



## “A STUDY OF THE IMPACT ON BONE TISSUES OF IMMEDIATE IMPLANT-SUPPORTED MANDIBULAR OVERDENTURES WITH CUSPED AND CUSPLESS TEETH”

### Dental Science

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### ABSTRACT

**Aims:** To examine the effects on bone tissues of immediate implant-supported mandibular overdentures with cusped or cusplless teeth.

**Methods:** A randomized controlled trial was conducted at the Dental Clinic, Faculty of Dentistry, in a tertiary hospital in central India, over a 12-month period from January 2016 to December 2016 on Twenty patients.

**Results:** Overdentures with cusped teeth showed a significant improvement in the clinical criteria, including the absence of clinical implant mobility, pain, and bone resorption, while the clinical criteria for the absence of peri-implant radiolucency were insignificantly different between the 2 groups ( $p > 0.05$ ). There were no significant differences in the clinical evaluations for bone levels at the time of insertion or 3 months after insertions, while significant differences were found at 6, 9, and 12 months after insertion.

**Conclusions:** Overdentures with cusped teeth supported by immediate implants were found superior regarding many clinical criteria than those cusplless counterparts.

### KEYWORDS:

#### Introduction:

We all know that as the life span increases, significant damage occurs to the teeth. Treating edentulous patients can be a demanding challenge.[1] Implants in mandibular retained overdentures could be an effective method for the treatment of these patients;[2] the success of maxillary implant overdentures was 86.6%, and the success of mandibular implant overdentures was 95.8%.[3] Implant-supported overdentures have been preferred over complete dentures due to their simplicity and improved patient quality of life.[1-4] The roots have been used beneath overdentures in cases with almost hopeless mandibular dentition. The overdenture design was found to be highly effective in the mandible and has been popularly accepted,[5] allowing the root-to-crown ratio to increase, and the prognosis of the remaining teeth to improve. It also seems that the presence of the vertical periodontal ligament preserves the alveolar ridge morphology.[6,7] Mainly, 3 impressions have been widely utilized to treat the edentulous jaw, including fixed prostheses supported with implants, removable overdentures supported with implants, and implant overdentures supported with soft tissue.[8] The immediate implants are located at diseased and non-diseased sites.[9] Immediately after extraction, placing the implant at a site with endodontic infection has resulted in a good substitution for complete dentures.[10] Today, the problem is facilitated by the use of implants. The utilization of 4 implants is now common and popularly acceptable. Cusped teeth have advantages, such as their effectiveness, the balance of occlusion, the definitive point of relationship between the upper and lower posterior teeth, and their acceptability and compatibility. Cusplless teeth have some advantages, such as resistance to non-masticatory mobility and the absence of harm to supporting tissue. The use of natural teeth with cusps leads to instability of the dentures, which could not be overcome.[12] There has been a lack of evidence for the effectiveness of immediate implant-supported mandibular overdentures. The use of 2-implant mandibular overdentures for edentulous patients is affordable and cost-effective. The overdenture design was found to be highly effective in the mandible and has been popularly accepted. This study aimed to examine the impact on the surrounding bone tissue of immediate implant-supported mandibular overdentures with cusped or cusplless teeth.

#### Materials and methods:

A randomized controlled trial was conducted at the Dental Clinic, Faculty of Dentistry, in a tertiary hospital in central India, over a 12-month period from January 2016 to December 2016. Twenty patients presenting with hopeless anterior mandibular teeth were selected by convenience sampling and met the following criteria: age  $> 40$  years old; no systematic diseases; non-smoker; jaw relation angle class one; refused removable partial dentures; edentulous more than 3 years; and

hopeless mandibular teeth. Diabetic patients, hypertensive patients, patients who preferred removable partial dentures and immunodeficient patients were excluded. The randomization of the selected patients was by lottery selection after providing each patient with a number from a list, and the 20 patients were then randomly divided into 2 groups, with 10 patients in each group. SPSS version 20 was used for the data analysis.

#### Results:

A total of 20 patients participated in this study who were homogenous in the demographic characteristics, such as age and education ( $p > 0.05$ ). The findings in Table 1 show that there were significant improvements in implant mobility, pain, and bone resorption with overdentures, while the clinical criteria for the absence of peri-implant radiolucency were not at a significant level between the 2 groups after 12 months of follow-up. Table 1 also shows that the 2 groups were homogenous at the time of insertion. There were no significant differences in the mean values of clinical evaluation by x-ray for bone levels at the time of insertion or 3 months after insertions, but there were significant differences at 6, 9, and 12 months after insertion, as shown in Table 2. The bone loss at insertion of the implant was similar between the 2 groups at baseline, while it was significantly higher in the cusplless group than in the cusped teeth group, as shown in Table 3.

#### Discussion:

This study was conducted among 20 patients, divided into 2 groups homogenous in age and gender, to examine the impact on surrounding bone tissues of immediate implant-supported mandibular overdentures with cusped or cusplless teeth. It was found that overdentures with cusped teeth were more effective according to clinical and radiographic evaluations at different times than cusplless teeth. Our findings were similar to those of a study conducted to assess the placement of implants in a molar region, which was a randomized follow-up study 12 months in length and showed that noticeable changes occurred in edentulous site. Thus, not only the dimension of the palate but also the height of the bone was reduced.[15]

This study showed that there was an absence of clinical mobility of implants, pain, clinical signs, and bone resorption with cusped tooth overdentures that was more significant than with cusplless teeth overdentures, while the clinical criteria for the absence of peri-implant radiolucency were not significant between the 2 groups. In one study,[16] it was advised that the assignment of an implant immediately after extraction might neutralize the ridge after tooth removal. A report by Evans and Chen[17] showed, over an 18 month period after type I placement, that there was an approximately 1.7 mm decrease in bone height and an approximately one mm recession of the

buccal soft tissue. Furthermore, this study was comparable to a study performed in Egypt[18] to assess the effects of both cusped and cusplless teeth with immediate implants in the mandible after tooth removal. The Egyptian study[18] showed that overdentures with cusplless teeth showed little significant difference from those with cusped teeth. The findings of this study were unique in exploring the beneficial effects of cusped teeth for patients. However, patient satisfaction was not correlated with cusped or cusplless teeth for many years. This study emphasized the superiority of cusped teeth in implant-supported overdentures.

In conclusion, supported overdentures with immediate implants with cusped teeth had more significant success according to clinical criteria, such as absence of tooth mobility, pain, and bone resorption, and clinical evaluation than that with cusplless teeth at different times. The superiority of cusped teeth over cusplless teeth might be justified because the cusp height and angle of all of the posterior teeth are properly related to the pathways of the mandible and its satisfactory use. The strengths of this study included its comparison of 2 different methods of implant-supported mandibular overdentures, which are 2 of the most cost-effective methods, and the long evaluation period (12 months). The study provided significant findings that cusped teeth were preferred to cusplless teeth, using clinical criteria and clinical evaluation. The study limitations were that it was conducted among only 20 patients; such studies will yield more useful results if conducted in larger sample sizes from across the country.

**Tables: TABLE 1: Comparison of the clinical criteria for the first groups of overdentures with cusped teeth, and the second group with cusplless teeth after bar removal.**

Variables	Group 1	Group 2 (%)	P-value
<i>At insertion</i>			
Absence of clinical mobility of implants	78	75	0.16
No radiolucency around the implant	83	7	0.61
Absence of pain and clinical signs of neural lesions	76	82	0.11
Bone resorption	87	74	0.09
<i>After 12 months</i>			
Absence of clinical mobility of implants	80	70	0.04*
Absence of peri-implant radiolucency	80	75	0.10
Absence of pain and clinical signs of neural lesions	90	80	0.04*
Bone resorption	95	80	0.03*

\* Significant

**TABLE 2: Comparison of the means and standard deviations of the clinical evaluation of bone loss for the first group with overdentures with cusped teeth and second group with cusplless teeth at different times.**

Time of evaluation	Group 1 Mean ± SD	Group 2 Mean ± SD	P-value
At insertion	1.10 ± 0.35	1.2 ± 0.38	0.23
3 months	1.40 ± 0.31	1.6 ± 0.32	0.14
6 months	1.45 ± 0.37	1.8 ± 0.36	0.04*
9 months	1.52 ± 0.43	1.9 ± 0.35	0.03*
12 months	1.63 ± 0.36	2.1 ± 0.38	0.02*

\* Significant, SD - standard deviation

**Table 3: Comparison of the average bone loss for the first group with overdentures with cusped teeth, and second group with cusplless teeth at insertions and after one year.**

Time and groups	Average bone loss			P-value
	<0.5 mm	0.5- <1 mm	>1 mm	
	n (%)			
<i>At insertion</i>				
Group 1	9 (90)	1 (10)	0 (0)	0.3
Group 2	8 (80)	1 (10)	1 (10)	
<i>After one year</i>				
Group 1	8 (80)	1 (10)	1 (10)	0.01*
Group 2	7 (70)	2 (10)	1 (10)	

\* Significant

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