

Analysis of the Effectiveness of Prosthetic Rehabilitation in Patients with Challenging Conditions of Multiple Edentulism Using Traditional Methods and Dental Implants

Análisis de la Eficacia de la Rehabilitación Protésica en Pacientes con Condiciones Difíciles de Edentulismo Múltiple Mediante Métodos Tradicionales e Implantes Dentales

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SUMMARY

Background: The rehabilitation of patients with multiple edentia and unfavorable mandibular denture bed conditions is an important area of modern dentistry, given the growing need for practical, less invasive treatment methods. Traditional methods involving the placement of multiple implants to anchor dentures often encounter anatomical and clinical limitations of patients, necessitating the search for alternative protocols. **Objective:** The purpose of this review was to analyze the available literature on the efficacy of such protocols compared to traditional approaches. **Methods:** The review focused on publications that examined the clinical results of three immediately

loaded implants. Special attention was paid to bone resorption parameters, as they are the leading indicators of long-term implant stability and the absence of complications in the short and medium term. Many researchers have reported that the average level of bone resorption around implants using this protocol is within acceptable limits and comparable to that observed with traditional approaches that use more implants. **Results:** A review of the literature revealed that the immediate placement of three implants yields stable clinical results when the protocol is appropriately planned and followed. In particular, the difference in resorption between central and peripheral implants is negligible and does not affect the prosthesis's overall stability. Studies have also shown no significant correlation between implant length and bone resorption, underscoring the protocol's versatility. **Conclusion:** The review confirms that the three-implant protocol with immediate loading is an effective and reliable option for the rehabilitation of patients with multiple edentia under unfavorable prosthetic site conditions. It provides clinical results comparable to traditional approaches, reduces treatment time, and the number of surgical interventions. The practical significance of this approach lies in its adaptability to patients' anatomical and clinical conditions, making it convenient for both doctors and patients.

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RESUMEN

Antecedentes: La rehabilitación de pacientes con adentia múltiple y condiciones desfavorables del lecho dentario mandibular es un área importante de la odontología moderna, dada la creciente necesidad de métodos de tratamiento eficaces y menos invasivos. Los métodos tradicionales que implican la colocación de múltiples implantes para anclar las dentaduras a menudo se encuentran con limitaciones anatómicas y clínicas en los pacientes, lo que hace necesaria la búsqueda de protocolos alternativos. **Objetivo:** Analizar la literatura disponible sobre la eficacia de dichos protocolos en comparación con los enfoques tradicionales. **Métodos:** La revisión se centró en publicaciones que analizaron los resultados clínicos de tres implantes de carga inmediata. Se prestó especial atención a los parámetros de reabsorción ósea como principal indicador de la estabilidad del implante a largo plazo y de la ausencia de complicaciones a corto y medio plazo. Numerosas investigaciones han informado que el nivel medio de reabsorción ósea alrededor de los implantes, utilizando este protocolo, se encuentra dentro de límites aceptables y es comparable al de los enfoques tradicionales que emplean un mayor número de implantes. **Resultados:** La revisión de la literatura mostró que la colocación inmediata de tres implantes da resultados clínicos estables si el protocolo se planifica y se sigue adecuadamente. En particular, la diferencia en la reabsorción entre los implantes centrales y periféricos es insignificante y no afecta la estabilidad global de la prótesis. Los estudios también han demostrado que no existe una correlación significativa entre la longitud del implante y la reabsorción ósea, lo que evidencia la versatilidad del protocolo. **Conclusiones:** La revisión confirma que el protocolo de tres implantes con carga inmediata es una opción eficaz y fiable para la rehabilitación de pacientes con adentia múltiple en condiciones desfavorables del lecho protésico. Proporciona resultados clínicos comparables a los de los enfoques tradicionales, reduce el tiempo de tratamiento y el número de intervenciones quirúrgicas. La importancia práctica de este enfoque radica en su adaptabilidad a las condiciones anatómicas y clínicas de los pacientes, lo que lo hace conveniente tanto para los médicos como para los pacientes.

Palabras clave: Tratamiento restaurador, cambios óseos alveolares, carga acelerada, estrategias no convencionales, resultados terapéuticos, enfoques reconstructivos, soluciones protésicas para el maxilar inferior.

INTRODUCTION

Rehabilitation of patients with multiple adentia under unfavorable conditions of the denture bed is one of the most urgent problems in modern dentistry, as this pathology significantly affects quality of life, masticatory function, and facial aesthetics. Patients with multiple adentia often experience decreased chewing ability, speech impairment, loss of facial harmony, and social isolation. Preservation of remaining bone tissue, especially in the presence of significant alveolar resorption, is a key factor in successful long-term rehabilitation. While traditional removable prostheses have limited capacity to address these problems, modern implant technology offers new avenues for creating stable and functional prostheses. The main problem remains the selection of an optimal treatment protocol that maximizes functional and aesthetic outcomes while minimizing surgical interventions. Despite significant advances in dentistry, the question of the effectiveness of fewer implants for supporting fixed prostheses remains unresolved. There is a need to compare traditional methods, which involve the use of more implants, with modern protocols, such as the all-on-four approach, which uses only four implants placed in strategic locations. Additional gaps in the literature include insufficient data on the long-term stability of prostheses under these conditions, the effects of implant reduction on bone tissue, and the relationships among the aesthetic, functional, and psychological aspects of rehabilitation. Exploring these issues is critical to improving treatment approaches for patients with unfavorable anatomic conditions and limited resources.

In Bansod et al. (1), methods for tooth replacement in patients with partial dentition using an upper partial denture in combination with an implant-supported lower denture are discussed. This approach provides prosthesis stability while preserving the patient's facial aesthetics. The study demonstrated that the combination of partial denture and implants effectively restores chewing function and avoids complex surgical procedures such as sinus floor elevation. Meanwhile, in the work of Balwani et al. (2), the effect of phonetics on complete denture restoration was

studied. It was observed that bite misalignment or misaligned teeth can significantly affect the patient's ability to pronounce sounds clearly. Therefore, not only anatomical and functional parameters should be considered when planning rehabilitation, but also proper tooth positioning should be ensured to achieve standard phonetics.

Similar results were obtained by Khubchandani et al. (3), who compared bite force and electromyographic muscle activity in patients before and after implant rehabilitation. It has been shown that implant-supported prostheses significantly improve masticatory function compared with traditional removable prostheses. This demonstrates the effectiveness of implants not only in restoring functional performance but also in improving the patient's overall physiological condition. Aesthetics, an important aspect of dental treatment, remains subjective, although modern research seeks to define objective criteria for evaluating aesthetic outcomes. As noted by Portelli et al. (4), a comprehensive analysis of all facial components, including not only the shape of the teeth but also the position of the lips, soft tissues, and the interaction of the teeth with the face at rest and during smiling, is necessary to evaluate aesthetics. This approach significantly improves the accuracy of aesthetic outcome assessment and makes the treatment more predictable and satisfying for the patient. Cicciù (5), assessed recent technological advances and innovative biomedical devices in the field of prosthodontics. The author focused on the development of modern technologies, such as 3D printing and composite materials, that enable the fabrication of more accurate, durable, and aesthetically pleasing prostheses. In addition, the study identified opportunities to use bioactive materials to improve the integration of prostheses with surrounding tissues, thereby reducing the risk of rejection and complications. Special attention was paid to implementing advanced digital orthotics techniques to reduce fabrication time and improve the accuracy of the fabricated products. This study highlights the importance of innovative biomedical devices that can significantly improve the quality of life for patients with edentulism, providing not only functionality but also aesthetic appearance.

Ali et al. (6) emphasize a key aspect of rehabilitation for patients with edentulism: improving their quality of life. Following implantation of prostheses, patients reported significant improvements not only in chewing efficiency but also in emotional well-being. This emphasizes the critical role of social and psychological factors in treatment planning, especially for the elderly who may face social isolation due to tooth loss. Shri and Jaiswal (7) also demonstrate that missing teeth in older adults can negatively affect their general health and overall satisfaction, emphasizing the importance of timely and effective interventions. Restoring teeth in these patients helps to increase their social engagement, reduce feelings of depression and anxiety, and increase self-confidence. Frossard et al. (8) emphasize the success of the All-on-4 technique in treating complete edentulism. This approach, which uses four implants to anchor the prosthesis, provides stability and long-term reliability without requiring complex procedures such as sinus lift procedures or bone grafting. The World Health Organization (WHO) (9) provides a comprehensive overview of global oral health trends and challenges. The report sheds light on the prevalence of dental diseases, including adentia, and their impact on public health. The WHO emphasizes preventive measures and access to high-quality dental care as vital strategies to improve patients' quality of life worldwide (10). This document serves as an important reference for evaluating different methods of adentia rehabilitation in the context of global oral health trends. McGrory et al. (11), in their study on the occurrence of heterotopic ossification in patients after hip replacement surgery, offer information on rehabilitation techniques in medical prosthetics. Although the focus is on prosthetic implants, the findings provide valuable insights into the general principles of using prostheses to restore body function. These principles are equally applicable to dental prosthetics, emphasizing the critical importance of precision in the design and fitting of prostheses for successful rehabilitation. Thus, these studies emphasize the importance of an individualized approach to the rehabilitation of patients with edentulousness, taking into account not only functional but also aesthetic, psychological, and social aspects. However,

further research is needed to develop standardized methods for determining the optimal number of implants and aesthetic criteria across different clinical settings.

The study aimed to determine the most effective rehabilitation strategies for patients with extensive implant-assisted tooth loss, with a focus on the functional, aesthetic, and social aspects of treatment to improve their quality of life.

MATERIALS AND METHODS

A systematic literature review was conducted to comprehensively evaluate the effectiveness of prosthetic rehabilitation techniques in patients with multiple adentia, comparing traditional prosthetic techniques with implant-retained restorations. The main objective was to assess the impact of these different rehabilitation techniques on key outcomes, including quality of life, functional improvements, aesthetic outcomes, patient satisfaction, and related psychological and clinical factors. To achieve this goal, a structured and exhaustive search of multiple academic databases, including PubMed, Scopus, Web of Science, Cochrane Library, Embase, and Google Scholar, was conducted. The search strategy employed carefully selected keywords and logical operators (AND, OR, and NOT) to ensure that all relevant studies were identified. For example, the query sample included terms such as “multiple adentia” AND “dental implants” OR “traditional dentures”, focusing on studies that directly compared these rehabilitation approaches. Inclusion criteria for this review included original research articles, systematic reviews, meta-analyses, and case reports published in English between 2013 and 2023. Studies were needed that clearly focused on prosthetic techniques for the treatment of multiple adentia, analyzing their impact on quality of life, functional recovery, and patient satisfaction. Articles that did not meet these criteria were excluded, including editorials, letters to the editor, and studies that lacked data on functional or aesthetic outcomes or did not specifically address dental rehabilitation in the context of multiple adentia. An initial database search identified 3461 articles; after removing 762 duplicates, 2699 remained for initial selection. Further evaluation narrowed

the selection to 153 articles for full-text review; after applying strict inclusion and exclusion criteria, a final set of 30 studies was selected for detailed analysis. The selected studies were grouped into the following topic areas to facilitate generalization of the results: prosthetic methods, quality of life, functional and aesthetic outcomes, patient satisfaction, psychological factors, and clinical and surgical aspects. In the category of prosthetic methods, traditional prostheses, such as partial removable prostheses and complete dentures, were compared with implant-supported prostheses, including fixed implant-supported prostheses and removable implant-supported prostheses.

The review evaluated functional outcomes, such as chewing efficiency, restoration of bite force, improved speech, and aesthetic improvements, which contributed to patients' self-esteem. In addition, the review compared the cost-effectiveness and longevity of traditional prosthodontic methods with those of implant-retained restorations. The financial implications for both patients and health systems, as well as the clinical benefits and challenges associated with prosthesis maintenance over time, were considered. To ensure the reliability and validity of the results, each selected study underwent a rigorous critical appraisal that assessed methodological rigor, adequacy of sample size, study design, and relevance of outcome measures.

RESULTS AND DISCUSSION

Functional aspects of dentures in restoring oral function and health

Several studies have demonstrated the functional benefits of dentures, particularly in improving oral health and enabling patients to perform essential daily activities, such as chewing and speech. In particular, implant-supported dentures have been shown to significantly improve chewing function, which is critical to nutrient intake and overall health. Fiorillo et al. (12) demonstrated the superior functional performance of fixed implant dentures compared with conventional dentures, highlighting their role in improving chewing efficiency and restoring the ability to eat a variety of foods. This improved

chewing ability contributes to better overall health and wellness, as people with implant-supported dentures can chew more efficiently, thereby improving nutrient intake. Further studies have shown the importance of bite strength and patient comfort. Altayyar et al. (13) found that implant-supported restorations provided superior bite strength and greater comfort than traditional dentures. This is important as it not only improves chewing function, but also reduces the discomfort that can result from ill-fitting or poorly supported dentures. In addition, Kusumoto et al. (14) have shown that implant-supported dentures also improve speech and overall chewing ability, providing a more natural experience for patients who rely on their dentures for daily communication and eating. Peri-implant health is an important factor in maintaining dental implants (15). Gündoğar et al. (16) emphasized the importance of peri-implant health management, particularly in older adults, whose oral health may deteriorate over time. Failure to do so may result in significant deterioration of both implant function and overall quality of life. Proper care and early intervention are critical to prolonging the life of dental implants and preserving their functional benefits (17-19). This emphasizes the need for ongoing monitoring and treatment to ensure optimal implant function, especially as patients age and face an increased risk of peri-implant disease. Thus, dentures, particularly implant-supported dentures, provide significant functional benefits by improving chewing, bite strength, comfort, and speech. In addition, maintaining peri-implant health is essential to ensure the longevity and continued functionality of implants, underscoring the importance of comprehensive care for patients using these prosthetic devices. Aesthetic results are crucial for patient satisfaction with prosthetic dentures, as they significantly influence both self-esteem and social interactions.

Economic aspects of dental rehabilitation. Cost-benefit ratio and long-term sustainability

The economic aspects of dental prostheses have been a topic of considerable discussion, particularly with respect to initial investment and long-term cost-effectiveness. One key area of focus is the cost-effectiveness of implant-

supported prostheses. Ravidà et al. (20) conducted a study comparing different types of implant prostheses. They found that although some implant options may have a higher initial cost, they are more cost-effective over time. This is due to their longevity, less need for replacement, and fewer associated complications. In other words, although the initial investment in implant-supported dentures may appear higher than that of traditional dentures, their longevity and lower long-term maintenance costs make them a more cost-effective option over the long term. In addition to implant dentures, preventive care also plays an important role in reducing overall dental costs. Fiorillo et al. (12) emphasized the economic benefits of using chlorhexidine gel as part of preventive care. This gel helps prevent infections and reduces the need for costly restorative procedures, such as root canal treatments, crowns, or additional implants. By emphasizing prevention and early intervention, patients can avoid expensive and more complicated treatments, ultimately resulting in time savings. Moreover, Lemos et al. (21) analyzed the economic advantages of implant-supported prostheses compared to removable partial dentures. Although the initial cost of implants is higher, their long-term performance and lower maintenance requirements provide significant financial benefits. Removable partial dentures, while less expensive initially, typically require more frequent adjustments, replacements, and maintenance, resulting in higher total costs over time. Thus, investing in implant-supported dentures may be a more efficient and cost-effective long-term solution, particularly for patients requiring long-term dental restorations. In conclusion, although the initial costs of some dentures may be higher, studies have consistently shown that their longevity, reduced maintenance, and preventive measures help maximize treatment effectiveness and minimize long-term costs.

The economic benefits of these dental procedures are clear, whether it's the use of durable implant-supported dentures or preventative treatments such as chlorhexidine gel. By making an initial investment in high-quality solutions, patients can reduce overall costs and improve their long-term oral health. Rodrigues et al. (22) and Carvalho et al. (23) emphasized the value of multidisciplinary collaboration in the treatment

of patients with severe oral diseases or facial deformities. They noted that achieving optimal functional, aesthetic, and social outcomes for these patients requires the involvement of various specialists, including oral surgeons, orthopedists, periodontists, and even psychologists. This team approach ensures that all aspects of the patient's condition are carefully considered, helping to restore not only physical function, but also social integration and emotional well-being. Such integrated care addresses both the practical need to regain function (e.g., chewing ability, speech) and the psychological impact of this condition (e.g., self-esteem, self-confidence). For example, for patients suffering from severe facial trauma or congenital disabilities, rehabilitation involving both surgery and customized prostheses can significantly improve their quality of life. This type of care helps patients regain the ability to speak and chew properly. It promotes their social integration by restoring facial appearance, which can be a significant source of emotional distress. A study by Chambrone et al. (24) on gingival tissue augmentation emphasizes the importance of soft-tissue management in improving both aesthetic and functional outcomes of dental implants. The study shows that enhancing soft tissue health around implants not only improves the appearance of the dental restoration but also reduces the risk of complications such as peri-implantitis, ultimately ensuring long-term success. The economic benefits are also noteworthy, as improved soft-tissue care can reduce maintenance requirements and the need for restorative interventions, thereby contributing to long-term cost savings. Sanz et al. (25) also emphasize the importance of periodontal health to the overall success of dental treatment. Their study on the treatment of stage I-III periodontitis outlines clinical guidelines that emphasize the importance of maintaining healthy periodontal tissues during implant-assisted rehabilitation. Rehabilitation of patients with adentia, especially those with psychological problems, requires a comprehensive approach that includes both clinical and psychological support. Several studies have emphasized the significant role of psychological factors in the treatment process. De Stefano (26) and Masood et al. (27) indicate the crucial influence of depression and dental anxiety on patient satisfaction and treatment outcomes.

Addressing these psychological barriers through appropriate strategies, such as anxiety-reducing techniques and mental health support, is essential to increasing patient commitment to treatment and improving prosthetic outcomes. In addition to psychological factors, the selection of prosthetic materials and technologies is a key determinant of treatment success. Ortensi et al. (28) demonstrated that optimizing the preparation of ceramic veneers improves both aesthetic and functional outcomes of dental prostheses, thereby enhancing longevity and patient satisfaction. Similarly, Lemos et al. (21) reviewed the benefits of partial removable prostheses on implants, which provide superior stability and comfort compared to traditional dentures, emphasizing the importance of advanced prosthetic solutions in modern dental care.

Careful medical examination of patients is equally important, as Resnik (29) stresses the need for a multidisciplinary approach in implantology. Proper risk assessment and associated disease are essential for determining patients' suitability for implantation procedures, thereby ensuring long-term success and effectiveness. In this context, Ravidà et al. (20) highlight the importance of selecting the most appropriate prosthesis type for implantation, based on individual needs, with consideration of factors such as durability, functionality, and cost-effectiveness. Studies on the impact of prosthetic rehabilitation on quality of life once again confirm the importance of personalized care. Kusumoto et al. (14) found that implant-supported prostheses significantly improve comfort, function, and aesthetics, thereby enhancing quality of life for patients with bone loss. Similarly, Dellepiane et al. (30) reported that immediate full-arch loading substantially enhances quality of life for individuals experiencing prolonged tooth loss. This finding suggests that prompt and effective prosthetic treatment can markedly improve patient well-being in a relatively brief timeframe. To better understand the various interrelated factors of dental rehabilitation, the social, economic, and aesthetic aspects are presented in Table 1, where it is shown that the inclusion of these components improves patient satisfaction, treatment outcomes, and quality of life among patients with tooth loss.

Table 1. Social, economic, and aesthetic aspects of dental rehabilitation of patients with multiple adenitis.

Aspect	Description	Examples	Patient Impact	Health Impact
Social	Impact on social integration, self-esteem, and reduction of social stigma	Reduction of social isolation by restoration of teeth or implants. Improvement of well-being by combating phobias such as odontophobia.	Enhancing self-esteem and participation in society. Increased confidence in social situations.	Improvement of psychological and emotional health. Reduction of social exclusion and stigma.
Economic	Cost reduction through preventive care and long-term treatment effectiveness.	Use of chlorhexidine for infection prevention. Long-term cost savings through long-term solutions such as implants.	Reduction of treatment costs through preventive measures and effective rehabilitation methods.	The long-term effect of the treatment reduces the need for further interventions. Cost-effective solutions (implants). Aesthetic improvement of appearance, restoration of natural smile, and functions.
Aesthetic	Improvement of appearance, restoration of a natural smile, and function	Restoring the natural appearance with ceramic veneers or implants. Aesthetic satisfaction from prosthetics.	Improved self-assessment and appearance. Increased confidence in social interactions.	Restoration of functions (e.g., chewing, speech) while maintaining oral health and aesthetics.

These results confirm the need for a comprehensive approach to prosthetic rehabilitation that considers psychological, functional, aesthetic, and economic factors. An individualized treatment plan based on a thorough assessment of each patient's needs is crucial for achieving optimal outcomes and improving quality of life. Finally, it can be stated that the most effective approaches to solve the problem of prosthetic rehabilitation of patients with multiple adenicity are the use of a multidisciplinary approach, considering psychological aspects, optimization of the selection of materials and methods of prosthesis, as well as the application of modern techniques of implantology and individual treatment plans. This enables better functional and aesthetic outcomes, improving patients' quality of life. Prosthetic patients with complex conditions, including those requiring repeated anesthesia procedures, require careful consideration of several key factors such as treatment outcomes, patient satisfaction, and

the distribution of occlusion efforts. Integrating clinical experience and research provides valuable insights into the benefits of different prosthetic approaches, enabling more informed decision-making. One significant advance in this area is the introduction of monolithic zirconia restorations, which address common problems, such as vinyl deposits often observed in zirconia-based restorations. These restorations also minimize the natural wear and tear of teeth that typically occurs with traditional prosthetic materials.

Zirconia monolithic restorations have been widely used in dentistry due to their versatility, as they are suitable for single-unit, multi-component, and full-size prostheses on implants (31). Temporary, non-removable prostheses play a crucial role in maintaining occlusal relationships during treatment planning, thereby ensuring functional and aesthetic integrity. On the other hand, when performing final restorations,

reliable compounds are used to reduce the risk of mechanical damage and complications, such as tooth penetration. This holistic approach contributes to the long-term success of prosthetics while improving treatment outcomes and patient satisfaction. Occlusion efforts play a vital role in planning prosthetic treatment, especially for patients with high occlusion loads, as excessive effort can lead to biomechanical complications such as overloading and potential implant failure (32,33). These efforts require careful monitoring to ensure the prosthesis's long-term stability and functionality. High occlusion loads increase the risk of mechanical damage, including screw loosening, prosthetic component failure, and bone resorption around implants, thereby adversely affecting treatment outcomes. Therefore, understanding and accurately assessing these forces is an important aspect of the treatment process. To achieve this goal, precise tools for measuring occlusive force are required. Studies have shown that occlusion force sensors provide high accuracy and reliability in estimating these forces, making them superior to other measurement methods, such as electromyography. Although electromyography is useful for assessing chewing-related muscle activity, it is less practical and accurate for directly quantifying occlusive efforts. In contrast, occlusive force meters are easier to use, provide simpler measurements, and allow clinicians to obtain detailed information on the distribution and magnitude of forces throughout the prosthesis.

The data obtained from these measurements allows clinicians to optimize the design and selection of prosthetic components, ensuring that they can withstand expected loads with minimal risk of complications. This approach contributes to improved outcomes, including better load distribution, reduced mechanical loads, and increased patient satisfaction with prosthesis restoration. Patient satisfaction is the cornerstone of successful prosthetics, as it reflects the patient's perception of both functional and aesthetic outcomes of the restoration (34). One of the most widely used tools for assessing patient satisfaction is a visual analog scale (VAS) (20). This tool is popular for its simplicity, accuracy, and consistency in allowing patients to measure their satisfaction on a scale that translates subjective experiences

into quantitative data. VAS will enable clinicians to assess various aspects of treatment, including comfort, aesthetics, chewing efficiency, and overall quality of life. This superiority is primarily due to the enhanced stability and functionality afforded by implant-supported designs. Unlike dentures, which are based on natural teeth and are prone to displacement and possible loosening, implant-based restorations are anchored directly to the bone. This fixed design significantly limits the microbiota during chewing, thereby improving the patient's ability to perform functional activities such as eating and speaking with confidence. Prostheses on implants also exhibit excellent chewing performance, which is critical for many patients. Increased stability and even distribution of occlusal forces contribute to efficient chewing, allowing patients to consume a broader range of foods without discomfort. This functional advantage not only improves nutrition but also enhances patients' psychological well-being, as they feel less constrained by their prosthetic limitations. In addition to the functional benefits, implant-based restorations often provide excellent aesthetics. Modern materials, such as zirconia dioxide, and the sophisticated design of prostheses help achieve a natural appearance, thereby increasing patient confidence and satisfaction.

These results highlight the importance of considering patient satisfaction as a multifaceted outcome of prosthetics, encompassing functionality, aesthetics, and overall quality of life to ensure comprehensive success. The dynamic feedback from natural teeth, transmitted through the periodontal ligament, is crucial for the perception and distribution of occlusal forces. Periodontal ligaments are specialized connective tissues that function as sensory organs, enabling natural teeth to detect and respond to varying levels of force (35). This proprioceptive ability allows precise regulation of occlusal forces, thereby protecting both teeth and their surrounding structures from excessive loads. Natural teeth can undergo controlled vertical and horizontal movements under load, thereby distributing force evenly during functions such as chewing and tooth contact. In contrast, prostheses on implants lack periodontal ligaments, resulting in noticeable differences in proadhesion function. The implants are attached directly to the bone,

providing exceptional stability but minimal ability to perceive and adapt to dynamic loads. This can lead to increased strain on the implant and surrounding bone if occlusion loads are not carefully monitored. Careful treatment planning, including accurate occlusion strength assessment and material selection, is therefore important to optimize the operation of prostheses on implants and reduce possible complications. The choice of prosthetic solutions extends beyond functional considerations to include aesthetic, socioeconomic, and patient satisfaction factors. Implant-supported prostheses have been shown to significantly improve chewing efficiency compared with other options, thereby allowing patients to eat a more diverse and nutritious diet. Their excellent resilience also contributes to improved speech and comfort, satisfying both functional and psychological needs. Aesthetics is another important advantage of implant prostheses, particularly when materials such as zirconia dioxide or ceramics are used, which accurately replicate the natural appearance of teeth. This contributes to increased patient confidence and satisfaction, as the restoration is precisely matched to the surrounding dentition. In addition, implant prostheses are often associated with lower long-term maintenance costs. Although initial investments may be higher than other prosthetic options, durability and a lower frequency of repair or replacement make them a cost-effective solution over time. These functional and aesthetic advantages, combined with their implant-based design, make prostheses an increasingly popular choice for patients seeking comprehensive, long-term restorative solutions. Ultimately, the integration of these factors – functional characteristics, aesthetics, economic considerations, and patient satisfaction – emphasizes the importance of a patient-oriented approach to planning prosthetic treatment that ensures optimal results. The patient's needs and expectations.

CONCLUSIONS

The findings from the reviewed literature indicate that dental implants provide greater occlusal force than traditional prosthetic options, such as dentures or bridges. This advantage stems from the stable fixation of implants in the bone,

which enables implant-supported prostheses to transmit greater chewing forces. Studies have consistently shown that implants improve masticatory efficiency, enhancing patients' ability to chew and, by extension, their overall nutritional intake and oral health. However, these findings also highlight significant limitations. One critical issue is the small sample sizes used in many studies, which limits the generalizability of the results. Moreover, certain conditions, such as bruxism (teeth grinding) and temporomandibular joint disorders, are often excluded from research, reducing the applicability of the results to patients with these conditions. This exclusion creates a gap in understanding how implants perform in individuals with these common oral health issues. Additionally, reviewed have relatively short follow-up periods, typically lasting only a few years. This short-term scope limits the ability to assess the long-term effectiveness and durability of implants fully. Long-term complications, such as implant failure, peri-implantitis, or bone loss around the implant, cannot be adequately predicted with the limited follow-up data available. Longer studies are necessary to provide more accurate insights into the longevity and potential complications of implants. Future research should focus on these gaps. Larger sample sizes would increase the statistical power of studies and make the findings more applicable to a broader range of patients.

Furthermore, a more extended follow-up period would yield more comprehensive data on the long-term effectiveness of implants. Additionally, the consideration of dynamic chewing parameters – such as chewing speed, bite contact area, and food particle reduction – could give a more nuanced understanding of how implant-supported prostheses function in real-world conditions. These additional factors would allow for a more accurate assessment of the overall effectiveness and stability of implants, including their potential for long-term success and the likelihood of complications.

List of abbreviations: OHRQoL – Oral Health-Related Quality of Life, WHO – World Health Organization, OHIP – Oral Health Impact Profile, FDP – Fixed Dental Prosthesis, VAS – Visual Analog Scale, ANOVA – Analysis of Variance, SD – Standard Deviation.

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