



## Evaluation of Hygiene in Patients with Implant Supported Overdentures - An In-Vivo Study

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 23 Nov 2023	<i>Maintaining optimal oral hygiene is essential for the long-term success of implant-supported overdentures. The Denture Cleanliness Index (DCI) is a reliable tool to assess denture hygiene and bacterial plaque accumulation. In this study, we evaluated the hygiene status of implant-supported overdentures in 30 patients using the DCI. The findings showed that majority of patients had plaque accumulation on the impression surface of dentures within one year of using the dentures. Patients were given the denture cleaning instructions according to the DCI scores.</i>
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> Hygiene, Patients Implant, Cloning

### 1. Introduction

Implant supported overdentures removable dentures fabricated on 2-3 implants and retained using ball attachments, locator or magnets. They have become a modern treatment modality as it provides better retention, stability and support with reduced residual ridge resorption thus leading to better functionality and patient satisfaction. It is well documented in the literature that denture wearing patients need to maintain high standards of oral hygiene and prosthesis hygiene in order to maintain optimum oral health.<sup>1,2</sup> Failure to maintain optimum oral hygiene and denture hygiene can lead to greater incidence and risk for periimplantitis <sup>3</sup>Dentures can accumulate plaque and develop calculus deposits similar to natural teeth. The composition of plaque differs in denture and teeth. Studies show that dentures and soft liners especially acrylics become porous over time and can lead to ingress of potentially harmful microorganisms like Methicillin-resistant Staphylococcus aureus, Candida albicans, and Streptococcus mutans.<sup>4,5</sup> Maintaining proper oral and denture hygiene ensures the longevity of these prostheses. The Denture Cleanliness Index (DCI) can prove to be a reliable analyzing index to evaluate the cleanliness of dentures. <sup>1,6</sup> The literature falls short of data on denture cleanliness in implant supported overdentures, thus the aim of the present study was to analyze the denture cleanliness after one year of wearing of the implant overdenture and to encourage the patients to implement all denture hygiene and cleaning protocols.

### 2. Materials And Methods

The present study was conducted in Department of prosthodontics at Karnavati School of Dentistry on patients wearing implant retained overdentures for the last one year or more. Patients wearing acrylic implant overdentures (ball attachments or bar attachment retained), in age group 50-75 years were selected for this cross-sectional study. (n=30; 11 Male; 19 Female). The Denture cleanliness index was used as a parameter to access the cleanliness and plaque accumulation on the intaglio surface of the denture.<sup>7</sup> The dentures were washed under running water to remove the debris. A plaque disclosing die (Plaque Test, Ivoclar Vivadent) was applied on the impression surface of the denture as per manufacturer instructions. After 30 seconds the dentures were gently rinsed to remove the excess die and the location of plaque appeared as a coloured area on the denture surface. The coloured area on impression surface surface was noted and scored using Denture hygiene index. DCI Score 0(Most clean)

to 4(Worst). [Figure 1] the DCI index for each patient was noted and the total number of patients in each score was obtained. Patients were asked about their denture cleaning routine such as the frequency and method of cleaning dentures. The percentage of patients in each score of DCI index was obtained and denture cleaning instructions were given according to their DCI score.



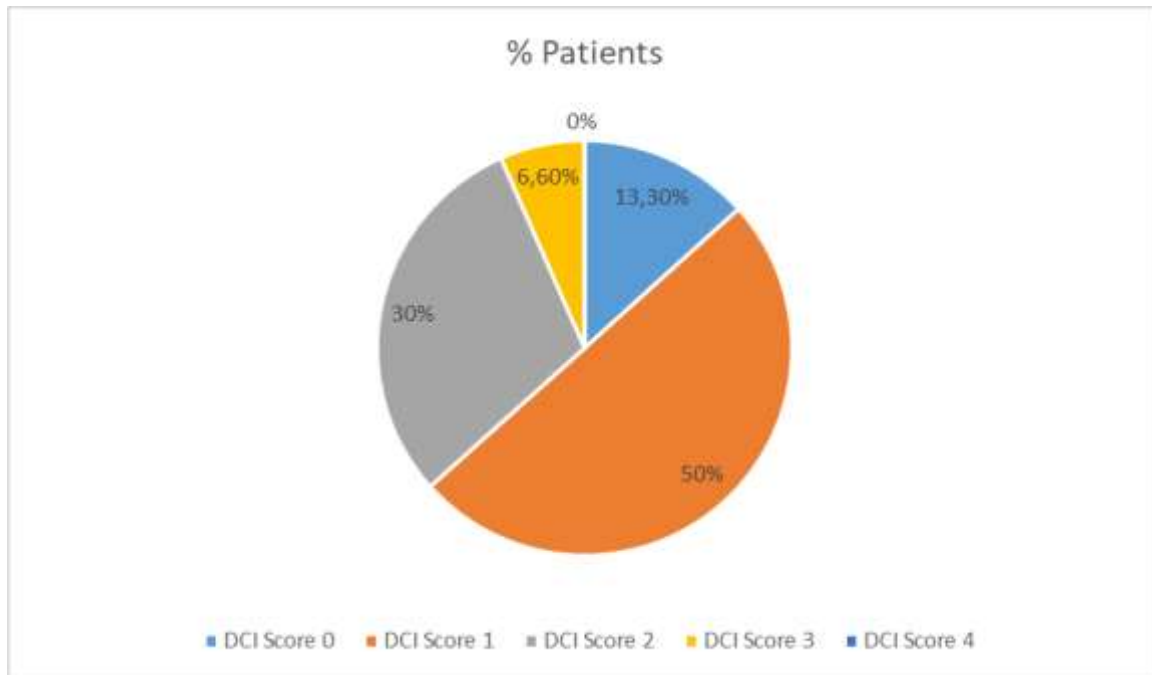
**Figure 1:** Evaluation of DCI index for mandibular implant overdenture after application of plaque disclosing die.

### 3. Results and Discussion

All the Denture cleanliness index scores were tabulated and the total number of patients in each score was tabulated. (Table1)

Number of patients	Denture Cleanliness index score	Implication of the score
04	0	Clean denture. No plaque is visibly seen, no staining, no plaque detectable
15	1	Denture is visibly clean. Little staining (<25% fit surface stained)
09	2	Denture has visible plaque and/or debris. Moderate staining of fit surface (25–50% fit surface stained)
02	3	Denture has visible plaque and/or debris. Severe staining of fit surface (>50% fit surface stained)
00	4	Denture has visible calculus deposit on any surface

The distribution of DCI Scores among the Patients (in%) is as follows-(graph 1) DCI score of 0-13.3% of patients; DCI score of 1: 50% of patients; DCI score of 2: 30% of patients; DCI score of 3: 6.6% of patients; DCI score of 4: 0% of patients. The mean DCI Score is 1.3 and standard deviation of 0.73



**Graph 1:** Data collection showing the DCI index score and corresponding percentage of patients in that score.

Patients wearing removable implant overdentures must be able to maintain their prostheses properly in order to maintain optimal oral health and minimize the risks of developing oral diseases.<sup>8</sup> The Denture Cleanliness Index provides a simple and quick visual method for evaluating the quality of denture hygiene. The staining of the dentures with plaque disclosing agents helps in better patient education and motivation in maintaining the hygiene of the dentures.

In the present study the mean value of DCI index was 1.3 which implies the majority of the patients had plaque accumulation on the intaglio surface of the denture after one year of wearing dentures. Thus, the dentures exhibited plaque accumulation in approximately 25-50 % of impression surface. These results are similar to other studies done by Dicbas et al.<sup>9,10</sup>

Mechanical and chemical methods are available for cleaning of the dentures. Usually, the patients are advised to use combination of the two techniques to clean the implant overdentures for an optimal hygiene maintenance.<sup>11</sup> In the present study all the patients were questioned about their routine cleaning procedures and it was observed that patients who used a combination of techniques in cleaning the dentures showed better denture hygiene (DCI Score 0,1,2) in comparison to patients using only one aid (DCI Score 3 and 4). Thus, there was Also significant correlation between oral hygiene instructions implementation and DCI scores. Patients who followed the recommended denture cleaning practice consistently exhibited lower DCI scores, indicating better denture cleanliness. On the other hand, patients who failed to clean their dentures as instructed, exhibited poor oral and prosthesis hygiene with higher DCI scores, suggesting inadequate plaque removal and denture cleanliness. Area around the metal housing showed greater plaque accumulation in patients using only one denture cleaning aid. These results are in coordination with the study done by Petros Mylonas et al.<sup>1</sup> This can be attributed to the reduced dexterity of patients in cleaning minor regions with increased age.

The present study signifies the importance of patient education regarding the maintenance of prosthesis and also the effect of ill-maintained prosthesis hygiene on the oral microflora. High DCI scores indicate higher amount of plaque which might lead to potential risks of peri-implant inflammation and complications. Therefore, equal emphases should be given on prosthesis maintenance and oral hygiene maintenance. Based on the method utilized in this study, the patients understand the importance of maintenance of prosthesis and are encouraged for regular follow up visits and maintenance of oral hygiene. This minimizes the risk of bacterial accumulation and can detect any implant related complications at an early stage.

Regular follow up data on the hygiene maintenance needs to be collected in order to screen the patients for the dci score and to maintain optimum health. The present study did not take into consideration the long-term data and other variables like the systemic conditions and oral conditions which might affect the salivary flow and dexterity of the patient. Thus, further studies are required in that direction.

#### 4. Conclusion

The Denture Cleanliness Index (DCI) proves to be an important tool in assessing the hygiene status of implant-supported overdentures. The dentists should encourage the patients and emphasize on the importance of denture cleaning. Amalgamation of two techniques for cleaning the implant overdentures proves as a better path in long term denture cleanliness than over using one technique. Patients must be provided guidance in the denture cleanliness regime based on their DCI scores and regular follow up of the DCI scores should be made to improve the longevity of the prosthesis.

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