Ethical Considerations

The study protocol was approved by the Scientific and Ethical Committee of the Babylon Health Directorate. All participants were informed about the purpose of the study, and verbal informed consent was obtained prior to participation. Confidentiality and anonymity of patient information were maintained throughout the study

Results and Discussion

One hundred prosthodontic patients who met the inclusion criteria were enrolled in this study. The mean age of the participants was 52.1 ± 9.4 years, ranging from 33 to 71 years. The study population showed an almost equal gender distribution, with males accounting for 51% ($n = 51$) and females for 49% ($n = 49$) of the sample.

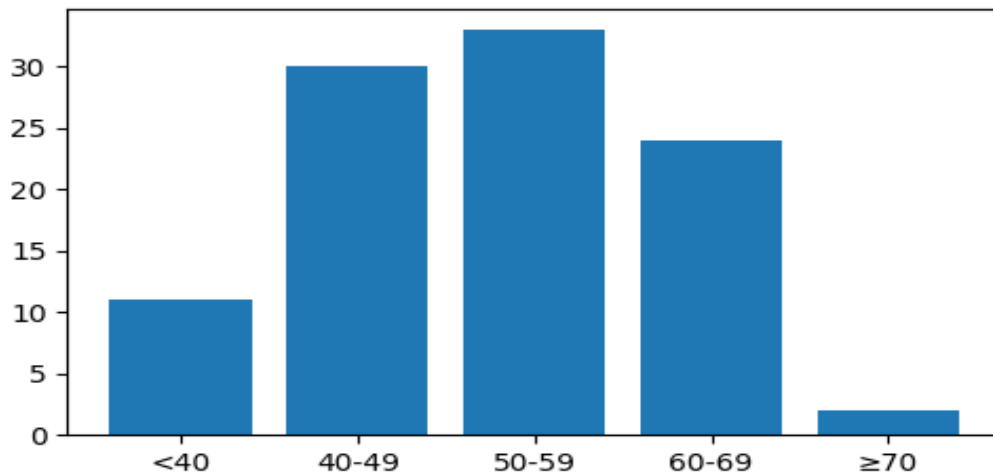


Figure 1. Age Group Distribution

Table 1. Demographic Characteristics and Age Group of the Study Population (N = 100)

Variable	Category/Statistic	Frequency (n)	Percentage (%)	p-Value
Gender	Male	51	51.0	p = 0.079
	Female	49	49.0	
Age Group (Years)	< 40	11	11.0	
	40–49	30	30.0	
	50–59	33	33.0	
	60–69	24	24.0	
	≥ 70	2	2.0	
Age Statistics	Mean ± SD (years)	52.1 ± 9.4		
	Median (years)	52		
	Minimum age (years)	33		
	Maximum age (years)	71		

SD: Standard Deviation.

Table 1 presents the demographic characteristics and age group of the study population. A total of 100 prosthodontic patients were included, with a nearly equal gender distribution comprising 51 males (51%) and 49 females (49%) as in Figure1. The mean age of the participants was 52.1 ± 9.4 years, with a median age of 52 years and an age range of 33–71 years. The largest proportion of participants belonged to the 50–59-year age group (33%), followed by the 40–49-year age group (30%) and the 60–69-year age group (24%).

No statistically significant association was observed between gender and type of prosthesis ($p = 0.079$)

Table ٢. Clinical Outcomes of Removable Prosthetic Cases (N = 100)

Clinical Outcome	n	%
Closed / Successful cases	٧٢	72.0%
Loose cases	١٠	10.0%
Stability & retention problems	٩	9.0%
Failure in follow-up	٩	9.0%
Total	١٠٠	100.0%

The clinical outcomes of removable prosthetic cases are presented in Table ٢. The majority of cases were classified as successful (closed cases), accounting for 72% of the total sample, indicating satisfactory prosthetic performance in most patients. Loose cases were observed in 10% of the patients, while stability and retention problems were reported in 9%. Additionally, failure in follow-up constituted 9% of the cases. These findings suggest that although removable prosthetic treatments demonstrate a relatively high success rate, a notable proportion of cases still experience functional and maintenance-related complications.

Table 3. Distribution of Prosthesis Types Applied (N = 100)

Type of Prosthesis	Frequency (n)	Percentage (%)
Complete denture	29	29.0
Partial denture	27	27.0
Semi-complete denture	20	20.0
Partial denture (Kennedy Class I)	6	6.0
Partial denture (Kennedy Class II)	4	4.0
Partial denture (Kennedy Class III)	6	6.0
Others	8	8.0
Total	100	100.0

The distribution of prosthesis types among the study population is presented in Table 3. Complete dentures accounted for 29% of the rehabilitations, while conventional removable partial dentures represented 27%. Semi-complete dentures constituted 20% of the cases. More specific classifications of removable partial dentures were also observed, including Kennedy Class I (6%), Class II (4%), and Class III (6%), whereas other types of prostheses represented 8% of the sample. These findings indicate that conventional complete and partial dentures remain widely used modalities in prosthodontic rehabilitation, reflecting their continued clinical relevance despite advances in implant-supported treatment options. The relatively lower proportion of classified RPDs may be attributed to variations in case selection, arch conditions, and patient-specific anatomical or economic factors influencing treatment planning.

Table 4. Distribution of Treated Dental Arches (N = 100)

Dental Arch Location	Frequency (n)	Percentage (%)
Upper arch	56	56.0
Lower arch	31	31.0
Both arches	13	13.0
Total	100	100.0

Regarding the distribution of treated dental arches (Table 4), the maxillary arch was more frequently rehabilitated (56%) compared to the mandibular arch (31%), while 13% of patients required prosthetic treatment for both arches. This predominance of maxillary prosthetic treatment may be explained by the anatomical characteristics of the upper arch,

which generally provide better support and retention for complete and partial dentures due to a larger denture-bearing area and the presence of the palate. In contrast, mandibular dentures are often associated with reduced stability because of a smaller supporting area, higher tongue activity, and less favorable neuromuscular control. From a biomechanical perspective, the functional behavior of removable prostheses is strongly influenced by load distribution, retention, and stability. Improper force transmission, especially in partial dentures with unfavorable Kennedy classifications, may result in excessive stress concentration on abutment teeth and supporting tissues. This can predispose to biological complications such as periodontal breakdown, mucosal irritation, and accelerated ridge resorption, ultimately contributing to prosthetic failure. The differences in arch anatomy play a crucial role in prosthesis performance. The maxillary arch, with its broader surface area and palatal coverage, typically offers improved stress distribution and retention, whereas mandibular prostheses are more prone to instability due to limited surface area and dynamic muscular influences. These biomechanical limitations may explain the higher clinical challenges often reported in mandibular denture success. Overall, the present findings highlight that prosthesis type and arch location are key factors influencing treatment distribution and potential prognosis. A careful understanding of biomechanical principles, combined with appropriate design and case selection, is essential to reduce complications and improve long-term success of removable prostheses. The observed clinical outcomes in the present study can be interpreted in relation to prosthesis type distribution (Table 3) and treated arch characteristics (Table 4). The relatively high success rate (72%) may be attributed to the predominant use of conventional complete and partial dentures, which are widely applied and well-established treatment modalities. However, the presence of loose cases and stability/retention problems (19% combined) reflects the inherent biomechanical limitations of removable prostheses. In particular, mandibular prostheses and Kennedy Class I and II partial dentures are known to present reduced stability due to unfavorable support conditions and increased rotational forces. This is consistent with the arch distribution findings, where 31% of cases involved the lower arch, which is biomechanically more challenging in terms of retention and load distribution. Furthermore, failures in follow-up (9%) may indicate patient-related factors such as reduced compliance, systemic health conditions, or inadequate maintenance of prostheses. This is consistent with Table 2 findings, where 26% of patients had systemic conditions (diabetes mellitus and hypertension), which may indirectly influence oral tissue response and prosthesis longevity. Overall, these results emphasize that clinical success in removable prosthodontics is multifactorial, being influenced by prosthesis design, arch anatomy, and patient systemic conditions. Careful case selection, precise prosthesis design, and regular follow-up are essential to minimize complications and improve long-term outcomes.

Conclusion

Removable dentures remain a popular treatment option for patients with partial or complete tooth loss, with traditional complete and partial dentures being the most commonly used. The majority of study participants were middle-aged, with an almost equal gender distribution and a low prevalence of systemic diseases. Maxillary arches were treated more often than mandibular arches, likely due to better anatomical conditions for retention and stability. Overall, prosthesis type and arch location are important factors influencing treatment planning and outcomes. Successful rehabilitation depends on proper case selection, sound biomechanical principles, and accurate prosthesis design to reduce complications and improve long-term prognosis.

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Declaration of patient consent

The authors confirm that they have obtained all appropriate patient consent forms.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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