

## Original Research

### A Survey Based Estimation and Comparison of the Efficacy of Neutral Zone Technique among Resorbed Ridge Patients: A Questionnaire Based Original Research Study

Uttkarsh Bhatt<sup>1</sup> Pooja Sood<sup>2</sup> Navroj Singh<sup>3</sup> Indu Bhushan Deshbakht<sup>4</sup> Neel Ratan Sinha<sup>5</sup> Niyamet Naz Begam<sup>6</sup>

<sup>1</sup>PG Student, Department of Prosthodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad UP, India

<sup>2</sup>Reader, Department of Conservative Dentistry & Endodontics, Baba Jaswant Singh Dental College Hospital & Research Institute, Ludhiana, India

<sup>3</sup>BDS & Masters in Administrative Science, Private Practitioner, Rajpura, Punjab

<sup>4</sup>Pedodontist, Private Practitioner Purnea, Bihar

<sup>5</sup>Oral Pathologist, Private Practitioner, Madhubani, Bihar

<sup>6</sup>PG Student, Department of Prosthodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad UP, India

#### **ABSTRACT:**

**Background and Aim:** Literature has well evidenced that Neutral zone technique provides satisfactory result when it comes to treatment protocol for resorbed ridges. In today's scenario this technique has lost its value among clinicians. Moreover, there are also not much evidence based research articles in favour of this technique. Therefore this survey based study was attempted to estimate and compare the efficacy of neutral zone technique among resorbed ridge patients.

**Materials & Methods:** This study was completely attempted on a cross sectional ideology. Authors also used self prepared questionnaire to meet the requirements of the study. A total of 10 patients with resorbed mandibular ridges were treated using Neutral Zone technique. Follow up of the patients was done periodically. After an interval of 3-6 months patients were called off and a review survey was taken to check for the prognosis. Authors completed the study by close ended questionnaire having questions about neutral zone related retention, stability and overall satisfaction in complete denture patients with resorbed ridge. Response was collected and data was processed statistically to evaluate efficacy of neutral zone technique among resorbed ridge patients.

**Results:** Statistical analysis was completed using statistical software 'Statistical Package for the Social Sciences (SPSS)'. The compiled data was subjected to appropriate statistical tests to obtain p values, mean, standard deviation, standard error and 95% CI.  $P \leq 0.05$  was considered as statistically significant. Out of 10 studied participants, males were 6 and females were 4. Only 1 participant were belonging to age group >65 years. P value was significant here. 8 patients agreed that they have improved masticatory efficiency in complete denture made from neutral zone technique. Clinicians prognosis (post insertion 3-6 months) was positive up to 80 percent.

**Conclusion:** Authors concluded that overall efficacy of neutral zone technique among resorbed ridge patients was fairly satisfactory. More than half of the studied patients were happy with the retention and stability offered by this technique. The post insertion patient prognosis and post insertion clinicians prognosis was also good.

**Key words:** Neutral Zone, Resorbed Ridge, Questionnaire, Survey

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**Corresponding Author:** Dr. Uttkarsh Bhatt, PG Student, Department of Prosthodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad UP, India

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## INTRODUCTION

As we all know that the average life expectancy of the Indian people is gradually increasing, this might lead to a rise in the number of intricate complete denture cases. The stability of mandibular complete denture is a complex therapy.<sup>1,2</sup> It is like this primarily due to the continuous diminution of residual ridge size and its closeness to limiting structures. The conventionally used procedures provide an outstanding role in most of the cases except in cases where the residual ridge resorption has led to highly atrophic ridge.<sup>3,4</sup> The key endeavor of managing a completely edentulous patient is rehabilitating the looks, form and functions by substitution of the lost structures within the oral cavity. Neutral zone is defined as that region or position where the forces between the tongue and cheeks or lips are equal. Researchers must not be rigid and insist that teeth be placed over the apex of ridge every time. Rather teeth must be positioned as guided by the musculature. Literature has shown that the overall effect of tooth arrangement and flange shape on denture stability is equal to or greater than any other factor.<sup>5,6,7</sup> Clinical registration of neutral zone is most necessary for patients where there is a extremely atrophic ridge. This technique has been widely explored and attempted by several clinicians in an hunt to manage resorbed mandibular ridge. All have put forward more or less similar results. However, clinical inferences were mostly based on the type of material used. Neutral zone must be ideally attempted for mandibular arch only. Different materials like tissue conditioners, impression compound, waxes, and impression plaster have been suggested to precisely locate neutral zone. As retention of the denture is lowered because of poor denture base foundation, the role of stability becomes even more significant, which is attained by neutral zone. Neutral zone is the potential space between lips and cheeks on one side and tongue on the other side. It is also known as dead space, zone of minimal conflict, zone of equilibrium, and potential denture space. Few of the documented indications of these techniques are severely atrophic mandibular ridge, prominent and highly attached mentalis muscle, lateral spreading of tongue as a result of poor transition from dentulous to edentulous state, patients with atypical shape or consistency of oral and perioral structures, e.g., marginal or segmental mandibulectomy and partial glossectomy.<sup>8,9,10</sup> So, keeping all these overlapping points in mind, this survey based study was attempted to estimate and compare the efficacy of neutral zone technique among resorbed ridge patients.

## MATERIALS & METHODS

The current study was designed, abstracted and performed to estimate and compare the efficacy of neutral zone technique among resorbed ridge patients. The study was conducted at department of Prosthodontics and Oral Implantology, Shree Bankey

Bihari Dental College and Research Centre, Ghaziabad. This study was completely attempted on a cross sectional ideology. Authors also used self prepared questionnaire to meet the requirements of the study. A total of 10 patients with resorbed mandibular ridges were treated using Neutral Zone technique (Figure 1-4). Follow up of the patients was done periodically. After an interval of 3-6 months patients were called off and a review survey was taken to check for the prognosis. Authors completed the study by close ended questionnaire having questions about neutral zone related retention, stability and overall satisfaction in complete denture patients with resorbed ridge. While setting up the questions, authors have put special stress on neutral zone technique and its clinical outcomes. Clinicians prognosis was also estimated to authenticate results. Authors have processed questionnaire response data efficiently. Response was collected and data was processed statistically to evaluate efficacy of neutral zone technique among resorbed ridge patients. Delivery of the survey and collection of responses was done by electronic surveying method via online forms. Data compilation was finished within one month. Informed consent was taken from the respondents those were enthusiastically ready for participation. The significance of this study was explained in detail to all participants. Results thus obtained was tabulated and subjected to basic statistical analysis. P value less than 0.05 was considered significant ( $p < 0.05$ ).

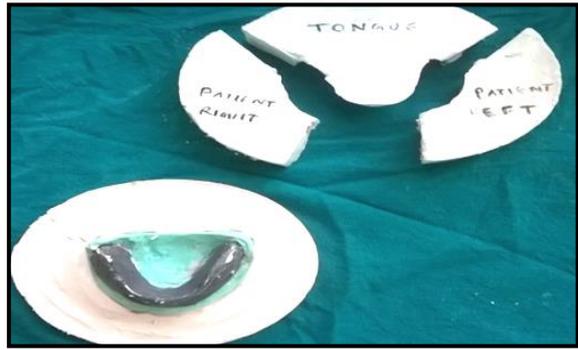
## STATISTICAL ANALYSIS AND RESULTS

Replies which noticed from questionnaire exercise were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The resulting data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi-square test, standard error and 95% CI. Table 1 and Graph 1 showed that out of 10 participants, males were 6 and females were 4. Only 1 participant were belonging to age group  $>65$  years. P value was significant here. 2 participants were belonging to the age range of 45-50 years. 2 participants were belonging to the age range of 51-55 years. 2 participants were belonging to the age range of 61-65 years. P value was significant here. Questionnaire responses discovered significant outcomes for neutral zone technique (Table 2). 5 patients showed good response for denture retention while similarly, 5 patients showed good response for denture stability. 8 patients agreed that they have improved masticatory efficiency in complete denture made from neutral zone technique. Clinicians prognosis (post insertion 3-6 months) was positive up to 80 percent. All responses have also been illustrated in graphs (graph 2 to 6). Table 3 shows fundamental statistical description with level of significance evaluation using pearson chi-square test. Question no 3 and 4 showed significant levels ( $p < 0.05$  significant).

**Figure 1; Intraoral View of Resorbed Ridges**



**Figure 3C; Sectional plaster index to make lower rim in neutral zone**



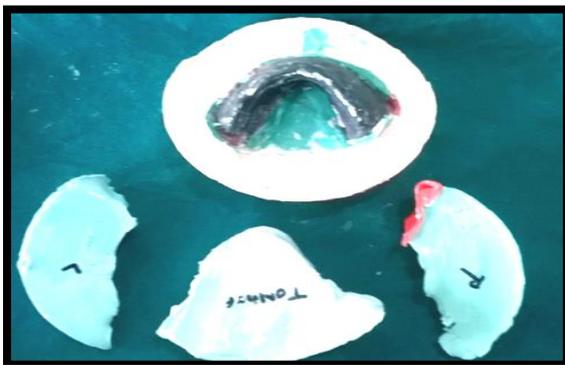
**Figure 2; Primary impression of lower arch with correct extensions**



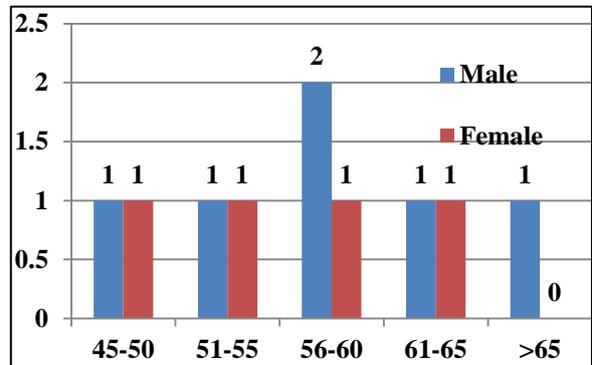
**Figure 4: Post insertion view of complete denture made by neutral zone technique**



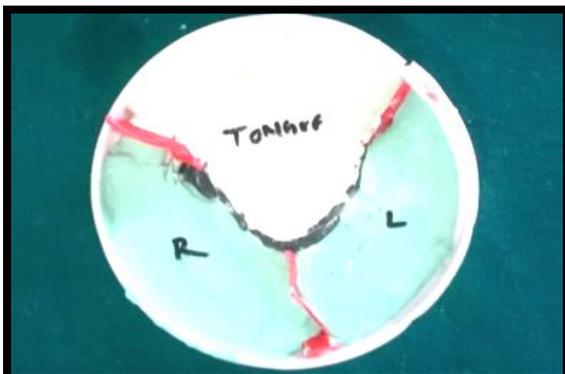
**Figure 3A; Sectional plaster index to capture neutral zone**



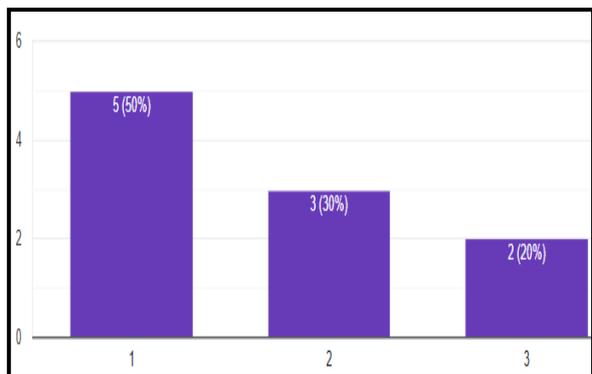
**Graph 1: Age & gender based division of participants**



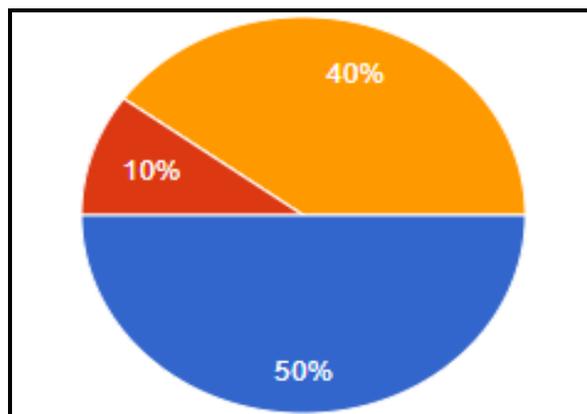
**Figure 3B; Sectional plaster index to capture neutral zone**



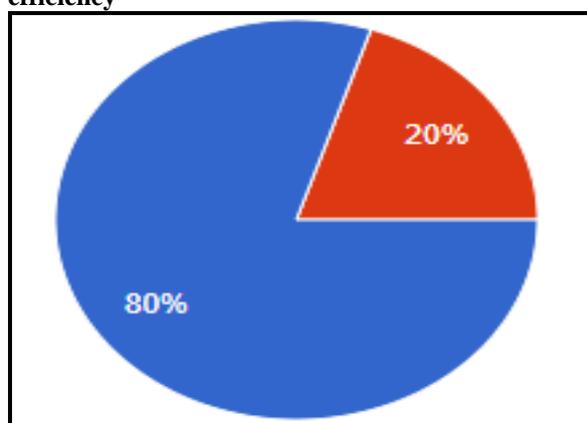
**Graph 2: Denture retention responses**



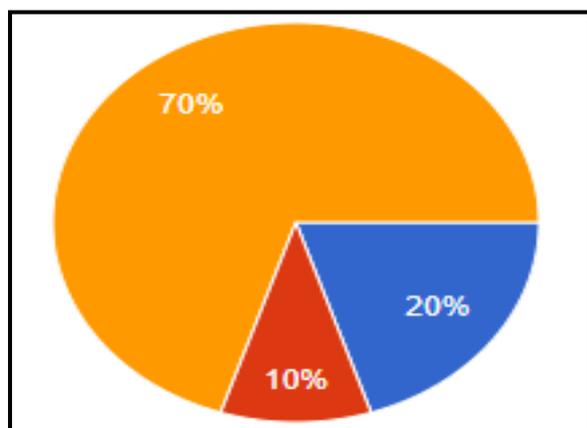
**Graph 3: Denture stability responses**



**Graph 4: Responses related to masticatory efficiency**



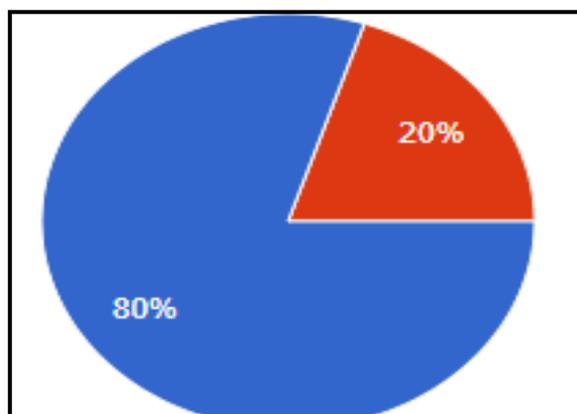
**Graph 5: Responses related to patients prognosis (post insertion 3-6 months)**



**DISCUSSION**

According to GPT-9, “The neutral zone is the potential space between the lips and cheeks on one side and the tongue on the other, that area or position where the forces between the tongue and cheeks or lips are equal.” Several materials have been advocated for shaping the neutral zone i.e. modeling plastic impression compound, soft wax, impression plaster, a polymer of dimethyl siloxane filled with calcium silicate, tissue conditioners lesion and other common

**Graph 6: Responses related to clinicians prognosis (post insertion 3-6 months)**



**Table 1: Age & gender wise distribution of patients**

| Age Group (Yrs) | Male | Female | Total %  | P value      |
|-----------------|------|--------|----------|--------------|
| 45-50           | 1    | 1      | 2 [20 %] | 0.09         |
| 51-55           | 1    | 1      | 2 [20 %] | 0.60         |
| 56-60           | 2    | 1      | 3 [30 %] | 0.50         |
| 61-65           | 1    | 1      | 2 [20 %] | 0.02*        |
| >65             | 1    | 0      | 1 [10 %] | 0.01*        |
| Total           | 6    | 4      | 100%     | *Significant |

**Table 2: Questionnaire estimation with responses of participants**

| Q. No | Parameters                                       | Options                                | Responses                              |
|-------|--|--|--|
| 1     | Denture Retention                                | 1. Good<br>2. Average<br>3. Poor       | 1. 5 (50%)<br>2. 3 (30%)<br>3. 2 (20%) |
| 2     | Denture Stability                                | 1. Good<br>2. Poor<br>3. Average       | 1. 5 (50%)<br>2. 1 (10%)<br>3. 4 (40%) |
| 3     | Improvement in masticatory efficiency            | 1. Yes<br>2. No                        | 1. 8 (80%)<br>2. 2 (20%)               |
| 4     | Patients prognosis (post insertion 3-6 months)   | 1. Happy<br>2. Not Happy<br>3. Average | 1. 2 (20%)<br>2. 1 (10%)<br>3. 7 (70%) |
| 5     | Clinicians prognosis (post insertion 3-6 months) | 1. Satisfactory<br>2. Non Satisfactory | 1. 8 (80%)<br>2. 2 (20%)               |

resilient lining materials.<sup>11,12,13</sup> Different techniques have also been demonstrated using the materials in combination with movements including sucking and pursing the lips along with phonetics & swallowing. The ultimate goal of any prosthodontic treatment is to

**Table 3: Basic statistical explanation with level of significance evaluation using Pearson Chi-Square test**

| Q. No | Mean | Std. Deviation | Std. Error | 95 % CI | Pearson Chi-Square Value | p value |
|-------|------|----------------|------------|---------|--------------------------|---------|
| 1     | 1.34 | 0.636          | 0.836      | 1.43    | 1.424                    | 0.400   |
| 2     | 1.91 | 0.503          | 0.203      | 1.69    | 1.332                    | 0.090   |
| 3     | 1.02 | 1.625          | 0.424      | 1.65    | 1.875                    | 0.020*  |
| 4     | 1.63 | 0.736          | 0.403      | 1.98    | 1.987                    | 0.010*  |
| 5     | 1.83 | 1.951          | 0.727      | 1.76    | 1.451                    | 0.080   |

\*p&lt;0.05 significant

restore the function, form, and esthetics of the patient. Many of the researchers have highlighted that out of three surfaces of the denture, the polished surface is efficiently bounded by the tongue and the cheeks.<sup>14,15,16</sup> Dentures are occupied in normal physiologic movements such as mastication, smiling, swallowing, speech, and swallowing. Therefore, the denture must be in synchronization with these functions because physiologically improper denture is liable for poor prosthesis stability and retention, inadequate facial tissue support, less tongue space and compromised phonetics. Denture constructed over on the highly resorbed mandibular ridge by neutral zone impression technique will assure that the muscular forces assist in retention and stabilization of the denture rather than displacing the denture during mastications.<sup>17,18</sup> The main aim of giving complete denture prosthesis to an edentulous patient includes the provision of functionally aesthetic substitutes and the replacement of associated structures within the oral cavity. The complete dentures must use the areas obtainable for the retention. When retention is obtained, the complete denture prosthesis acquires considerable region in the mouth. Long term denture wearers frequently face difficulty due to deficiency of stability in mandibular complete dentures. This is particularly true due to high resorption of lower edentulous bone.<sup>9,12,19</sup>

### CONCLUSION

Authors concluded that overall efficacy of neutral zone technique among resorbed ridge patients was fairly satisfactory. More than half of the studied patients were genuinely happy with the retention and stability offered by this technique. Improvement of masticatory efficiency was noted in more than two third of the cases. The post insertion patient prognosis

and post insertion clinicians prognosis was also good. The outcomes of this study must be considered as suggestive for assuming clinical results of such important circumstances. Nevertheless, authors anticipate some other large scale studies to be conducted that can further set up certain genuine norms in these regards.

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