International Journal of Community Medicine and Public Health
Alfaer AS et al. Int J Community Med Public Health. 2023 Aug;10(8):2974-2979
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20232393

Review Article

Indications, design considerations, and clinical outcomes of implant-supported fixed prostheses

Ali Salem Alfaer[1]*, Khulood Khalid Bakhsh[2], Ibrahim Mohammed Alyami[3], Rawaa Mohammed Fallatah[4], Mashael Saleh Saloum[5], Nouf Yahya AlHarbi[6], Suha Dhaifallah Al Otaibi[7], Bandar Zaid Alotaibi[8], Salem Abdullah AL Meheini[9], Sahar Safar AL Shalawi[10], Abdulrahman Mohammed Bushnaq[11]

[1]Department of Prosthodontic, Rabigh General Hospital, Rabigh, Saudi Arabia
[2]Department of Restorative Dentistry, King Fahad Hospital, Jeddah, Saudi Arabia
[3]General Dentist, New Najran General Hospital, Najran, Saudi Arabia
[4]College of Dentistry, Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia
[5]General Dental Clinic, 360 Clinics, Riyadh, Saudi Arabia
[6]Riyadh Specialized Dental Center, Ministry of Health, Riyadh, Saudi Arabia
[7]Dental Department, Dental Medical Complex in West of Riyadh, Riyadh, Saudi Arabia
[8]General Dentist, Ministry of Health, Riyadh, Saudi Arabia
[9]College of Dentistry, Riyadh Elm University, Riyadh, Saudi Arabia
[10]General Dentist, Ministry of Health, Dammam, Saudi Arabia
[11]Advanced Education in General Dentistry, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

Received: 03 July 2023
Accepted: 19 July 2023

***Correspondence:**
Dr. Ali Salem Alfaer,
E-mail: Dr.alfaer@gmail.com

ABSTRACT

Implant-supported fixed prostheses are a highly successful treatment option for replacing missing teeth, offering improved esthetics, function, and patient satisfaction. Design considerations play a crucial role in achieving optimal outcomes. Implant distribution and angulation should be carefully planned to ensure balanced load distribution and biomechanical stability. Occlusal considerations are vital to minimize mechanical complications and implant overloading, with proper adjustments and occlusal schemes implemented. The emergence profile should replicate natural tooth contours for esthetic integration and ease of oral hygiene maintenance. Material selection is essential, considering factors such as occlusal loading, esthetic requirements, and patient-specific considerations. Biomechanical analysis helps identify stress distribution patterns and optimize prosthesis design for long-term success. Patient satisfaction is high, with improved chewing ability, speech, and overall quality of life reported. Long-term success rates exceed 90%, influenced by implant survival, peri-implant health, maintenance of prosthesis integrity, and patient satisfaction. Thorough patient assessment, treatment planning, precise surgical and prosthetic execution, and comprehensive follow-up care are crucial for favorable outcomes. Implant-supported fixed prostheses provide functional and esthetic restorations, enhancing oral health and overall well-being.

Keywords: Implant-supported fixed prostheses, Implant design, Biomechanics, Patient satisfaction, Material selection

INTRODUCTION

Implant-supported fixed prostheses have gained significant popularity due to their ability to restore masticatory function and esthetics in individuals with missing teeth. These restorations rely on dental implants as stable anchors within the jawbone, providing support for the fixed prosthesis.[1] The design of implant-supported fixed prostheses is crucial for achieving long-term success. Factors such as the number and position of implants, occlusal considerations, and emergence profile are critical determinants.[2] Proper implant distribution and angulation help distribute occlusal forces evenly, minimizing stress on individual implants and the surrounding bone.[3] Additionally, the emergence profile should mimic natural tooth contours for optimal esthetics and hygiene maintenance.[4] The choice of materials for implant-supported fixed prostheses is vital for both function and aesthetics. Prosthesis frameworks can be fabricated from metals, ceramics, or hybrid materials, each offering unique advantages. High-strength materials like titanium and zirconia provide excellent mechanical properties, while esthetic materials like lithium disilicate and layered ceramics offer superior translucency.[5,6] The selection of appropriate materials should consider factors such as occlusal loading, esthetic requirements, and patient-specific considerations. Understanding the biomechanics of implant-supported fixed prostheses is crucial to prevent mechanical failures. Prosthesis design should aim to minimize stress concentrations and ensure load distribution along the implants and surrounding bone. Adequate implant number, length, and diameter, along with favorable implant positioning, play a pivotal role in achieving favorable biomechanical outcomes.[7] Finite element analysis and other computational techniques aid in optimizing the design and assessing stress distribution.

Clinical factors, including patient assessment, treatment planning, surgical protocols, and prosthetic techniques, significantly influence the success of implant-supported fixed prostheses.[8] Comprehensive evaluation of oral health, bone quality, and quantity is essential to determine the suitability for implant placement.[9] Appropriate surgical techniques and protocols, such as implant selection, site preparation, and primary stability, greatly contribute to favorable clinical outcomes.[10] Prosthetic considerations, such as occlusal scheme and material selection, should be meticulously planned and executed.

Long-term success of implant-supported fixed prostheses depends on multiple factors, including proper case selection, meticulous treatment planning, precise surgical and prosthetic execution, and comprehensive follow-up care. Longitudinal studies have demonstrated high implant survival rates and improved patient satisfaction.[11-13] However, potential complications, such as peri-implantitis and mechanical failures, warrant careful monitoring and maintenance to ensure long-term success.

LITERATURE SEARCH

This study is based on a comprehensive literature search conducted on June 12, 2023 in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed indications, design considerations, and clinical outcomes of implant-supported fixed prostheses. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

Implant-supported fixed prostheses are a suitable treatment option for various clinical situations involving tooth loss or edentulism. Common indications for the use of implant-supported fixed prostheses include single tooth replacement, multiple teeth replacement, full arch edentulism, partial edentulism, improved stability and retention, preservation of bone and soft tissues, and aesthetic considerations.[14] When a patient has a single missing tooth, an implant-supported fixed prosthesis can be an excellent alternative to conventional fixed partial dentures or resin-bonded bridges. Firstly, the implant serves as an artificial tooth root, providing stability and support for a custom-made crown that replaces the missing tooth.[15] Further, implant-supported fixed prostheses are often indicated when several adjacent teeth are missing. By strategically placing dental implants, a fixed bridge can be fabricated, replacing multiple missing teeth.[16] This avoids the need for removable dentures or the preparation of healthy adjacent teeth for traditional fixed bridgework. Moreover, complete tooth loss in either the upper or lower arch can be effectively treated with implant-supported fixed prostheses.[17] Using a series of dental implants strategically placed within the arch, a fixed prosthesis can be secured, restoring both function and aesthetics. This eliminates the need for removable complete dentures, providing improved stability and patient comfort. Furthermore, when a patient has a combination of natural teeth and missing teeth, implant-supported fixed prostheses can be used to replace the missing teeth while preserving the natural dentition. The dental implants act as anchors, supporting the fixed prosthesis without relying on adjacent natural teeth for stability. Also, patients who have experienced instability or difficulty with removable dentures may benefit from implant-supported fixed prostheses.[18] By anchoring the prosthesis to dental implants, stability and retention are significantly enhanced, improving patient comfort and confidence during mastication and speech. Additionally, implant-supported fixed prostheses help preserve the integrity of the jawbone and adjacent soft tissues. Dental implants stimulate the underlying bone, preventing bone resorption that typically occurs following tooth loss.[19]

This contributes to maintaining facial aesthetics and a healthy oral environment. Lastly, implant-supported fixed prostheses offer superior esthetics compared to traditional removable dentures. Customized crowns or bridges can be fabricated to match the natural color, shape, and contour of adjacent teeth, resulting in a seamless and natural-looking smile.

Implant-supported fixed prostheses offer a reliable and functional solution for the replacement of missing teeth. However, certain clinical conditions and patient factors may contraindicate their use. Certain systemic conditions may contraindicate the use of implant-supported fixed prostheses.[20] These conditions include uncontrolled diabetes, autoimmune disorders, bleeding disorders, untreated or active malignancy, and systemic conditions that compromise bone healing, such as osteoporosis or bisphosphonate therapy. These systemic factors may increase the risk of implant failure, impair healing processes, or compromise the patient's ability to undergo surgical procedures.[21] Local factors in the oral cavity can also contraindicate the use of implant-supported fixed prostheses. Severe periodontal disease, active oral infections, or untreated oral lesions may compromise the success of dental implant therapy.[22] Inadequate bone quantity or quality in the implant site may also present challenges for implant placement and osseointegration.[23] Proper evaluation and management of these local factors are essential before considering implant-supported fixed prostheses. Anatomical factors can significantly influence the suitability of implant-supported fixed prostheses. Insufficient bone volume or inadequate bone density in the potential implant sites may hinder successful implant placement. Insufficient interarch space or unfavorable crown-root ratios may limit the feasibility of implant-supported fixed prostheses.[24] Additionally, anatomical structures such as nerves or sinuses in close proximity to the implant site may pose challenges during surgery. Comprehensive radiographic evaluation and treatment planning are necessary to identify and address anatomical contraindications. Several patient-specific factors should be considered when evaluating the suitability of implant-supported fixed prostheses. Poor oral hygiene practices, smoking, and uncooperative patients may increase the risk of peri-implant diseases and complications.[25] Patients with unrealistic expectations, psychological concerns, or limited motivation may not be ideal candidates for implant therapy. Patient cooperation and commitment to postoperative care and maintenance are essential for the long-term success of implant-supported fixed prostheses. A thorough review of the patient's medical history and medications is crucial to identify potential contraindications. Certain medications, such as bisphosphonates and anticoagulants, may increase the risk of complications or impair implant healing.[26] In patients with a history of radiation therapy to the head and neck region, careful evaluation is necessary to assess the impact on the oral tissues and implant integration. Close collaboration with the patient's healthcare team is essential in managing these complex cases. Psychological factors, such as severe dental anxiety or unrealistic expectations, should also be taken into account.[27] Patients with significant dental anxiety may not tolerate the surgical procedures and follow-up visits required for implant-supported fixed prostheses. Additionally, patients with unrealistic expectations regarding treatment outcomes may be dissatisfied with the final results. Open communication, patient education, and counseling are essential in managing these psychological considerations. In some cases, the presence of contraindications may indicate the need for alternative treatment options to replace missing teeth. Removable prostheses, implant-supported overdentures, or other non-implant-based treatments may be more suitable for certain patients.

The design of implant-supported fixed prostheses plays a crucial role in achieving long-term success and optimal patient outcomes. Key design considerations involved in the fabrication of implant-supported fixed prostheses include implant distribution and angulation, occlusal considerations, emergence profile, and material selection. The design of implant-supported fixed prostheses involves careful planning and consideration of various factors to ensure functional stability, esthetics, and longevity. The distribution and angulation of dental implants significantly impact the load distribution, stress patterns, and overall biomechanical stability of implant-supported fixed prostheses.[28] The number and position of implants should be carefully determined to achieve an optimal balance between biomechanical demands and esthetics. Factors such as bone quality, available space, occlusal forces, and patient-specific considerations influence the implant distribution and angulation.[29] Proper occlusal design is essential for the long-term success of implant-supported fixed prostheses. Occlusal forces must be distributed evenly among the implants and natural dentition to minimize mechanical complications and implant overloading. Functional and parafunctional movements should be considered during the occlusal design process, with appropriate adjustments and occlusal schemes implemented to minimize excessive forces on the implants and prosthetic components. The emergence profile, defined as the contour and position of the prosthesis in relation to the surrounding soft tissues, plays a vital role in achieving natural esthetics and facilitating proper oral hygiene.[30] The emergence profile should replicate the contours of natural teeth, ensuring harmonious integration with the adjacent soft tissues. Further, careful consideration of emergence profile during the design phase helps optimize esthetics, phonetics, and maintenance of oral hygiene. The selection of appropriate materials for implant-supported fixed prostheses is crucial for achieving both functional and esthetic outcomes.[31] Prosthesis frameworks can be fabricated from various materials, including metals, ceramics, or hybrid options. Factors such as occlusal loading, esthetic requirements, and patient-specific considerations influence material selection. High-strength materials like titanium and zirconia are commonly used for implant frameworks, while esthetic materials like lithium disilicate and layered

ceramics are favored for the visible components. Additionally, a thorough understanding of the biomechanics of implant-supported fixed prostheses is essential for successful design. Biomechanical analysis helps identify stress distribution patterns, potential areas of implant overload, and areas of concern for mechanical complications.[32] Techniques such as finite element analysis aid in optimizing the design and evaluating the biomechanical performance of implant-supported fixed prostheses before clinical implementation. Achieving optimal esthetics is a critical aspect of implant-supported fixed prostheses, particularly in the anterior region. The design should focus on creating natural-looking restorations that blend seamlessly with the remaining dentition and surrounding soft tissues.[33] Factors such as tooth shape, shade, texture, and translucency should be meticulously considered to achieve an esthetically pleasing outcome that satisfies patient expectations. Several clinical factors influence the design of implant-supported fixed prostheses, including patient assessment, treatment planning, surgical protocols, and prosthetic techniques. Comprehensive evaluation of oral health, bone quality, and quantity is crucial to determine the feasibility and limitations of the implant-supported fixed prosthesis design. Proper surgical protocols, such as implant selection, site preparation, and achieving primary stability, are critical for successful implant placement and osseointegration. Advances in digital technology and computational analysis have enhanced the precision and predictability of implant-supported fixed prosthesis design, providing clinicians with valuable tools for improved treatment planning and outcomes.[34,35]

Implant-supported fixed prostheses have revolutionized restorative dentistry by providing a reliable solution for patients with missing teeth. Understanding the clinical outcomes associated with these prostheses is crucial for assessing their long-term success. Implant survival is a critical factor in assessing the clinical success of implant-supported fixed prostheses. Numerous studies have reported high implant survival rates, with long-term studies demonstrating survival rates ranging from 90% to 98%.[36] Factors influencing implant survival include patient characteristics, implant location, bone quality, surgical technique, and prosthetic design.[36] Adequate preoperative assessment, meticulous surgical protocols, and appropriate prosthetic techniques contribute to favorable implant survival rates. While implant-supported fixed prostheses offer excellent clinical outcomes, prosthetic complications can occur over time. The most common prosthetic complications include screw loosening, porcelain chipping, framework fractures, and veneer debonding.[37] These complications are often multifactorial and can be influenced by occlusal factors, material selection, framework design, and patient-related factors. However, with proper maintenance and regular follow-up, the incidence of prosthetic complications can be minimized. The health of peri-implant tissues is a crucial aspect of implant-supported fixed prostheses. Peri-implant mucositis and peri-implantitis are inflammatory conditions that can affect the long-term stability and success of implants.[38] Proper oral hygiene maintenance, regular professional maintenance, and early detection and management of peri-implant diseases are essential for ensuring peri-implant health and preventing complications. Patient-reported outcomes provide valuable insights into the success of implant-supported fixed prostheses. Multiple studies have demonstrated high patient satisfaction rates, with patients reporting improved chewing ability, speech, esthetics, and overall quality of life.[39] Patient satisfaction is influenced by factors such as function, comfort, esthetics, and psychological well-being. Adequate patient education, realistic expectations, and personalized treatment planning contribute to improved patient satisfaction. Long-term success of implant-supported fixed prostheses depends on various factors, including proper case selection, meticulous treatment planning, precise surgical and prosthetic execution, and comprehensive follow-up care. Longitudinal studies have demonstrated high long-term success rates, with studies reporting 10-year success rates exceeding 90%.[40] Factors influencing long-term success include implant survival, peri-implant health, maintenance of prosthesis integrity, and patient satisfaction. Several factors influence the clinical outcomes of implant-supported fixed prostheses. These include patient-related factors (systemic health, smoking status, oral hygiene), anatomical factors (bone quality and quantity, implant position), surgical factors (implant selection, surgical technique), prosthetic factors (material selection, framework design), and maintenance protocols.[41]

CONCLUSION

Implant-supported fixed prostheses offer favorable clinical outcomes, including high implant survival rates, patient satisfaction, improved chewing ability, and enhanced esthetics. Prosthetic complications and peri-implant diseases are possible, but with proper maintenance and management, their incidence can be minimized. Successful treatment outcomes depend on thorough patient assessment, meticulous treatment planning, precise surgical and prosthetic execution, and comprehensive follow-up care. By considering these factors and adhering to best practices, clinicians can optimize the clinical outcomes of implant-supported fixed prostheses and provide patients with functional and esthetic restorations that improve their oral health and quality of life.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Lindh T, Dahlgren S, Gunnarsson K. Tooth-implant supported fixed prostheses: a retrospective multicenter study. Int J Prosthodontics. 2001;14(4).

2. Chrcanovic BR, Kisch J, Larsson C. Analysis of technical complications and risk factors for failure of combined tooth-implant-supported fixed dental prostheses. Clin Implant Dentistry Rel Res. 2020;22(4):523-32.
3. Sheridan RA, Decker AM, Plonka AB, Wang H-L. The role of occlusion in implant therapy: a comprehensive updated review. Implant Dentistry. 2016;25(6):829-38.
4. Chu SJ, Kan JY, Lee EA. Restorative emergence profile for single-tooth implants in healthy periodontal patients: clinical guidelines and decision-making strategies. Int J Periodontics Restorative Dent. 2019;40(1):19-29.
5. Kobayashi E, Matsumoto S, Doi H, Yoneyama T, Hamanaka H. Mechanical properties of the binary titanium-zirconium alloys and their potential for biomedical materials. J Biomed Materials Res. 1995;29(8):943-950.
6. Tysowsky G. The science behind lithium disilicate: today's surprisingly versatile, esthetic and durable metal-free alternative. Oral Health. 2009;99(3):93.
7. Hingsammer L, Pommer B, Hunger S, Stehrer R, Watzek G, Insua A. Influence of implant length and associated parameters upon biomechanical forces in finite element analyses: a systematic review. Implant Dentistry. 2019;28(3):296-305.
8. Herrmann I, Lekholm U, Holm S, Kultje C. Evaluation of patient and implant characteristics as potential prognostic factors for oral implant failures. Int J Oral Maxillofacial Implants. 2005;20(2).
9. Turkyilmaz I, McGlumphy EA. Influence of bone density on implant stability parameters and implant success: a retrospective clinical study. BMC Oral Heal. 2008;8(1):1-8.
10. Tabassum A, Meijer GJ, Wolke JG, Jansen JA. Influence of the surgical technique and surface roughness on the primary stability of an implant in artificial bone with a density equivalent to maxillary bone: a laboratory study. Clin Oral Implants Res. 2009;20(4):327-32.
11. Kapur KK, Garrett NR, Hamada MO. Randomized clinical trial comparing the efficacy of mandibular implant-supported overdentures and conventional dentures in diabetic patients. Part III: comparisons of patient satisfaction. J Prosthetic Dentistry. 1999;82(4):416-27.
12. Nikellis T, Lampraki E, Romeo D, et al. Survival rates, patient satisfaction, and prosthetic complications of implant fixed complete dental prostheses: a 12-month prospective study. J Prosthodontics. 2023;32(3):214-20.
13. Pjetursson BE, Karoussis I, Bürgin W, Brägger U, Lang NP. Patients' satisfaction following implant therapy: a 10-year prospective cohort study. Clin Oral Implants Res. 2005;16(2):185-93.
14. Jivraj S, Chee W. Rationale for dental implants. British Dental J. 2006;200(12):661-5.
15. Pasqualini U, Pasqualini M. Treatise of Implant Dentistry. Carimate Como: AriesDue. 2009.
16. Henry P. Tooth loss and implant replacement. Australian dental journal. 2000;45(3):150-172.
17. Monteiro DR, Silva EV, Pellizzer EP, Magro Filho O, Goiato MC. Posterior partially edentulous jaws, planning a rehabilitation with dental implants. World J Clin Cases: WJCC. 2015;3(1):65.
18. Misch CE. Rationale for dental implants. Dental implant prosthetics 2nd ed St Louis (MO): Elsevier. 2014:1-25.
19. Weinlaender M. Bone growth around dental implants. Dental Clin N Am. 1991;35(3):585-601.
20. Diz P, Scully C, Sanz M. Dental implants in the medically compromised patient. J Dentistry. 2013;41(3):195-206.
21. Liddelow G, Klineberg I. Patient-related risk factors for implant therapy. A critique of pertinent literature. Aust Dental J. 2011;56(4):417-26.
22. Quirynen M, Teughels W. Microbiologically compromised patients and impact on oral implants. Periodontology. 2003;33(1):119-28.
23. Chrcanovic BR, Albrektsson T, Wennerberg A. Bone Quality and Quantity and Dental Implant Failure: A Systematic Review and Meta-analysis. Int J Prosthodontics. 2017;30(3).
24. Nugala B, Kumar BS, Sahitya S, Krishna PM. Biologic width and its importance in periodontal and restorative dentistry. J Conservative Dentistry. 2012;15(1):12.
25. Heitz-Mayfield LJ. Peri-implant diseases: diagnosis and risk indicators. J Clin Periodontol. 2008;35:292-304.
26. Vissink A, Spijkervet F, Raghoebar G. The medically compromised patient: Are dental implants a feasible option? Oral diseases. 2018;24(1-2):253-60.
27. Selim K, Ali S, Reda A. Implant supported fixed restorations versus implant supported removable overdentures: a systematic review. Open Access Macedonian J Med Sci. 2016;4(4):726.
28. Şahin S, Cehreli MC, Yalçın E. The influence of functional forces on the biomechanics of implant-supported prostheses-a review. J Dentistr. 2002;30(7-8):271-82.
29. Gross M. Occlusion in implant dentistry. A review of the literature of prosthetic determinants and current concepts. Austr Dental J. 2008;53:S60-8.
30. Schoenbaum TR. Abutment emergence profile and its effect on peri-implant tissues. Compend Contin Educ Dent. 2015;36(7):474-.
31. Pjetursson BE, Fehmer V, Sailer I. EAO Position Paper: Material selection for implant-supported restorations. Int J Prosthodontics. 2022;35(1):7-16.
32. Hsu Y-T, Fu J-H, Al-Hezaimi K, Wang H-L. Biomechanical implant treatment complications: a systematic review of clinical studies of implants with at least 1 year of functional loading. Int J Oral Maxillofacial Implants. 2012;27(4).
33. Jivraj S, Chee W. Treatment planning of implants in the aesthetic zone. Brit Dental J. 2006;201(2):77-89.
34. Coachman C, Calamita MA, Coachman FG, Coachman RG, Sesma N. Facially generated and

cephalometric guided 3D digital design for complete mouth implant rehabilitation: a clinical report. J Prosthetic Dentistr. 2017;117(5):577-86.
35. Albiero AM, Benato R, Momic S, Degidi M. Implementation of computer-guided implant planning using digital scanning technology for restorations supported by conical abutments: A dental technique. J Prosthetic Dentistr. 2018;119(5):720-6.
36. Albrektsson T, Donos N, 1 WG. Implant survival and complications. The Third EAO consensus conference 2012. Clin Oral Implants Res. 2012;23:63-5.
37. De Kok IJ, Duqum IS, Katz LH, Cooper LF. Management of implant/prosthodontic complications. Dental Clin. 2019;63(2):217-31.
38. Levin L. Nonsurgical and surgical management of biologic complications around dental implants: Peri-implant mucositis and peri-implantitis. Quintessence Int. 2020;51(10):810-20.
39. Duong HY, Roccuzzo A, Stähli A, Salvi GE, Lang NP, Sculean A. Oral health-related quality of life of patients rehabilitated with fixed and removable implant-supported dental prostheses. Periodontology. 2022;88(1):201-37.
40. Moraschini V, Poubel LdC, Ferreira V, dos Sp Barboza E. Evaluation of survival and success rates of dental implants reported in longitudinal studies with a follow-up period of at least 10 years: a systematic review. Int J Oral Maxillofacial Surg. 2015;44(3):377-88.
41. Mauer RG, Shadrav A, Dashti M. Predictability of dental implants. Innovative Perspectives Oral Maxillofacial Surg. 2021:35-45.

Cite this article as: Alfaer AS, Bakhsh KK, Alyami IM, Fallatah RM, Saloum MS, Al Harbi NY et al. Indications, design considerations, and clinical outcomes of implant-supported fixed prostheses. Int J Community Med Public Health 2023;10:2974-9.