

## ORIGINAL ARTICLE

# METHODS USED TO ESTABLISH THE POSTERIOR PALATAL SEAL FOR MAXILLARY COMPLETE DENTURE PROSTHESIS

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## ABSTRACT

**Background:** The survey was conducted in Pakistani teaching hospitals to determine techniques and concepts which are used to establish the posterior seal in complete dentures. The aim of this study is to obtain the existing curriculum which is used for teaching the concepts of posterior palatal seal establishment for complete dentures.

**Methods:** A questionnaire was made on online survey development software (Survey Monkey) that consisted of 7 multiple-choice based questions. The questions were related exclusively to the methods for establishing posterior palatal seal for complete denture prosthesis. The forms were forwarded and distributed via e-mail to 75 faculty members of 13 dental Institute of Pakistan who were teaching prosthodontics. A total of 64 faculty members (41 from public sector and 23 from private) responded and participated in the study.

**Results:** Results of our survey indicated that 37.5% of the faculty members were teaching a combination of phonation, nose blowing and fovea palatinae methods. The two vibrating line concept for establishing posterior palatal seal was taught by 64.06% of faculty members, 53.65 % of these place the border of maxillary dentures at the posterior flexion line. Carving the maxillary posterior palatal seal on the master cast was taught by 92.18 % of faculty members, 64% were teaching the post palatal seal carving depth of 0.5–1.5 mm on the maxillary cast, along with consideration of Compressibility of the palatal tissues. The butterfly pattern was the mostly (79.6%) described pattern for carving post palatal seal on the maxillary cast.

**Conclusion:** Statistically there was no significant difference in techniques and concepts which are used to establish the posterior palatal seal, between government and private dental institutes.

**KEYWORDS:** Palatal tissues, Posterior palatal seal, Complete denture prosthesis.

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## INTRODUCTION

Completely edentulous patients are the ones who have lost all of the remaining natural dentition. Over the last few decades, edentulism is observed to have increased in the developing countries<sup>1</sup>. So the effective demand for prosthetic treatment is therefore likely to increase. The edentulous patients suffer from on-going bone loss<sup>2</sup>, impaired mastication<sup>3</sup>,

and decreased protective function of the oral mucosa<sup>4</sup>. Dentition loss also has detrimental effects on nutrition that, in turn, impact general health<sup>5</sup>.

Treatment options available for completely edentate patients are complete denture and implant prosthodontics<sup>6</sup>. However, complete denture is one of the most commonly prescribed solutions to the edentulous patients. Complete denture fabrication

is a demanding task and undergoes critical steps. It is primarily retained by the physical forces that are created by a valve-like seal between the border of the flanges and the surrounding limiting tissues in the sulcus<sup>7</sup>. Hence, this type of seal is very difficult to achieve at the posterior end/border of the maxillary complete denture prosthesis<sup>8</sup>. Adequate coverage of the posterior extension of maxillary denture is required to develop a good posterior palatal seal<sup>9,10</sup>.

Post palatal seal (PPS) is defined as the "portion of the intaglio surface of a maxillary removable complete denture, located at its posterior border, which places pressure, within physiologic limits, on the posterior palatal seal area of the soft palate."<sup>11</sup> PPS serve to provide retention, prevent trapping of fluid, air and food beneath the prosthesis, also to make the distal region least noticeable to tongue, reduces the chances of gagging, to provide thicken area that increase the strength of the posterior border of the denture<sup>12,13</sup>. PPS can be recorded using various approaches, documented as (1) Conventional/Winkler technique, (2) the technique involving the arbitrary scrapping of the master cast prior to the denture construction, (3) physiological technique, (4) extended palatal technique<sup>14,15</sup> and (5) ultrasonic technique of recording PPS<sup>16</sup>. Demarcation of PPS and its integration in the maxillary denture is a clinical procedure, because tissue displacement must be determined at the chair side. Therefore, marking PPS is not a laboratory procedure but a dentist's responsibility<sup>17</sup>.

Vibrating line is "an imaginary line across the posterior part of the soft palate marking the division between the movable and immovable tissues; this line can be identified when the movable tissues are functioning"<sup>11</sup>. There are a number of techniques which can be used to determine the location of the vibrating line. These are based upon (1) pronunciation of "ah" sound that causes lifting of the soft palate<sup>6,18</sup>, (2) swallowing method<sup>19</sup>, (3) the valsalva maneuver (nose-blowing)<sup>19,20</sup>, and (4) T burnisher palpatory method<sup>21</sup>. Vibrating line location also shows variation with the classification of the soft palate defined by Millsap<sup>13</sup>. According to Kumar et al<sup>22</sup>, the vibrating line is predominantly present anterior to the fovea palatinae in patients with class I and class II soft palate. Whereas, 50% of the patients with class III type palate had their vibrating line present on fovea palatinae.

"Fovea Palatinae are two small pits in the posterior aspect of the palatal mucosa, one on each side of the midline, near the attachment of the soft palate to the hard palate"<sup>11</sup>. Study<sup>23</sup> found that anterior vibrating line is about  $2.58 \pm 1.19$ mm anteriorly to fovea palatinae. Whereas, posterior line is  $0.71 \pm 0.68$ mm posterior. Hence, the fovea palatinae are present close to the posterior vibrating line and can serve as a reliable landmark/area for determi-

nation of the posterior maxillary denture border.

Surveys were conducted to obtain the methods followed by the educational institutions for scoring the PPS region. A recent study on this topic was conducted by Hussain S Z<sup>24</sup> for the determination of the concepts and techniques which are being taught in the dental colleges. They concluded that 85.72% of faculty taught a combination of phonation along with other methods for locating vibrating line. 80.95% of the teachers taught single concept of vibrating line for PPS establishment. Winland and Young<sup>25</sup>, Rashedi and Petropoulos<sup>17</sup> and Hussain S Z<sup>24</sup>, concluded that most schools were teaching the butterfly pattern for PPS carving.

The aim of this study is to obtain the existing curriculum which is used for teaching the concepts of posterior palatal seal establishment for complete dentures, identify lacking areas and upgrade the theory and clinical teaching patterns for the betterment of graduating dentists.

## METHODS

In 2016, an online questionnaire was made on Survey Monkey and was send via E-mail to 75 prosthodontics instructors of 13 dental Institutes across the country. A total of 64 instructors (41 from Public sector, 23 from Private) submitted their response and participated in the study and thus, the response rate was recorded to be 85.3%.

The questionnaire survey contained 7 multiple-choice questions related to the Methods for establishing posterior palatal seal of complete denture and every respondent was to select appropriately by tick marking their choices. The respondents had an option of giving a specific response which was not listed in the choices of the questionnaire. The obtained data was analyzed using SPSS Version 16.0 so that the percentages and frequencies could be calculated.

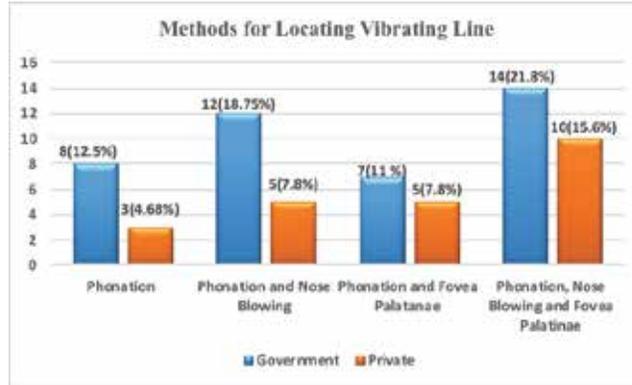
## RESULTS

Out of the total 17 dental institutes, 13 were involved in this study, of which 7 were government and 6 were private dental institutes. Among the 13 of the total dental institute, 64 faculty members out of a total of 75 had provided the response to the given questionnaire and thus, a response rate of 85.3% was obtained.

## DISCUSSION

The current study showed that most of faculty members of government and private dental institutes

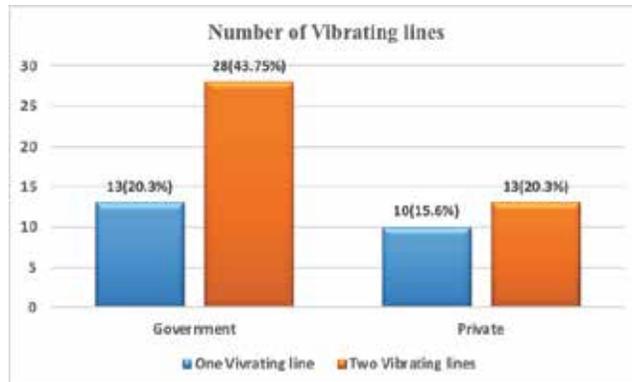
were teaching combination of phonation, nose blowing and fovea palatinae methods for locating vibrating line (Figure: 1).



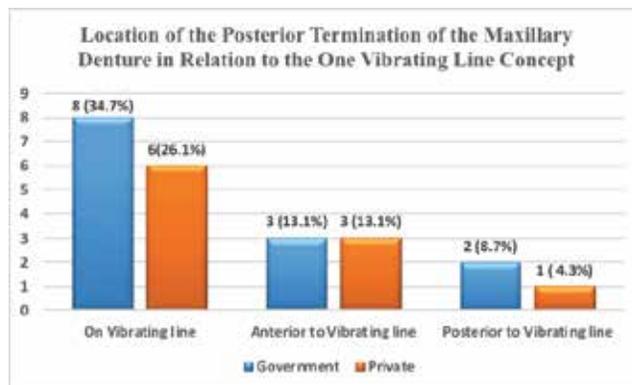
**Figure 1: Positive response of government and private faculty members regarding method or determining the location of the vibrating line.**

These findings are in agreement with the study of Husain SZ, Samejo <sup>24</sup> and also with the study of Rashedi B and Petropoulos VC<sup>17</sup>. The studies conducted by Husain SZ, Samejo <sup>24</sup> and Rashedi & Petropoulos <sup>17</sup> indicated that mostly teachers (around 80%) were teaching the concept of one vibrating line and extend the posterior

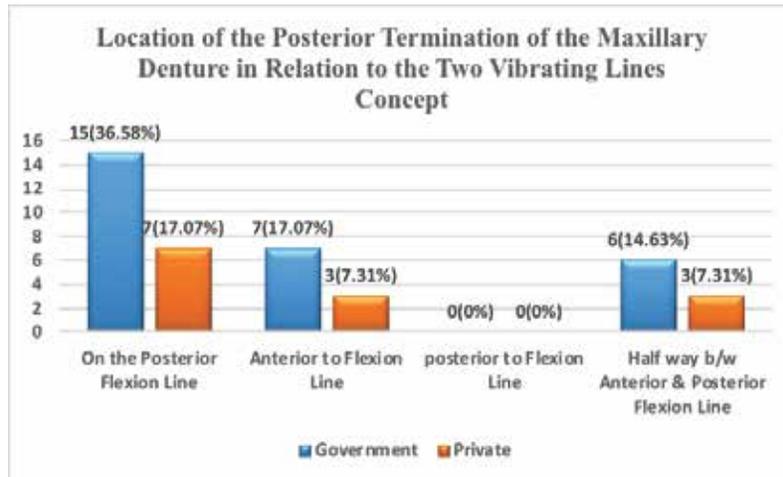
border of maxillary denture posterior to vibrating line. However; the results of our study indicated that the majority of faculty members in government and private dental institutes were teaching the two vibrating line concept while placing the posterior maxillary denture border at posterior flexion line (Figures 2,3,4).



**Figure 2: Positive response of government and private faculty members regarding Number of vibrating line.**



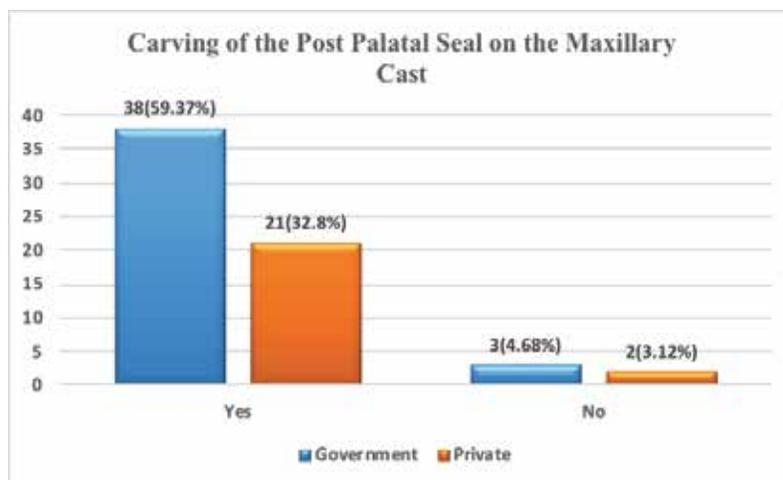
**Figure 3: Positive response of government and private faculty members regarding Location of the posterior termination of the maxillary denture in relation to the one Vibrating Line concept.**



**Figure 4: Positive response of government and private faculty members regarding Location of the posterior termination of the maxillary denture in relation to the two Vibrating Lines concept.**

In our study, we found out that majority of government as well as private dental institutes were teaching their students about carving of post dam area on maxillary denture as shown in (Figure 5), these results are similar with the studies survey of Husain SZ,

Samejo I<sup>24</sup>, Rashedi & Petropoulos<sup>17</sup> and also study of Chen MS<sup>26</sup>. All of these studies showed 83.3%, 95% and 87.5% of teachers were teaching the carving of post dam on maxillary cast.



**Figure 5: Positive response of government and private faculty members regarding Carving of the Post Palatal Seal on the Maxillary Cast.**

Most of faculty members of government (39%) and private institutes (25%), carve the post dam area to the depth of 0.5 to 1 mm, with the consideration of compressible palatal tissue however; Husain SZ, Samejo I<sup>24</sup> and Rashedi & Petropoulos<sup>17</sup> and Chen MS<sup>26</sup> carved the post-dam area to the depth of 1 to 1.5 mm, considering the tissue compressibility. Butterfly shape of post-dam carving was the most

taught method i.e. 50% in the government and 29.6% in the private dentures institutes and single bead, double bead and carving on the basis of palpation of tissue were less frequently being taught by teachers in our study (Figures 6, 7). These results are in conformity with other studies which have been carried out in the dental schools of the United States<sup>17, 26</sup>.

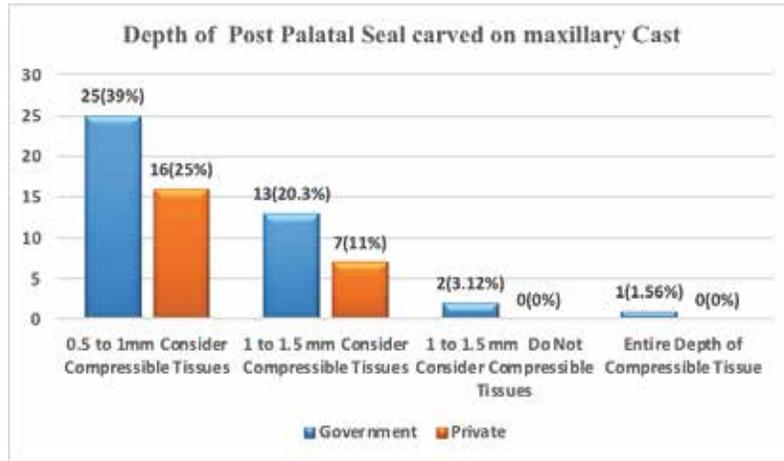


Figure 6: Positive response of government and private faculty members regarding depth of post palatal seal on maxillary cast.

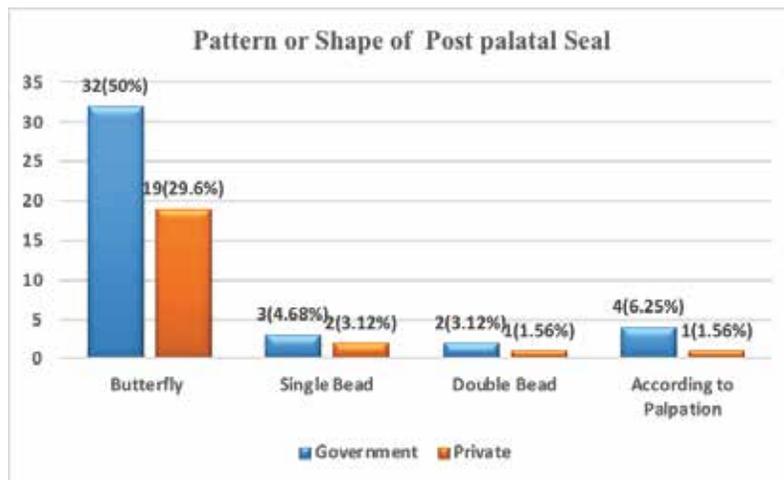


Figure 7: Positive response of government and private faculty members regarding pattern of post palatal seal on maxillary cast.

Statistically no significant difference was seen in between government and private dental faculties in teaching the methods for determining the posterior palatal seal area during maxillary complete denture fabrication.

**CONCLUSION**

Combination of phonation, nose blowing and fovea palatinae methods were mostly used for locating vibrating line. Majority of dental institutes were teaching two vibrating line concept and placing posterior maxillary denture border at posterior flexion line. Most of dental institutes teach carving the posterior palatal seal on the maxillary master cast up to 0.5 mm to 1mm, considering the compressibility of palatal mucosa. Butterfly pattern method was the commonest of all the methods used to carve the posterior palatal seal on the maxillary cast

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