Original Article

CORRELATION BETWEEN TRANSVERSE MAXILLARY ARCH DIMENSION AND TONSILLAR GRADE

Ghulam Rasool, Ahsan Mahmood Shah, Saira Bilal

Khyber College of Dentistry, Peshawar Pakistan

ABSTRACT

Objective: *To determine correlation between tonsillar grade and transverse maxillary arch dimension.*

Material and Methods: *A cross sectional study of 50 patients was conducted at the department of Orthodontics Khyber College of Dentistry, Peshawar from July 2106 to December 2016 with age range from 5 to 12 years. The sample was selected through non-probability consecutive technique. They were divided into 5 subgroups according to their tonsil sizes. The different sizes were grouped into grades according to the standardized tonsillar hypertrophy grading scale of Brodsky and Koch. The transverse dimensions of maxillary arch which was measured were; intercanine width and intermolar width. Spearman rank test was applied to determine the correlation between tonsillar grade and transverse arch dimension using SPSS 20.*

Results: *The mean age in this study was 8.53±2.02 years. The most common grade was grade 1, n=26, (52%) followed by grade 2, n=13 (26%). The mean intercanine width was 30.7±0.803 mm and mean intermolar width was 35.8±1.01 mm. A negative correlation (r=-0.079) was found between age and tonsillar grades (0,1,2,3, and 4) which was statistically non-significant (p value=0.585). Similarly a negative correlation(r=-0.046) was found between intercanine and tonsillar grades (0,1,2,3, and 4) which was statistically significant (P value=0.049) while intermolar and tonsillar grades have negative correlation(r=-0.030) and the p value was non-significant(p=0.0838).*

Conclusions: *Maxillary intercanine and intermolar widths were significantly and negatively correlated tonsillar grade.*

Key words: *Tonsillar grade, transverse maxillary arch dimension, intercanine width*

INTRODUCTION

The palatine tonsils are dense compact bodies of lymphoid tissue that are located in the lateral wall of the oropharynx, bounded by the palatoglossus muscle anteriorly and the palatopharyngeus and superior constrictor muscles posteriorly and laterally[1]. The adenoid is a median mass of mucosa-associated lymphoid tissue. It is situated in the roof and posterior wall of the nasopharynx. The adenoid was first described in 1968 by the Danish physician Meyer in his paper "Adenoid Vegetations in the Nasopharyngeal Cavity"[2]. Both tonsils and adenoid are part of the Waldeyer ring, which is a ring of lymphoid tissue found in the pharynx. The lymphoid tissue in this ring provides defense against pathogens. The Waldeyer ring is involved in the production of immunoglobulins and the development of both B cells and T cells[2].

It is since long controversial issue in orthodontics literature that whether tonsillar hypertrophy affects the inter-arch and intra-arch dental anomalies[3,4]. Most of the studies which had investigated this subjects are two dimensional[5,6]. A lateral cephalogram is part of early orthodontic documentation, and its assessment has allowed orthodontists to view upper airway obstructions[7]. However, measurements in the sagittal plane are not accurate, insofar as this methodology has important limitations, with errors inherent to a two-dimensional representation of complex tridimensional structures[8].

It has been established that size of tonsil has more essential role than the dimension of pharynx on arch dimension and other dentoskeletal features of long face syndrome[9]. Brodsky and Koch[10] have set up a tonsillar hypertrophy grading scale based on the space they occupy in the pharynx.

Correspondence:
Dr. Ghulam Rasool
Dean, HOD of Orthodontics
Khyber College of Dentistry, Peshawar
Cell: 0333-9126029
Email address: grasoolkcd@yahoo.com

To our knowledge one study has been reported in literature to quantify the relationship between the space occupied by the tonsils in the pharyngeal airway and the intra arch and interdental arch dimension[11]. The aim of this study was to determine correlation between tonsillar grade and transverse maxillary arch dimension in patients visiting at Khyber College of Dentistry, Peshawar.

METHODS AND MATERIALS

A cross-sectional study was conducted at department of Orthodontics , Khyber College of Dentistry , Peshawar from July 2106 to December 2016. Approval of the hospital ethical committee was taken. Subjects fulfilling the inclusion criteria were invited to take part in the study. A total of 50 participants were selected by non-probability consecutive sampling technique.

Participants were divided into 5 subgroups according to their tonsil sizes. The different sizes were grouped into grades according to the standardized tonsillar hypertrophy grading scale of Brodsky and Koch[10]. This grading scale is based on the space occupied by the tonsils between the anterior pillars of the oropharynx. (Grade 0: Tonsils limited to the tonsillar fossa; Grade1: Tonsils occupying up to 25% of the space between the anterior pillars in the oropharynx; Grade 2: Tonsils occupying 25%-50% of the space between the anterior pillars; Grade 3: Tonsils occupying 50%-75% of the space between theanterior pillars; Grade: 4 Tonsils occupying 75%-100% of the space between the anterior pillars).

The patient age from 5 to 12 years of both gender with no previous history of Orthodontic treatment were included in the study while patients having previous history of tonsillectomy, non-nutritive sucking(habits), chronic allergic rhinitis , nasal septum deviation, and obstructive adenoids were excluded from the study.

In grading of tonsil the patients were asked to lie in a supine position, open his or her mouthwide, and continuously pronounce the phoneme /r/. At the same time, a tongue depressor was placed by the operator at the level of the posterior part of the dorsum of the tongue. The operator examined the pharynx without activating the gag reflex, making the tonsils rotate to bring them artificially closer to the median line. The transverse dimensions of maxillary arch which was measured were; intercanine width and intermolar width.

Statistical analysis was performed using SPSS(statistical Package for Social Sciences) 20.0. Mean and standard deviation was calculated for age, intercanine width and intermolar width. Frequency and percentage was determined for categorical variable like gender. Spearman rank test was applied to determine the correlation between tonsillar grade and transverse arch dimension.

Table-1: Descriptive statistics of age, intercanine and intermolar width

Variable	Mean	SD	Minimum	Maximum
Age	8.53	2.02	6	12
Intercanine width	30.7	0.803	29.5	32
Intermolar width	35.8	1.01	34	37

RESULTS

A total of 50 patients with age range from 6 to12 years were included in the study. The mean age was 8.53±2.02 years. The mean intercanine width was 30.7±0.803mm and intermolar width was 35.8±1.01mm. The minimum intercanine width was 29.5 while maximum was 32.0 mm. Similarly minimum intermolar width was 34.0 and maximum was 37.0 mm. (Table 1).

The most common grade in this study was grade 1(n=26, 52%) followed by grade 2 (n=13, 26%). Only one case had grade 0 and one had grade 4 tonsillar size. The percentages and frequencies of tonsillar grades are given in Table-2.

A negative and statistically nonsignificant correlation (r=-0.079, P=0.585) was found between age and tonsillar grades (0,1,2,3, and 4). The details are given in table 3. A negative and weak and statistically significant

Table-2: Frequency of tonsillar grades

Tonsillar grade	**n**	**%**
Grade 0	1	2
Grade 1	26	52
Grade 2	13	26
Grade 3	9	18
Grade 4	1	2
Total	**50**	**100**

Table-3: Correlations between age and tonsillar grades

		Age	Tonsillar grade
Age	Pearson Correlation	1	-0.079
	Sig. (2-tailed)		.585
	N	50	50
Tonsillar grade	Pearson Correlation	-0.079	1
	Sig. (2-tailed)	.585	
	N	50	50

Table-4: Correlation between tonsillar grade and intercanine and intermolar width

Tonsillar grade	Intercanine width	Intermolar width
Pearson Correlation	-0.046	-0.030
Sig. (2-tailed)	0.049	0.038
N	50	50

correlation was found between intercanine (r=-0.046 P=0.049) and intermolar (r=-0.030, P=0.038)and tonsillar grades (0,1,2,3, and 4). (Table 4).

DISCUSSION

The mean age in this study was 8.53±2.02 years. Similar results have been reported by other studies conducted on tonsillar size. Kargoshaie et al[12] conducted a study on the correlation between tonsil size and academic performance is not a direct one, but the results of various factors. In their study the mean age was close to the current study.

The most common grade in this study was grade 1(52%) followed by grade 2 (26%). Only one case had grade 0 and one had grade 4 tonsillar size. Kargoshaie et al[12] reported that tonsil size was grade 0, 1, 2, 3, and 4, in 1.9%, 53.4%, 29.7%, 8.8%, and 1.6% of the children respectively. These results are in consistent with the current results.

In our study, the mean intercanine width was 30.7±0.803mm and mean intermolar width was 35.8±1.01 mm. The minimum intercanine width was 29.5mm while was 32.0 mm. similarly minimum intercanine width was 34.0mm and maximum was 37.0 mm. Similar results was reported by another study conducted Karachi, Pakistan. In their study the mean intercanine width was 31.6±3.0mm and intermolar width was 34.5±0.3[13].

A negative and weak and statistically nonsignificant correlation (r=-0.079, P=0.585) was found between age and tonsillar grades (0, 1,2,3, and 4). As the age increases the tonsillar grads are decreasing. This phenomenon is physiologically normal because the volume of the palatine tonsils normally decreases with age. Kozak[14] has shown that atrophy of the tonsils starts after age 10 years and ends at adulthood. The absolute value of the rho correlation coefficient between 0.10 and 0.30 is considered small according to Cohen[15]. So it is concluded that there is weak correlation between age and tonsillar grade.

Maxillary intercanine width was significantly negatively correlated to tonsillar grade (r= -0.046; P=0.049). Likewise, and the maxillary inter first molar width (r= -0.030; P= 0.038), the higher the tonsillar grade, the lower the transversal dimension of the maxillary arch. This decrease may also be caused by the low tongue posture, no longer involved in the conformation of the maxillary arch in patients with higher grades, who are more prone to ventilator disturbance. The absolute values of rho correlation coefficients are between -0.030 and 0.03. The strength of the associations between the transversal dimension of the maxillary arch and the grade could also be considered moderate. Similar results are reported by Diouf et al[11].

CONCLUSION

Maxillary intercanine and intermolar widths have significant and negative correlation with tonsillar grade. So in patients having narrow maxilla proper diagnosis of airway and timely referral to otolaryngologist is recommended.

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