Assessment of Oral Health Status in a Group of Asthmatic Children

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Abstract

The oral health status of children affected by asthma due change in natural environment of the oral cavity. Aim of this study to evaluate clinically the effect of asthma on oral health as dental caries, gingivitis, and dental erosion. Present study conducted on 55 asthmatic children age range from 7-11 years from (ACIRU) Allergy Clinical Immunology and Respiratory Unit, Mansoura University, Children Hospital, compared with 55 non-asthmatic children by intraoral examination for dmft, DMFT, gingivitis, dental erosion. The results Non-asthmatic children group showed less mean values in when compared with asthmatic children group with no statistical significance difference in dmft. However, DMFT showed less mean values in asthmatic children group when compared with non-asthmatic children group with no statistical significance in both gender when significant difference calculated by U- test. Conclusion: This study proves a relation of asthma and incidence of dmft, DMFT, gingivitis, and dental erosion in both genders.

Key Words: Asthma, Caries, Gingivitis, Dental erosion, Children

Introduction

Asthma is a critical worldwide health trouble that has constancy growing in prevalence during the previous twenty years [1]. In spite of actual fact that various as a benign condition, the mortality rate for this disease, see asthma has nearly tripled in the previous two decades, reaching a peak of more than 5,000 annual deaths in United Kingdom [2]. It is a chronic inflammatory situation that causes the airways to narrow and produce additional mucus, lead to difficulty in breathing. It is characterized by the obstruction of airflow for a short period. This condition either is reversible, instinctively or can be controlled with support of medicine [3]. Asthma usually has its onset in early childhood. However, adult-onset asthma does subsist, and many are unable to remember childhood events that would provide a clue to the early stages of asthma. In many asthmatic patients with long-standing asthma, there is an appreciable component of chronic permanent airflow obstruction with reduced lung capacity and poor response to a short-acting bronchodilator or to inhaled or oral corticosteroids [4]. It affected about 300 million people of all ages, ethnic groups and countries. It was estimated that about 250,000 people die prematurely each year [5]. The worldwide prevalence of asthma in different countries was studied, in Saudi Arabia 12%, Egypt 9.4%, Sultanate of Oman 20.7%, Palestine 9.4%, Morocco 10.4%, Algeria 8.7%, and in Yemen 14.4% [6]. In 2009 the prevalence of asthma in United States was 8.2% [7], in United Kingdom was 5%, Swiss 8%, 8.3% in Canada, and in India from 15-20 million patients [8]. Oral health of children with asthma affect due to two causes: firstly, on salivary secretion by decreased rate of secretion, PH, and it is immunity role by IgA, IgE, that effected by prolonged use of medication that contain in it is formula ß2-agonists and use in asthma treatment. Secondly, by modification in normal nasal breathing to mouth breathing that makes difference in humidity of oral cavity by dehydration of fluid [9]. This disturbance in chemical and mechanical balance effects on hard tissue and soft tissue present in oral cavity. This effect leads to presenting some of dental deformities as increased incidence of dental caries, increased levels gingivitis, and presence dental erosion [10]. All those of defect can by affected by one or more of this causes. Such as in dental caries reduced salivary flow is accompanied by concomitant increases in *lactobacilli* and *Streptococcus mutans* in the oral cavity [11]. In addition to reduced salivary concentrations and increases in cariogenic microbiota, higher rates of caries had been observed in people with asthma, possibly due to antiasthma medications containing fermentable carbohydrate and sugar [12,13]. Use of inhaled steroids has been linked to increased levels of gingivitis [14]. The common practice of mouth breathing in asthmatic people, as well as various immunological factors, also may contribute to the observed increase in gingival inflammation. It also had been suggested that asthmatic children exhibit more calculus than do healthy children [15]. This possibly is caused by increased levels of calcium, and phosphorus found in sub maxillary and parotid saliva in children with asthma [16,17]. The salivary flow increased mechanical cleansing of the remnants present in the mouth, such as non-adherent bacteria, cellular and food debris [18]. The distribution of oral flora is affected by the prolonged use of asthma medication that contains ß2-agonists (work as bronchodilators agents) and corticosteroid (work as anti-inflammatory agents) in it is formula. Some of medication found as aerosol form (PMDI), or in powder form (DPI) [19]. The main reasons control the constancy of enamel hydroxyapatite is the active concentrations of free calcium, phosphate, and fluoride in solution and the salivary pH [20]. Prolonged use of β-2 agonists is associated with reduced salivary rate and increased in *Lactobacillus* and *Streptococcus mutans* in the oral cavity. It may be one of the main contributing factors that decreased the antimicrobial salivary

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defense and increased bacterial colonization and plaque growth [21,22]. A higher risk rates of caries, gingivitis and dental erosion have been detected in people with asthma, may be due to anti-asthma drugs containing fermentable carbohydrate and sugar that reduced salivary protection against extrinsic or intrinsic acids [23,24]. The purpose of this study was to assessment some of oral health status in a group of asthmatic children as dental caries, gingivitis, and dental erosion.

Materials and Methods

Study conducted on one hundred ten (110) children of both gender, their age range between 7–11 years old (*Table 1*). Fifty-five non-asthmatic children, which recruited from the outpatient of the Pediatric Dentistry Department, Faculty of Dentistry, Mansoura University, Egypt. Fifty-five children with asthma that carefully chosen from the (ACIRU), Mansoura University, Children Hospital. The children involved in this study had the following inclusion criteria child with mild or moderate persistent asthma, and suffered from asthma four years ago, at least for study group. Children were excluded from the study for one or more of these reasons: children or his/her parents rejected to join in the study and children with retrogression and require quick intermediation of a physician of (ACIRU). In this study, rules of Ethics Committee of Faculty of Dentistry, Mansoura University and medical ethics in dealing with children and parents as well as all steps of infection control and sterilization protocol were followed. The parents were informed in detail about the objective of this study, and their right to refuse or stop participating at any time, and the parents signed the Arabic agreement to participate in the study.

Table 1. *Comparison between the two groups according to demographic data.*

	Asthmatic		Non-asthmatic		Total	
	(n= 55)		(n= 55)		(n= 110)	
	No.	%	No.	%	No.	%
Gender						
Male	32	58.1	25	45.4	57	51.8
Female	23	41.9	30	54.6	53	48.2
Age (years)						
Min. – Max.	7.0 – 11.0		7.0 – 11.0		7.0 – 11.0	
Mean ± SD	8.73 ± 1.29		8.83 ± 1.35		8.78 ± 1.32	

Assessment of oral health can be summarized in following study parameters:

Dental caries

Each child was examined to record the caries status by using dental mirror, dental probe, under a good light, and direct vision detect, (dmft) for primary teeth and (DMFT) for permanent teeth. These indexes mean decayed teeth (D/d), missing tooth (M/m), filled teeth (F/f), and total number of teeth that have (T/t). In this study (DMFT) and (dmft) index was used, because the selected children were in mixed dentition. The missing teeth were ignored, because the selected children were in mixed dentition and it was difficult to make sure whether the missing tooth was exfoliated or extracted due to caries or due to serial extraction [25]. The mean of dmft or DMFT were calculated for each child by summation number of decayed, missed and filled teeth, and divided on number of whole teeth of same child.

Gingivitis

Gingival bleeding index (GI) of each child was examined by using dental mirror and periodontal probe, under a good light, and direct vision. Bleeding was detected when the probe passed in the gingival sulcus for each quadrant in upper and lower dental arch according to modified gingival index of Loe [26]. The mean of gingivitis was calculated for each child by summation value of (GI) for each aspect of the tooth divided on 4 (number of gingival aspects) then summation the result of teeth, and divided on number of whole teeth of same child.

Dental erosion

Teeth of each child were examined for dental erosion by using dental mirror, under a good light, and direct vision to detect the erosive dental tissue on facial and occlusal / lingual surfaces depend on the score category of Lussi [27]. The mean of dental erosion was calculated for each child by summation value of erosion score in facial or occlusal surface for each tooth, and divided on number of whole teeth of same child.

Statistical analysis

Data were tabulated, and coded then analyzed using the computer program IBM SPSS software package version 20.0. Qualitative data were defined using range (minimum and maximum), mean, and standard deviation. Significance of the obtained results was judged at the 5% level. The Mann Whitney U- test was used to normally distributions qualitative variables that used to compare differences between two independent groups when the dependent quantitative variable is either ordinal or continuous, but abnormally distributed. All the statistical analysis was carried out through the SPSS (version 20.0.).

Results

This study included one hundred children (n=110) of different gender, 57 male (50.9%) of the sample, and 53 female (49.1%). Their age ranged from 7-11 years with mean age of 8.78 ± 1.32, children assigned into 2 groups (*Table 1*).

Less mean values of dmft in non-asthmatic group (2.84 ± 1.67) when compared with asthmatic group (3.22 ± 1.63) (P=0.340) with no statistical significance. Regarding gender in asthmatic male the mean dmft was (3.07 ± 1.74) however in non-asthmatic male was (2.91 ± 2.07) with no statistical significance difference (P=0.665). In asthmatic female, it was (3.45 ± 1.47) while non-asthmatic female (2.79 ± 1.32) with no statistical significance difference (P=0.274) (*Table 2*).

Less mean values of DMFT in asthmatic group (0.66 ± 1.17) was found when compared with non-asthmatic group (0.76 ± 1.10), (P=0.405) with no statistical significance.

According to gender in asthmatic male the mean of DMFT was (0.80 ± 1.35) while non-asthmatic was (1.05 ± 1.33) with no statistical significance (P=0.320). In asthmatic female, the mean value was (0.45 ± 0.83) and non-asthmatic female was (0.54 ± 0.84) with no statistical significance (P=0.656) (*Table 3 and Figure 1*).

Table 2. *Comparison between study and control groups according to dmft, and gender.*

	Asthmatic	**Non-asthmatic**	**U**	**P**
	(n= 55)	(n= 55)		
dmft				
Min. – Max.	0.0 – 7.0	0.0 – 8.0	0.955	0.34
Mean ± SD.	3.22 ± 1.63	2.84 ± 1.67		
Male	**Asthmatic**	**Non-asthmatic**		
	(n= 32)	(n= 25)		
dmft				
Min. – Max.	0.0 – 7.0	0.0 – 8.0	0.433	0.665
Mean ± SD.	3.07 ± 1.74	2.91 ± 2.07		
Female	**Asthmatic**	**Non-asthmatic**		
	(n= 23)	(n= 30)		
dmft				
Min. – Max.	1.0 – 7.0	0.0 – 5.0	1.093	0.274
Mean ± SD	3.45 ± 1.47	2.79 ± 1.32		

Table 3. *Comparison between the two groups according to DMFT, and gender.*

	Asthmatic	**Non-asthmatic**	**U**	**P**
	(n= 55)	(n= 55)		
DMFT				
Min. – Max.	0.0 – 4.0	0.0 – 4.0	0.833	0.405
Mean ± SD.	0.66 ± 1.17	0.76 ± 1.10		
Male	**Asthmatic**	**Non-asthmatic**		
	(n= 32)	(n= 25)		
DMFT				
Min. – Max.	0.0 – 4.0	0.0 – 4.0	0.995	0.32
Mean ± SD.	0.80 ± 1.35	1.05 ± 1.33		
Female	Asthmatic	Non-asthmatic		
	(n= 23)	(n= 30)		
DMFT				
Min. – Max.	0.0 – 2.0	0.0 – 2.0	0.446	0.656
Mean ± SD	0.45 ± 0.38	0.54 ± 0.84		

The gingivitis showed less mean values in asthmatic group (0.79 ± 0.46) when compared with non-asthmatic group (0.76 ± 0.43), (P=0.534) with no statistical significance difference. Regarding to gender in asthmatic male the mean value of gingivitis was (0.82 ± 0.46) while in non-asthmatic male was (0.83 ± 0.47) with no statistical significance (P=0.738). In asthmatic female (0.74 ± 0.46) and in non-asthmatic female it was (0.70 ± 0.40) with no statistical significance (P=0.629) (*Table 4 and Figure 2*).

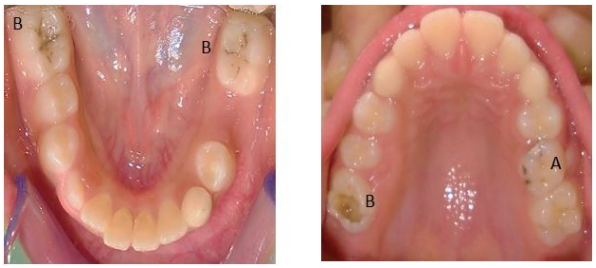

Figure 1. *Dental caries in oral cavity of 11 years old asthmatic female (A) primary tooth (B) permanent tooth.*

Figure 2. *Gingivitis [score 1] in gingival papilla of 10 years old asthmatic male.*

Table 4. *Comparison between asthmatic and non-asthmatic according to gingivitis, and gender.*

	Asthmatic	Non-asthmatic	**U**	**P**
	(n= 55)	(n= 55)		
Gingivitis				
Min. – Max.	0.0 – 1.73	0.0-1.70	0.622	0.534
Mean ± SD.	0.79 ± 0.46	0.76 ± 0.43		
Male	**Asthmatic**	**Non-asthmatic**		
	(n= 32)	(n= 25)		
Gingivitis				
Min. – Max.	0.0-1.73	0.0-1.70	0.335	0.738
Mean ± SD.	0.82 ± 0.46	0.83 ± 0.47		
Female	**Asthmatic**	**Non-asthmatic**		
	(n= 23)	(n= 30)		
Gingivitis				
Min. – Max.	0.0 – 1.47	0.0-1.47	0.483	0.629
Mean ± SD.	0.74 ± 0.46	0.70 ± 0.40		

Dental erosion had high mean values in asthmatic group of dental erosion (0.43 ± 0.34) when compared with non-

asthmatic group (0.33 ± 0.22), (P=0.311) with no statistical significance. Both asthmatic and non-asthmatic male recorded similar mean value of dental erosion (0.50 ± 0.35) with no statistical significance (P=0.320). Asthmatic female recorded mean value of dental erosion (0.32 ± 0.30) and non-asthmatic was (0.32 ± 0.25) with no statistical significance difference (P=0.737) (*Table 5*).

Table 5. *Comparison between study and control groups according to dental erosion, and gender.*

	Asthmatic	**Non-asthmatic**	**U**	**P**
	(n= 55)	(n= 55)		
Erosion				
Min. – Max.	0.0 – 1.33	0.0 – 0.75	1.012	0.311
Mean ± SD.	0.43 ± 0.34	0.33 ± 0.22		
	Asthmatic	**Non-asthmatic**		
Male	(n= 32)	(n= 25)		
Erosion				
Min. – Max.	0.0 – 1.33	0.0 – 1.33	1.615	0.32
Mean ± SD.	0.50 ± 0.35	0.50 ± 0.35		
	Asthmatic	**Non-asthmatic**		
Female	(n= 23)	(n= 30)		
Erosion				
Min. – Max.	0.0 – 1.0	0.0 – 0.75	0.336	0.737
Mean ± SD.	0.32 ± 0.30	0.32 ± 0.25		

Discussion

Chemical disturbance in oral cavity occurs by medication that used to control and treated of asthmatic attack, that cause distribution of normal flora in oral cavity and air passage way and immunity of oral cavity and all body. In this study, children suffered from asthma since 4 years or more to confirm the effect of asthma on dentoalveolar structures. Mild or moderate persistent asthmatic selected children because they are the more prevalence of cases that present, and not had any problems with impression material that used. Concerning to effect of asthma on dental caries in this study, the asthmatic children had high value in dmft with no significant difference when compared with non- asthmatic children in both gender. These results in agreement with Hyyppä and Paunio [8], McDerra et al. [9], Maupomé et al. [28], they suggested that dmft had high mean value in asthmatic children with no statically significant difference, and agree with Sohi et al. [29] in non-asthmatic children. Asthmatic children had less mean value of DMFT when compared with non-asthmatic children without significant difference in both gender. This result in accordance with Shulman et al. [30] who establish that, DMFT in asthmatic children had less mean value when compared with non-asthmatic children, and Folayan et al. [31] found non- asthmatic female children had less DMFT than non- asthmatic males. While Stensson et al. [32], Khalilzadeh et al. [33] differ with the result of dmft and DMFT in this study because they found a significant correlation between the children with asthmatic attack when compared to healthy control children. The conceivable cause of the difference in dmft and DMFT of asthmatic children may be related to medication effect on the cariogenic microorganism. In addition, the composition of medication lactose monohydrate that exaggerate its effect on salivary flow rate that result by medication and mouth dryness from mouth breathing. In this study, there was no statically significant difference between asthmatic and non- asthmatic children and intragroup comparisons of asthmatic and non-asthmatic children regarding to gingivitis. This result was in agreement with Shashikiran et al. [34] and Ferrazzano et al. [35] found that, no significant differences in gingival and periodontal health between asthmatic children and controls, and David et al. [36] found the male children showed higher gingivitis than the female. While Yaghobee et al. [37] showed statically significant difference between asthmatic and non-asthmatic groups. The incidence of gingivitis in asthmatic children may be due to the medication effect on the oral flora. Additionally, the low pH that is one of side effect of the asthma medications increases the activity of pathological bacteria in gingival plaque. In the present study, there was no statically significant difference between asthmatic and non- asthmatic children regarding to dental erosion. Except asthmatic male children, other had high mean value with significant difference. This result agreed with the Dugmore et al. [38] who suggested there was no significant difference in erosion prevalence between asthmatics and asthma free in a cohort study of children, and Manish et al. [39] found increase incidence of dental erosion in non-asthmatic male with non-asthmatic female. While results of this study disagree with Manuel et al. [40], McDerra et al. [14], Manish et al. [39] showed statically significant difference in dental erosion between asthmatic and non-asthmatic groups, and they suggested that asthmatic individuals were the highest risk groups suffering from dental erosion. The possible cause of occurrence of dental erosion in asthmatic children may be associated with medication effect that cause reduced of salivary flow rate. In addition, composition of medication had large particles that increase effect on the hard tissue of teeth.

Conclusion and Recommendation

From this study, we can conclude that asthma really not effect in incidence of dental caries, gingivitis, and dental erosion when the children under control by medication of asthma. Therefore, identify the necessary dental management to reduce the impact of dental caries, gingivitis, and dental erosion in asthmatic children by some asthma medication. In addition, dental health education programs are required for parents and pediatric physicians to elevate knowledge.

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