The effect of oral respiration on the dental occlusion in patients with respiratory tract allergies

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ABSTRACT:

Background: Malocclusion is one of the main problems concerning the oral cavity. This study examined the possible effect of mouth breathing habits in patients with respiratory tract allergies on the dental occlusion.

Materials and methods: The study was conducted on 150 patients having allergic rhinitis, asthma or both ranging in age from 5-19 years. A group of 150 healthy individuals matched with gender and age to the study group was used as a control group. The total sample was questioned about their mode of breathing then their occlusion was examined clinically.

Results: Significantly higher percentages of mouth breathers were found among the study group ($P<0.05$). Similarly CLII and CLIII dental occlusion, displaced teeth as well as crowding affected significantly greater percentages of allergic patients in comparison to the control group.

Conclusion: Mouth breathing habits in patients with respiratory tract allergies may have an additive role in the development of some undesirable malocclusions.

Keywords: Allergic rhinitis, asthma, malocclusion. **(J Coll Dentistry 2005; 17(2) 87 -92)**

INTRODUCTION

Allergic respiratory disorders are significantly connected in their history, etiology, pathology and treatment measures. They are highly prevalent conditions that have significant social implication [1]

Allergic rhinitis is a term used to describe disorders of the nasal mucosa which are caused by inhaled allergens that indicates an inflammatory reaction with associated symptoms of nasal discharge or obstruction, sneezing, rhinorrhea, pain and anosmia [2]. Similarly asthma is a chronic inflammatory disorder of the airways, characterized by reversible airflow obstruction causing cough, chest tightness and shortness of breath [3].

The effect of mouth breathing on dento-facial development is controversial; some considered it as the primary factor in the etiology of malocclusion and other facial abnormalities [4]. Others found that mouth breathing is unrelated to the type of occlusion [5,6], while others suggested that it is may be the additive factor in the development of undesirable malocclusion particularly around the prepubertal timing of growth during the period of transitional dentition [7].

Marks, in 1965, found that persistent oral habits are frequent in children with perennial allergic rhinitis.

He concluded that mouth breathing in the infant and children should be regarded as an allergic manifestation and that efficient allergy management can forestall this major contributor to the progressive effects of dento-facial deformities [8].Respiratory allergy is considered one of the exciting factors that causes mouth breathing due to impairment of nasal breathing [9,10,11].

Many authors who found that mouth breathing as a result of allergy affects the dento-facial features leading to paranasal depression and overriding maxillary incisors [12,13], retroclined lower incisors [10,14], high arched narrow palate "constricted maxillary arch" [12,13,14], and posterior cross-bites in children having asthma [15] or allergic rhinitis with an increased upper anterior and total anterior facial height as well as greater overjets [16]. Others found inconclusive evidence linking malocclusion and mouth breathing in patients having respiratory tract allergies [5,17].

This study was conducted to see the effect of persistent or intermittent oral respiration on the developing dentition in patients with respiratory tract allergies in Baghdad city to point out if this group has any special orthodontic needs.

MATERIALS AND METHODS

The sample included 150 patient with an age range 5-19 years, diagnosed as having (allergic rhinitis &/ or asthma) attending the Allergy Institute in Baghdad as the study group. The control group consisted of an equal number of healthy individuals selected

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randomly from primary and secondary schools in Baghdad city and matched concerning age and gender to the study group.

Information about the medical condition of the patients in the study group concerning type of allergy and the time and duration of disease onset were taken from their medical record.

Mouth breathing habit was established by patient observation and parent's corroboration as being the predominant mode of breathing [15]. Then the occlusion was examined including:

1- The antero-posterior occlusion:

A/ for the permanent dentition, Angle classification according to the first molar relation [18]. If not applicable the canine relation was recorded [19]. In case of primary dentition, the intermaxillary relation was regestered [20]. If the above methods were not applicable, the incisal relationship was recorded according to the British standard classification [21].

B/ Overjet: using a vernier with depth gauge, the overjet was recorded to the 0.1 mm and if the four upper incisors occluded lingually to the four lower incisors, the overjet was registered as reversed [22].

2- Vertical occlusion: the overbite was measured using the vernier to the complete 0.1mm. It was recorded according to Nilner and Lassing [20].

3- Transverse occlusion: subjects were recorded as having anterior crossbite if 1, 2 or 3 incisors occlude lingual to mandibular incisors [23]. Posterior crossbite was recorded as unilateral or bilateral if the maxillary teeth occluded lingually to those of the corresponding mandibular teeth [22,24].

The above three relations were recorded when the dental arches were in centric occlusion.

4- Intra-arch discrepancies:

1) A modified instrument from Vankirk and Pennell (1959) and Bjork et al. (1964) was used to record:

A/ rotation as present if one or more fully erupted teeth are rotated mesially as as or distally more than 15° [22].

B/ displacement if one or more fully erupted teeth was displaced bodily more than 1mm, buccally or lingually from the ideal arch line [25].

2) Spacing and crowding were assessed for the maxillary and mandibular dentitions separately and recorded as if a shortage or an excess of 2mm or more was recorded in one of the six segments of both upper and lower arches [22,24].

Data were statistically analyzed using Chi-square test to compare percentages.

RESULTS

The types of dentitions found in the sample of an age range "5-19" years included primary, mixed and permanent dentition. 88 males formed 58.7% of the study group and the rest 62 (41.3%) were females and those figures were matched when selecting their healthy controls (Table- 1).

Of the total experimental group, 103 (68.7%) were asthmatic and only 13 (8.7%) had allergic rhinitis. Allergy affected about half of the allergic patients (50.6%) for 5 years or more (Figure- 1).

More significant mouth breathing habits mostly during the disease episodes were recorded among allergic patients ($P<0.05$) as shown in Figure- 2. When comparing the antero-posterior occlusion between the two groups, more allergic patients had Cl II and Cl III malocclusion than the healthy controls and the difference between the two groups was significant at $P<0.05$ (Table- 2).

Some of the measured occlusal traits were not recordable due to the uncompleted eruption of teeth or were doubtful in few individuals; therefore, these cases were excluded from the statistical analyses for that specific occlusal trait. Table- 3 reveals non-significant differences between the two groups in overjet, overbite. Higher percentages of patients with respiratory tract allergies had anterior cross-bite (6.8%) as well as posterior cross-bite (9.5%) compared to the controls (2.7%) and (4.4%) respectively, yet these differences didn't reach the level of statistical significance (Table- 3).

As shown in table- 4, rotation of teeth showed a non-significant difference between the two groups studied. But significantly higher percentages of allergic patients were affected by tooth displacement than their healthy controls. As well as, crowding of teeth affected 61 allergic patients and 43 healthy controls, this difference was statistically significant ($P<0.05$). While spacing was recorded in 39 allergic patients only compared to 44 healthy individuals, which was non-significant statistically.

Table 1: Sample Distribution According to Age and Gender

Age / Years	Gender	Cases		Controls	
		NO.	%	NO.	%
5 - 9	M	19	12.67	19	12.67
	F	16	10.67	16	10.67
	T	35	23.33	35	23.33
10-14	M	49	32.67	49	32.67
	F	21	14.00	21	14.00
	T	70	46.67	70	46.67
15 -19	M	20	13.33	20	13.33
	F	25	16.67	25	16.67
	T	45	30.00	45	30.00
TOTAL	M	88	58.67	88	58.67
	F	62	41.33	62	41.33
	T	150	100.00	150	100.00

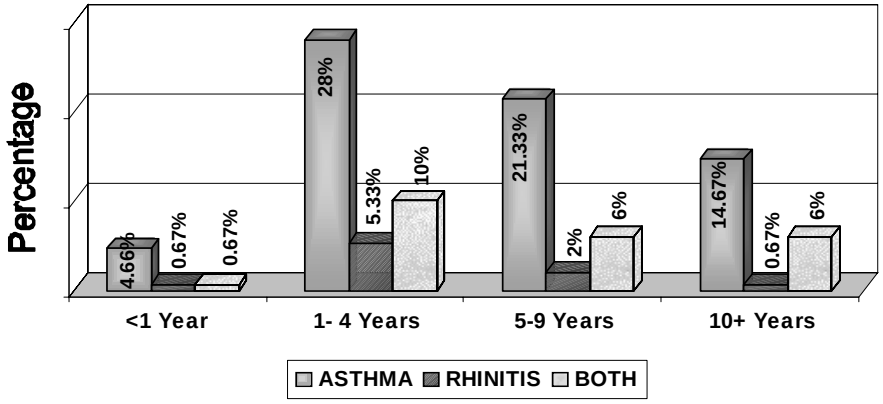

Figure 1: Type and Duration of the Allergic Disorder

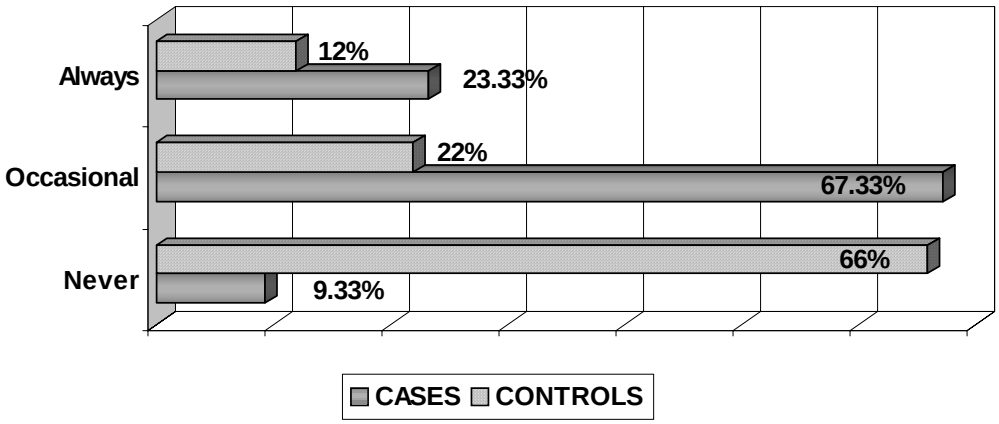

Figure 2: Mouth Breathing Habits

Table 2: Antero-Posterior Relationship

Antero-Posterior relationship	Cases		Controls		P- Value
	No.	%	No.	%	
CL I	111	74	121	80.67	P<0.01
CL II	29	19.33	22	14.67	
CL III	10	6.67	7	4.67	
Total	150	100	150	100	

Table 3:Distribution of Antero-posterior, Vertical and Transverse occlusions among the Two Groups

Malocclusion Trait	Cases		Controls		*P-Value*
	No.	%	No.	%	
1/ Overjet					
Reverse (<0)	2	1.52	3	2.31	
Normal (0-4)	96	72.73	92	70.77	
Increased (5-8)	32	24.24	33	25.38	*N.S.*
Excessively Increased (9+)	2	1.52	2	1.54	
Total	132	100	130	100	
2/ Overbite					
Openbite (<0)	1	0.76	0	0	
Normal (0-4)	94	71.76	90	69.23	*N.S.*
Deep Bite (5+)	36	27.48	40	30.77	
Total	131	100	130	100	
3/ Crossbite					
A) Anterior					
Negative	136	93.15	140	97.22	
Positive	10	6.85	4	2.78	*N.S.*
Total	146	100	144	100	
B) Posterior					
Negative	134	90.54	138	94.52	
Positive Unilateral	10	6.76	6	4.11	
Positive Bilateral	4	2.70	2	1.37	
Total	148	100	146	100	*N.S.*
Positive	50	33.33	46	30.67	
Total	150	100	150	100	
Positive	61	40.67	43	28.67	
Total	150	100	150	100	

DISCUSSION

Patients with respiratory tract allergy showed a significant higher tendency for occasional and persistent mouth-breathing habits compared to their healthy controls, which could be referred to their allergic disorder that necessitate oral respiration due to nasal blockage in allergic rhinitis or shortness of breath in asthma that are essential clinical manifestations of these disorders. This result matched the previous findings of Marks (1965) [(8)], Hannuksela (1981) [(10)] and Venetikidou (1993) [(15)]. The disorder was diagnosed 5 years ago or even more in about 50% of the total allergic patients when this research was conducted, meaning that these mouth breathing habits affected most of the study group in the prepubertal growth period which can explain the significant higher percentage of CL II dental relation than their controls that agrees with Meslen et al. (1987) [(26)]. But it disagrees with others findings such as Miller (1949) [(5)].

Deference in overjet and overbite between the two groups were statistically non-significant which is similar to Hannuksela

(1981) [10] and Venetikidou (1993) [15] findings, yet it disagree with Bresolin et al. (1983) [16], who reported an increased overjets in patients with allergic rhinitis and Meslen et al. (1987) who found a higher frequency of openbite in mouth breathers [26].

Table 4: Distribution of Intra-arch Discrepancies among the Two Groups

Malocclusion Trait	Cases		Controls		*P- Value*	
	No.	%	No.	%		
4/ Rotation of Teeth						
Negative	**53**	**35.33**	**59**	**39.33**	***N.S.***	
Positive	**97**	**64.67**	**91**	**60.67**		
Total	**150**	**100**	**150**	**100**		
5/ Displacement of Teeth						
Negative	**100**	**66.67**	**104**	**69.33**	***P<0.05***	
Positive	**50**	**33.33**	**46**	**30.67**		
Total	**150**	**100**	**150**	**100**		
6/ Crowding of Teeth						
Negative	**89**	**59.33**	**107**	**71.33**	***P<0.01***	
Positive	**61**	**40.67**	**43**	**28.67**		
Total	**150**	**100**	**150**	**100**		
7/ Spacing of Teeth						
Negative	**111**	**74**	**106**	**70.67**	***N.S.***	
Positive	**39**	**26**	**44**	**29.33**		
Total	**150**	**100**	**150**	**100**		

Higher percentages of anterior and posterior crossbite "especially unilateral posterior crossbite" affected the study group individuals compared to their healthy controls although it didn't reach the level of statistical significance. That can be attributed to the mouth breathing habits, which leads to constriction in the maxillary arch during the growth period resulting in crossbite. This agrees with authors reporting a crossbite or a tendency towards such in patients with respiratory allergy [15,16]. On the contrary, Miller in 1949 couldn't find any differences between allergic and non-allergic patients included in his study concerning posterior crossbite [5].

As for rotation and displacement of teeth, the slight differences between the two groups studied were of statistical significance concerning the displaced teeth only. This might be due to the morphological changes occurring in the arch dimensions in addition to the positional and functional alterations affecting the oral soft tissues "tongue and lips" as a result of mouth breathing habits in these patients.

When comparing crowding and spacing of teeth between allergic patients and their healthy controls, highly significant higher percentages of allergic patients were affected by crowding compared to the controls. This finding agrees with Balyeat and Bowen (1934) [9]. Again this could be explained by the possible narrowing occurring in the maxillary arch due to oral respiration in patients with respiratory tract allergy. Similarly, Miller (1949) [5], reported a slightly higher percentages of crowding in allergic patients in comparison to non-allergic individuals, yet the differences didn't reach the level of statistical significance in his study.

An early diagnosis and proper medical treatment of patients with respiratory tract allergy can prevent any possible adverse effect on the growing face and the developing occlusion especially in prepubertal period during the transitional dentition. Patients with respiratory tract allergy included in this study were following a hyposensitization program to raise their immune system tolerance to the specific allergens they are allergic to. This resulted in reducing the frequency and severity of their allergic attacks, eventually it can be concluded that the frequency of mouth breathing habits "especially those reporting occasional oral respiration during the disease episodes only" is reduced after a while following starting this type of treatment in most of them. This might explain the slight

differences in some malocclusion traits examined.

It is also essential to take in consideration that other factors such as hereditary factors has an important role on the developing occlusion which was not included in the present study.

In conclusion, the prevalence of mouth breathing habits is greater in patients with respiratory tract allergy compared to healthy individuals included in this study due to the nature of their allergic disorder and this could be an additive factor in the development of undesirable malocclusion in these patients.

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