

# Evaluation of Occlusal Stability in Patients after Prosthodontic Rehabilitation

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## Abstract

Occlusal stability is a fundamental determinant of long-term success in prosthodontic rehabilitation. Proper occlusal relationships contribute to functional efficiency, preservation of oral structures, patient comfort, and overall treatment predictability. Disturbances in occlusal balance following prosthetic treatment may result in masticatory dysfunction, temporomandibular joint disorders, excessive tooth wear, and prosthetic complications. This study aimed to evaluate occlusal stability in patients following prosthodontic rehabilitation and to assess factors influencing functional adaptation and treatment outcomes. A total of 130 patients who underwent fixed, removable, or implant-supported prosthetic rehabilitation were clinically examined over a twelve-month observation period. Occlusal contacts, mandibular movements, masticatory efficiency, patient satisfaction, and prosthetic integrity were assessed using contemporary diagnostic methods. The findings demonstrated that well-planned prosthodontic treatment significantly improved occlusal harmony and functional performance. Most patients achieved satisfactory adaptation and maintained stable occlusal relationships throughout the follow-up period. The results emphasize the importance of comprehensive occlusal evaluation during prosthetic treatment planning and post-treatment monitoring. Long-term occlusal stability remains a key factor in achieving successful prosthodontic rehabilitation and preserving oral health.

**Keywords:** occlusal stability, prosthodontic rehabilitation, occlusion, masticatory function, prosthetic dentistry, implant-supported prostheses, temporomandibular joint, oral rehabilitation, dental prosthesis, treatment outcomes.

## 1. Introduction

The restoration of oral function represents one of the principal objectives of contemporary prosthodontics. Successful rehabilitation requires not only replacement of missing or damaged teeth but also re-establishment of harmonious functional relationships within the stomatognathic system. Among the numerous factors influencing treatment success, occlusal stability occupies a central position because it directly affects mastication, speech, aesthetics, patient comfort, and long-term preservation of oral structures.

Occlusion refers to the dynamic and static relationship between maxillary and mandibular teeth during functional and non-functional movements. Balanced occlusal contacts contribute to efficient force distribution, maintenance of periodontal health, protection of supporting tissues, and stability of

prosthetic restorations. Conversely, occlusal discrepancies may generate excessive mechanical stress, leading to discomfort, prosthetic failure, tooth mobility, muscular fatigue, and temporomandibular joint dysfunction.

Prosthodontic rehabilitation frequently involves significant modification of existing occlusal relationships. Whether treatment includes fixed crowns, bridges, removable dentures, implant-supported restorations, or full-mouth reconstruction, restoration of functional occlusion is essential for achieving favorable clinical outcomes. The complexity of occlusal rehabilitation increases when extensive tooth loss, severe tooth wear, or altered vertical dimensions are present.

Advances in prosthodontic materials and digital technologies have improved the precision of prosthetic fabrication and occlusal adjustment. Contemporary diagnostic tools such as computerized occlusal analysis, digital articulators, intraoral scanners, and three-dimensional imaging systems enable more accurate assessment of occlusal relationships and facilitate individualized treatment planning. These innovations have contributed to improved predictability and long-term success of prosthetic rehabilitation.

The adaptive capacity of the masticatory system plays a crucial role following prosthetic treatment. Although many patients successfully accommodate minor occlusal changes, significant discrepancies may exceed physiological tolerance and result in functional disturbances. Therefore, careful evaluation of occlusal stability during the post-rehabilitation period is necessary to identify potential complications and optimize treatment outcomes.

The relationship between occlusion and temporomandibular joint function remains an important area of clinical investigation. Improper occlusal contacts may alter mandibular movement patterns and increase loading of joint structures. Consequently, prosthodontic treatment should aim to establish functional harmony between dental occlusion, masticatory muscles, and temporomandibular joints. Patient-centered outcomes have become increasingly important in modern prosthodontics. Occlusal stability influences not only objective clinical parameters but also subjective perceptions of comfort, chewing ability, and overall satisfaction. Evaluation of these factors provides valuable information regarding the effectiveness of prosthetic rehabilitation and its impact on quality of life.

Despite considerable progress in prosthodontic techniques, maintenance of long-term occlusal stability remains a clinical challenge. Biological adaptation, prosthetic wear, material fatigue, and changes in oral structures may influence occlusal relationships over time. Continuous monitoring and periodic assessment are therefore essential components of comprehensive prosthodontic care. The purpose of this study was to evaluate occlusal stability in patients following prosthodontic rehabilitation, assess functional adaptation during the post-treatment period, and identify factors associated with successful long-term occlusal outcomes.

## 2. Materials and Methods

This prospective clinical study was carried out between 2024 and 2025 at the Department of Prosthodontics. The investigation involved 130 patients who had undergone various forms of prosthodontic rehabilitation. Participants ranged in age from 24 to 75 years and included both male and female patients requiring restoration of missing teeth, damaged dentition, or compromised occlusal function.

The study population was divided into three groups according to the type of prosthetic treatment received. The first group consisted of patients rehabilitated with fixed prosthetic restorations, including crowns and bridges. The second group included individuals treated with removable partial or complete dentures. The third group comprised patients who received implant-supported prosthetic restorations.

Prior to treatment, all participants underwent comprehensive clinical examination, radiographic assessment, and occlusal analysis. Baseline records included evaluation of existing occlusal contacts, mandibular movement patterns, masticatory efficiency, temporomandibular joint condition, and periodontal status.

Following prosthetic rehabilitation, patients were assessed immediately after treatment and subsequently at three, six, and twelve months. Occlusal stability was evaluated using the following parameters:

- Number and distribution of occlusal contacts;
- Bilateral balance during intercuspation;
- Functional mandibular movements;

- Presence of occlusal interferences;
- Masticatory efficiency;
- Temporomandibular joint symptoms;
- Prosthetic integrity and wear patterns;
- Patient-reported comfort and satisfaction.

Clinical examinations were performed under standardized conditions by experienced prosthodontists. Occlusal indicators, articulating paper analysis, computerized occlusal assessment systems, and functional evaluations were used where appropriate.

### 3. Results

The results demonstrated significant improvement in occlusal function following prosthodontic rehabilitation across all treatment groups. Most patients achieved satisfactory occlusal relationships immediately after treatment, with further adaptation observed during the follow-up period. Patients rehabilitated with fixed prosthetic restorations exhibited the highest level of occlusal stability throughout the observation period. Uniform distribution of occlusal contacts was maintained in the majority of cases, and only minor adjustments were required during follow-up visits. Functional movements remained smooth and coordinated without evidence of significant occlusal interference. Individuals treated with implant-supported prostheses also demonstrated excellent occlusal outcomes. Precise prosthetic fabrication and controlled force distribution contributed to stable functional performance. Most implant-supported restorations maintained favorable contact relationships and showed minimal signs of mechanical complications during the twelve-month evaluation period.

Patients wearing removable prostheses initially required a longer adaptation phase compared with the other groups. During the first months after treatment, some participants reported mild difficulties with mastication and speech. However, progressive neuromuscular adaptation resulted in substantial improvement over time, leading to enhanced comfort and functional efficiency.

Analysis of masticatory performance revealed significant improvement in chewing ability among all study groups. Participants reported greater confidence when consuming a variety of food textures and experienced less discomfort during functional activities. Enhanced chewing efficiency was associated with improved distribution of occlusal forces and restoration of dental arch continuity. Temporomandibular joint evaluation demonstrated favorable outcomes in most patients. Individuals presenting with pre-treatment functional discomfort frequently reported reduction of symptoms following rehabilitation. Stable occlusal contacts appeared to contribute positively to joint function and muscular coordination.

Minor occlusal discrepancies were detected in a limited number of cases during follow-up examinations. These issues were successfully corrected through selective adjustment procedures and did not significantly affect overall treatment outcomes. No major prosthetic failures attributable to occlusal instability were observed.

Patient satisfaction remained high throughout the observation period. Most participants expressed positive perceptions regarding comfort, functional performance, aesthetics, and overall treatment success. Improved oral function was frequently associated with enhanced quality of life and increased confidence during social interactions.

### 4. Discussion

The findings of this study confirm that occlusal stability represents a critical determinant of successful prosthodontic rehabilitation. Restoration of balanced occlusal relationships contributes significantly to functional efficiency, patient comfort, and long-term preservation of oral structures.

One of the most important observations was the ability of modern prosthodontic techniques to achieve predictable occlusal outcomes. Advances in diagnostic procedures, restorative materials, and digital technologies have enhanced the accuracy of prosthetic treatment and improved the capacity to establish functional harmony within the stomatognathic system.

The superior results observed among patients receiving fixed and implant-supported restorations may be attributed to increased structural stability and more precise force distribution. These treatment modalities allow closer reproduction of natural occlusal relationships and facilitate effective transmission of masticatory forces.

The adaptation process observed among removable prosthesis users highlights the importance of neuromuscular accommodation following rehabilitation. Although initial functional challenges were present in some cases, progressive adaptation enabled most patients to achieve satisfactory occlusal function within the observation period.

The positive influence of stable occlusion on temporomandibular joint function observed in this investigation supports current concepts emphasizing the relationship between dental occlusion and musculoskeletal balance. Properly distributed occlusal forces may reduce excessive loading of joint structures and contribute to improved functional comfort.

Patient-reported outcomes further emphasize the clinical significance of occlusal stability. Functional rehabilitation extends beyond restoration of missing teeth and directly influences nutrition, speech, psychological wellbeing, and social confidence. Therefore, comprehensive assessment of both objective and subjective treatment outcomes is essential in contemporary prosthodontics.

Despite favorable findings, maintenance of long-term occlusal stability requires continuous monitoring. Physiological changes, prosthetic wear, periodontal remodeling, and aging-related alterations may gradually influence occlusal relationships. Periodic follow-up examinations remain important for preserving treatment success and preventing complications.

Certain limitations should be acknowledged. The study involved a relatively limited observation period, and longer-term investigations are necessary to evaluate the durability of occlusal outcomes over extended periods. Future studies incorporating larger patient populations and advanced digital analysis methods may provide additional insight into factors affecting long-term occlusal stability.

## 5. Conclusion

The present study demonstrated that successful prosthodontic rehabilitation significantly improves occlusal stability, masticatory efficiency, and overall oral function. Establishment of balanced occlusal relationships contributed to favorable treatment outcomes across fixed, removable, and implant-supported prosthetic modalities.

Patients exhibiting stable occlusal contacts experienced improved chewing performance, enhanced comfort, reduced functional disturbances, and high levels of treatment satisfaction. Fixed and implant-supported restorations demonstrated particularly favorable long-term occlusal performance due to their structural stability and precise adaptation.

Comprehensive occlusal assessment before, during, and after prosthetic treatment remains essential for achieving predictable clinical success. Modern diagnostic technologies and individualized treatment planning can further enhance occlusal outcomes and reduce the risk of functional complications.

The findings highlight the importance of long-term monitoring and maintenance protocols in preserving occlusal stability following prosthodontic rehabilitation. Continued attention to occlusal factors will contribute to improved patient outcomes and greater longevity of prosthetic restorations.

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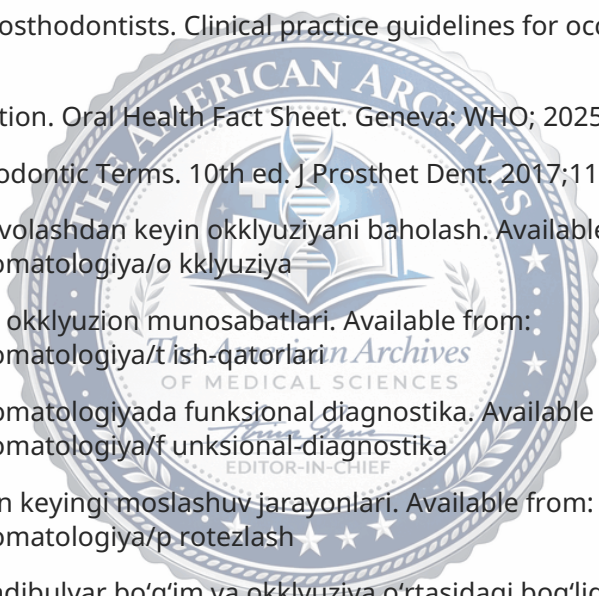
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