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WHETHER BRONCHIAL ASTHMA INFLUENCES DENTAL HEALTH OF THE DISEASED CHILDREN?

DA LI BRONHIJALNA ASTMA UTIČE NA ZDRAVLJE ZUBA OBOLJELE DJECE?

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Abstract

**Background / Aim.** Asthma is a chronic inflammatory lung disorder. The effect of asthma drugs on oral health is still the subject of debate among researchers in dentistry. The aim of this study was to evaluate dental status in asthmatic children and evaluate the possible effect of drugs treating asthma on dental health. **Methods.** Participants were divided into two groups: the asthma (AG) and the non-asthma (NAG) group. Based on symptoms of the asthma and possibility for effective control of the disease, the asthma group was divided into two subgroups. The oral examination of the teeth was performed by the use of probe and mouth mirror under artificial light in accordance with World Health Organization recommendations. Saliva analysis was carried out by GC Saliva-Check Buffer. **Results.** The present study included 136 children aged from 6 to 16 years. The mean dmft/DMFT (decayed, missing, filled, teeth) of children in the AG group (6.0±4.0/3.3±4.4) was higher than in the NAG group (4.8±4.4/2.5±3.4), but significant differences were not observed between the groups. Salivary pH values were found to be similar in both groups, but a stimulated salivary flow rate was found to be significantly lower in the AG group (p<0.01). **Conclusion.** Although the prevalence of dental caries in the AG group was similar to the NAG group in this study, decreased stimulated salivary flow rate in the AG group may contribute to higher values of dental caries in asthmatic children in future.

**Keywords:** children; asthma; caries; saliva; epidemiology.

Apstrakt

**Uvod / Cilj.** Bronhijalna astma je hronično zapaljenjsko oboljenje disajnih puteva. Uticaj antiasmatskih lijekova na oralno zdravlje je još uvijek predmet istraživanja u stomatologiji. Cilj ove studije je bio da se procjeni zdravlje zuba djece sa astmom, te da se ispita uticaj antiasmatskih lijekova na stanje zdravlja zuba. **Metode.** Ispitanici su bili podjeljeni u dvije grupe: djeca sa astmom (AG) i djeca bez astme (NAG). Na osnovu prisutnih simptoma astme, kao i njene kontrolisanosti, grupu djece sa astmom smo podijelili u dvije podgrupe. Stomatološki pregled obavljen je pomoću stomatološke sonde i ogledalea pod vještačkim osvjetljenjem, a za analizu pljuvačke je korišćen GC Saliva-Check Buffer, prema uputstvu proizvođača. **Rezultati.** Epidemiološko istraživanje je obuhvatio 136 djece uzrasta od 6 do 16 godina (10,5±3,3). U ovoj studiji prosječni kep/KEP (karijesan, ekstrahovan, plombiran) zuba djece u AG grupi (6,0±4,0/3,3±4,4) bio je viši u odnosu na NAG grupu (4,8±4,4/2,5±3,4), ali nisu zabilježene značajne razlike između ispitivanih grupa. pH vrijednosti pljuvačke bile su slične u obje grupe, ali primjećen je značajno niži puferski kapacitet stimulisane pljuvačke u AG grupi (p <0,01). **Zaključak.** Iako je ovoj studiji prevalenca karijesa u AG grupi bila slična kao i u NAG grupi, smanjena vrijednosti stimulisane pljuvačke u AG grupi može doprinijeti većoj podložnosti karijesu ove grupe u budućnosti.

**Ključne riječi:** djeca; astma; karijes; pljuvačka; epidemiologija.
Introduction

Bronchial asthma is a chronic inflammatory disorder of the airways that causes recurrent episodes of wheezing, breathlessness, chest tightness and coughing (particularly at night or early in the morning) [1]. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. Asthma prevalence has been increasing across all ages and gender worldwide. Asthma is a serious global health problem that usually starts in childhood and the patients have to take lifelong therapy [2]. The majority of asthmatic patients require a long-term medication, which is usually administered using various forms of inhalers. The effect of these drugs on oral health has been subject of debate among dental practitioners [3].

Systemic diseases like bronchial asthma have a detrimental effect in the oral cavity, such as reduction of salivary secretion, change in salivary composition and pH. The negative effects of dental caries occurrence include pain, dysfunction, poor appearance, and speech problems [4]. However, these oral health problems vary from person to person and depend on the frequency of cariogenic drinks and foods consumption, as well as oral hygiene.

Hamid et al. suggested that dental caries and asthma are most common chronic diseases in childhood. Children with chronic medical disorders mostly require long-term medication what puts them at high risk of oral diseases in general, and dental caries in particular [5].

Caries lesion forms through a complex interaction between acid-producing bacteria and fermentable carbohydrates and is also affected by many host factors including saliva and the inherent nature of the teeth [6]. Saliva plays an important role in oral health as it maintains the integrity of oral hard and soft tissues and protects the oral tissue against bacterial, fungal and viral infections. Also, salivary buffers can reverse the low pH thus preventing enamel demineralization. Furthermore, increase in caries prevalence in asthmatic patients was reported to be associated with prolonged use of β2 agonists that lead to decreased salivary flow, altered saliva composition and decreased pH that affects protective properties of saliva [7]. Higher rates of caries among asthmatics were considered possibly due to antiasthma medications containing fermentable carbohydrate and sugar as well [3].

This study was conducted to compare the prevalence of dental caries in asthmatic and non-asthmatic children, as well as to evaluate the relationship between the types, time of taking and the duration of asthma medication and dental caries in asthma groups.

Methods

This study was based and designed according to the recommendations for epidemiological surveys (National Oral Health Survey) defined by the World Health Organization (WHO) [8]. This one-year long study was conducted according to Declaration of Helsinki of 1975, as revised in 2000. The study was approved by the Ethical Committee of Faculty of Medicine Foca, University East Sarajevo (No. 01-8/37).
**Study Population**

The parents and children involved in the study were informed about the objectives and procedure. The parents approved participation of their children in this study by signing written consent and children were permitted to leave process in any time during study.

The present study was conducted among 136 children aged from 6 to 16 years. Participants were divided into two groups. The first group consisted of 68 children with asthma (AG), without any other systemic disease, who were treated in the University Hospital Foca or Primary care facility in Foca. The second group consisted of children without asthma (NAG) or any other chronic disease, who visited Faculty of Medicine Foca, Dentistry Program. AG and NAG were matched by gender and age (±6 months).

Symptoms were evaluated according to medical history, physical examination, spirometry result and data obtained after completing the basic disease related questionnaire. The level of asthma control was determined according to results of asthma control test. Based on symptoms of the asthma and level of asthma control, the AG was divided into two subgroups [1]. The first subgroup consisted of children with good controlled asthma (GCA), while the second subgroup consisted of children with partly controlled asthma (PCA). Asthma was considered to be under good controlled if: children have symptoms no more than 2 days a week, these symptoms do not wake them from sleep more than 1 or 2 nights a month; they can perform all usual activities; they take quick relief medicines no more than 2 days a week; they do not have more than one asthma attack a year that requires taking systemic steroids and their peak flow does not drop below 80 percent of their personal best value. [1] Asthma was considered to be only partly controlled if: children have symptoms more than 2 days a week; they cannot perform normal physical activities and they have nocturnal symptoms; they have more asthma attack a year that requires taking asthma drugs and their peak flow drop below 80 percent of their personal best values. [1] Children with uncontrolled asthma were not recorded in this study.

**Dental Examination**

Dental examinations were carried out in a dental chair by the use of dental mirror and probe under artificial light, according to the WHO criteria [8]. All participants were examined and saliva samples were collected at the Department of Pediatric and Preventive Dentistry, Faculty of Medicine Foca.

**Clinical Measurements**

Caries status was determined by the number of decayed (d/D), missing (m/M), and filled (f/F) primary (dmft) and permanent (DMFT) teeth. No radiographs were taken.

Saliva sampling was conducted in the morning hours as follows. Individuals were instructed not to drink, eat or use chewing gum for at least 2 h before sampling, not to rinse their mouth and not to take medicine at least an hour prior the visit. Patients were placed in upright relaxed position with their heads tilted down. Saliva hydration, salivary consistency, resting saliva pH, stimulated saliva flow, stimulated saliva pH and saliva buffering capacity were recorded using GC Saliva-Check Buffer test (GC Corporation, Tokyo, Japan) according to the manufacturer’s instructions.

**Statistical Analysis**
The results’ analysis was carried out using the Statistical Package for Social Sciences (SPSS version 19.0 for Windows, SPSS Inc., Chicago, IL, USA). Chi square tests were used to compare differences in categorical variables. An Independent-Samples T test was used to compare differences in dental caries status between the experimental and control groups, as well as between the subgroups. One-Way ANOVA was used to test differences of the caries status in relation to time of taking medication and type of administered medication. Mann-Whitney test was used for saliva testing between the AG and NAG, as well as the subgroup with good controlled asthma and partly controlled asthma. A p<0.05 was considered as statistically significant.

Results

The study population consisted of 68 (50%) asthmatic and 68 (50%) non-asthmatic children. There were 53 (39%) boys and 15 (11%) girls in the AG(p<0.05) compared to 53 (39%) boys and 15 (11%) girls in the NAG (p<0.05). The mean ages were 10.5±3.3 years and 10.5±3.3 years, respectively in the two groups. In the NAG, 63.0% participants were using inhaled corticosteroids (ICS), 13.2% bronchodilators (inhaled long-acting beta-2 agonists) and 23.5% combination of inhaler steroids and bronchodilators. On average, 27.9% of respondents used asthma medications for at least two years, and 57.7% of respondents were taking asthma drugs several times a day.

Characteristics of the participants' salivary samples are presented in table 1. Resting saliva flow rate was approximately the same between the AG and the NAG. Also, there was not statistically significant difference in resting saliva flow between the GCA and PCA subgroups. Sticky saliva was more common in the AG than NAG. Lower salivary pH was found in the PCA subgroup. Very low buffering ability of saliva was observed in 27.9% of the AG compared to 13.2% in the NAG (Table 1).

The percentage of children with caries-free primary dentition in the AG and NAG was 16.7% and 25%, respectively, while the percentage of children with caries-free permanent dentition in the AG and NAG was 28.6% and 44.5%, respectively. The results of the present study showed a higher prevalence and severity of dental caries among asthmatic patients compared to the matched healthy children in both primary and permanent dentitions (Tables 2 and 3), but these differences were not statistically significant. Moreover, the dmft/ DMFT were higher in the PCA subgroup compared to the GCA, both in primary and permanent dentition, but statistical significance was not observed.

The type of medication, frequency of medication use, duration of medication use did not affect mean dmft/DMFT in the AG, neither GCA nor PCA. Interestingly, results indicated higher values of mean d/D, F, DMFT in the AG group in children who were using the anti-asthmatic drugs in the afternoon (Tables 4 and 5).

Discussion

Oral health is an important part of overall health. Therefore, the promotion of oral health and the quality of life is an important objective of modern dentistry. Literature data indicate a possible association between systemic diseases, including asthma, and oral health. Systemic diseases can affect the defense mechanisms and patient’s motivation, and may be considered as risk factors for oral diseases [3, 7].
Bronchodilators play a major role in asthma therapy while corticosteroids are second in line. The more severe forms of asthma require a combination of several anti-asthmatic drugs. Recent study showed that the inhalation drugs have some negative impact on oral health, depending on their dosage, frequency, and length of use [9]. Factors associated with severity of the disease and/or medicaments used for treatment may increase the risk for the development of caries due to the reduced secretion of saliva, as well as lower salivary pH in asthmatics [3, 6, 7, 10-15]. Moreover, certain inhalers contain fermentable carbohydrates in the form of lactose, which mask the bitter medication taste and improve patient tolerance, but may contribute to an increased caries risk as well [15].

Normal salivary flow is one of the most important protective factors against caries. All changes in the amount or composition of the saliva can alter the oral health status. This study showed that asthmatic children had smaller amount of un-stimulated saliva. Also, the saliva was stickier in the asthmatic children and the resting salivary flow was below normal as droplets of saliva were formed at the orifices of the minor glands in more than 60 seconds. Sticky and less viscous, saliva facilitates accumulation and adhesion of bacteria to the tooth surface, as well as retention of deposits in the mouth, as the capacity of saliva to flush microorganisms and substrates and maintain oral cleanliness may be influenced by its consistency and flow rate [16].

Stimulated salivary flow is important to facilitate flushing away acids originated from the food, dental plaque or other sources (like gastric reflux). The amount of stimulated saliva was reduced in the asthmatic group in this study. The stimulated flow was lower than 3.5 ml/min in almost half of the children in this group, followed by low and very low buffering capacity. Results of this study also showed that medications used in the asthma treatment did not have any visible impact on the tested saliva parameters in respect to their dosage, frequency, duration of use as well as time of medication administration during the day. Significant difference was not observed in saliva pH values between asthma and non-asthma children in this study what is consistent with the literature data that attributes the absence the difference to the fact that the measurement of salivary pH was not performed immediately after the use of the asthma drug [17].

Buffer capacity testing indicates saliva effectiveness to neutralize acidity in the mouth. Karova and Christoff [14] pointed out that the use of inhaled antiasthmatic drugs leads to the rapid reduction of the salivary pH. The pH level was recorded to be lowest in the first five minutes after the use and increased during first 30 minutes; however, it did not reach values registered prior the drug administration. In the other study, it has been reported that 30 minutes after the use of beta-2 antagonist, salivary and plaque pH declined to a critical level (pH=5.5), causing enamel demineralization [3, 15].

The average dmft/DMFT values were higher in primary and/or permanent dentition in asthmatic children in several studies [2, 6, 17-20]. Those values were reported to be higher in children that used inhaler form of drugs [18], especially salbutamol inhalers (bronchodilator) [19]. In contrast to the above mentioned studies, there are other studies that do not demonstrate a positive relationship between asthma and dental caries [21-29]. These findings are in accordance with our study. The prevalence of dental caries in asthmatic children in this study was higher than in the healthy control group, both in primary and permanent dentition, but it was not statistically significant; however, this finding supports the claim that asthmatic children may be at higher risk for tooth decay. This study showed a higher prevalence, without statistical significance, of dental caries in asthmatic children, particularly in the subgroup of children with partly controlled asthma.
The dmft/DMFT index values in both groups were high. This could be explained by insufficient knowledge, as well as the lack of interest of children and their parents for their own oral health, increased consumption of sweet products, inadequate oral hygiene, and insufficient awareness of the importance of regular dental examinations. Also, the fact that patients involved in this research lived in the area with less than 0.6 ppm F in drinking water might have contributed to the high index values. Devastating fact that, in general, children in this region had higher dmft/DMFT values as shown by the results of previous studies [30], may have also contributed to the lack of difference in mentioned values between asthmatic and non-asthmatic children.

In this study, non-asthmatic children had higher salivary buffering capacity, and a larger amount of stimulated saliva compared to children with asthma, the fact that may speak in favor of influence of asthma medications on composition, pH value and amount of saliva.

Eloot et al. [23] did not observe any relationship between the severity of the asthma, the period of exposure to medication and the prevalence of caries. In contrast to that, in our study, the average DMFT and the value of component D was higher if the children that used asthma medications in the afternoon period. It appeared that poor oral hygiene and dietary habits, usage of anti-asthmatic drugs in the afternoon, as well as a decrease in the salivary flow rate and salivary pH may lead to pronounced caries development in children with asthma.

Vázquez et al. [4] showed that the presence of nocturnal asthma symptoms and usage of antiasthmatic drugs during night in pre-school children may lead to the caries development in primary dentition although relationship between caries and asthma was not found. The results of our study showed that the value of component d in primary dentition was higher in patients who consumed asthma medications prior sleeping. Difference in dental status between asthmatic and non-asthmatic Brazilian children, younger than eleven years of age, was not observed, while larger prevalence of dental caries was recorded in children with asthma older than this age. These differences were followed by a positive correlation between a number of S. mutans and the severity of asthma [31]. Having in mind a fact that caries is a multi factorial disease, other studies [32] reported that lower DMFT was found in primary and/or permanent dentition in asthmatic children than in healthy children.

**Conclusion**

Although children with asthma had a higher average dmft/DMFT values compared to children without asthma, the difference was not statistically significant. Therefore, this study did not confirm a mutual association between asthma and caries.

Further studies are necessary to clarify possible asthma impact on dental health and thus improve everyday dental practice related to preventive measures planning, as well as dental assessment and treatment of patients with asthma.

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Table 1. Mean ± SD values of saliva testing in the asthma group, non-asthma group and subgroups of children

| Saliva testing (parameters) | AG (n=68) | NAG (n=68) | GCA (n=44) | PCA (n=24) | p/q | q/q | q/q |
|-----------------------------|-----------|------------|------------|------------|-----|-----|-----|
| Hydration, RS (%±SD)        |           |            |            |            |     |     |     |
| < 30 s                      | 30.9±0.8  | 38.2±0.7   | 34.1±0.8   | 25±0.7     | *p=NS; |     |     |
| 30-60 s                     | 35.5±0.8  | 45.6±0.7   | 34.1±0.8   | 37.5±0.7   |     |     |     |
| > 60 s                      | 33.8±0.8  | 16.2±0.7   | 31.8±0.8   | 37.5±0.7   |     |     |     |
| Viscosity, RS (%±SD)        |           |            |            |            |     |     |     |
| Watery                      | 26.5±0.8  | 45.6±0.7   | 31.8±0.8   | 16.7±0.7   | *p=0.001; |     |     |
| Frothy                      | 33.8±0.8  | 39.7±0.7   | 31.8±0.8   | 37.5±0.7   |     | *p=NS; |     |
| Sticky                      | 39.7±0.8  | 1.7±0.7    | 36.4±0.8   | 45.8±0.7   |     |     |     |
| pH, RS (%±SD)               | 6.8±0.5   | 6.7±0.4    | 6.9±0.5    | 6.7±0.5    | *q=NS; |     |     |
| Quantity, SS (%±SD)         |           |            |            |            |     |     |     |
| > 5 ml                      | 29.4±0.8  | 44.1±0.6   | 29.5±0.8   | 29.2±0.8   |     |     |     |
| 3.5-5 ml                    | 26.5±0.8  | 42.6±0.6   | 31.8±0.8   | 16.7±0.8   |     | *p=0.001; |     |
| < 3.5 ml                    | 44.1±0.8  | 13.2±0.6   | 38.6±0.8   | 54.2±0.8   |     | *p=NS; |     |
| Buffering capacity, SS (%±SD) |         |            |            |            |     |     |     |
| Normal                      | 19.1±0.6  | 26.5±0.6   | 22.7±0.6   | 12.5±0.6   | *p<0.05; |     |     |
| Low                         | 52.9±0.6  | 60.3±0.6   | 54.5±0.6   | 50±0.6     |     |     |     |
| Very low                    | 27.9±0.6  | 13.2±0.6   | 22.7±0.6   | 47.5±0.6   |     |     |     |

* statistical significance between AG and NAG; † statistical significance between GCA and PCA
AG - Children with asthma; NAG - Children without asthma; GCA - Good Controlled Asthma; PCA - Partly Controlled Asthma; RS - Resting Saliva; SS- Stimulated Saliva; n – number of subjects; % - percentage of subjects; p - level of statistical significance (Mann-Whitney Test), q - level of statistical significance (Independent-Samples T Test); NS - non significant
Table 2. Mean ± SD values of dental status in primary dentition

| Characteristics | d±SD | m±SD | f±SD | dmft±SD |
|-----------------|------|------|------|---------|
| AG (n=30)       | 4.6±3.5 | 1.2±2.2 | 0.2±0.5 | 6.0±4.0 |
| NAG (n=28)      | 3.4±3.8 | 0.7±1.5 | 0.6±1.5 | 4.8±4.4 |
| GCA (n=21)      | 4.4±3.7 | 0.9±2.1 | 0.1±0.3 | 5.5±4.3 |
| PCA (n=9)       | 5.2±3.3 | 1.7±2.5 | 0.3±0.7 | 7.3±3.1 |
| p               | *NS; †NS | *NS; †NS | *NS; †NS | *NS; †NS |

* Statistical significance between AG and NAG; † statistical significance between GCA and PCA

AG - Children with asthma; NAG - Children without asthma; GCA - Good Controlled Asthma; PCA - Partly Controlled Asthma; n - number of subjects; % - percentage of subjects; p - level of statistical significance (Independent-Samples T test); dmft index - number of decayed (d), missing (m) and filled (f) primary teeth; NS - non significant
Table 3. Mean ± SD values of dental status in permanent dentition

| Characteristics | D±SD   | M±SD   | F±SD   | DMFT±SD |
|-----------------|--------|--------|--------|---------|
| AG (n=68)       | 1.5±3.1| 0.2±0.5| 1.6±2.2| 3.3±4.4 |
| NAG (n=68)      | 0.6±1.4| 0.3±1.2| 1.7±2.5| 2.5±3.3 |
| GCA (n=44)      | 1.0±2.1| 0.2±0.5| 1.4±1.9| 2.6±3.6 |
| PCA (n=24)      | 2.4±4.3| 0.3±0.6| 1.8±2.7| 4.5±5.5 |
| p               | *<0.05;*NS; †NS | *NS; †NS | *NS; †NS | *NS; †NS |

* Statistical significance between AG and NAG; † statistical significance between GCA and PCA
AG - Children with asthma; NAG - Children without asthma; GCA - Good Controlled Asthma; PCA - Partly Controlled Asthma; n - number of subjects; % - percentage of subjects; p - level of statistical significance (Independent-Samples T test); DMFT index - number of decayed (D), missing (M) and filled (F) primary teeth; NS - non significant
**Table 4.** Mean ± SD values of dental status (primary dentition) in relation to time of medication administration

| Time of taking medication | Only in the morning | Only in the afternoon | In the morning and evening | Before sleeping | One-Way ANOVA |
|---------------------------|---------------------|-----------------------|---------------------------|-----------------|---------------|
| Decayed teeth±SD          | AG (n=30)           | 3.4±3.6               | 0.0±0.0                   | 3.5±3.5         | 7.0±2.5       | p<0.05       |
|                           | GCA (n=21)          | 3.6±4.3               | 0.0±0.0                   | 3.7±3.7         | 6.3±2.8       | NS           |
|                           | PCA (n=9)           | 3.0±1.4               | 0.0±0.0                   | 3.0±3.0         | 8.0±1.8       | NS           |
| Missing teeth±SD          | AG (n=30)           | 2.4±3.2               | 0.0±0.0                   | 1.2±2.3         | 0.3±0.6       | NS           |
|                           | GCA (n=21)          | 1.2±2.6               | 0.0±0.0                   | 1.1±2.5         | 0.3±0.6       | NS           |
|                           | PCA (n=9)           | 5.5±2.1               | 0.0±0.0                   | 1.6±1.5         | 0.0±0.0       | p<0.01       |
| Filled teeth±SD           | AG (n=30)           | 0.3±0.7               | 0.0±0.0                   | 0.2±0.4         | 0.3±0.5       | NS           |
|                           | GCA (n=21)          | 0.0±0.0               | 0.0±0.0                   | 0.2±0.4         | 0.0±0.0       | NS           |
|                           | PCA (n=9)           | 0.3±0.7               | 0.0±0.0                   | 0.0±0.0         | 0.3±0.5       | NS           |
| dmft±SD                   | AG (n=30)           | 6.1±5.2               | 0.0±0.0                   | 4.9±4.1         | 7.4±2.7       | NS           |
|                           | GCA (n=21)          | 4.8±5.7               | 0.0±0.0                   | 5.0±4.3         | 6.8±3.4       | NS           |
|                           | PCA (n=9)           | 9.5±0.7               | 0.0±0.0                   | 4.6±4.2         | 8.3±1.5       | NS           |

AG - Children with asthma; GCA - Good Controlled Asthma; PCA - Partly Controlled Asthma; dmft index - number of decayed (d), missing (m) and filled (f) primary teeth; n - number of subjects; % - percentage of subjects; p - level of statistical significance (One-Way ANOVA); NS - non significant
Table 5. Mean ± SD values of dental status (permanent dentition) in relation to time of medication administration

| Time of taking medication | Only in the morning | Only in the afternoon | In the morning and evening | Before sleeping | One-Way ANOVA |
|---------------------------|---------------------|-----------------------|---------------------------|----------------|--------------|
| Decayed teeth±SD          |                     |                       |                           |                |              |
| AG (n=63)                 | 1.2±2.3             | 11.5±7.7              | 1.1±1.8                   | 1.6±3.8        | p<0.001      |
| GCA (n=40)                | 1.1±2.4             | 0.0±0.0               | 1.0±2.2                   | 0.6±0.5        | NS           |
| PCA (n=23)                | 1.5±2.2             | 11.5±7.7              | 1.1±1.3                   | 2.8±5.7        | p<0.01       |
| Missing teeth±SD          |                     |                       |                           |                |              |
| AG (n=63)                 | 0.0±0.0             | 0.5±0.7               | 0.3±0.6                   | 0.1±0.3        | NS           |
| GCA (n=40)                | 0.0±0.0             | 0.0±0.0               | 0.3±0.6                   | 0.0±0.0        | NS           |
| PCA (n=23)                | 0.0±0.0             | 0.5±0.7               | 0.3±0.6                   | 0.1±0.3        | NS           |
| Filled teeth±SD           |                     |                       |                           |                |              |
| AG (n=63)                 | 0.9±1.2             | 2.5±2.1               | 2.1±2.6                   | 3.3±5.9        | p<0.05       |
| GCA (n=40)                | 1.0±1.2             | 0.0±0.0               | 1.8±2.2                   | 0.3±0.5        | NS           |
| PCA (n=23)                | 0.5±0.7             | 2.5±2.1               | 2.6±3.2                   | 0.0±0.0        | NS           |
| DMFT ±SD                  |                     |                       |                           |                |              |
| AG (n=63)                 | 2.1±3.3             | 14.5±9.2              | 3.5±3.9                   | 2.0±4.1        | p<0.01       |
| GCA (n=40)                | 2.1±3.3             | 0.0±0.0               | 3.2±4.0                   | 1.2±0.9        | NS           |
| PCA (n=23)                | 2.0±2.8             | 14.5±9.2              | 4.0±3.7                   | 3.0±6.2        | p<0.05       |

AG - Children with asthma; GCA - Good Controlled Asthma; PCA - Partly Controlled Asthma; DMFT index - number of decayed (D), missing (M) and filled (F) permanent teeth; n - number of subjects; % - percentage of subjects; p - level of statistical significance (One-Way ANOVA); NS - non significant

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