ORIGINAL ARTICLE

A STUDY CORRELATING BREATHING PATTERN WITH DIFFERENT MALOCCLUSIONS AMONG PATIENTS REPORTING AT DEPARTMENT OF ORTHODONTICS AYUB MEDICAL COLLEGE, ABBOTTABAD, PAKISTAN

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Background: The present era has been commanded by ample studies correlating breathing modes & risk of occurrence of malocclusion. The early intervention of altered breathing patterns can head off the long-lasting effects of already established malocclusion. The main intention of this project was to establish the possible correlation between mouth-breathing & malocclusions. **Methods:** Sixty-two (62) patients undergoing orthodontic treatment were evaluated via data form (including history & clinical evaluation). SPSS software version 25.0 was used for data analysis. Patient's age, gender, type of Angle's malocclusion & breathing pattern was taken in account while analysing data. Descriptive statistics & Chi- Square test was applied on the data. It was anticipated that mouth breathing is associated with malocclusion. *p*-value of less than 0.05 was considered to be statistically significant. **Results:** A total of 29 males & 33 females participated in the study. The mean age was 13 years (range 6–20 years). A significant correlation was found between mouth-breathing, tongue thrust (p=0.03) & bleeding gums (p=0.006). Other parameters had no significant correlation with mouth-breathing. **Conclusion:** The current study revealed that mouth breathing has significant association with opened mouth at rest & gingival abnormalities (bleeding/ swollen gums) implying that timely diagnosis of such abnormal breathing pattern can hinder with development of altered occlusion & dentofacial conformation.

Keywords: Breathing pattern; Malocclusion; Correlation; Orthodontics

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INTRODUCTION

Inheritable factors along with ambient elements perform a crucial job in determining maxillofacial conformation.[1] Amongst them, pivotal enthrallment has been captured by linkage between craniofacial topography & function of respiratory system in Orthodontic sphere.[2] The ultimate development & growth of jaws & facial form along with eruption of teeth is dependent up to great extent on the harmonious maxillofacial function.[3]

A well-known correlation has been substantiated between euphonic craniofacial evolution & normal nasal breathing pattern; howbeit a handsome amount of literature also suggests the impact of mouth/oral breathing on craniofacial topography while other authors are of the belief that the discrepancies encountered in craniofacial evolution are attributed to environmental & inheritable factors. The impediments encountered in comprehending the association between various breathing patterns & craniofacial evolution is attributed to multitude of factors; missteps in diagnosis of breathing pattern (nasal/oral/combination) being a key reason.[4–5]

One of the invigorating functions of human body is respiration. All types of breathing patterns encountered in humans are intended to provide lung oxygenation, but each pattern is associated with wide array of body changes. Primary breathing pattern in human organisms is nasal but multiple aetiologies can be attributed to development of breathing via mouth culminating in wide assorts of aftereffects-lowered tongue posture, scarce skeletal progression which ultimately upshots in development of "Long face syndrome". The last but not least pattern of breathing encountered in human subjects is "Mouth breathing syndrome" which is characterized by the combination of nasal & oral breathing.[6,7] Other researchers are also convinced of the fact that various breathing tendencies have a bearing on transverse relationship between "maxilla" & "mandible".[8]

Breathing via mouth is most commonly spawned by blockage of the nose which in turn is mostly attributed to "hypertrophic adenoids" among juvenile cases. Morphological discrepancies in dentofacial conformation have been observed in chronic cases executing mouth breathing.[9] Studies have also concluded that a handsome amount of convivial stigma is associated with altered dentofacial conformation associated with mouth

breathing.[10] Former studies have shown that breathing via mouth has linkage with augmented lower facial height, palatine depth, width of lower face, pronounced open & cross bites. Surgical amendment of breathing pattern might redeem the soft tissue conformation, but occlusal deviations remain as such.[11]

Since, a study correlating breathing patterns with various type of malocclusions was not conducted in KPK, Pakistan while other national & international studies had conflicting results in establishing linkage between oral breathing & various malocclusions, therefore the soul design of this research was to determine the possible correlation between various breath patterns (nasal/oral/combination) & different malocclusions among patients reporting at Department of Orthodontics, Ayub Medical College, Abbottabad.

MATERIAL AND METHODS

This particular descriptive study of cross-sectional variety was reviewed & approved by ethical committee of Ayub Medical College, Abbottabad. Pakistan. Orthodontic records of 62 patients undergoing orthodontic treatment were evaluated. Twenty-nine (29) male & 33 female patients participated in this study. Data forms were filled by trained examiners after obtaining informed assent from all the participants. The data form had three main portions, i.e.,

1). Personal data such as age, gender, type of malocclusion (decided on basis of Angle's classification of malocclusion on right & left side of oral cavity) & type of breathing.

2). Patient's history including questions regarding bad breath, mode of breathing in routine, nasal congestion, food spillage, snoring & asthma.

3). Clinical examination of patient; looking for opened mouth at rest, presence of tongue thrust, swollen/bleeding gums, variation in thickness of upper & lower lips, cavities on upper anterior teeth, presence of an open bite, retrognathic maxilla, protruded mandible & excessive overbite.

The patients aging 6-20 years (mean age= 12.58 years), having intact occlusion (erupted first permanent molars) were included in this project. The exclusion criteria for sample collection were mutilated dentition, history of trauma, congenitally missing teeth, developmental anomalies, neurological impairments, craniofacial malformations & syndromic patients.

Patient's age, gender, type of Angle' malocclusion & mode of breathing was taken in account while performing data analysis.

SPSS software version 25.0 was brought in use for the analysis of obtained data. Descriptive statistics & Chi- Square Test were applied on the data. Statistical significance was considered at *p*-value of less than 0.05.

RESULTS

The demographic characteristics of the participants have been presented in table-1. The study was conducted on a total of 62 participants, among which 29 were males & 33 were females. The occurrence of Angle's Class I, Class II & Class III amongst male participants was 55%, 24% & 20% respectively. Similarly, the distribution of above-mentioned classification amongst females was found to be 55%, 39% & 6% respectively.

Figure-1 shows the correlation between gender & mode of breathing. Proportion of females using oral route of breathing was far higher than that of males. Subjects' history revealed higher percentage of mouth breathing as compared to nasal breathing amongst Angle's Class II & Class III patients (determined on clinical examination), but the findings were not statistically significant (p=0.43). Similarly nasal breathing pattern was more frequent amongst Class I individuals (Figure-2).

The variation of Angle's malocclusion on right and left side of oral cavity is shown in table 2 implying that high prevalence of Class I was reported on right side as compared to Class II which was seen more frequently on left side. Class III was reported to be equal on right & left side. No significant correlation was reported between breathing pattern & Angle's malocclusion. High percentage of snoring (determined on basis of patient's history & calculated via Chi- square test) was reported amongst mouth-breathers, but the findings were not significant. Similarly opened mouth at rest was seen more frequently with mouth breathers having *p*-value of 0.024 (Table-3).

Table-1: Age & gender wise distribution of the subjects

Age	Males	Females	Total
6–7 years	2 (6.8%)	2 (6%)	4
8–9 years	3 (10.3%)	7 (21.2%)	10
10–11 years	8 (27.5%)	4 (12.1%)	12
12–13 years	8 (27.5%)	7 (21.3%)	15
14–15 years	1 (3.4%)	5 (15.1%)	6
16–17 years	6 (20.7%)	2 (6.1%)	8
18–20 years	1 (3.4%)	6 (18.2%)	7
Total	29	33	62

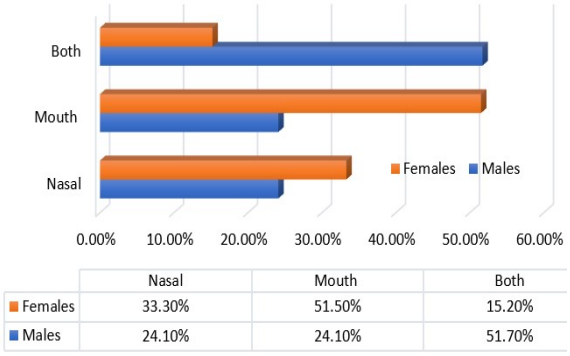
Table-2: Distribution of participants in terms of malocclusion

	Angle's malocclusion on right side	Angle's malocclusion on left side
Class I	34 (54.8%)	30 (48.4%)
Class II	20 (32.3%)	24 (38.7%)
Class III	8 (12.9%)	8 (12.9%)
Total	62 (100%)	62 (100%)

Table-3: Pattern of breathing according to data form

Parameter	Nasal breathing	Mouth breathing	Combination of nasal and mouth breathing	*p*-value
Bad breath	9 (50.0%)	13 (54.2%)	7 (35.0%)	.424
Nasal congestion	3 (16.7%)	8 (33.3%)	10 (50.0%)	.095
Food spillage	1 (5.6%)	0 (0.0%)	1 (5.0%)	.518
Snoring	2 (11.1%)	8 (33.3%)	6 (30.0%)	.232
Tongue thrust	1 (5.6%)	8 (33.3%)	3 (15.0%)	.066
Bleeding gums	3 (16.7%)	14 (58.3%)	10 (50.0%)	.021*
Mouth open at rest	3 (16.7%)	10 (41.7%)	12 (60.0%)	.024*
Variation in Thickness of lips	2 (11.1%)	5 (20.8%)	4 (20.0%)	.681
Cavities on upper anterior teeth	1 (5.6%)	3 (12.5%)	0 (0.0%)	.240
Open bite	0 (0.0%)	2 (8.3%)	3 (15.0%)	.237
Retrognathic maxilla	2 (11.1%)	2 (8.3%)	3 (15.0%)	.785
Protruded mandible	2 (11.1%)	4 (16.7%)	3 (15.0%)	.877
Excessive overbite	7 (38.9%)	4 (16.7%)	4 (20.0%)	.217

*= significant



	Nasal	Mouth	Both
Females	33.30%	51.50%	15.20%
Males	24.10%	24.10%	51.70%

Figure-1: Distribution of participants in terms of gender & type of breathing

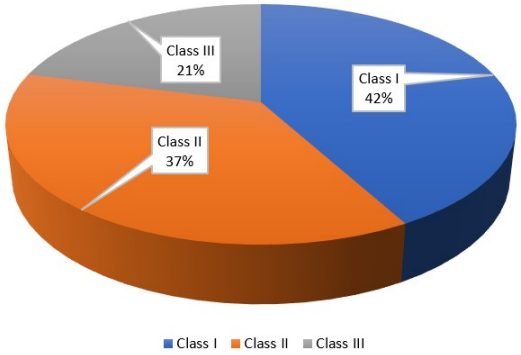


Figure-2: Percentage of mouth breathing in different types of malocclusions

DISCUSSION

An ample number of authors have discussed the correlation between orofacial conformation & breathing via mouth, concluding the fact, that dentofacial development can alter the balance of muscular function- a distinguishing characteristic of oral breathing.[10] Hindered airway, specifically at nasal & pharyngeal foci, encourages breathing via mouth in subjects.[12]

Majority of the participants of our study had combination of oral & nasal breathing pattern rather than isolated mouth breathing with was in accordance with other studies on account of the fact that demarcation between oral & nasal passages is meagre; sometimes oral breathing replaces nasal pattern even though the nasal passage is quite normal.[13] Many previous studies are of the view that no "Gold standard" method is available for evaluation of breathing mode.[4] Therefore we used data form & clinical evaluation to determine breathing pattern.

A large percentage (87.5%) patients using oral route as mode of breathing revealed the fact that, they breathe via mouth on routine basis. Higher percentage (37.5%) of Angle's Class II malocclusion was reported among mouth breathers as compared to the study conducted by Adamidis (28 %), but the aforementioned percentage was in accordance with the study conducted by Souk *et al.*[14,15]

Howbeit, our study could not reveal any significant correlation between occurrence of Class II malocclusion & breathing via mouth which was in compliance with the study conducted in Nepal.[16] 8.3% of the subjects had an open bite associated with oral breathing which was much lower than the study conducted on Nigerian subjects.[9] The percentage of mouth breathers with excessive overbite was 16.7%, but this correlation was not

statistically significant. Studies have revealed the fact that mouth breathers carry a marked variation in the normal functioning of lips; lower lip being prominent & conspicuous while upper lip being inconspicuous & functionally compromised.[17] 20.8% of the participants of this study had marked discrepancy in thickness of upper & lower lips but the findings were found to be non-significant. Previous projects have implied that there is highly significant correlation between opened mouth at rest & mouth breathing. The results of this study coincided with past projects in this domain.[7] Highly significant correlation was determined for gingival changes (swelling/bleeding) associated with mouth breathing which was in agreement with other studies.[18–21]

Statistically insignificant percentage (33.3%) of mouth breathers had tongue thrust in association with oral mode of breathing which was not in accordance with a study conducted by Costa *et al*.[22]

CONCLUSION

The corollaries of this project unveil the fact that oral mode of breathing is associated with various alterations in orofacial structures such as opened mouth at rest & gingival modifications (swollen/bleeding gums). Howbeit in order to substantiate such correlations concisely, different specialties should be brought in collaboration such as orthodontics, paediatrics & otorhinolaryngology to intervene with such an altered breathing pattern at an early stage in order to head off the long-lasting effects of already established occlusal problems.

AUTHORS' CONTRIBUTION

NN: Data analysis, interpretation, write-up. AZ: Literature search, proof reading. WI: Conceptualization of study design, data collection.

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