ASSOCIATION OF OCCLUSAL PLANE WITH THE LEVEL OF RETROMOLAR PAD

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ABSTRACT

The objective of this study was to determine the association of the occlusal plane with level of retromolar pad in dentate individuals. A descriptive cross-sectional study was conducted at the department of Prosthodontics, Armed Forces Institute Dentistry (AFID), Rawalpindi over a period of 6 months and included 60 subjects from either gender with intact dentition. Convenience sampling technique was employed. The results from this study showed that greatest number of the study participants had occlusal plane coinciding with either the middle 3rd i.e. 33.3% or the lower 3rd i.e. 35%. Only 11.7% of the patients had retromolar pad at the level of upper 3rd or the junction of upper and middle 3rd of the retromolar pad. No significant difference was found between the male and female gender as far as the location of the occlusal plane and its relationship with the retromolar pad was concerned. Within the limitations of this study, it can be concluded that in most of the individuals the occlusal plane coincides with the lower part of the retromolar pad and this association is irrespective of the gender of the patients.

Key Words: Occlusal plane, retromolar pad.

INTRODUCTION

The complex configuration of the occlusion is one of the best examples of nature's complex and intricate designs. All components of occlusion are structurally and functionally interrelated, creating a balance that is compatible with the neuromuscular mechanism. A change in any one component of occlusion will result in deleterious effects on the other components. According to Dr Peter E Dawson, “the plane of occlusion refers to an imaginary surface that theoretically touches incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth”. A plane usually signifies a flat surface; however, it is not so where the occlusal plane is concerned. Two areas comprising of anterior and posterior teeth constitute the occlusal plane and must be considered individually. Anterior tooth position is governed by esthetics, phonetics and the required anterior guidance. On the contrary, functional needs predominantly determine the position of posterior teeth and this position is also affected by the incorporation of the anteroposterior and mediolateral curves. Optimal function, aesthetics and phonetics following prosthodontic rehabilitation is dependent on the establishment of physiologically accurate vertical dimensions of occlusion, palatal contours, positioning of the teeth and the level of occlusal plane. The occlusal plane orientation is lost in patients with mutilated dentitions or those rendered edentulous and needs to be re-established for optimal function and comfort.

Different intra- and extra-oral landmarks used by clinicians to define the level of the occlusal plane include the upper lip, corners of mouth, lateral margins of tongue, Camper's plane and interpupillary line, the parotid papilla and the retromolar pad (RMP). Of these landmarks, the RMP is considered to be a more stable landmark. Keeping in view the significance of the level of occlusal plane with respect to optimal functions, esthetics and comfort, it is critical for the dental clinicians to establish it accurately for the design and fabrication of fixed and removable prostheses.

Any discrepancy in establishing the optimal level of occlusal plane causes adverse effects on periodontal tissues in dentate individuals and may result in vague symptoms such as headaches, migraines or stiffened
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shoulders and in edentulous patients, compromising the stability of the prosthesis, ultimately leading to alveolar bone resorption. If the level of occlusal plane is too high, the tongue is unable to lie on the lingual cusps of the mandibular denture teeth and hence, fails to counter the movement of the denture. It may also result in food accretion in the labial and lingual sulci. In contrast, a low level of occlusal plane will promote tongue and cheek biting. Therefore, it is mandatory for the prosthodontist to re-establish the lost occlusal plane, both while dealing with multiple long span posterior restorations as well as in complete denture prosthodontics. This study, hence, tends to employ the most reliable marker of occlusal plane orientation i.e. the RMP for confirming the level of RMP that is most commonly harmonious with the occlusal plane level in our young dentate population. This will give us a clear idea of the level of occlusal plane that we want to establish in doing prosthodontic rehabilitation for patients who require full mouth rehabilitation or complete denture prosthesis.

METHODOLOGY

A cross-sectional descriptive study was conducted at the Prosthodontics Department, Armed Forces Institute Dentistry (AFID), Rawalpindi over a period of 6 months and included 60 subject divided in two groups of 30 males and 30 females. Convenience sampling technique was employed. Inclusion criteria allowed all male and female subjects that were in the 19-25 years age bracket having intact maxillary and mandibular arches with permanent dentition in ideal arch form and alignment with Angles class-I relationship to be included in study.

The participants were excluded from the study if they had over erupted teeth in maxillary and mandibular arch or any degree of crowding in maxillary and mandibular dentition. Subjects were also filtered if they presented with rotation of maxillary or mandibular teeth or Class-II operative restorations or abnormal tooth form or a previous history of orthodontic treatment.

Sixty students from Army Medical College meeting the inclusion criteria were recruited for the study. An informed consent was obtained from them regarding the procedure and using their data in research. The male subjects were placed in group A and females in group B. Demographic information like name and age were obtained. All the information was recorded in a specially designed proforma. The location of the level of the RMP coinciding with the plane of occlusion was evaluated by placing a 19 gauge straight stainless steel wire, 6” in length (the straightness of wire was confirmed by rolling it on a hard and flat marble surface) on the cusp tip of canine in the lower jaw and by posteriorly extending it to the distolingual cusp tip of second or the third molar (the most posterior tooth). The point of intersection of the wire was employed to establish the correlation of the occlusal plane to RMP. The vertical height of the pad was divided into 3 parts (lower, middle and upper 1/3rd). The process was done both intraorally and on the cast of impressions made for all the selected patients, both on the right and left side. Distolingual cusp tip of the second or the third mandibular molars were used as the posterior reference point because of its strong anatomic relationship to the RMP.

RESULTS

Out of the 60 students participating in the study, 30 were male and 30 were female. Gender distribution with respect to age of the subjects are shown in Table 1. Occlusal plane level with reference to RMP was divided into 5 levels Upper third, Junction between upper and middle 3rd, middle 3rd, junction between middle and lower 3rd, and lower 3rd. The greatest number of the participants i.e. 21 (35%) subjects had their plane of occlusion coinciding with the lower third of the RMP (Fig 1). Fig 2 highlights the distribution of male and female subjects according to the level of occlusal plane.

TABLE 1: MEAN AGE OF STUDY SUBJECTS

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>25</td>
<td>21.77</td>
<td>1.59</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>23</td>
<td>20.87</td>
<td>1.33</td>
</tr>
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Fig 1: Association of Occlusal Plane with different levels of RMP

Fig 2: Distribution of male and female subjects according to the level of Plane of Occlusion
DISCUSSION

Correct orientation of the plane of occlusion in all three dimensions after loss of natural teeth is a demanding task. The optimal position/orientation of the occlusal plane are essential for successful prosthodontic treatment of completely edentulous patients. RMP has long been used as a landmark in establishing the optimal occlusal level of artificial dentition in patients who are completely edentulous.

In the present study, for most of the study subjects, occlusal plane coincided with the level of middle 3rd (33.33%) and the lower 3rd (35%) of the RMP. These findings are endorsed by those of Gupta et al where 77% of the study subjects had occlusal plane level with the middle 3rd of RMP. Singla and Rathee reported 58% of the study subjects with occlusal plane at the level of the lower 3rd of RMP. Similar results were also reported by Shigli et al who reported that the occlusal plane levelled with the lower 1/3rd of RMP in majority (56.7%) of the subjects. No significant difference was found in the level of occlusal plane between male and female subjects in this study. Similar findings have been reported by Gupta et al as well as by Singla and Rathee.

The distal reference point used in this study was the distolingual cusp tip. Since the mandibular molars are lingually inclined, using the distobuccal cusp tip would have resulted in a greater number of subjects with occlusal plane coinciding with the upper 1/3rd of the RMP. Moreover, Gupta et al in their study encountered variations in the level of the occlusal plane coinciding with the RMP between the right and left sides, thereby, deeming it an unreliable landmark. However, no such variations were found in the present study. The results were consistent irrespective of the right or left side, and hence, RMP can be considered a reliable landmark. Shigli et al also described RMP as a stable, conspicuous and easily accessible landmark. The variations found by Gupta et al may have been incorporated due to human error in measuring the occlusal plane level.

The weakness of the present study lies in its small sample size. Only 60 subjects were included. The results, therefore, cannot be generalized to the population at large. Further research with a greater sample size and a diverse group of subjects should be carried out.

CONCLUSION

Within the limitations of this study, the following conclusions can be drawn:

1. In most of the individuals, the occlusal plane correlated with the lower 1/3rd of the retromolar pad.
2. No significant difference was found between males and females regarding the association of occlusal plane with level of retromolar pad.
3. Retromolar pad can serve as a stable intraoral landmark to reestablish the lost occlusal plane orientation in edentulous subjects.

REFERENCES