ORIGINAL ARTICLE

Tanaffos (2007) 6(4), 42-46

Dental Caries-Associated Microorganisms in Asthmatic Children

Soheila Khalilzadeh[1], Jamshid Salamzadeh [2], Farzaneh Salem [2], Katayoon Salem [3], Mojdeh Hakemi Vala[4]

[1] Department of Pediatrics, NRITLD, Shahid Beheshti University, M.C., [2] Pharmacology Department, Shahid Beheshti University, M.C., [3] Department of Pediatric Dentistry, Gilan Dental School, Guilan University of Medical Sciences, Rasht-Iran, [4] Department of Biotechnology, Pasteur Institute of Iran, TEHRAN-IRAN.

ABSTRACT

***Background**: According to several studies, asthma medications especially β_2-agonists and corticosteroids have harmful effects on the dentition. This study was conducted to evaluate the prevalence of dental caries in asthmatic children in comparison with healthy controls. Some potential confounders of oral health were also evaluated.*

***Materials and Methods**: Asthmatic children aged 5-15 years under the care of the Pediatric Pulmonary Clinic of Masih Daneshvari Hospital were studied. DMFT index (decay, missing, filling teeth) was assessed in them by using the visual-tactile technique. Also, saliva samples were taken from each child and the number of Streptococcus mutans and Lactobacilli colonies in the samples was counted. Similar data were collected from the healthy controls.*

***Results**: Forty-five asthmatic (mean age 10.90 ± 3.16 yrs) and 46 healthy children (mean age 11.03 ± 0.59 yrs) were studied. Mean DMFT was 3.98 ± 2.53 in the control group and 4.30 ± 2.81 in the study group which revealed a significant difference between the two groups regarding DMFT index. The number of Lactobacilli colonies was 8171.3 ± 11956.0 and 16078.4 ± 24305.5 in asthmatic and non-asthmatic groups, respectively which demonstrated no significant difference in this regard. Whereas, the number of Streptococcus mutans colonies was significantly different between the two groups (32331.7 ± 46258.9 colonies in the control group versus 80883.4 ± 74799.9 colonies in the study group; p-value < 0.05). Multivariable analysis revealed that asthmatic children receiving anti-asthmatic medication including β_2-agonists and corticosteroids had a higher DMFT index.*

***Conclusion**: According to our study the prevalence of dental caries was higher in asthmatic children as compared to the healthy controls. Also, a significant correlation was detected between the saliva pathogens and dental caries. Dental caries were more prevalent in children receiving β_2-agonists alone than in those receiving both corticosteroids and β_2-agonists. Our study concluded that a more comprehensive precise oral health training program needs to be established by complete evaluation of the dental caries status in asthmatic children and also by training them regarding the technique of using inhalers with a spacer to lower the complications and costs of dental caries. (**Tanaffos 2007; 6(4): 42-46**)*

***Key words:** Asthma, Children, Dental caries, Streptococcus mutans*

Correspondence to: Khalilzadeh S

Address: NRITLD, Shaheed Bahonar Ave, Darabad, TEHRAN 19569, P.O:19575/154,TEHRAN- IRAN

Email address: soheilak@yahoo.com

Received: 26 Feb 2007

Accepted: 7 June 2007

INTRODUCTION

According to several studies, anti-asthma medications including β_2-agonists and corticosteroids can have harmful effects on teeth. Inhaled β_2 agonists can provide an optimal environment for the growth and proliferation of microorganisms responsible for dental caries (Streptococcus mutans and Lactobacilli) through decreasing salivary secretion (1,2).

Various studies have demonstrated that the prevalence of dental caries is higher in asthmatic children as compared with the healthy controls. Therefore, asthma is considered a risk factor for dental caries (3).

Reddy and colleagues in 2003 assessed the caries status of asthmatic children and reported that dental caries were more prevalent in these children as compared to the normal population (4).

On the contrary, Meldrum and coworkers in a study in 2001 did not find any significant difference in terms of dental caries status (5).

A study performed in a South Carolina Medical School on 655 children aged 1 to 5 years evaluated the correlation between dental caries and asthma. (6). In this study, 125 asthmatic children were examined. DMFT scores in these children were significantly higher than those of non-asthmatic controls. Also inhaled bronchodilators (salbutamol) that are frequently used by asthmatic children decreased the secretion of saliva.

This study was conducted to assess the dental caries status in Iranian asthmatic children receiving inhaled drugs to evaluate the potential risk factors in this regard. The potential confounding factors related with oral health were assessed as well.

MATERIALS AND METHODS

Asthmatic children aged 5 to 15 years under the care of the Pediatric Pulmonary Clinic of Masih Daneshvari Hospital were studied. DMFT index was evaluated by using the visual-tactile technique. Also, saliva samples were taken from each child and were collected in sterile McCartney tubes with 2 ml capacity. The samples were Gram-stained and cultured. Afterwards, the number of Streptococcus mutans and Lactobacilli colonies in the saliva samples was counted. Similar data were collected from the non- asthmatic controls. Demographic data along with the medical records containing age, sex, family income, parents' level of education, type of the medication, duration of drug use and the method of using the spray were recorded. Data were analyzed by using Mann-Whitney test, Kendall's rank correlation test, chi-square test, Fisher's exact test and t- test. P-value <0.05 was considered significant. All data collected, were categorized and entered in SPSS and Excel softwares and analyzed.

RESULTS

A total of 91 children enrolled in the study. Forty-five asthmatic children with a mean age of 10.90 ± 3.16 years (the study group) and 46 non-asthmatic children with a mean age of 11.03 ± 0.59 years (the control group) were studied. Assessment of DMFT scores in asthmatic children revealed that as the child grows the DMFT score improves (p=0.03) and the DMFT score in female asthmatic children was higher than the affected males (p=0.03). Regarding the technique of using the spray, it was found that children using the inhalers by spacers have lower DMFT scores (p=0.04). DMFT values were lower in those with a higher family income (p=0.02). Also, DMFT scores were lower in children whose mothers had a higher educational level. According to our study results, there was a significant correlation between the DMFT scores and type of medication and duration of pharmacotherapy. Mean DMFT scores and the statistical comparison between the two groups are summarized in Table 1.

Table 1. Mean DMFT scores in the study and the control groups.

Group	Mean DMFT
Control	3.98 ± 8.53
Study	4.30 ± 2.81

Also, the number of *Streptococcus mutans* colonies was higher in asthmatic children (p=0.001). However, no significant difference was detected between the two groups regarding the number of Lactobacilli colonies. Tables 2 and 3 demonstrate the correlation between DMFT scores and number of colonies in the culture media.

Table 2. The correlation between the mean DMFT and number of Lactobacilli colonies according to Kendall's rank correlation test.

Group	Mean number of Lactobacilli	Mean DMFT	P-value
Study	8171.33± 11956.01	3.98 ± 2.53	0.14
Control	16078.37± 24305.54	4.30 ± 2.81	0.53

Table 3. The correlation between the mean DMFT and the number of Streptococcus mutans colonies according to Kendall's rank correlation test.

Group	Mean number of Streptococcus mutans	Mean DMFT	P-value
Study	32331.74 ± 46258.93	3.98 ± 2.53	0.04
Control	80883.40 ± 74798.95	4.30 ± 2.81	0.38

DISCUSSION

According to the results of our study there was a significant difference in the mean DMFT values between the asthmatic children and the control group. Our results are consistent with those of Shulman (2001), Dugmore (2003) and Eloot (2004) who also found a correlation between the use of antihistamine, corticosteroids and anti asthma sprays with DMFT score (1, 7, 8).

In the Shulman study performed on severe asthmatic children, these patients had lower DMFT scores as compared to the control group (1). However, Milano in 1999 reported different results. He detected significantly higher DMFT scores in asthmatic patients. Drinking-water fluoride in Milano's understudy population was below the optimal level (0.7 ppm) (9). Whereas, the amount of drinking-water fluoride in our understudy patients was 0.5 to 1 ppm. The difference in the rate of water fluoride may be one of the factors influencing the results. Our study results are similar to those of McDerra reporting that the prevalence of dental caries is higher in asthmatic children than in controls (10). In our study, asthmatic children only received anti-asthma inhalers including salbutamol and beclomethazone but McDerra's understudy population received both syrups and sprays. Syrups contain a high percentage of sugar which is a caries risk factor in children with chronic diseases. This study demonstrated that the number of *Streptococcus mutans* colonies are the major cause of dental caries. The growth of this aciduric and acidogenic microorganism is strongly related to the presence of carbohydrates in the environment. The number of *Streptococcus mutans* colonies was higher in the study group and the two groups showed a significant difference regarding the mean number of *Streptococcus mutans* colonies (p=0.0001). This confirms the higher prevalence of caries in the asthmatic children.

Also, based on our study, a direct correlation was found between the mean DMFT scores and mean number of *Streptococcus mutans* colonies but no significant correlation was found between the number of Lactobacilli and DMFT scores. Several studies have been performed in this regard revealing a direct relation between DMFT score and number of Lactobacilli and *Streptococcus mutans* colonies

(11,12). Also, a study was conducted in India on 372 children aged 13-15 years aiming to estimate the number of *Streptococcus mutans* and Lactobacilli colonies in the saliva and evaluate the correlation between these two microorganisms and dental caries. Mean DMFT was 2.41 indicating a significant correlation between the number of Streptococcus mutans and DMFT but there was no correlation regarding the number of Lactobacilli and DMFT score (13). This finding was similar to our study results.

Another finding of this study was the effect of medication type on DMFT score. Children who received β_2-agonists alone had a higher prevalence of dental caries as compared to those using corticosteroids and β_2-agonists. This difference might be due to the fact that asthma is better managed in those receiving inhaled steroids. Therefore, the child's need for inhaled β_2-agonists (which are stronger xerostomic drugs compared to corticosteroids) will be decreased specially in the acute phase of disease. Decreased use of β_2-agonists causes less defect in saliva secretion in children under treatment with two drugs and lowers the DMFT score of these children more than those receiving β_2-agonists alone (14). Therefore, children receiving β_2-agonists are more susceptible to dental caries. Also, saliva secretion rate (SSR) in these children is lower than that of healthy controls. Saliva is the most important defensive factor against dental caries and presence of immunoglobulins and other glycoproteins in the saliva and also its viscosity play an important role in decay prevention (15). Since the dental management of asthmatic children requires special measures which make the treatment process more complicated, these children should be provided with particularly intensive preventive dental programs. Therefore, by evaluating the dental caries status and oral health condition of asthmatic children and teaching them the correct method of using the inhaled drugs and comprehensive preventive dental programs may benefit this group of patients.

REFERENCES

1. Shulman JD, Taylor SE, Nunn ME. The association between asthma and dental caries in children and adolescents: A population-based case-control study. ***Caries Res*** 2001; 35 (4): 240- 6.
2. Wogelius P, Poulsen S, Sørensen HT. Use of asthma-drugs and risk of dental caries among 5 to 7 year old Danish children: a cohort study. ***Community Dent Health*** 2004; 21 (3): 207- 11.
3. Al-Dlaigan YH, Shaw L, Smith AJ. Is there a relationship between asthma and dental erosion? A case control study. ***Int J Paediatr Dent*** 2002; 12 (3): 189- 200.
4. Reddy DK, Hegde AM, Munshi AK. Dental caries status of children with bronchial asthma. ***J Clin Pediatr Dent*** 2003; 27 (3): 293- 5.
5. Meldrum AM, Thomson WM, Drummond BK, Sears MR. Is asthma a risk factor for dental caries? Finding from a cohort study. ***Caries Res*** 2001; 35 (4): 235- 9.
6. Peterson, D., Family Gentle Dental Care, Personal Web page: www.dentalgentlecare.com/allergies.html
7. Dugmore CR, Rock WP. Asthma and tooth erosion. Is there an association? ***Int J Paediatr Dent*** 2003; 13 (6): 417- 24.
8. Eloot AK, Vanobbergen JN, De Baets F, Martens LC. Oral health and habits in children with asthma related to severity and duration of condition. ***Eur J Paediatr Dent*** 2004; 5 (4): 210- 5.
9. Milano M. Increased risk for dental caries in asthmatic children. ***Tex Dent J*** 1999; 116 (9): 35- 42.
10. McDerra EJ, Pollard MA, Curzon ME. The dental status of asthmatic British school children. ***Pediatr Dent*** 1998; 20 (4): 281- 7.
11. Brambilla E, Twetman S, Felloni A, Cagetti MG, Canegallo L, Garcia-Godoy F, et al. Salivary mutans streptococci and

lactobacilli in 9- and 13-year-old Italian schoolchildren and the relation to oral health. ***Clin Oral Investig*** 1999; 3 (1): 7-10.

12. Sullivan A, Hector M. Inconsistent levels of mutans streptococci and lactobacilli measured in stimulated whole saliva. ***Eur J Oral Sci*** 1995; 103 (2 (Pt 1)): 99- 102.
13. Murray, P.R., Baron, E.J., Jorgensen, J.H., Faller, M.A. and Yolken, R.H. Mannual of Clinical Microbiology, 8th Edition, Vol. 1, American Society for Microbiology, OHIO, 2003.
14. Imhof E, Elsasser S, Karrer W, Grossenbacher M, Emmons R, Perruchoud AP. Comparison of bronchodilator effects of fenoterol/ipratropium bromide and salbutamol in patients with chronic obstructive lung disease. ***Respiration*** 1993; 60 (2): 84- 8.
15. Hegde PP, Ashok Kumar BR, Ankola VA. Dental caries experience and salivary levels of Streptococcus mutans and Lactobacilli in 13-15 years old children of Belgaum city, Karnataka. ***J Indian Soc Pedod Prev Dent*** 2005; 23 (1): 23-6.