The Relationship Between Oral and Demographic Characteristics of Children with Asthma

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The information from 291 children's dental charts was analyzed; 127 children had no mental or systemic diseases, 50 had asthma and 114 had other diseases. Children with systemic diseases in general and those with asthma had a higher prevalence of history of toothaches and higher plaque, calculus and caries indices than the healthy children. Children with systemic diseases in general and those with asthma in particular should be targeted for preventive dental services.

Key words: *Oral health, asthma, children*
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INTRODUCTION

The relationship between oral diseases and mental or systemic diseases, or syndromes and their treatment in children have been extensively reported in the literature.[1-24] These include premature birth,2-6 radiation or chemo therapies of cancer before or after birth,[7-9] renal deficiency,[10,11] Papillon Lèfevre Syndrome,[12] immune diseases,[13-14] attention-deficit-hyperactivity disorder,[15-17] allergies,[18] and asthma.[19-24]

There is inconsistent information regarding the caries susceptibility of children with asthma; while some studies indicate higher caries scores for asthmatic children when compared to non-asthmatic children,[19,20,23,24,26,27] others did not find significant differences between the groups.[21,28,29] The aim of this study was to describe the characteristics of oral hygiene and diseases in children with asthma, examine their relation to demographic variables, and compare them with children with no systemic and/or mental diseases or with other diseases.

MATERIALS AND METHODS

After approval by an University Review Board for Research on Human Subjects, a review of 300 randomly selected active dental charts of children ongoing treatment in three United States university pediatric dentistry clinics (100 at each clinic) was performed. The clinics were located at: 1) the College of Dentistry; 2) a low socioeconomic city area; 3) a rural area. The final research sample consisted of the data from the records of 291 children in which the systemic condition was clearly recorded. The following data was included in a database for statistical analysis:

a. Demographic data: age in months, gender, ethnicity (Caucasian, African American, Hispanic, other), rural or city residence (population of less or more than 20,000 individuals respectively), annual household income (below or above $30,000 respectively), and type of payment (Medicaid, private pay or other).
b. Oral variables: histories (reported by the parents) of toothache, bleeding gums or tooth grinding during sleep; incidence of caries by the number of decayed, missing or filled surfaces in the primary and permanent teeth (dmfs+DMFS); plaque index (0=no plaque, 1=isolated plaque deposits, 2= generalized plaque deposits, 3= heavy plaque deposits); gingival index (0=no inflammation, 1=inflammation with no bleeding on probing, 2=inflammation with bleeding on probing, 3= spontaneous bleeding); calculus index (0=no calculus, 1= light, 2=moderate, 3= heavy); and presence of tooth discoloration.
c. Health condition: healthy, asthma, or other systemic or mental disease. Asthma was recorded only in cases in which, in addition to the parent's report of the presence of the disease, the child was receiving specific treatment for the disease.

Statistical examination

The demographic data and the oral variables were analyzed by the health conditions with a standard statistical computer program (JMP, version 5, 1989-2002, SAS Institute Inc. Cary NC, USA) was utilized. t-Test analysis was utilized to analyze the statistical significance of differences between numerical parameters by a categorical variable. Chi square analysis was used to examine the statistical significance of the differences in distribution of one categorical variable by another categorical variable.

RESULTS

The distribution of children by gender indicated similar percentages (50.8% males and 49.2% females); 69.6% were Medicaid patients; the mean age was 85.5 months with a standard deviation (SD) of 41.7 months; 127 children (43.6%) had no mental or systemic disease (H group), and 164 (56.4%) had one or more mental

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or systemic diseases or syndrome (D group). In the D group, 50 children had asthma ("all asthma" group 17.2% of the population sample or 30.5% of the D group), among these, 21 had asthma only ("asthma only" group) and 29 had asthma and an additional heath problem ("asthma+" group).

No statistical significant difference (t-Test, mean±SD) in age was found between males and females (83±38.9 and 88.0±44.3 respectively), or between the H and D groups (88.3±43.7 and 83.3±40.1 respectively). The ethnic origin was recorded in 184 files: 107 (58.1%) were Caucasian, 58 (31.5%) were African American, 17 (9.2%) were Hispanic and the rest were either American Indian or Asian (n=1 each). The total household year income was included in 141 charts: 54 (38.3%) had "low" income and 87 (61.7%) had a "high" income. The mean number of family members in the same household was included in 182 charts, its mean being 4.3±1.3. Place of residence was included in all charts: 166 (57.0%) were city residents and 125 (43.0%) were rural areas residents. History of presence/absence of bleeding gums was recorded in 271 charts: 36 (13.3%) had a positive history of bleeding gums. History of presence/absence of toothache was recorded in 272 charts: 75 (25.7%) had a positive history of toothache. Plaque scores were recorded in 187 charts: indices of 0, 1, 2 and 3 were reported in 18 (28.8%), 107 (46.2%), 57 (23.7%) and 5 (1.1%) of these charts respectively. The gingival index was recorded in 184 children: 0, 1, 2 or 3 indices were recorded in 53 (28.8%), 85 (46.2%), 44 (23.9%) and 3 (1.1%) of these charts respectively. Calculus scores were recorded in 140 charts: indices of 0, 1, or 2 were reported in 89 (63.6%), 41 (29.3%) and 10 (7.1%) of these charts respectively. Presence/absence of discolored teeth was recorded in 241 charts; among these, 53 (22%) had discolored teeth.

Table 1 presents the percentages of children by the health condition and the demographic variables. Statistically significant differences (Chi Square) were found in the distribution of:

a. Gender between the: D and H groups (p=0.02); H and "all asthma" groups (p=0.04).
b. Ethnicity between the: H and "asthma only" groups (p=0.006); "asthma only" and "asthma+" groups (p=0.01).
c. Income between the: different ethnic groups (p=0.002; H and the "asthma only" groups (p=0.003); "all asthma" and "asthma+" groups (p=0.0007).

Table 2 presents the percentages of children by the health condition and the plaque, gingival and calculus indices. Statistically significant differences (Chi square) were found in the distribution of:

a. Plaque index scores between the: H and D groups (p=0.008); "all asthma" and H groups (p=0.02); H and "asthma only" groups (p=0.03).
b. Gingival index scores between the H and D groups (p=0.04).
c. Calculus index scores between the: H and D groups (p=0.03); H and "all asthma" groups (p=0.02); H and "asthma+" groups (p=0.001)

Table 3 presents the percentages of children by the systemic condition and the history of toothache, bruxism, bleeding gums and tooth discoloration. Statistically significant differences (Chi square) were found in the distribution of:

a. Toothache history between the: H and D groups (p=0.008); "all asthma" and H groups (p=0.002); "asthma+" and H groups (p=0.009).
b. Discolored teeth between the H and "asthma+" groups (p=0.04).

Table 4 presents the distribution of children by the health condition and the carious, missing and filled surfaces. Statistically significant differences (t-Test) were found in the distribution of carious, missing and filled surfaces between the H and D groups (p=0.04) and between the H and "all asthma" groups (p=0.04).

Table 1: Percentages of children by the health condition and demographic variables.

		Systemic diseases		Asthma		
		With	Without	All	Asthma only	Asthma +
Gender	Male	56.7	43.3	60.0	61.9	58.6
	Female	43.3	56.7	40.0	38.1	41.4
Residence	City	55.2	59.1	54.0	42.9	62.1
	Rural	44.8	40.9	46.0	57.1	37.9
Ethnicity	Caucasian	60.7	54.9	42.4	16.7	57.2
	AA*	31.3	32.4	51.5	83.3	33.3
	Hispanic	87.1	12.7	6.1	0.0	9.5
	Other	0.9	0	0	0.0	0.0
Income	Low	61.2	62.5	65.4	100	43.8
	High	38.8	37.5	34.6	0	56.2

*African American

Table 2: Percentages of children by the health conditions and the plaque, gingival and calculus indices.

		Healthy	All diseases	All Asthma	Asthma only	Asthma +
Plaque index	0	13.6	6.1	2.9	0.0	5.3
	1	64.8	50.5	50.0	46.7	52.6
	2	20.5	39.4	41.2	46.7	36.8
	3	1.1	4.0	5.9	6.7	5.3
Gingival index	0	35.2	22.9	24.2	20.0	27.8
	1	47.7	44.8	39.4	46.7	33.3
	2	17.0	30.2	33.3	26.7	38.9
	3	0.0	2.1	3.0	6.7	0.0
Calculus index	0	70.3	57.9	46.2	54.5	40
	1	28.1	30.3	23.1	18.2	26.7
	2	1.6	11.8	30.8	27.3	33.3

Table 3: Percentages of children by the health conditions and history of tooth ache, bruxism, bleeding gums (BG), and tooth discoloration (TD).

		Healthy	All diseases	All Asthma	Asthma only	Asthma +
Tooth ache	Yes	19.7	34.0	43.5	42.1	44.4
	No	80.3	66.0	56.5	57.9	55.6
Bruxism	Yes	7.8	20.0	17.1	25.0	12.0
	No	92.2	80.0	82.9	75.0	88.0
BG	Yes	9.2	16.4	40.4	33.3	41.5
	No	90.8	83.6	59.6	66.7	58.5
TD	Yes	16.7	26.3	30.0	20.0	36.0
	No	53.7	73.7	70	80.0	64.0

Table 4: Mean and standard error (SE) of carious, missing and filled surfaces, by the systemic conditions

	Healthy	All diseases	All Asthma	Asthma only	Asthma +	All ADHD
mean	8.1	10.6	13.4	13.2	13.6	9.4
SE	0.9	0.8	1.5	2.3	1.9	2.1

DISCUSSION

The close relationship between the oral and systemic conditions is emphasized by the present findings that children with systemic diseases had significantly higher prevalence of histories of toothaches and bruxism, and higher plaque, gingival, calculus and caries scores than the healthy children.

Previous reports indicate that the etiology and severity of asthma is based on a complicated interaction between environmental, social, and genetic factors, including age, ethnicity, migration, gender, place of residence and socio-economic status.[22,30,31,32,33] Moreover, it has been found that socio-demographic status influence the susceptibility to allergens, prevalence of asthma and hospitalization due to asthma.[32,35] These findings may account for the high prevalence (17.2%) of asthma in the present population in which almost 70% qualified for Medicaid, which is higher than the one reported for U. S. children under the age of 3-17-years old (13%), in 2001.[34]

A higher prevalence in oral diseases in asthmatic children may be expected due to a decrease in salivary flow and plaque pH caused by the use of beta adrenergic agonist, anti-histaminic, salbutamol and corticosteroids.[19,20,23,26,27] However, there is not consistency in the findings on the comparison of the prevalence of oral diseases in asthmatic and healthy children; some studies indicate that neither asthma per se, its severity, or its duration relate to the caries prevalence or gingival condition in children or adolescents,[28,29] whereas in a population of British school children with asthma proved to have more decay, poorer periodontal status and more tooth surface loss that healthy controls.[24] The present findings support the findings that children with asthma may have higher plaque, calculus and dental caries scores, and a higher prevalence of history of toothaches. The apparent discrepancy between the studies may be related to population characteristics like age[22] or socioeconomic status,[36] diagnostic criteria, oral hygiene, type of medication,[19,20] route of administration of the medication and its sugar content since asthmatic children who take medication in the form of syrup have a higher caries prevalence.[26,23,37]

Not as in previous findings,[30] in the present study the place of residence did not affect the prevalence of asthma. This is interesting since one could expect more allergies and resulting asthma in rural areas, where allergies may be related to pollen. More severe gingival inflammation scores have been found in children with allergic rhino-conjunctivitis when compared to children without it.[18] Therefore, one could expect a larger prevalence of a history of bleeding gums or higher gingival indices in children with asthma. In the present sample the asthmatic children had a higher prevalence of history of gingival bleeding but did not have higher gingival inflammation scores than the healthy children. This finding may be related to the diagnostic criteria and lack of standardization between the examiners.

In the present sample, African American children who had a lower income than the other ethnic groups had a higher prevalence of asthma. This finding is similar to the one previously reported for a low-income African American population in New York.[32] The question that still remains is if a high asthma prevalence is directly related to the ethnic origin or the socioeconomic conditions of the population, or both. Moreover, when comparing the different patient characteristics between the children with asthma only and those with asthma and additional systemic disease, it was found that the second group had a larger population of low income African Americans families. These findings emphasize the multifactor etiology of oral or systemic diseases and their relationship.

CONCLUSIONS

Children with systemic diseases in general and those with asthma in particular should be targeted for frequent dental examinations for preventive dental services.

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