

# Comparison of Maxillary Premolar Clinical Crown Height in Adolescent and Adult Patients with Healthy Periodontics

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## ABSTRACT

### INTRODUCTION

One of the most crucial steps in diagnosing a smile and to provide aesthetics is to assess the clinical crown length of the teeth in the smile line. A crucial role in the functional aesthetic display has been played by the clinical crown length, not only during a full smile, but it also plays a role during speech. The ultimate length of the clinical crown of the teeth is dependent upon several factors. These factors may be genetic factors and also developmental factors. The adolescence can be grouped into three age groups including early (ages 11 - 14 years), middle (ages 15 - 17 years), and late (ages 18 - 21 years). These adolescent patients are more problematic because their stomatognathic systems have not been stabilized. Tissue migration, that is the passive eruption, as well as growth of the whole premolar tooth are ongoing during these adolescent years.

### AIM

The aim of our present study is to investigate the relationship between age, gender and clinical crown length of the maxillary premolars.

### MATERIALS AND METHODS

The study was done in a hospital setting, the data was collected from the patient software system of Saveetha dental College and the samples included adolescent and adult patients with healthy periodontium who needed orthodontic treatment. The data was analysed using the *chi Square test*.

### RESULTS

In our study it was evident that adolescents of 11 - 14 years of age had crowns of heights 3 mm and 4 mm in relation to 14, while adolescents of 15 - 17 years of age had crowns of heights 4 mm, 5 mm, and 6 mm in relation to 14, while adolescents of 18 - 21 years of age had clinical crowns of heights 7 mm and 8 mm, in relation to 14 and the adults had clinical crowns of heights 8 mm, 9 mm and 10 mm in relation to 14.

### KEYWORDS

Premolar, Clinical crown height, Age, Adults, Adolescents

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**INTRODUCTION**

The branch of dentistry that corrects teeth and jaws that have been positioned improperly is called orthodontics. Improperly positioned teeth or crooked teeth are often hard to clean and these teeth are at high risk of decay and periodontal breakdown. These improperly positioned teeth can cause extra stress on the chewing muscles which eventually lead to headaches and TMJ syndrome. Teeth that are crooked or the teeth that have been improperly placed can also affect one's appearance.<sup>1,2</sup> It is widely recognized that the gingival tissues that surround the teeth have an impact on the overall aesthetic presentation.<sup>3,4</sup> Thus, understanding the factors that affect the position and stability of the gingival complex is indispensable for the dentist to provide long-term aesthetic restorative therapy. One of the most crucial steps in improving the smile of the patient and to provide aesthetics is to assess the clinical crown length of the teeth in the smile line. A crucial role in the functional aesthetic display has been played by the clinical crown length, not only during a full smile, but it also plays a role during speech.<sup>5-7</sup> The ultimate length of the clinical crown of the teeth is dependent upon several factors. These factors may be genetic factors and also developmental factors. The maxillary premolars erupt into the oral cavity at approximately 10 to 11 years of age and it continues to erupt until it comes into contact with the opposing teeth. This eruption process is known as the active eruption. At this point of eruption approximately almost 50 % of the anatomic crown structure is covered with the gingiva. Over the next few years, the gingiva slowly starts to migrate up the labial surface of the anatomic crown structure until the tooth stabilizes. The gingiva migrates approximately 1–2 mm from the cemento–enamel junction (CEJ). This process is called the passive eruption.<sup>8</sup> In few patients, the gingival tissue does not migrate far enough apically to approximate the CEJ. Which ultimately leads to short clinical crowns due to the excess gingival coverage of the anatomic crown structure? This condition of excess gingival coverage is known as the "altered passive eruption" or "delayed passive eruption."<sup>9-11</sup> Adolescence is an important period for developing and maintaining social and emotional habits that are important for mental well-being. The adolescent patients are acknowledged for having particular needs (12) due to a potentially high caries rate, poor routine oral health care, increased risk for periodontal disease and traumatic injury, an increased esthetic desire and awareness and unique social and psychological needs.<sup>12-18</sup> The adolescence can be grouped into three age groups including early (ages 11-14 years), middle (ages 15-17 years), and late (ages 18 - 21 years). These adolescent patients due to their social and peer pressure have an increased esthetic desire to undergo orthodontic treatment at an early stage. It is no surprise that the adolescent patients also embrace the treatment modalities that have been embraced by the adults. However, these adolescent patients are more problematic because their stomatognathic systems have not been stabilised.<sup>19</sup> Tissue migration, that is the passive eruption, as well as growth of the whole premolar tooth are ongoing during these adolescent years. For this purpose, many dentists go for the use of only reversible procedures on adolescent patients due to the risk of continued apical migration of the gingival tissues. Our team has extensive knowledge and research experience that has translated into high quality publications.

<sup>20-39</sup> this present study was undertaken to investigate the relationship between age, gender and clinical crown length of the maxillary.

**MATERIALS AND METHODS**

The retrospective cross sectional study was done in a private dental institution, in Chennai. This study was approved by the institutional ethical board. Two reviewers were involved in the study. Patient records were reviewed from the digital archives of our university. The data was collected from the patients visiting saveetha dental college who underwent orthodontic treatment. Only patients with healthy periodontium without any previous history of Orthodontic treatment were included in the study. The independent variables are the patient's PID, name, and gender. Dependent variables are the patient's age and the clinical crown height. The clinical crown height was measured from the gingival margin to the incisal tip of 14 (first premolar in the first quadrant of the maxillary arch) along the long axis. The crown height was measured using the CMEIAS image tool software. CMEIAS is image tool software consisting of several custom plugins for UTHSCSA Image tool in windows. The data collected were reviewed and cross verified. The data was tabulated and imported to SPSS software and the variables were defined. The data was statistically analyzed. *Chi square tests* were performed. The level of significance of each variable was set at p less than or equal to 0.05.

**RESULTS AND DISCUSSION**

The data collected from the patient's management software were tabulated in SPSS and the descriptive method statistics were obtained. From the study it was found that various sizes of the premolar clinical crown height were observed in adolescent and adult patients with healthy periodontium. Patients of all ages and both genders undergo orthodontic treatment. The most common group undergoing the orthodontic treatment is the females of 18 - 20 years of age group. (Table 1)

		age					
		11 - 14 years	15 - 17 years	18 - 21 years	22 - 30 years	31 - 40 years	Total
Gender	Male	5	22	26	32	12	97
	Female	5	8	44	28	18	103
Total		10	30	70	60	30	200

**Table 1. Shows the Correlation between the age and Gender of the Patient Undergoing Orthodontic Treatment. The Most Common Group Undergoing the Orthodontic Treatment is the Females of 18 - 20 Years of Age Group.**

The crowns were of 3 mm (2.5 %), 4 mm (12 %), 5 mm (14 %), 6 mm (9 %), 7 mm (40 %), 8 mm (60 %), 9 mm (50 %), and 10 mm (10 %). (Figure 1).

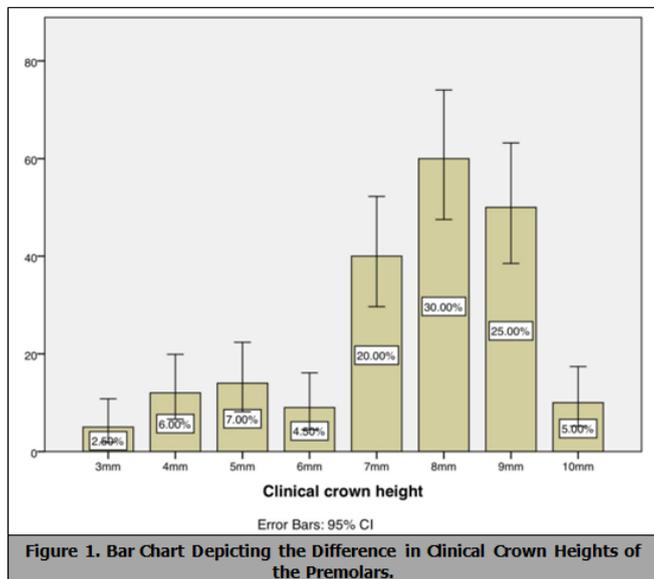


Figure 1. Bar Chart Depicting the Difference in Clinical Crown Heights of the Premolars.

It was also found that only adolescent of 11 - 14 years of age had crowns of heights 3 mm and 4 mm, adolescents of 15 - 17 years of age had crowns of heights 4 mm, 5 mm and 6 mm, adolescents of 18 - 21 years of age had clinical crowns of heights 7 mm and 8 mm, while the adults had clinical crowns of heights 8 mm, 9 mm and 10 mm (Figure 2).

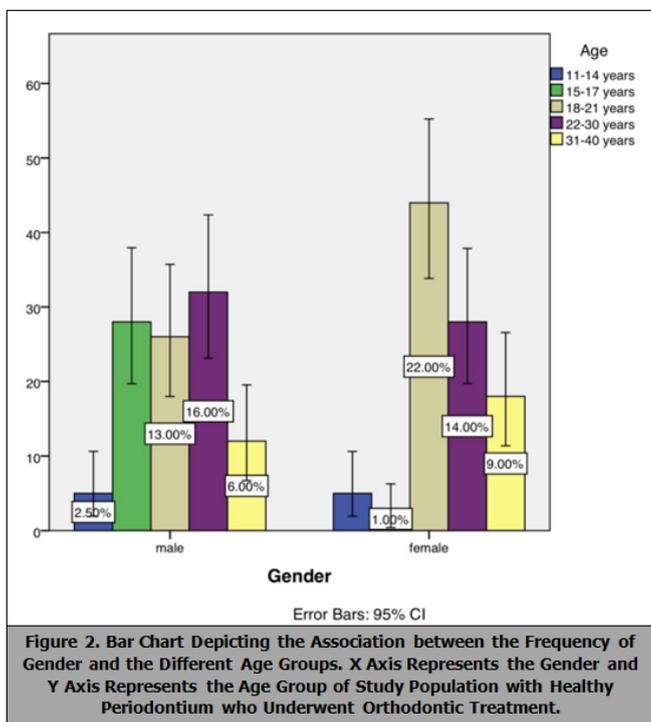


Figure 2. Bar Chart Depicting the Association between the Frequency of Gender and the Different Age Groups. X Axis Represents the Gender and Y Axis Represents the Age Group of Study Population with Healthy Periodontium who Underwent Orthodontic Treatment.

The correlation between the gender and the clinical crown heights of 14 shows that the common clinical crown height found among the females is 8 mm (Table 2).

		Clinical Crown Height								Total
		3 mm	4 mm	5 mm	6 mm	7 mm	8 mm	9 mm	10 mm	
gender	male	2	8	12	5	26	15	25	4	97
	female	3	4	2	4	14	45	25	6	103

Total	5	12	14	9	40	60	50	1	200
								0	

Table 2. Shows the Correlation between the Gender and the Clinical Crown Heights of 14. The Most Common Clinical Crown Height Observed is 8 mm.

The most common clinical crown height observed is 8 mm. The correlation between the age group and the clinical crown heights of 14 shows the significant increase in clinical crown heights of 14 with respect to the age (Table 3).

		Clinical Crown								Total
		3 mm	4 mm	5 mm	6 mm	7 mm	8 mm	9 mm	10 mm	
age	11 - 14 years	5	5	0	0	0	0	0	0	10
	15 - 17 years	0	7	14	9	0	0	0	0	30
	18 - 21 years	0	0	0	0	40	30	0	0	70
	22 - 30 years	0	0	0	0	0	30	30	0	60
	31 - 40 years	0	0	0	0	0	0	20	1	30
									0	
Total		5	12	14	9	40	60	50	1	200

Table 3. Shows the Correlation between the Age and Clinical Crown Heights of 14. The Most Commonly Found Clinical Crown Height of 14 Is 8 mm and is Prevalent among the Age Groups 18 to 21 and 22 To 30 Years of Age.

This can be explained in relation to the developmental period of the premolar. In our study we can observe that the premolar clinical height increases with age since the premolar eruption is in the adolescent period the crown appears to be small or the crown is in the passive eruption state. Volchansky and Cleaton - Jones in their study investigated the effect of age on clinical crown height in a cross sectional study.<sup>40</sup> There was no statistically significant increase in the clinical crown heights in adults as the teeth have attained full growth. This is similar to the findings of our study (Figure3).

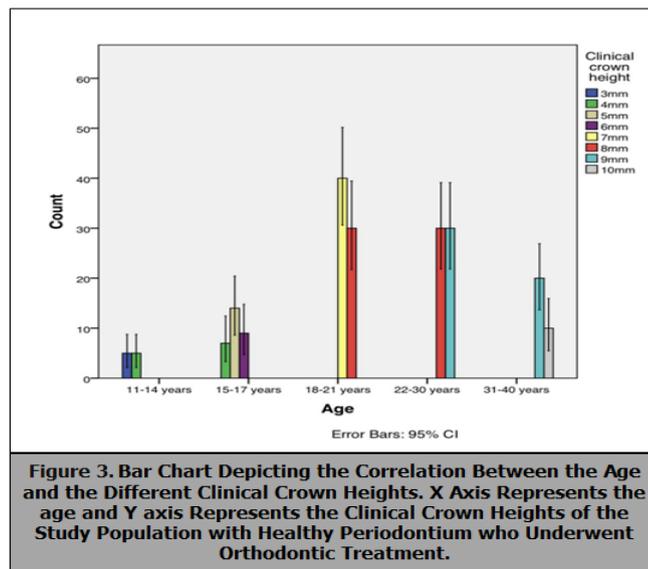


Figure 3. Bar Chart Depicting the Correlation between the Age and the Different Clinical Crown Heights. X Axis Represents the age and Y axis Represents the Clinical Crown Heights of the Study Population with Healthy Periodontium who Underwent Orthodontic Treatment.

The present study was undertaken to investigate the relationship between age, gender and clinical crown length of the maxillary premolars. Morrow in his study states that the process of passive eruption, resulting in increased clinical crown length may be found to continue throughout the teenage years.<sup>41,42</sup> In his study stated that there is no significant difference in the clinical crown heights between the adult patients which is in correlation with our current study.

### CONCLUSION

Our study revealed a significant increase in clinical crown length in the adolescent development period. This finding is considered to be of importance to the clinician who is making treatment decisions for teenagers and young adults regarding the timing of orthodontic treatment. Clinicians should wisely choose procedures on adolescent patients considering the risk of continued apical migration of the gingival tissues.

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