Comparative Evaluation of Oral Health Quality of Life among Geriatric Patients Undergoing Oral Rehabilitation with Conventional Dentures Versus Strategic Implant Supported Prosthesis – A Randomized Control Trial with 1-year Follow-Up

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ABSTRACT

Background: Conventional dentures often provide limited stability in edentulous patients with resorbed ridges. Strategic implants, designed for bicortical anchorage and immediate loading, may offer improved functional outcomes. This study compares the impact of strategic implant–supported prostheses and conventional dentures on oral health–related quality of life (OHRQoL) in geriatric patients.

Materials and Methods: Sixty edentulous patients (≥60 years) were randomly assigned to receive either conventional complete dentures (Group A) or strategic implant–supported prostheses (Group B). OHRQoL was assessed using GOHAI and OHIP-14 at baseline, immediately after treatment, and at 3-, 6-, and 12-month follow-ups.

Results: Both groups showed improved OHRQoL over time, but Group B exhibited significantly greater improvement. The implant group demonstrated a larger decrease in GOHAI scores and increase in OHIP-14 scores across all follow-ups, with the most significant differences observed at 3 and 6 months (p < 0.001).

Conclusion: Strategic implant–supported prostheses provide superior improvement in quality of life compared to conventional dentures, particularly for patients with resorbed ridges, making them a strong alternative for geriatric oral rehabilitation.

Keywords: Basal Implants, Complete Dentures, OHRQoL, Immediate Loading, Strategic Implants.

Introduction

Tooth loss greatly impairs the masticatory efficiency, leading to restrictions in diet and possible nutritional deficiencies.[1] Currently, edentulous ridges are rehabilitated with either conventional dentures or implant-supported

prosthesis. However, rapid resorption of the alveolar ridge after loss of teeth compromises optimal retention and stability in conventional dentures.[2] Managing moderately to severely resorbed ridges with standard implants is also difficult because adequate bone height and width, ideally around 13–15 mm and 5–7 mm, respectively, are required for successful osseointegration.[3] To restore the lost alveolar dimensions, additional procedures like bone grafting, nerve repositioning and sinus lift are required, which add to the discomfort, prolongation of healing time and treatment cost for the patient.4

In such scenarios, strategic implants have proven to be a sustainable alternative. Drawing from the principles of orthopedics and traumatology, these implants are designed to utilize the cortical portion of the basal bones for anchorage.[5] According to this concept, if implants achieve initial stability but have not undergone osseointegration yet, it is similar to the surgical stabilization of mobile bone fragments by osteosynthesis plates in orthopedic surgery.[6] Ihde and Ihde later redefined strategic implants by introducing smooth surface screws with bicortical anchorage.[7] Other considerations include –thin mucosal penetration, smooth surface significantly decreasing the risk of peri-implantitis, single-piece abutments, bendable zone, avoidance of cantilever, and cross-arch splinting, preferably within 72 hours of the procedure (before remodeling starts).[8,9] Although slender, these implants are engineered to endure occlusal forces and can be bent to achieve proper prosthetic positioning.[10] Additionally, these implants are designed to be flapless, causing less trauma to the tissues, while the force is transmitted at apical threads engaged at the basal cortex and buttresses with negligible influence of the relatively unstable crestal cortex on which conventional implants rely.[11]

As with any treatment modality, long-term clinical studies are essential to establish the effectiveness of basal implants for rehabilitating atrophic ridges.

The satisfaction of the patients and improvement in their health is the ultimate goal of any oral rehabilitation procedure. To assess health from a comprehensive perspective, tools measuring broader aspects of wellbeing, specifically Quality of Life indicators, have been developed.[12] Oral Health-Related Quality of Life (OHRQoL) reflects how oral conditions influence daily functioning and physical, psychological, and social well-being.[13] One of the most commonly used instruments for assessing OHRQoL is the Oral Health Impact Profile (OHIP), which consists of 49 standardized items that measure domains such as functional limitation, pain, physical and social disability, and handicap.[14] Shorter, validated versions have since been created for ease of use.[1] To simplify its clinical use, shorter validated versions have been introduced. In 1997, Slade developed a concise 14-item version that demonstrated strong reliability, validity, and precision. These 14 items are grouped into seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap.[15]

Another widely utilized instrument is the Geriatric Oral Health Assessment Index (GOHAI), created by Atchison and Dolan in 1990 as a 12-item questionnaire for older adults in the USA. It is designed to assess three key components of quality of life: physical function, psychosocial function, and pain or discomfort.[16]

Understanding patients' subjective experiences is essential, as their perceptions of oral disease and treatment often influence their quality of life more profoundly than clinical findings alone. Studies have shown a mismatch between patients' denture satisfaction and clinicians' evaluations, emphasizing the need to incorporate patient-reported outcomes into routine practice.[17]

Therefore, this study aims to evaluate and compare the impact of strategic implant-supported

prosthesis and conventional complete dentures on the OHRQoL among geraitric edentulous patients.

Methodology
Ethical Considerations
This randomized controlled trial was approved by the Ethics Committee of the Faculty of Medicine, Aligarh Muslim University. Participants were informed that their participation was entirely voluntary and that their identities would be kept confidential. Although names were collected for study administration purposes, they were not revealed at any stage. Informed consent was ensured, as demonstrated by the participants' voluntary completion of the questionnaires across five separate assessment intervals.

Participants Selection
Patients were recruited from those, reporting to the Department of Prosthodontics, Dr. Z A Dental College, AMU, Aligarh on the basis of strict inclusion and exclusion criteria.

A total of 60 participants, who agreed to participate in the study, were randomly selected and divided into two groups: Group A (Control) - 30 patients receiving conventional complete dentures; and Group B (Test) - 30 patients receiving strategic implant-supported prostheses. The inclusion criteria were – patients above the age of 60 years, who had either all teeth missing or some remaining, which were planned for extraction; absence of prolonged disorders, like TMJ disorders and soft tissue lesions; patients with resorbed edentulous ridges, who were co-operative, motivated and hygiene conscious. Only those patients who agreed to follow the study protocol and were willing to sign an informed consent form were included. Patients with uncontrolled systemic disease, recent history of myocardial infarction, bleeding disorders, any mental illness, hypersensitivity to implant materials and those with expected surgical complications, were excluded.

Treatment Planning and Execution
The initial examinations were conducted by two of the authors, both specialists in the field of Prosthodontics. A thorough clinical examination, radiographic analysis, and relevant blood investigations were performed. The suitability of implant-supported dentures was determined based on factors such as bone density, periodontal health, and overall oral and systemic conditions. Patients were then counseled on the available treatment options, and informed consent was obtained before enrollment. OHIP-14 and GOHAI questionnaires were administered pre-operatively, to assess the Quality of life of the patient before treatment.

For Group A, complete dentures with bilateral balanced occlusion were fabricated by trained professionals, using the conventional technique. The participants of Group B underwent surgery for strategic implant placement, engaging both the cortical plates of the alveolar bone, to facilitate osseofixation. The procedures were performed in routine dental operatory, mostly being flapless, except in cases, where extraction was done. The prosthetic phase of Group B was completed within 7 to 10 days of implant placement to ensure maximum stability and fixation to the bone. The occlusal scheme provided for the second group, preferably, was a lingualised occlusion.

Patients of both groups were provided with all necessary instructions regarding diet and hygiene maintenance protocols were demonstrated to them.

Follow up and data collection
The patients' oral hygiene and status of prosthesis were assessed clinically at the follow-up appointments. Hygiene measures were reinforced, and any problems encountered with the prosthesis were eliminated by correction.
Well-explained questionnaires for assessing the Quality of life were administered to the patients at fixed intervals – pre-operative, post-operative, 03, 06, 12 months follow-up.

This study utilized the Geriatric Oral Health Assessment Index (GOHAI) along with a shortened form of the OHIP-49, known as OHIP-14, which allows for quick evaluation of oral health–related quality of life. The questionnaires were explained to participants in their local language to ensure better comprehension and more accurate responses. A 5-point Likert scale was used for all items, with response options ranging from "Never" to "Very Often." As the study involved edentulous individuals, the 12th item of the GOHAI questionnaire—related to sensitivity to hot, cold, or sweet foods—was excluded. Improvement in OHRQoL is indicated by a decrease in GOHAI score (minimum – 11; maximum – 55) and an increase in OHIP-14 score (minimum – 14; maximum – 70).

Statistical Analysis

Data was statistically analyzed using paired t-test for intra-group analysis (within the same patients at different time intervals) and ANOVA for intergroup comparison (between Group A and Group B) using IBM SPSS Statistics (IBM, Chicago, IL, USA). A significance level of $p < 0.05$ was used to determine meaningful changes in both questionnaires. Descriptive statistics such as mean, standard deviation, and percentage distributions were calculated to summarize trends. The normality of data was tested using the Shapiro-Wilk test, and homogeneity of variance was assessed using Levene's test.

Results

The final sample that underwent the control trial was a total of 60 patients divided into two equal groups, based on the treatment modality. Group A (conventional denture) had 20 males and 10 female participants, with a mean age of 69.3 years, whereas Group B (implant-supported prosthesis) had 22 males and 8 females, with a mean age of 67.9 years. Table 1 and Table 2 summarize the mean scores of the GOHAI and OHIP-14 questionnaires at different time intervals, respectively.

Time Point	Group A	Group B	p value
Pre-Operative	42.10 ± 5.148	44.97 ± 3.605	0.016*
Post-Operative	38.20 ± 5.255	36.27 ± 3.638	0.104
3 Months Follow up	35.33 ± 5.422	29.70 ± 3.621	< 0.001***
6 Months Follow up	30.97 ± 5.301	24.81 ± 3.728	< 0.001***
1 Year Follow up	27.78 ± 4.482	21.89 ± 3.180	< 0.01**

*Significant at 5% level of significance; **Significant at 1% level of significance; ***Significant at 0.1% level of significance.

Table 1: Mean scores of GOHAI questionnaire.

Time Point	Control	Test	p value
Pre-Operative	30.80 ± 6.718	27.63 ± 3.996	< 0.05*
Post-Operative	35.70 ± 6.773	39.23 ± 4.681	< 0.05*
3 Months Follow up	40.00 ± 6.270	47.00 ± 5.051	< 0.001***
6 Months Follow up	44.37 ± 5.385	51.38 ± 6.344	< 0.001***
1 Year Follow up	49.52 ± 4.944	54.67 ± 6.305	< 0.05*

* Significant at 5% level of significance; ** Significant at 1% level of significance; *** Significant at 0.1% level of significance.

Table 2: Mean scores of OHIP-14 questionnaire.

Significant improvement was seen in the Test group as compared to the control group (p<0.05). Highest significance (p<0.001) was seen in the time interval 3 months and 6 months follow-up. The test group exhibited a higher decrease in mean GOHAI scores (from pre op mean score of 44.97 to 21.89 after 1 year) and an increase in OHIP-14 scores (from pre op 27.63 to 54.67 at 1 year follow-up) over time compared to the control group, confirming the positive impact of the intervention. However, post-operative scores for the GOHAI scale were not statistically significant (p=0.104).

Discussion

This randomized controlled trial assessed the effects of strategic implant–supported prostheses versus conventional complete dentures on the OHRQoL of elderly edentulous patients at multiple time points—preoperatively, immediately after prosthesis placement, and at 3-month, 6-month, and 1-year follow-ups. The findings showed that the mean OHIP-14 and GOHAI scores improved in both groups from the point of prosthesis delivery up to the 1-year evaluation. However, the improvement was drastic and far more significant in patients with a strategically implanted supported prosthesis. (p< 0.05 at all intervals) The follow-ups at 3 months and 6 months showed the most significant improvement in mean scores (p< 0.001).

Azar R et al. assessed quality of life in patients rehabilitated with conventional dentures versus implant-supported overdentures using the OHIP-20 questionnaire. They reported mean OHIP-20 scores of 43.82 ± 15.95 for the overdenture group and 48.64 ± 18.44 for the conventional denture group, noting that lower scores correspond to better QoL (P = 0.063). (2) Similar patterns were observed in other studies: Awad et al. reported values of 66.1 ± 28.08 and 89.3 ± 40.42 for the two groups, while Heydecke et al. documented scores of 35 ± 15.94 and 47.84 ± 22.6, respectively—findings that align with the trends seen in our study.[18,19]

However, this study has evaluated patients with a strategic implant prosthesis. In cases of atrophied mandibular ridges, retention from the ridge is minimal. It decreases denture stability in cases of removable prostheses. Additionally, bone quality and quantity is insufficient for conventional implant placement. Basal implants provide a great alternative for satisfactory esthetic and functional outcomes in these cases. They do not require grafting, and flap surgeries can also be usually avoided, reducing the chances of surgical complications. The armamentarium is simple, and the number of drills required is less than that of conventional systems. The immediate loading protocol followed in these cases has the advantage of faster rehabilitation, consuming less chair-side time. The smooth surface of these implants allows uneventful, quick healing with minimal chances of peri-implant infection.[20,21]

On the other hand, certain challenges were faced with this protocol. Apprehension regarding surgical procedures, difficulty in compliance for follow-up due to old age, multiple visits and long-term follow-up required a lot of motivation and education of both the patient and their attendant. Surgical complications were faced due to anatomical variations. Thorough treatment planning and diagnostic aids like CBCT helped in overcoming this challenge to a great extent. Prosthetic designs needed to be modified according to each individual's restorative space and profile. Meticulous hygiene maintenance and compliance in the geriatric population is difficult due to reduced manual dexterity. This is overcome by keeping the prosthesis design hygienic.

A structured feedback via questionnaires and interviews indicated an overall increase in self-esteem and social participation, positive comments on the ease of function and improved aesthetics, particularly, patients with implant-supported dentures noted superior stability and fewer incidences of discomfort compared to those with conventional dentures. Further studies focusing on the clinical and radiographic evaluation, and

longer follow-ups, can give a better picture of this treatment modality.

Conclusion

Implant-supported prosthesis has proven to improve the QoL of geriatric edentulous patients over conventional complete dentures. Placing basal implants has the added advantage of immediate loading, faster final prosthesis placement, and rehabilitation of atrophied ridges which were otherwise inadequate for a conventional implant-supported prosthesis. They reduce the surgical complications by eliminating the need for grafting and raising the flap in most cases. With good prosthesis design and meticulous hygiene maintenance, it can prove to be a viable long-term treatment modality for edentulous patients.

Acknowledgements

References

1. Sabău, D. T., Moca, A. E., Juncar, R. I., Bota, T., & Juncar, M. (2024). Analysis of Oral Health-Related Quality of Life in Elderly Romanian Edentulous Patients: Implant-Supported Versus Conventional Complete Dentures. Journal of Clinical Medicine, 13(22), 6865. https://doi.org/10.3390/jcm13226865

2. Azar, R., Semyari, H., & Kharazifard, M. J. (2020). Oral Health Related Quality of Life of Patients Using Conventional Dentures versus Implant-Supported Overdentures. Frontiers in dentistry, 17(4), 1–7. https://doi.org/10.18502/fid.v17i1.3964

3. Ihde S. Restoration of the atrophied mandible using basal osseointegrated implants and fixed prosthetic superstructures. Implant Dent. 2001;10(1):41-5. doi: https://doi.org/10.1097/00008505-200101000-00011

4. Sharma R, P J, Dhruv A, Hasti A. Basal Implants- An Alternate Treatment Modality for Atrophied Ridges. IJRID. 2016;6:60–72.

5. Patel, K., Madan, S., Mehta, D., Shah, S. P., Trivedi, V., & Seta, H. (2021). Basal Implants: An Asset for Rehabilitation of Atrophied Resorbed Maxillary and Mandibular Jaw - A Prospective Study. Annals of maxillofacial surgery, 11(1), 64–69. https://doi.org/10.4103/ams.ams_446_20

6. Gangadhar, B., Ila, A., Kumar, R., Ruban, B., Punnoose, K., Dandekeri, S., Babu J, S., Swarnalatha, C., & Nayyar, A. S. (2023). Strategic implants and bone morphogenic changes: Survival and clinical success in long-term. Journal of Orthodontic Science, 12, 24. https://doi.org/10.4103/jos.jos_43_22

7. Ihde S, Ihde A. 3rd ed. Munich, Germany: The International Implant Foundation Publishing; 2017. Introduction into the Work with Strategic Implants.

8. Rubin CT, McLeod KJ, Bain SD. Functional strains and cortical bone adaptation: Epigenetic assurance of skeletal integrity. J Biomech. 1990;23:43–54. doi: https://doi.org/10.1016/0021-9290(90)90040-a

9. Ruedi TP, Murphy WM. Stuttgart/New York: Thieme; 2001. AO Principles of Fracture Management.

10. Gupta AD, Verma A, Dubey T, Thakur S. Basal osseo-integrated implants: Classification and review. Int J Contemp Med Res. 2017;4:2329–35. https://www.ijcmr.com/uploads/7/7/4/6/77464738/ijcmr_1768.pdf

11. Verna C. Regional acceleratory phenomenon. Front Oral Biol. 2016;18:28–35. doi: https://doi.org/10.1159/000351897

12. Pequeno, N.P.F.; Cabral, N.L.A.; Marchioni, D.M.; Lima, S.C.V.C.; Lyra, C.O. Quality of Life Assessment Instruments for Adults:A Systematic Review of Population-Based Studies. Health Qual. Life Outcomes **2020**, 18, 208; doi: https://doi.org/10.1186/s12955-020-01347-7

13. Parkerson, G.R., Jr.; Gehlbach, S.H.;Wagner, E.H.; James, S.A.; Clapp, N.E.; Muhlbaier, L.H. The Duke-UNC Health Profile: An Adult Health Status Instrument for Primary Care. Med. Care **1981**, 19, 806–828. doi: https://doi.org/10.1097/00005650-198108000-00002

14. Sischo, L.; Broder, H.L. Oral Health-Related Quality of Life: What, Why, How, and Future Implications. J. Dent. Res. **2011**,90, 1264–1270.

15. Slade G. D. (1997). Derivation and validation of a short-form oral health impact profile. Community dentistry and oral epidemiology, 25(4), 284–290. https://doi.org/10.1111/j.1600-0528.1997.tb00941.x

16. Atchison, K. A., & Dolan, T. A. (1990). Development of the Geriatric Oral Health Assessment Index. Journal of dental education, 54(11), 680–687. https://pubmed.ncbi.nlm.nih.gov/2229624/

17. John, M.T.; Omara, M.; Su, N.; List, T.; Sekulic, S.; Haggman-Henrikson, B.; Visscher, C.M.; Bekes, K.; Reissmann, D.R.; Baba, K.; et al. Recommendations for Use and Scoring of Oral Health Impact Profile Versions. J. Evid. Based Dent. Pract. **2022**, 22, 101619. doi: https://doi.org/10.1016/j.jebdp.2021.101619

18. Awad MA, Locker D, Korner-Bitensky N, Feine JS. Measuring the effect of intra-oral implant rehabilitation on health-related quality of life in a randomized controlled clinical trial. J Dent Res. 2000 Sep;79(9):1659-63. doi: https://doi.org/10.1177/00220345000790090401

19. Heydecke G, Locker D, Awad MA, Lund JP, Feine JS. Oral and general health-related quality of life with conventional and implant dentures. Community Dent Oral Epidemiol. 2003 Jun;31(3):161-8. doi: https://doi.org/10.1034/j.1600-0528.2003.00029.x

20. Perla N. A Comprehensive Overview of Basal Implants. (2024) Int J Inn Sci Res Tech, 9(8); doi: https://doi.org/10.38124/ijisrt/IJISRT24AUG1462

21. Pathania N, Gill HS, Nagpal A, Vaidya S, Sailo JL. Basal implants–A blessing for atrophied ridges. IP Annals of Prosthodontics and Restorative Dentistry. 2021;7(1):16-21. doi: https://doi.org/10.18231/j.aprd.2021.004