

# FREQUENCY OF TYPE OF COMMON MAJOR CONNECTOR DESIGN EMPLOYED IN REMOVABLE PARTIAL DENTURES PROVIDED TO PATIENT

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## ABSTRACT

**Objective:** To determine the frequency of the types of common major connector designs in removable partial dentures provided to patients.

**Materials and Methods:** A cross-sectional study was done at Khyber College of Dentistry. Participants fulfilling the inclusion and exclusion criteria were invited to take part in the study. The information was collected using a single interviewer-administered questionnaire. The demographic information of the patient was recorded. Information related to the design of major connector was recorded after it was drawn on the cast, before it was sent to the laboratory. Data was analyzed using SPSS version 17.

**Results:** Data from 207 subjects were collected over a period of 24 months. The mean age of subjects was  $41.21 \pm 9.13$  (SD) years. Out of 207 subjects, 41.1% were males and 59.9% were females. Female to male ratio was 1.43:1. Out of total, 49.3% were maxillary and 50.7% were mandibular removable partial dentures. Removable partial dentures constructed from cobalt-chromium accounted for 152 of the observed cases. Of the 152 observed cases of removable partial dentures made of cobalt-chromium, 81 were in the mandibular arch and 71 were maxillary. The remaining 55 were made of acrylic resin, out of which 31 were maxillary and 24 belonged to the mandibular arch. The study concluded that the horse shoe shaped connector is the most common type of connector used in the maxillary removable partial dentures (both cast partial and acrylic RPD's) and the lingual plate is the most frequent type of connector given in the mandibular removable partial dentures.

**Conclusion:** The study showed that common maxillary cobalt-chromium major connector was the horseshoe shape, and that of mandibular cobalt-chromium major connector design was the lingual plate. Additionally, common acrylic RPD were horseshoe shape in maxilla and lingual plate in mandible.

**Keywords:** Removable cast partial denture, acrylic, cobalt-chromium, major connector design

## INTRODUCTION

Severe and extensive partial edentulism being on the rise requires partial dentures as a replacement option<sup>1-3</sup>. The most popular prosthesis used for some missing teeth is the removable partial denture

(RPD). The advantages of RPD include improved appearance, speech, good masticatory function, and improved quality of life<sup>4</sup>. A number of methods have been used to classify the partially edentulous arches that mainly accounts on the possible combinations of teeth to ridges<sup>5</sup>.

Currently, Kennedy's classification is the most widely used and accepted. Kennedy classified all partially edentulous arches in four main types<sup>6,7</sup>. Literature on RPDs explains a number of major connectors;

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however, only a few are used in routine. In cases of short saddles and tori Palatinae, the U-shaped palatal connector (horseshoe) is commonly preferred. The palatal plate (PP) type major connector is reserved for extensive edentulous areas in Kennedy class I and II, and in cases of abutment teeth with poor support. As for mandibular arch, the major connector of choice is lingual bar (LB). A sublingual bar (SLB) is recommended in areas where there is insufficient space between the floor of the mouth and the free gingival margins. A mandibular continuous bar (MCB) is used in deficient space between the floor of the mouth and the free gingival margins and where there is tori mandibularis<sup>8,17</sup>.

A previous study done to report the occurrence of partial denture types in eastern Wisconsin reported that the division of major connector according to Kennedy classification in maxilla was A-P strap 9.5%, palatal strap 9.5%, horseshoe 72.5%. In mandible, lingual bar 38.8% and lingual plate accounted for 59.4%. The common major connector was horseshoe in maxilla, and lingual plate in mandible<sup>2</sup>.

This study will provide the clinicians information regarding RPD major connector design that is most commonly used. No previous work in local population requiring RPD has been carried out. Therefore, an exercise of this kind will provide useful information for use by local dental practitioners.

## MATERIALS AND METHODS

This cross-sectional study was carried out at Khyber College of Dentistry Peshawar. Subjects belonging to both the genders having age within the range of 20-50 years were included in the study. All partial edentulous cases for provision of removable partial dentures, with clearly identified major connector designs on the cast were selected. Patient-shaving only missing one or all 3<sup>rd</sup> molars, requiring / using obturators, mouth guard, palatal feeding plates, requiring pre-prosthetic treatment, RPD design prescribed by the undergraduate students were not included in the study. The information was collected using a single interviewer-administered questionnaire. The demographic information of the patient was recorded. Information related to the design of major connector was recorded after it was drawn on the cast before it was sent to the laboratory.

Statistical analysis of the data was done using the

software (SPSS version 17.0). Frequency and percentages were calculated for categorical variable like gender, partially edentulous arch and type of major connector in maxillary and mandibular arch. Mean  $\pm$  SD were calculated for continuous variables like age. Major connector was stratified among age, gender and partially edentulous arch. Post stratification was done through chi-square test, keeping p value less than or equal to 0.05 as significant.

## RESULTS

This study was conducted at the Prosthodontics Department of Khyber College of Dentistry Peshawar. A total of 207 subjects were evaluated to determine the frequency of the common major connector design employed in removable partial dentures provided to patients.

The mean age of subjects was  $41.21 \pm 9.13$  (SD) years. Age range of subjects was divided into 7 groups, majority of the subjects were in age group of 46-50 years.

Out of 207 subjects, 41.1% were males and 59.9% were females. Female to male ratio was 1.43:1. Maxillary removable partial dentures accounted for 49.3% and mandibular 50.7% of the observed dentures. Removable partial dentures made from cobalt-chromium accounted for 152 of the observed cases with 81 in mandibular arch and 71 in maxillary arch. The remaining 55 were made of acrylic resin with 31 in maxillary arch and 24 in mandibular arch.

Table 1 shows distribution of major connector design used in provision of removable cast partial dentures indicating horse shoe shaped design is the most common one in maxilla and lingual plate is the common design used in mandibular arch. The table shows the horse shoe shaped major connector being the most common connector design given in maxillary acrylic removable partial dentures and the lingual plate is the common connector design given in mandibular acrylic partial dentures.

Table 2 shows no significant association exists between the type of major connector used in a removable partial denture (both cast partial and acrylic type) and gender of the subject, keeping p value  $<0.05$  as significant. However, significant association was found between the age of the individual and type of connector design given in removable partial

dentures, p value 0.036.

## DISCUSSION

Denture design is the result of the choice and knowledge of dentists. The dentist must know the biomechanical principal of different RPD design and prescribe the one appropriate for each patient. Perfect design increases the success of the removable partial denture<sup>9</sup>. In our study, out of 207 cases the mean age of subjects was  $41.21 \pm 9.13$  (SD) years. There was significant relation between age and major connector design (p value 0.036). Out of 207 subjects, 41.1 % were males and 59.9 % were females. There was also no significant relation between gender and major connector design.

Out of 207 cases, 102 (49.3%) were maxillary and 105 (50.7%) were mandibular similar to the

findings reported by a study done by Deo K. Pun in which out of 570 cases, 284 were maxillary (49.8%) and 286 (50.2%) mandibular<sup>2</sup>. In our study, cast partial removable partial dentures accounted for 73.3 % (152) and 26.7 % (55) were acrylic similar to the findings reported by Deo K. Pun<sup>2</sup> in which 73.3% of the cases had metallic major connector whereas 26.7% had non-metallic major connector designs fabricated from acrylic. Studies by Zalataric, Tuominen, and Carlson have found that almost all RPDs in these studies were acrylic resin without metal frameworks. It was mainly found that teeth in contact with these acrylic frameworks were more likely to show decay<sup>2</sup>.

As our finding is similar to the study done by Deo K Pun (72.5%), majority of the maxillary major connectors for a removable cast partial denture belonged to the horse shoe shaped design, 43 out of

**Table 1: Frequency of major connector designs used in both arches**

| Arch            | RPD Type                          | Type of major connector | N  | %    |
|-----------------|-----------------------------------|-------------------------|----|------|
| Maxillary Arch  | Removable Cast partial Denture    | AP Strap                | 14 | 6.8  |
|                 |                                   | Palatal Strap           | 7  | 3.4  |
|                 |                                   | Palatal Plate           | 7  | 3.4  |
|                 |                                   | Horseshoe               | 43 | 20.8 |
|                 |                                   | Total                   | 71 | 34.4 |
|                 | Acrylic Removable partial denture | Horseshoe               | 23 | 11.1 |
|                 |                                   | Palatal plate           | 8  | 3.9  |
| Mandibular Arch | Removable Cast partial Denture    | Lingual Plate           | 47 | 22.7 |
|                 |                                   | Lingual Bar             | 31 | 15   |
|                 |                                   | Others                  | 3  | 1.4  |
|                 | Acrylic Partial denture           | Lingual Plate           | 24 | 11.6 |

**Table 2: Cast partial denture major connector design related to gender.\*chi square test, P<0.05 significance level**

| Connector Design | Gender |        | P value* |
|------------------|--------|--------|----------|
|                  | Male   | Female |          |
| A-P strap        | 06     | 08     | 0.086    |
| Palatal plate    | 01     | 06     |          |
| Horse Shoe       | 14     | 29     |          |
| Palatal strap    | 06     | 01     |          |
| Lingual Bar      | 11     | 20     |          |
| Lingual plate    | 24     | 23     |          |
| Others           | 02     | 01     |          |

\*Chi Square test

71 (20.8%).<sup>2</sup>In another study done by Keyf et al, A-P strap and horse shoe shaped design were the most common connector designs used in maxillary removable cast partial dentures, similar findings to our study. Similarly, lingual plate and lingual bar was the most common connector design used for the mandibular removable cast partial dentures.<sup>8</sup>Polychronakis N has also reported the horseshoe shaped connector (55.2%) as the most common type of connector used in the maxillary arch.<sup>6</sup>

However, a study conducted by Walid M et al, reported the most common type of major connector to be the A-P palatal strap (140, 38.7%) in the maxillary arch and lingual bar (291, 76.9%) in the mandibular arch.<sup>11</sup>Similarly another study conducted by Polychronakis N reported the lingual bar as the common connector design (95%) used in the mandibular removable cast partial denture.<sup>6</sup>Similarly another study conducted by AL-Dwairi ZN reported the lingual bar as the common connector design (77%) used in mandibular removable cast partial denture<sup>16</sup>. The preferences reported in our study for anterior-posterior palatal strap type major connector confirms the variations established in the concept of RPD design. Our study also reports preference for the anterior-posterior palatal strap over the U-shaped maxillary major connector. However, there also appears to be an indiscriminate preference for the anterior-posterior palatal strap in Kennedy Class II and Class III, when the simpler palatal strap design would have been a logical choice providing more comfort to the patient due to less tissue coverage and few borders to bother the tongue.<sup>11</sup>

A study conducted in North America, the lingual bar was found to be the most common major connector, unlike in Sweden, where the dental connector Cingulum bar was reported to be the most common major connector used owing to patient comfort<sup>11-13</sup>. In a study conducted in Greece, common major connector were lingual bar (92.6%) and U-shaped palatal strap (54%)<sup>18</sup>. The reason for the larger use of horseshoe major connectors and lingual plate major connectors was apparently due to the material selection and ease of fabrication. The choice of major connectors in the mandibular arch was largely influenced by; the frenum attachment, depth of the lingual alveolar sulcus and the presence of tori. Compromised periodontium and existing dentures were reported to be less influential in dictating the

design of major connector. No study was found to have reported the influence of the clinicians' preference for a particular type of connector, so this matter needs to be further investigated<sup>11</sup>. If the fabricated RPD does not follow the biological and mechanical considerations, considerable damage might occur to remaining hard and soft tissues<sup>20,21</sup>. Prosthetic education also plays a role. Communication with the lab is also very important. Because some clinicians leave the duty of RPD design to dental technicians after making primary impressions for the patient without any former intraoral preparation.<sup>14,19</sup>. Many studies have highlighted this lack of prescribing dentist input as well as the varying RPD design philosophies<sup>15</sup>.

## CONCLUSIONS

It was found that the most common type of connector used in the maxillary arch was the horseshoe shaped major connector for both the cast partial and acrylic type of removable partial dentures and lingual plate was the most frequent design employed during the provision of the mandibular removable partial denture for both the cast partial and acrylic type of removable partial dentures. No statistically significant association was reported between the type of connector and gender; however statistical significance existed between the type of connector and age.

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