

Assessment of Anatomical Landmarks in Dentulous Patients to Calculate Height of Occlusal Registration Blocks

Height in
Dentulous
Patients by
Assessing
Anatomical
Landmarks

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ABSTRACT

Objective: To determine the mean rim height in dentulous patients by assessing anatomical landmarks.

Study Design: Descriptive cross sectional study

Place and Duration of Study: This study was conducted at the Prosthodontics Department of Liaquat University of Medical & Health Sciences, Jamshoro, Sindh from Sep 2022 to March 2023.

Methods: Thirty patients were included in this study. Impressions were taken with alginate and models were poured. Measurement were taken using digital Vernier caliper for both arches on first permanent molars and canines from cusp tip to sulcus depth. Three readings were taken to identify a mean in case of any human or machine error.

Results: The patients' average age was 28.10 ± 5.97 years. Mean height of 16.18 mm, 15.63 mm, 15.46 and 15.35 mm for First Molars teeth no. 16, 26, 36 and 46. Mean height was 19.5 mm, 19.07 mm, 18.09 mm and 18.06 mm for Canines teeth no. 13, 23, 33, and 43. The mean of mean height of all Molars teeth and all Canines teeth were 15.65 ± 1.16 mm and 18.68 ± 1.47 mm respectively.

Conclusion: In this population, for complete removable dental prosthesis fabrication, It is feasible to keep the maxillary anterior record rim's preset height of 19–20mm in male patients and 18-19mm in female patients. It could be help in fabricating denture which is functionally and aesthetically pleasing for edentulous patients.

Key Words: Complete denture prosthodontics, occlusal plane height, Fabricating denture

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INTRODUCTION

Complete denture prosthodontics is Skill. Since the rehabilitation of edentulous patients with conventional complete dentures, whether tissue or implant supported must focus in a variety of biological and mechanical factors in order to restore the functions and general health of the stomatognathic system.^[1]

One of the most important aspects in determining the prognosis of patients who are entirely edentulous is the establishment of balanced occlusion that should be in line with the functional movements of the stomatognathic system^[2].

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One of the key factor that helps in establishing the optimal occlusion is the orientation of the occlusal plane.^[3] Which is defined as the average plane established by incisal and occlusal surfaces of teeth. It helps in attaining aesthetics, phonetics efficient mastication, stability and any alteration can lead to damage to surrounding of tissues and resorption of ridges.^[4,5]

Various studies have been carried out to determine height of occlusal plane in dentate patients amongst various population. According to a study, measured maxillary height at 20.3 ± 1.3 mm and mandibular height 15.0 ± 1.3 mm at first molar region whereas in other study, recommended the heights of 24 mm and 20 mm in maxilla and mandible. A study by More et al^[6] conducted in India reported mean height of 14.49 mm, 16.87 mm, 13.55 and 12.33 mm for permanent first molars teeth no. 16, 26, 36 and 46 and mean height of 18.91 mm, 19.37 mm, 13.79 mm and 14.19 mm for canine's teeth no. 13, 23, 33, and 43. It was also observed that the mean occlusal plane height in Asian population varies from western population.

The occlusal rim height serves the basis in achieving the parallelism of occlusal plane, recording the maxillomandibular relationship and arrangement of artificial teeth, that in turn helps in fabricating

denture which is functionally and aesthetically pleasing for edentulous patients. As the average height of the occlusal plane varies across different racial populations, as noted in the literature, the aim of this study is to determine the occlusal plane height in our local population considering the genetic and geographical variations as we in our vicinity rely on guidelines established as per international values.

METHODS

This descriptive cross sectional study was conducted at Prosthodontics Department of Liaquat Medical University utilizing non-probability consecutive technique after approval from ethical review committee. A total number of 30 patients with age range 18-45 years, both genders having well aligned set of dentition, with intact permanent canines and molar devoid of any occlusal disharmony were included in this study after taking a written informed consent from each patient. Appropriate size of impression trays were selected and impression were made for both arches using alginate impression material (Cavex CA37 - Alginate) with manufacturer prescribed instructions. Impression were disinfected under tap water and using disinfectant by (SERPRO) for one minute. Within 12 minutes, impressions were poured with type III dental stone (Kopo-Hard CKH-52). Pouring was done using the powder/liquid ratios suggested by the manufacturer. After pouring for one to three hours, the casts were taken out, trimmed, cleaned, and left to dry on a bench. As reference teeth Permanent first molars (teeth no. 16 26 36 and 46) and canines (teeth no. 13 23 33 and 43) were chosen. The occlusal rim height was measured for each referenced tooth mentioned was recorded using vernier calliper from deepest portion of sulcus depth to tip of canines and mesio-palatal cusp of maxillary first molars and buccal cusps of mandibular molar respectively. This procedure was repeated three times on each side of both maxillary and mandibular arches on respected reference selected tooth in case of any human or machine error. The mean value was recorded in mm for each tooth i-e 16 26 36 46 and 13 23 33 43. All data was analyzed using SPSS version 20. For quantitative data like age and mean values of rim height, mean and standard deviation were measured; for qualitative variables include gender, frequency was calculated. Chi square test was applied and p value ≤ 0.05 was considered as significant.

RESULTS

A total of 30 patient patients with sound well aligned dentition having completely erupted permanent canines and first molars were selected in this study. Figure 1 depicts the patients' age distribution. The patients' average age was 28.10 ± 5.97 years. There were 16(53.33%) male and 14(46.67%) female as presented in figure 2. Mean occlusal plane height in permanent

1st molars and canines in both the jaws in complete edentulous patients are depicted in figure 3 & 4. The mean of mean height of all molars teeth and all canine's teeth is showed in figure 5.

Table No.1: Mean Height in Permanent 1st Molars and Canines in Both Jaws in Complete Edentulous Patients - By Age Groups - n=30

Canines and Molar	Age Groups (Years)	n	Mean height	P-Value
Upper canines	≤ 25	10	19.55±1.79	0.304
	26-30	12	19.41±0.48	
	>30	8	18.66±1.30	
Lower canines	≤ 25	10	18.23±1.64	0.187
	26-30	12	18.33±1.42	
	>30	8	17.48±1.14	
Upper Molar	≤ 25	10	16.12±1.18	0.638
	26-30	12	15.88±1.03	
	>30	8	15.65±0.82	
Lower Molar	≤ 25	10	15.78±1.42	0.003
	26-30	12	15.45±1.59	
	>30	8	14.86±1.34	

Table No.2: Mean Height in Permanent 1st Molars and Canines in Both Jaws in Complete Edentulous Patients - By Gender - n=30

All canines and molar	Gender	n	Mean height	P-Value
Upper canines	Male	16	19.95±1.21	0.009
	Female	14	18.52±1.56	
Lower canines	Male	16	18.66±1.31	0.013
	Female	14	17.39±1.29	
Upper Molar	Male	16	15.68±1.07	0.210
	Female	14	16.15±0.91	
Lower Molar	Male	16	15.05±1.73	0.173
	Female	14	15.80±1.01	

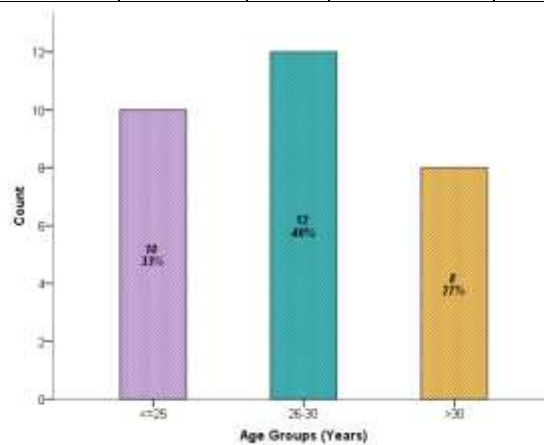


Figure No.1: Patients Age Distribution - n=30

Descriptive Statistics of Age
Age (Years):

Mean 28.10
Standard deviation ± 5.97

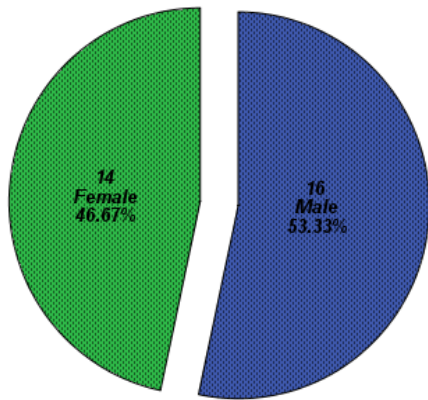


Figure No.2: Gender Distribution - n=30

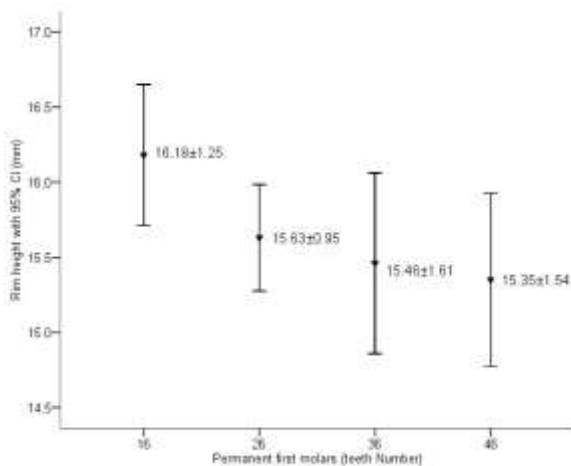


Figure No.3: Occlusal Plane Height in Permanent 1st Molars in Both Jaws n=30

Stratification analysis was performed between age, gender and mean occlusal plane height for all molar and canines. There were not significant difference as reported in table 1 & 2.

DISCUSSION

In current study average age of patients noted were 28.10 + 5.97 years, out of which 53% were males and 47% females. Jaw relation recording is very difficult step for fabrication of complete removable denture. Infinite relationships of mandible to the maxillae is called the Jaw relationship^[7]. The recording procedure is comprising of orientation jaw relation, vertical jaw relation and horizontal relationship. Ensuring a quick and simple jaw relation procedure is essential. In order to do this, wax rims are made using average values per the recommendations of researchers.^[8-10] Although many materials are used for making rims but it is usually made of modeling wax since it is easy to manipulate and convenient in use^[10].

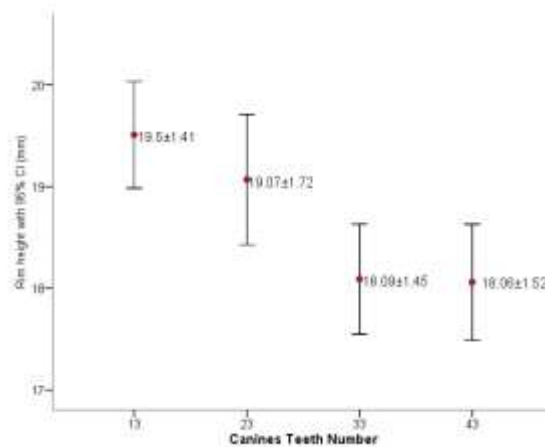


Figure No.4: Rim Height in Canines in Both Jaws - n=30

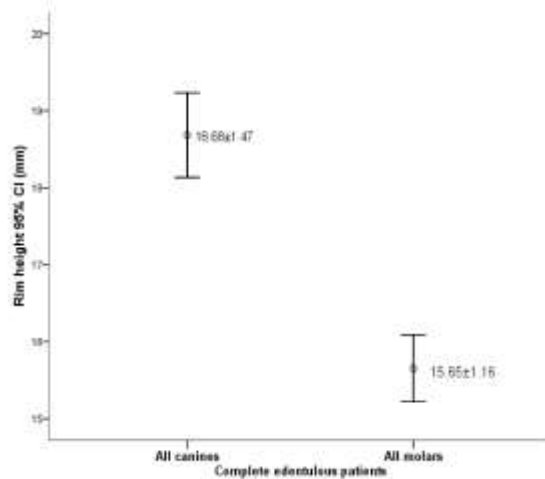


Figure No.5: Mean Occlusal Plane Height for Permanent 1st Molars and Canines in Both Jaws - n=30

Various studies have been carried out to determine occlusal plane height but with diverse results. Another study measured maxillary height 20.3±1.3 mm and mandibular first molars height 15.0±1.3 mm where as Ellinger et al^[7] suggested the heights of 24 mm and 20 mm in maxilla and mandible. Bishop^[11] on the other hand suggested 20 and 18 mm. In our study, the occlusal plane height did not found to have significant difference in maxilla and mandible. The mean occlusal plane height for teeth no 16, 26, 36 and 46 was recorded 16.18 mm, 15.63 mm, 15.46 and 15.35 mm respectively. Our results are in nearby comparison with the results stated by Johnson and Winstanley^[12] which reported the mean maxillary occlusal plane height 18 mm and mandibular 14.3. The results are in accordance to mentioned in Prosthodontic Treatment for Edentulous Patients^[9]. The distance between mandibular incisal edge to labial mucosal fold was 18 mm using casts poured from mucostatic type impressions^[13-14]. Distance in upper arch was 22 mm using the corresponding sites with a total of 40 mm

when mounted both together. In one of radiographic study done by Akinbami^[14] found the average height in maxillary arch 20 mm and in mandible 16.3 mm. He suggested that the Occlusal Record Blocks height should be 24 mm and 20 mm for maxillary and mandibular jaws respectively.

The mean maxillary anterior occlusal plane height for females in our study is 18 mm and for males 19 mm where as in mandible it is 17mm and 18mm respectively for both genders. The mean maxillary posterior occlusal plane height for females in our study is 16 mm and for males 15 mm where as in mandible it is 15 mm respectively for both genders. Our results bear similarity with results of MORE et al^[6] in maxilla but in mandible our values are slightly higher than the same study regardless of the study being conducted on similar Asian race. Rangarajan^[15] and Nallaswamy^[15] in contrast stated the maxillary height measurement as 22 mm in western population. The mean occlusal plane height anteriorly and posteriorly in both arches does not prove to have any significant relationship in comparison to age and also none of the literature have previously noted this relationship.

CONCLUSION

Although the mean height of occlusal plane for fabrication of occlusal rim in construction of prosthesis has already been determined as per the guidelines but it was concluded that the set values vary for population as per geographic locations.

Author's Contribution:

Concept & Design of Study:	Sidra Soomro, Naseem Shaikh
Drafting:	Naveed Memon, Aqsa Sajji
Data Analysis:	Sidra Soomro, Hina Memon, Muhammad Rizwan Memon
Revisiting Critically:	Sidra Soomro, Naseem Shaikh
Final Approval of version:	By all above authors

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