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**Original Research Article**

# Implant-Retained Mandibular Overdentures Effect on Patient Satisfaction and Oral Health Related Quality of Life: A Clinical Research

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**Abstract:**

**Purpose:** The purpose of this study was to evaluate and compare Oral Health Related Quality of Life (OHRQoL) in edentulous subjects provided with implant-retained mandibular overdentures (ICDs) and that of conventional complete dentures (CCDs).

**Materials and Methods:** Participating patients received new CCDs initially and later received two mandibular inter-foraminal implants and had their mandibular CCDs converted into ICDs with either Positioner or Magnetic attachments. Questionnaires were used to assess OHRQoL (verified Hindi version of OHIP-14) at different stages of treatment with CCDs and ICDs. Evaluations were carried out at 3 months with new CCDs and 3 months after mandibular ICD provision. The data obtained were statistically analysed and compared.

**Results:** In all the 15 subjects who completed the protocol, a significant improvement was observed in OHRQoL when CCDs were converted into ICDs.

**Conclusion:** Implant-retained mandibular dentures (ICDs) can be successfully used for improving oral health related quality of life (OHRQoL) which in turn can boost patient satisfaction.

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## Introduction

Complete tooth loss or edentulism can result due to periodontal disease, abscess formation, trauma and several systemic diseases. Common consequences of tooth loss include progressive alveolar bone resorption and decreased masticatory performance.[1] Edentulism has two major problems- disability because it limits a patient's ability to perform two essential tasks in life: speaking and eating, and handicap, because significant changes are needed in order to compensate for the deficiencies.[2] Both disability and handicap have been associated with a negative impact on psychosocial well-being, especially when considering elders. Edentulism affects oral and general health in addition to quality of life.[3]

Treatment options for complete edentulism includes conventional complete dentures (CCDs), implant-retained overdentures (ICDs) and, in some cases, implant supported full-arch fixed complete denture prosthesis. In the past, the most common treatment for edentulism had been to restore function with complete removable dentures. Due to the fact that, edentulism causes progressive bone loss, treatment with CCDs is limited and detrimental changes continue overtime. Common problems, especially with mandibular CCDs, include lack of stability and retention, soreness and pain and further loss of function.[4] ICDs are an alternative treatment option for edentulism that promises to overcome many of the limitations of CCDs. Studies have compared the use of CCDs to ICDs to restore edentulous patients, especially the use of mandibular ICDs retained by two unsplinted implants. Indeed, the use of mandibular ICDs retained by two unsplinted implants is considered to be the first choice of treatment for edentulous elderly patients who are unsatisfied with CCDs. [5] In general, mandibular ICDs may be a preferable option due to several advantages such as; possible decrease resorption of the residual ridges, may improve stability and retention, and possible additional improvement in the patient's quality of life and satisfaction. [6-9] The use of implants has dramatically improved treatment choices for most edentulous patients, but it may not be suitable for all patients particularly in less prosperous countries [10] or for patients who are unable to afford costs associated with this treatment option.[11] Even though the number of studies comparing the two modalities of treatment is extensive, definitive conclusions from these studies are not obvious due to heterogeneous methodological designs and instruments used to assess outcomes. The most commonly documented standardized instrument in the literature has been the Oral Health Impact Profile (OHIP) survey.[12]

Other methodological approaches were used as ad hoc instruments included; Likert Scale Questionnaire [13], Visual Analogue Scale [13], McGill Patient Satisfaction Questionnaire[14], Denture Satisfaction Questionnaire[15], Denture Complaint Questionnaire[15], and Oral Impacts on Daily Performances[16]. The OHIP questionnaire has acceptability, reliability, and validity pertaining to assessment of Oral Health as Related to Quality of Life (OHRQoL) [12]. Short versions of this instrument with supportive estimates of reliability and validity, such as OHIP-14, OHIP-20 and the OHIP-EDENT, are also considered valuable instruments and present a more succinct battery of questions to evaluate the perceived impact of oral health on subject's well-being in edentulous patients. [17-19]

Patient-centered standards of oral health-related quality of life (OHRQoL) [20] has also been increasingly emphasized in many studies. Restoration success was found to be largely affected by the patient's point of view, as they feel more subjectively regarding prosthesis stability, comfort, chewing performance, language, and so forth. Compared with conventional complete dentures, 2-implant retained overdentures, as the standard treatment option for mandibular edentulous patients, has lead to a better level of OHRQoL.[21,22] It is well known that OHRQoL is influenced by many factors,[23] such as the patient's gender, age, the number of implants, attachment type, level of education, cultural differences, and socio-economic environment,[24] all of which are fixed pre-implant parameters and immutable.

The objective of this clinical study was to assess the improvement in oral health-related quality of life (OHRQoL) in patients rehabilitated with implant-retained mandibular overdentures. In this research, improvement of OHRQoL from pre- to post-implant was investigated. These findings may be helpful in clinical decision-making regarding implant-retained overdenture options for mandibular edentulous patients.

## Materials and methods

This pilot study was conducted at Department of Dentistry, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India from September 2024 to May 2025 to include 15 patients with completely edentulous maxillary and severely resorbed mandibular ridges. Inclusion criteria: 1) age between 55 and 75 years; 2) wearing maxillary and mandibular complete dentures for at least 5 years; 3) willingness to change from the old complete denture; 4) willingness to choose implant-retained mandibular overdenture; and 5) ability to attend for follow up.

**Treatment procedure:** A new pair of complete dentures was fabricated for each patient. The new dentures were made with semi-anatomically shaped acrylic teeth (Acry Lux, Ruthimium, India). Three months after complete denture delivery, 2 Super Line implants (Dentium Company, Seoul, Korea) for each subject were placed between the mental foramina, according to a standardized 2-stage surgical protocol. The implants were capped with cover screws. 30 implants with 10 mm length, and 3.6 mm or 4 mm diameter were inserted into 15 subjects. To minimize loading of the implants during the osseointegration period, the tissue surfaces of the complete denture base corresponding to the implant locations were ground. Three months after implantation, the second stage of surgery was performed, and healing abutments were applied. If the interarch distance between the maxillary and mandibular ridge was sufficient enough to accommodate Positioner stud attachment, a pair of Positioner attachment (Dentium Company, Seoul, Korea) was applied to anchor the mandibular complete denture, otherwise dental Magnetic attachment (Dentium Company, Seoul, Korea) was applied. After the relining procedure for intaglio surface of the mandibular denture with self-curing acrylic resin as a final restoration, patients were given instructions on care of the implant-retained overdentures and attachments.

**Evaluation:** For each subject, the OHRQoL was determined both three months before the mandibular complete dentures were connected to the osseointegrated implants while conventional complete denture was still in use, and 3 months after they had been anchored. The OHRQoL was evaluated using the 14-item validated Hindi version of the Oral Health Impact Profile (OHIP-14) (Fig. 1).[25] The OHIP-14 is one of the most standard and validated questionnaires for measuring OHRQoL,[17] and includes 7 domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The OHIP-14 was applied in Hindi with face-to-face interviews by just one interviewer. Every item was scaled using a 5-point scale: never = 0, rarely = 1, occasionally = 2, often = 3, very often = 4. The total scores were calculated by adding the 14 items scores and ranged between 0 and 56, with lower scores indicating better OHRQoL.

| Question Number | Original version of OHIP-14 [19] |
|---|---|
| 1. | Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures? |
| 2. | Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures? |
| 3. | Have you had painful aching in your mouth? |
| 4. | Have you found it uncomfortable to eat any food because of problems with your teeth, mouth or dentures? |
| 5. | Have you been self-conscious because of your teeth, mouth or dentures? |
| 6. | Have you felt tense because of problems with your teeth, mouth or dentures? |
| 7. | Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures? |
| 8. | Have you had to interrupt meals because of problems with your teeth, mouth or dentures? |
| 9. | Have you found it difficult to relax because of problems with your teeth, mouth or dentures? |
| 10. | Have you been a bit embarrassed because of problems with your teeth, mouth or dentures? |
| 11. | Have you been a bit irritable with other people because of problems with your teeth, mouth or denture? |
| 12. | Have you had difficulty doing your usual jobs because of problems with your teeth or dentures? |
| 13. | Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures? |
| 14. | Have you been totally unable to function because of problems with your teeth, mouth or dentures? |

**Fig. 1: Verified Hindi version of OHIP-14 questionnaire used for interviewing the edentulous subjects when wearing conventional (CCD) and implant-retained (ICD) mandibular dentures.**

**Statistical Analyses:** All data were analyzed using descriptive statistics performed by calculating the mean and the standard deviation for continuous variables. The software used for statistical analysis was Statistical package for social sciences (SPSS) version 25.0. Paired or Dependent t-test was used for comparing a pair of values obtained from the same sample as the data followed a normal distribution. The p-value was taken significant when less than 0.05 ($p<0.05$) and confidence interval of 95% was taken.

**Results:** Table 1 summarizes the baseline information for 15 patients (10 men and 5 women, aged between 55 and 74 years) enrolled in the study. Table 2 demonstrates the total OHIP scores. No subject was lost to follow up. Table 3 shows mean of oral health impact profile (OHIP-14) and result of Paired t-test (n=15).

**Table 1: Socio-demographic characteristics of 15 patients**

| Characteristics | n (%) |
|---|---|
| Age (years) | |
| 60.0-65.9 | 11 |
| 66.0-70.0 | 4 |
| Gender | |
| Male | 10 |
| Female | 5 |
| Education level | |
| Elementary/High school | 8 |
| College | 6 |
| No answer | 1 |
| Annual Income (INR) | |
| < 4 lac | 4 |
| > 4 lac | 10 |
| No answer | 1 |

**Table 2: OHIP-14 Scores as obtained from patients' interview**

| Patients | OHIP-14 Scores from patients | |
|---|---|---|
| | CCD (Conventional mandibular denture) | ICD (Implant-retained mandibular denture) |
| 1. | 33 | 11 |
| 2. | 36 | 13 |
| 3. | 21 | 11 |
| 4. | 43 | 16 |
| 5. | 41 | 7 |
| 6. | 40 | 16 |
| 7. | 43 | 10 |
| 8. | 32 | 9 |
| 9. | 48 | 6 |
| 10. | 47 | 7 |
| 11. | 44 | 16 |
| 12. | 25 | 14 |
| 13. | 37 | 19 |
| 14. | 42 | 19 |
| 15. | 43 | 10 |

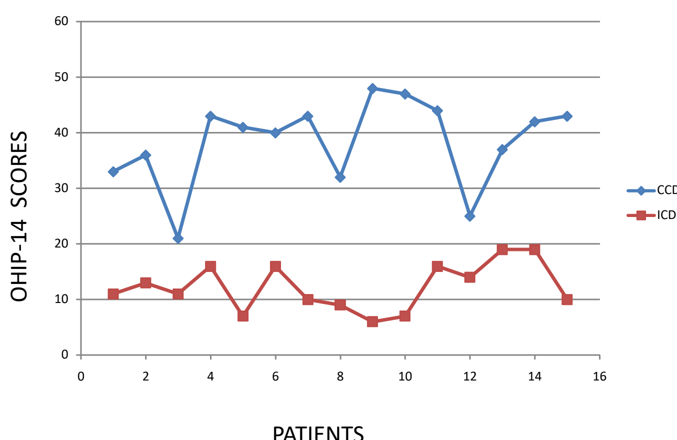


**Figure 2: Scatter diagram showing the OHIP-14 scores of the patients while wearing conventional complete dentures (CCD) and after their mandibular denture (ICD) was attached to 2 implants, placed in the inter-foraminal region, using Positioner or Magnetic attachments (Dentium, Seoul, Korea)**

**Table 3: Mean of oral health impact profile (OHIP-14) and result of Paired t-test (n=15)**

| | Mean | Std. Deviation | Mean difference | t-test value | p-value |
|---|---|---|---|---|---|
| CCD (Conventional mandibular denture) | 38.33 | 7.76 | 26.07 | 10.855 | < 0.001* |
| ICD (Implant-retained mandibular denture) | 12.27 | 4.27 | | | |

The mean OHIP-14 score was compared between CCD (Conventional Complete Denture) and ICD (Implant-retained Complete Denture) using the paired t-test. The mean OHIP-14 score was significantly more for CCD (Conventional Complete Denture) compared to ICD (Implant-retained Complete Denture).

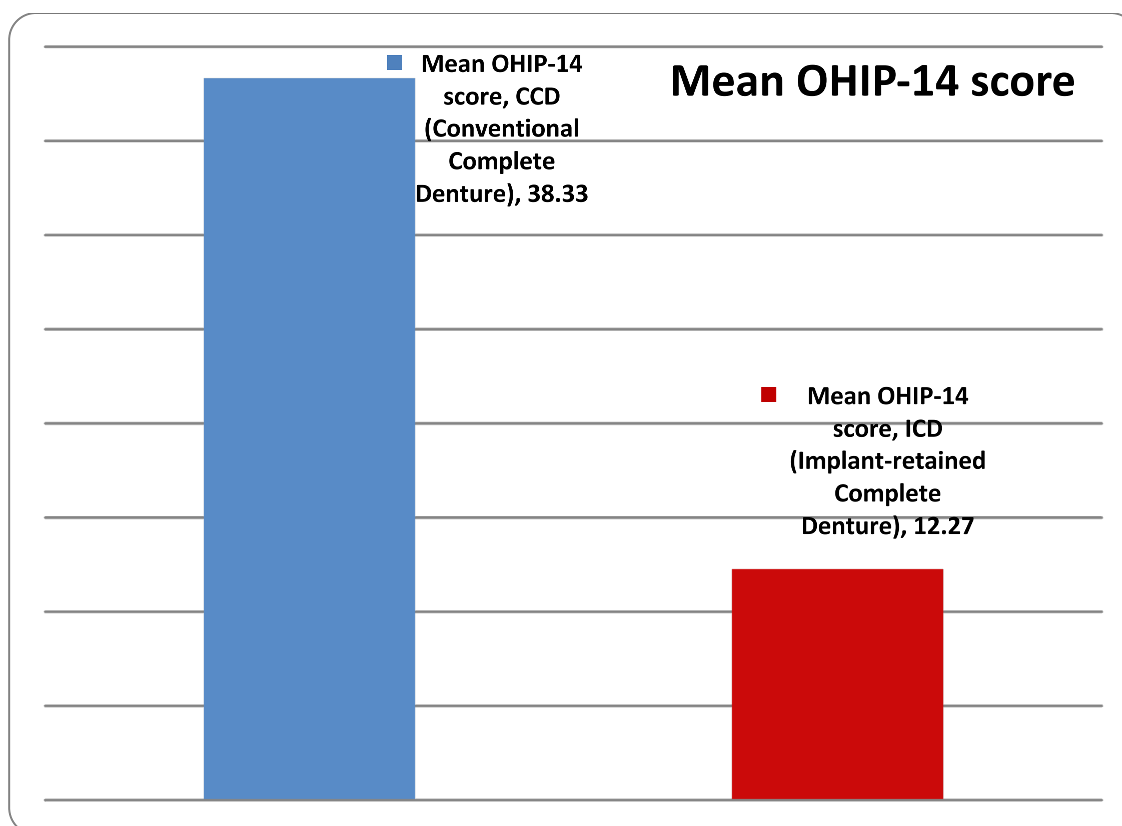


**Figure 2: Mean OHIP-14 score (n=15) of the same group of patients when wearing conventional (CCD) and implant-retained (ICD) mandibular dentures reflecting an apparent improvement in oral health-related quality of life (OHRQoL) for ICD phase.**

**Discussion**

A good pair of complete dentures can greatly improve the OHRQoL of patients. The evaluation of a restoration's effect on OHRQoL of patients has increased recently. [26] In this study, from pre- to post-implant, we found that the average of OHIP total scores reduced from 38.33±7.76 to 12.27±4.27, with a mean difference of 26.07 ($p<0.001$) which indicates that the OHRQoL of patients were significantly improved.

This result was similar to Awad et al,[24] who performed an international multicenter study, including 8 centers in North America, South America, and Europe. They concluded that the mandibular 2-implant overdentures are more likely to improve OHRQoL for edentulous patients than conventional complete dentures. The recent review analysis by Thomason [26] illustrated that patient OHRQoL is greater with mandibular implant-retained overdentures than conventional dentures; nevertheless, the magnitude of these effects remains uncertain. An uncertain intensity of effect may be due to different characteristics of the population, many researchers investigated, and different versions of the OHIP researchers chose, which made the comparisons between studies very difficult.

The OHIP-49[17] was the standard to measure OHRQoL with highest level of reliability and validity, from which other versions evolved for simplicity and convenience applications, such as OHIP-14 questionnaire which was used in this study. Awad et al discussed that although the responsiveness of the 49-item OHIP could be maintained with fewer item versions of OHIP questionnaires, this would lead to compromises in reliability and validity.[27] We used the verified translated Hindi version of OHIP-14 in this study, which kept our analysis simple but authentic.

In the present study, OHRQoL was determined just 3 months after the mandibular overdentures were anchored to the osseointegrated implants. Such a short-term improvement on OHRQoL was also found by Awad et al,[28] who performed a randomized controlled clinical trial with results suggesting that implant treatment provides significant short-term improvement on all subscales of OHRQoL.

**Conclusion**

Within limitation of the present study, it was concluded that mandibular implant-retained overdentures (ICDs) led to a significant improvement in oral health related quality of life (OHRQoL). However, it would be more meaningful if the sample sizes are greater, and additional randomized controlled clinical trials should research

how the ICDs will influence OHIP scores on longer trial.

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