



COMPARISON OF ORAL HEALTH-RELATED QUALITY OF LIFE AND MASTICATORY EFFICIENCY IN PATIENTS WEARING IMPLANT-SUPPORTED OVERDENTURES VERSUS CONVENTIONAL COMPLETE DENTURES: A MULTICENTER CROSS-SECTIONAL STUDY

Ali Hassan Mir¹ Rozeena Farooq^{2*} Mehwish Shoro³ Shaista Aziz⁴ Pakiza Fatima⁵ Muzamal Maqsood Butt⁶

¹BDS, Post Graduate Resident, Department of Periodontology, Khyber College of Dentistry, Peshawar, Pakistan Email: alihassanmir64@gmail.com

²BDS, FCPS, Dental surgeon, RHC Shinkari, Mansehra, Pakistan
Email: rozeenafarooq@gmail.com

³BDS, FCPS, MSc, Assistant Professor, Department of Prosthodontics, Institute of Dentistry, LUMHS, Jamshoro, Pakistan Email: wishumair@gmail.com

⁴BDS, Demonstrator, Department of Prosthodontics, CIMS Dental College, Multan, Pakistan
Email: shais24sumbal@gmail.com

⁵BDS, FCPS, Senior Registrar, Department of Prosthodontics, CIMS Dental College, Multan, Pakistan Email: pakiza.fatima2209@gmail.com

⁶BDS, FCPS, Department of Prosthodontics, CIMS Dental College, Multan, Pakistan
Email: Maqsoodmuzamalbutt@gmail.com

***Corresponding author:** Rozeena Farooq

²BDS, FCPS, Dental Surgeon, RHC Shinkari, Mansehra, Pakistan
Email: rozeenafarooq@gmail.com

Abstract

Objective: To compare oral health-related quality of life (OHRQoL) and masticatory efficiency between patients wearing mandibular implant-supported overdentures (IOD) and conventional complete dentures (CD) in clinical settings of Khyber Pakhtunkhwa.

Methods: This analytical cross-sectional multicenter study was conducted from January 2024 to September 2024 across teaching dental institutions and private clinical setups in Khyber Pakhtunkhwa. A total of 498 edentulous patients were included and divided into two groups: implant-supported overdenture (IOD) group (n=166) and conventional complete denture (CD) group (n=332). Oral health-related quality of life was assessed using the 19-item OHIP-EDENT questionnaire. At the same time, masticatory efficiency was evaluated using the two-colour chewing gum mixing test based on the Visual Propach Assessment Scale (V-PAS). Statistical analysis was performed using SPSS version 26.0.

Results: Patients in the IOD group demonstrated significantly better outcomes compared to the CD group. The mean OHIP-EDENT score was lower in the IOD group (22.1) compared to the CD group (45.6), indicating improved quality of life ($p < 0.001$). Similarly, masticatory performance was significantly higher among IOD users (76.4%) compared to CD users (41.2%) ($p < 0.001$).

Conclusion: Mandibular implant-supported overdentures provide significantly superior outcomes in both oral health-related quality of life and masticatory efficiency compared to conventional complete dentures. These findings support the clinical advantage of implant-based rehabilitation in improving functional and psychosocial well-being among edentulous patients in the local population.

Keywords: Mandibular overdenture; Complete denture; OHRQoL; Masticatory efficiency; OHIP-EDENT; Edentulism; Implant rehabilitation

1. Introduction

Edentulism remains a major public health concern worldwide, particularly in developing regions where access to preventive dental care is limited [1]. In Pakistan, especially in Khyber Pakhtunkhwa, edentulism is prevalent among the elderly population due to poor oral health awareness, limited resources, and delayed treatment-seeking behavior [2].

Conventional complete dentures (CD) have long been the standard treatment for edentulous patients. However, mandibular dentures often present with reduced retention and stability, leading to compromised chewing efficiency and patient dissatisfaction [3]. These limitations negatively affect oral health-related quality of life (OHRQoL), including physical, psychological, and social domains [4]. Implant-supported overdentures (IOD) have emerged as a predictable and effective alternative for mandibular rehabilitation. The McGill Consensus Statement recommends two-implant mandibular overdentures as the standard of care for edentulous patients [5]. Evidence suggests that IODs significantly improve denture stability, masticatory function, and patient satisfaction compared to conventional dentures [6,7].

Despite global evidence supporting IODs, their adoption in low-resource settings such as Khyber Pakhtunkhwa remains limited due to financial and infrastructural constraints. There is a need for region-specific data to evaluate whether the clinical benefits of implant-supported overdentures justify their cost and surgical intervention in the local population.

Therefore, this study aimed to compare OHRQoL and masticatory efficiency between patients wearing mandibular implant-supported overdentures and conventional complete dentures in a multicenter setting within Khyber Pakhtunkhwa.

2. Materials and Methods

Study Design and Setting

This analytical cross-sectional multicenter study was conducted between January 2024 and September 2024 across five major dental institutions in Khyber Pakhtunkhwa.

Participants

A total of 498 completely edentulous patients were included and divided into two groups:

- Group A: Implant-supported overdenture (IOD) (n=166)
- Group B: Conventional complete denture (CD) (n=332)

All prostheses had been in function for at least six months prior to evaluation.

Inclusion Criteria

- Completely edentulous patients
- Wearing a mandibular prosthesis for ≥ 6 months
- Willing to participate and provide consent s

Exclusion Criteria

- Patients with neuromuscular disorders
- Uncontrolled systemic diseases
- Poorly fitting or recently adjusted prostheses

Outcome Measures

1. Oral Health-Related Quality of Life (OHRQoL)

Assessed using the 19-item OHIP-EDENT questionnaire (Likert scale 0–4), a validated tool for edentulous patients [8].

2. Masticatory Efficiency

Measured using the two-colour chewing gum mixing test, evaluated through the Visual Propach Assessment Scale (V-PAS), a reliable and objective method [9].

Statistical Analysis

Data were analyzed using SPSS version 26.0. Normality was assessed using appropriate tests. Mann–Whitney U test was used for non-parametric OHRQoL data, while Chi-square test was used for categorical masticatory efficiency data. Multivariate linear regression analysis was performed to assess predictors of OHRQoL. A p-value < 0.05 was considered statistically significant.

Ethical Consideration

Ethical approval was obtained from the Institutional Review Board of the participating institutions. Written informed consent was obtained from all participants.

3. Results

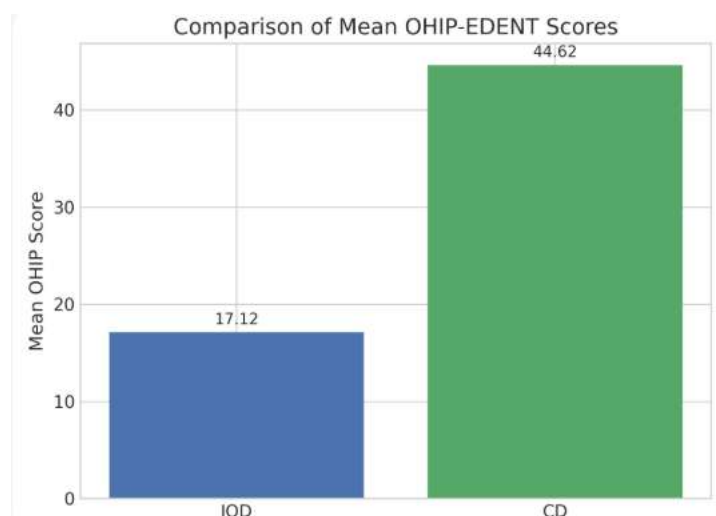
3.1 Demographic and Clinical Characteristics

A total of 498 participants were included in the study, comprising 166 patients in the IOD group and 332 patients in the CD group. The mean age of participants in the IOD group was 62.4 ± 7.8 years, while in the CD group it was 64.1 ± 8.2 years, with no statistically significant difference ($p = 0.12$). Gender distribution was comparable between the two groups ($p = 0.25$). However, a statistically significant difference was observed in education level, with a higher proportion of participants in the IOD group having secondary or higher education ($p < 0.01$). Duration of edentulism did not differ significantly between groups.

Table 1: Demographic and Clinical Profile of Participants

Variable	IOD Group (n=166)	CD Group (n=332)	p-value
Age (Mean $\pm$ SD)	62.4 ± 7.8	64.1 ± 8.2	0.12
Gender (Male/Female)	98 / 68	182 / 150	0.25
Education Level	-----	-----	< 0.01*
No Formal Education	15%	42%	
Secondary/Higher	85%	58%	

Duration of Edentulism (years)	8.4 ± 4.2	9.1 ± 5.1	0.31
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3.2 Oral Health-Related Quality of Life (OHIP-EDENT)

The IOD group demonstrated significantly better oral health-related quality of life compared to the CD group across all domains of the OHIP-EDENT scale.

The total OHIP score was markedly lower in the IOD group (17.12 ± 4.5) compared to the CD group (44.62 ± 9.2), indicating superior outcomes ($p < 0.001$).

All individual domains showed statistically significant differences, with the largest improvements observed in:

- Psychological discomfort
- Social disability
- Physical pain

Table 2: Comparison of OHIP-EDENT Domains

Domain	IOD (Mean $\pm$ SD)	CD (Mean $\pm$ SD)	Mean Difference	p-value
Functional Limitation	2.85 ± 1.1	6.92 ± 2.3	-4.07	<0.001*
Physical Pain	4.10 ± 1.4	8.45 ± 2.1	-4.35	<0.001*
Psychological Discomfort	2.12 ± 0.9	6.30 ± 1.8	-4.18	<0.001*
Physical Disability	3.40 ± 1.2	7.15 ± 2.5	-3.75	<0.001*
Psychological Disability	1.90 ± 0.7	5.80 ± 1.6	-3.90	<0.001*
Social Disability	1.20 ± 0.6	5.10 ± 1.4	-3.90	<0.001*
Handicap	1.55 ± 0.8	4.90 ± 1.9	-3.35	<0.001*
Total OHIP Score	17.12 ± 4.5	44.62 ± 9.2	-27.5	<0.001*

Lower scores indicate better quality of life

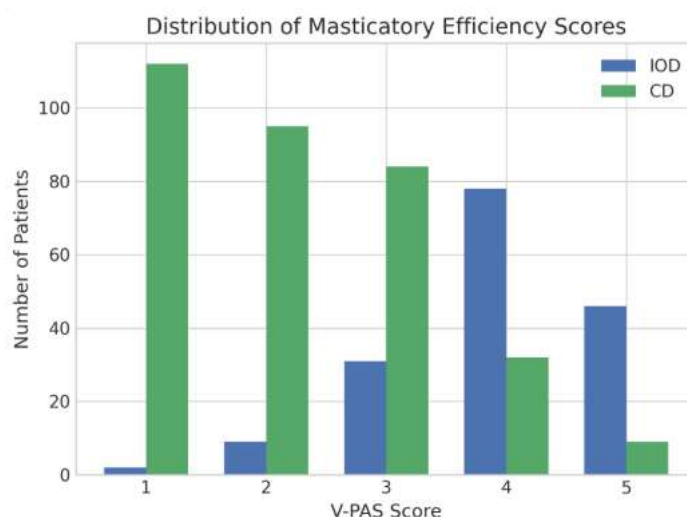
3.3 Masticatory Efficiency

The distribution of masticatory efficiency scores differed significantly between the two groups ($p < 0.001$).

- **IOD group:** Majority achieved *Good to Excellent* performance (**74.7%**)
- **CD group:** Majority remained in *Poor to Moderate* categories (**62.3%**)

Table 3: Masticatory Efficiency (V-PAS Scores)

Score	Description	IOD n (%)	CD n (%)
1	Very Poor	2 (1.2%)	112 (33.7%)
2	Poor	9 (5.4%)	95 (28.6%)
3	Moderate	31 (18.7%)	84 (25.3%)
4	Good	78 (47.0%)	32 (9.6%)
5	Excellent	46 (27.7%)	9 (2.7%)



3.4 Multivariate Regression Analysis

Multivariate regression analysis identified **prosthesis type** as the strongest predictor of OHRQoL.

- IOD significantly reduced OHIP score (**B = -24.82, $p < 0.001$**)
- Socioeconomic status also showed a significant association (**$p = 0.02$**)
- Age and gender were not statistically significant predictors

Table 4: Predictors of OHRQoL (Regression Analysis)

Variable	B	Std. Error	Beta	p-value
Prosthesis Type (IOD)	-24.82	1.15	-0.82	<0.001*
Age	0.12	0.08	0.05	0.15
Gender (Female)	1.45	0.95	0.04	0.09
Socioeconomic Status	-2.10	0.65	-0.12	0.02*

4. Discussion

The findings of this multicenter study demonstrate that mandibular implant-supported overdentures significantly improve both oral health-related quality of life and masticatory efficiency compared to conventional complete dentures. These results are consistent with a large body of evidence indicating that implant-supported prostheses provide superior functional and psychosocial outcomes in edentulous patients (3,6,7).

A key finding of this study was the significantly lower OHIP-EDENT scores in the IOD group, reflecting improved quality of life. This aligns with previous research showing that implant-retained overdentures enhance patient satisfaction, comfort, and daily functioning (3,7,11). The improvement in OHRQoL can be attributed to increased denture stability, which reduces pain, improves speech, and enhances confidence during social interactions. Similar findings have been reported in studies where implant-supported prostheses positively influenced social behavior and psychological well-being (24).

The most notable improvements in this study were observed in the domains of social disability and psychological discomfort. These findings highlight the broader impact of oral rehabilitation beyond physical function. In many cultural settings, including Khyber Pakhtunkhwa, edentulism is associated with aging, reduced self-esteem, and social withdrawal. The improved retention and stability of IODs allow patients to engage more confidently in social activities, thereby enhancing their overall quality of life (4,20).

From a functional perspective, the significantly higher masticatory efficiency observed in the IOD group supports previous studies demonstrating improved chewing performance with implant-supported prostheses (5,15,16). The two-colour chewing gum test used in this study provides an objective measure of food mixing ability, which correlates with the patient's capacity to process different food textures (5). Higher masticatory efficiency enables patients to consume a nutritionally balanced diet, which is particularly important in elderly populations at risk of malnutrition.

The superior masticatory performance in the IOD group can be explained by increased bite force and improved prosthesis stability. Studies have shown that implant-retained overdentures significantly enhance bite force compared to conventional dentures, leading to better food comminution and improved oral function (6,25). In contrast, conventional dentures often exhibit instability during function, resulting in inefficient mastication and patient discomfort (14,19).

Although the benefits of implant-supported overdentures are well established, their implementation in low-resource settings remains a challenge. In Khyber Pakhtunkhwa, economic barriers play a critical role in treatment selection, with many patients opting for conventional dentures due to lower cost. However, the findings of this study suggest that the long-term functional and psychosocial benefits of IODs may outweigh their initial cost, particularly in patients with high functional demands.

The multivariate analysis in this study further demonstrated that prosthesis type was the strongest predictor of OHRQoL, while socioeconomic status also showed a significant association. This indicates that both clinical and social factors influence patient outcomes. These findings are consistent with previous research emphasizing the role of socioeconomic determinants in oral health and access to advanced dental care (1,2).

5. Strengths of the Study

This study has several strengths, including a large sample size, multicenter design, and the use of both subjective and objective outcome measures. The combination of OHRQoL assessment and masticatory efficiency evaluation provides a comprehensive understanding of treatment outcomes.

6. Limitations

This study has several limitations. The cross-sectional design limits the ability to establish causal relationships. Selection bias may be present due to non-random sampling. Differences in education

and socioeconomic status between groups may have influenced outcomes. Additionally, OHRQoL assessment is subjective and may be affected by individual perception.

7. Conclusion

Within the healthcare framework of Khyber Pakhtunkhwa, implant-supported overdentures provide significantly better outcomes compared to conventional complete dentures. These improvements are evident in both masticatory efficiency and oral health-related quality of life, supporting the use of implant-based rehabilitation in edentulous patients.

7. Acknowledgments

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