Research Article

Palatal Depth in Normal Occlusion and Class-I with Dental Crowding for a Group of Yemeni School Children

Al-Qudaimi NH[1,2], Ali FA[2], Madfa AA[3]* and Al-Sanabani FA[3]

[1]Department of Pediatric Dentistry, Preventive Dentistry and Orthodontics, University of Thamar, Yemen
[2]Department of Paedodontics, Orthodontics and Preventive Dentistry, University of Baghdad, Iraq
[3]Department of Conservative Dentistry, University of Thamar, Yemen

*Corresponding author: Ahmed A. Madfa, Department of Conservative Dentistry, University of Thamar, Yemen

Abstract

Information about palatal dimensions in human populations is important for clinical orthodontics. This study was designed to evaluate the palatal dimensions of Yemeni children aged (10-15 years). The sample was gathered from primary and intermediate school in Sana'a city, Yemen. Clinical examination was performed on 200 subjects (100 males and 100 females) that fulfills the criteria of this study. The examination was carried out in subjects that have either normal occlusion or class-I with anterior dental crowding. Pairs of studying models for the dental arch were constructed and evaluated by special software for digitizing and analyzing the data. This study reported that class-I with anterior dental crowding is still high incidence, particularly for females, in Yemeni Population. Therefore, more prevention protocols, and dental health educational programs about orthodontics needs are essential in Yemen.

Keywords: Orthodontics; Palatal Dimension; Normal Occlusion; Crowding; Yemen

Introduction

Morphology of the palate is one of the key anatomical structures in determining the type skeletal pattern and most importantly, the palate can be influenced by orthodontic treatment procedures [1]. Westerman et al. Compared palatal dimensions (width, depth, length) obtained from patients with Down's syndrome in a control population [2]. Their results demonstrated that the palatal dimensions of participants with Down's syndrome were narrower in width, shorter in depth, lower in length. Eid et al. used three-dimensional orthodontic caliper for measuring the dental arch width and the palatal vault depth, and they found no significant correlation between arch perimeter and the palatal depth [3]. Al-Mulla et al. Investigated the palatal depth on 50 maxillary study models of patients (18 males and 32 females) aged 15-20 years old. They found that there was no significant difference between males and females [4].

Yemen is a poor developing country located South-West of Arabian Peninsula to Kingdom of Saudi Arabia. Dental care for most people in Yemen does not have the same priority as general health. Furthermore, Yemen governorate has been handling the major health problems, such as tuberculosis and malnutrition, and has higher mortality rates, than oral health [5]. Therefore, a major emphasis is placed on curative rather than preventive services supplied by Yemen governorate.

As orthodontics have advanced as a specialty, increasing numbers of adults seek orthodontic care. Thus, an understanding of the changes that normally occur in adult craniofacial structures is critical [6]. However, in Yemen, orthodontic practice and education are still relatively new. Therefore, basic information, such as the prevalence of dental crowding is required for a systematic and well-organized dental care program in Yemeni society.

Although the nationwide baseline data, information about the dimension of the palate for Yemeni population is still not available, some studies carried out to determine the dimension of the palatal dimensions in Yemeni adults [7,8]. However, the dimension of the palatal in mixed and permanent dentitions for Yemeni population is still not obtainable. These data is great value to clinicians in the different fields of dentistry. In orthodontics, the dimension of the palate can give a sign for clinicians to determine the kind of dental crowding, which it, in turn, will influence on the orthodontic treatment procedures. Therefore, this study was designed to determine the dimensions of palatal dimensions in the mixed and permanent dentitions of Yemeni school children age 10-15 years old regarding normal occlusion and class-I anterior dental crowding.

Materials and Methods

This cross-sectional study was conducted in primary and intermediate schools in Sana'a city, Yemen. About 7630 students agreed to participate in the study, but analysis was carried out on 200 students who fulfill the criteria of this study.

The sample divided into two categories

• Sample aged 10-12 years old with mixed dentitions (50 females and 50 males) were selected with normal occlusion and class-I anterior dental crowding.

• Sample aged 13-15 years old with permanent dentitions (50 females and 100 males) were selected with normal occlusion and class-I anterior dental crowding.

The sample was also divided into two subgroups

• Frist group was with normal occlusion.

• Second group was with class-I anterior dental crowding.

For the first group (normal occlusion), the following criteria were adopted

1. They have Class-I molar relationship.

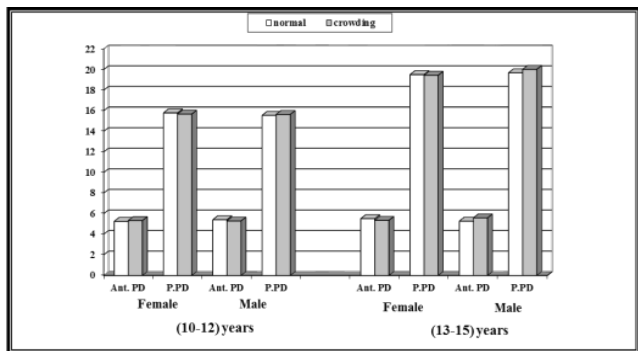2. Normal overjet and overbite (2-4 mm).

Figure 1: Bar chart showing anterior and posterior palatal depth measurements, for female and male in both aged (10-12) and (13-15) years.
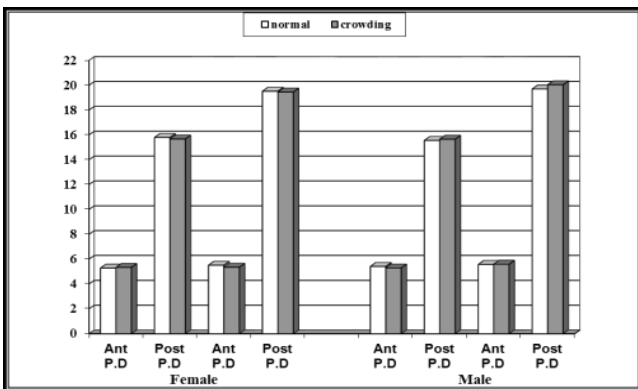

Figure 2: Bar chart showing anterior and posterior depth of the palate between female and male for normal occlusion and class-I with anterior dental crowding aged (10-12) and (13-15) years.

3.   They have no supernumerary, fracture teeth and posterior or anterior crossbite.

4.   They haven't any abnormal habits such as thumb sucking, tongue thrust and pencil biting.

5.   No massive caries and/or massive restorations.

6.   They haven't any history of orthodontics and surgical treatments.

7.   No midline sifting in normal occlusion.

The second group (class-I with anterior dental crowding) were adopted to have the same criteria, but with maxillary dental crowding more than 4mm.

By receiving permission from the directors/principles of the education office and schools in Sana'a city, the research process was started. The examination for all subjects was carried out under natural light using interchangeable plane mouth mirrors. Each subject was seated on an ordinary chair with the head positioned so that the Frankfort horizontal plane was parallel to the floor. During examinations, selected subjects confirm to fulfillment of the inclusion criteria. Sharp pencil was used to mark certain tooth-related points visible in occlusal study casts to facilitate the identification of landmarks used to measure dental arch dimensions. Measurements were recorded on 200 maxillary casts made of dental stone. The palatal depth was measured as the vertical distance from a point on

Table 1: Anterior and posterior palatal depth measurements, comparison between normal occlusion and class-I with anterior dental crowding for female and male in both aged (10-12) and (13-15) years.

Variables		(10-12) years				(13-15) years			
		Normal		Crowding		Normal		Crowding	
		Ant. PD	Post. PD	Ant. PD	Post. PD	Ant. PD	Post. PD	Ant. PD	Post. PD
Female	M	5.26	15.80	5.34	15.68	5.52	19.52	5.36	19.46
	SD	0.44	0.99	0.59	1.13	0.54	0.76	1.03	0.95
Male	M	5.42	15.56	5.30	15.66	5.28	19.70	5.60	20.04
	SD	0.54	0.67	0.68	0.75	0.45	0.76	0.78	0.99
P-*value*		0.225	0.166	0.87	0.908	0.288	0.299	0.023	0.001

the palatal width line to the palatal vault in the midline by using a modified sliding caliper gauge with an accuracy of 0.02mm. Pairs of studying models for the palate depth was constructed and evaluated by special software for digitizing and analyzing the data.

The data has been collected and entered into the computer using SPSS (Statistical Package for Social Science) program for statistical analysis. "T-test" was applied to achieve the aim of this study.

Results

Figure 1 exhibited the palatal depth in both normal occlusion and class-I with anterior dental crowding for both age groups (10-12) and (13-15). There were no significant differences in the anterior and posterior palatal depths between female and males with normal occlusion in both mixed and permanent dentition (p>0.05) as shown in (Table 1) Likewise, there were no significant difference in the anterior and posterior palatal depths between female and males in mixed dentition, while the males had greater mean values of anterior and posterior palatal depths than females which were considered statistically significant (p>0.05) as noticed in (Table 1).

Figure 2 Palatal depth in both normal occlusion and class-I with anterior dental crowding for same age groups (10-12) and (13-15). When normal occlusion and class-I with anterior dental crowding in females was compared, the result shows no significant differences between normal occlusion and class-I with anterior dental crowding (p<0.05). However in male normal occlusion and class-I with anterior dental crowding regarding palatal depth, only anterior palatal depth was greater in class-I with anterior dental crowding than those with normal occlusion in permanent dentition (p>0.05) as seen in (Table 2).

Discussion

Oral health, particularly the treatment of malocclusion, is not currently a high priority in Yemen. However, for future planning purposes, valid and reliable information about norms (normal skeleton-dental relationships) is needed. Such information enables the establishment of useful guidelines for orthodontic diagnosis and treatment planning. Besides, measurements taken from a definite cusp tip to a corresponding definite cusp tip are very reliable.

Review of the literature reveals variations in palatal dimensions, which exist between different Angle's malocclusion groups. Many studies have been done to compare the palatal dimensions between Class-I and Class-II malocclusion, the palatal index and compare it with primary, mixed and permanent dentitions [9-11]. Some studies determine the relation between the width and depth of palate in Class-I occlusion and normal occlusion, and they found that palate was different among gender [12,13]. The present study will therefore

Table 2: Comparison of anterior and posterior depth of the palate between normal occlusion and class-I with anterior dental crowding for both sex's and aged (10-12) and (13-15) years.

Statistics	Age	Female					Male				
		Normal		Crowding		p	Normal		Crowding		p
		M	SD	M	SD		M	SD	M	SD	
Ant P.D	(10-15)	5.29	0.44	5.34	0.59	0.543	5.42	0.54	5.30	0.68	0.225
Post P.D		15.80	0.99	15.68	1.13	0.484	15.56	0.67	15.66	0.75	0.797
Ant P.D	(10-15)	5.52	0.54	5.36	1.03	0.362	6.8	0.45	5.60	0.78	0.015
Post P.D		19.52	0.76	19.46	0.95	0.563	19.70	0.76	20.04	0.99	0.050

be the first data about the palatal dimensions in the mixed and permanent dentitions of Yemeni school children age 10-15 years old regarding normal occlusion and class-I anterior dental crowding, and will act as a database.

Several methods have been used to determine the dimensions of the dental arch and palate, however, orthodontic study model is a valuable diagnostic record, that no orthodontic case can be evaluated or treated without it. It is used in clinical studies as well as in survey for research purpose [9-13,14].

Anterior palatal depth

The result showed no significant difference between females and males with normal occlusion in both mixed and permanent dentition, and similar finding was reported between females and males in class-I with anterior dental crowding in the mixed dentition, while a significant difference was found between females and males with class-I with anterior dental crowding in permanent dentition. The finding of the present study cannot be directly compared with those of attributes similar studies since the search in the review of literature showed no similar landmark to those applied in this study concerning anterior palatal depth.

Posterior palatal depth

No significant differences were found in posterior palatal depth in normal occlusion. The result agrees with those findings of Al-Mulla and Al-Bashir [13] and disagrees with the finding of Borgan [15] and Al-Zubair [7], which may be attributed to different methods for the former age group variation with the latter.

Comparison between normal occlusion and class-I with dental crowding in the same sex

No significant differences were observed in that anterior palatal depth and posterior palatal depth between females with normal occlusion and females with class-I with anterior dental crowding in mixed and permanent dentition same finding was also found between males with normal occlusion and males with class-I with anterior dental crowding in anterior and posterior palatal depth in mixed dentition and posterior palatal depth in permanent dentition. While a significant difference in anterior palatal depth was found between males with normal occlusion and males with class-I with anterior dental crowding in permanent dentition with greater mean value in those with normal occlusion, which may be attributed to the different position of the canine in those with class-I with anterior dental crowding. These findings were in agreement with previous studies which reported that the palatal length were greater in women than in men, contradicting the accepted view that maxillary arch dimensions are larger in men [16,17]. This difference may be attributable to

differences in ethnicity, sample size, tooth size (women have larger teeth), and/or environmental factors. In addition, the observed greater palatal width and depth in men than in women was concurred Borgan [15].

Conclusions

The palatal dimensions are influenced by many factors, including the shape and size of the jaws and the type of malocclusion. Stability of the post-treatment results is one of the goals of orthodontic treatment, as the arch form tends to return back to original form. Therefore, more prevention protocols, and dental health educational programs about orthodontics needs are essential in Yemen.

Under limitations of the current study, it can be concluded that class-I with anterior dental crowding, particularly for females, is remaining high. The results of the present study may be of help to orthodontists in understanding the malocclusion in different ways. It may be helpful in the choice of the arch wire by taking guidance from the existing arch form and knowledge of stability of post treatment results in various malocclusions.

References

1. Riqueleme A, Green LJ. Palatal width, height, and length in human twins. Angle Orthodontics. 1970; 40: 71-78.

2. Westerman CH, Johnson R, Cohen MM. Variation of palatal dimensions in-patients with Down syndrome. Journal of Dental Research; 1975; 54: 767-771.

3. Eid A, El-Namrawy M, Kadry W. The relationship between the width, depth and circumference of the dental arch for a group of Egyptian school children. Egyptian Orthodontic Journal. 1987; 1: 113-136.

4. Al-Mulla A, Al-Bashir A. A new method for determination of highest point of the palate and its correlation. Iraqi-Dental Journal. 1997; 19: 71-82.

5. Elgazzar HA. Raising returns: The distribution of health financing and outcomes in Yemen. World Bank Washington, DC, USA; 2011.

6. Bishara SE. Changes in the maxillary and mandibular tooth size-arch length relationship from early adolescence to early adulthood "A longitudinal study". American Journal of Orthodontics and DentofacialOrthopedics. 1989; 92: 46-59.

7. Al-Zubair NM. Maxillary and mandibular dental arch dimensions and forms in a sample of Yemeni population aged (18-26) years with class I normal occlusion. Thesis, collage of dentistry Baghdad University-Iraq. 2002.

8. Al-Zubair NM. Determinant factors of Yemeni maxillary arch dimensions. The Saudi Dental Journal; 2015; 27: 50-54.

9. Papageorgiou IS, Papadopoulos MA, Zafiriadis A. Dentoalveolar characteristics in Class II, division 2 malocclusion. Hellenic Orthod Rev; 1998; 1: 117-134.

10. Papageorgiou IS, Papadopoulos MA. Dentoalveolar characteristics in Class II, division 1 malocclusion. Hellenic Orthod Rev. 2002; 5: 69-82.

11. Younes S, El-Angbawi MF, Al-Dosari AM. A comparative study of palatal height in a Saudi and Egyptian population. J Oral Rehabil; 1995; 22: 391-395.

12. Salman KA. The relationship between the maxillary dental arch width, depth and circumference. Al–Rafidain Dent J. 2001; 1: 401-410.

13. Al-Qudaimi NH, Ali FA, Madfa AA, Al-Sanabani FA. Evaluation of the occlusion and maxillary dental arch dimensions in the mixed dentitions of Yemeni population. American Journal of Health Research; 2015; 3: 1-4.

14. Borgan BE. Dental arch dimensions analysis among Jordanian school children. Master Thesis. Cairo University-Eygpt. 2001.

15. Dawasaz AA, Dinkar AD. Rugoscopy: predominant pattern, uniqueness, and stability assessment in the Indian goan population. Journal of Forensic Sciences. 2013; 58: 1621-1627.

16. Ahmed AA, Hamid A. Morphological Study of Palatal Rugae in a Sudanese Population. International Journal of Dentistry. 2015.

Citation: Al-Qudaimi NH, Ali FA, Madfa AA and Al-Sanabani FA. Palatal Depth in Normal Occlusion and Class-I with Dental Crowding for a Group of Yemeni School Children. Austin Dent Sci. 2016; 1(1): 1005.