Allergol Immunopathol (Madr). 2012;40(4):220–224

Allergologia et immunopathologia

www.elsevier.es/ai

ORIGINAL ARTICLE

Assessing caries, dental plaque and salivary flow in asthmatic adolescents using inhaled corticosteroids

N.C. Santos[a,b], S. Jamelli[a], L. Costa[c], C. Baracho Filho[a], D. Medeiros[a], J.A. Rizzo[a], E. Sarinho[a,*]

[a] *Federal University of Pernambuco, Recife, Brazil*
[b] *University of Feira de Santana, Bahia, Brazil*
[c] *Faculty of Sciences and Technology in Salvador, Bahia, Brazil*

Received 19 December 2010; accepted 6 April 2011
Available online 8 September 2011

KEYWORDS
Asthma;
Inhaled corticosteroids;
Caries;
Dental plaque;
Adolescents

Abstract
Background: A number of studies have reported that inhaled corticosteroids may cause a greater incidence of caries, reduced salivary flow, changes in saliva composition and an increased frequency of dental plaque, probably through alterations in the oral microbiota. The objective was to compare the frequency of caries, dental plaque and non-stimulated salivary flow rate among asthmatic adolescents using inhaled corticosteroids and non-asthmatic adolescents, as well as the salivary biochemical parameters (pH and leucocytes) in both groups.
Methods: This research has a descriptive cross-sectional design to compare dental health of 40 asthmatics on inhaled corticosteroids and 40 non-asthmatic adolescents (median age 13 years).
Results: The findings were a higher number of tooth surfaces affected by dental caries (median 4 versus 1.5), and more dental plaques (median 70.5 versus 60.7) among asthmatic adolescents. They also had a significantly higher frequency of salivary leucocytes. The non-stimulated salivary flow was similar in both groups.
Conclusions: The results suggest an association between the use of inhaled corticosteroids and an increased risk of dental caries and bacterial plaque, which calls for special attention of these patients by doctors and dental health professionals.

Introduction

Inhaled corticosteroids are the main recommended drugs for the treatment of chronic asthma, due to their anti-inflammatory effects.[1–4] These drugs, although extremely effective, can be associated with local or systemic adverse side effects.[2,5,6] While their systemic effects have been widely studied,[5] few researches have been conducted to assess the adverse local effects on oral-dental health,[3,5] and, while generally viewed as minor side effects, they may still be clinically important, affecting patient's quality of life and interfering with treatment adherence.[5]

The use of large volume spacers reduces the local and systemic adverse effects of inhaled corticosteroids.[7]

* Corresponding author.
E-mail address: emanuel.sarinho@gmail.com (E. Sarinho).

0301-0546/$ - see front matter © 2010 SEICAP. Published by Elsevier España, S.L. All rights reserved.
doi:10.1016/j.aller.2011.04.005

However, even with the use of these devices it is estimated that a large proportion of the drug is retained in the oral cavity and pharynx[8] and can lead to well-known local adverse effects, such as dysphonia, candidiasis, pharyngitis and cough.[2–5,9,10] Several factors influence the amount of corticosteroid retained in the mouth and oropharynx, such as the type of corticosteroid, the inhaler, the propellant, the use of a spacer and inhaler use technique.[5]

According to a meta-analysis,[6] ciclesonide, for example, produces fewer adverse oral effects when compared to oral budesonide and beclomethasone. The incidences of these adverse effects are also variable due to different diagnostic criteria and methodologies used throughout the studies.[5]

It was found that asthma on its own as well as its pharmacotherapy (inhaled corticosteroids included), may lead to a reduced salivary flow, changes in saliva composition, including pH alteration, and an increased frequency of dental plaque.[11–15]

The aim of this study was to compare the frequency of caries, dental plaque and non-stimulated salivary flow rate among asthmatic adolescents using inhaled corticosteroids, and non-asthmatic adolescent non-users of this drug, as well as the salivary pH and leucocytes.

Patients and methods

The present research has a descriptive cross-sectional design. This study was carried out at the postgraduate department of Child and Adolescent Health at the Federal University of Pernambuco, Recife, Brazil and was fully approved by the Ethics Committee of the Federal University of Pernambuco, Brazil. Forty asthmatic and 40 non-asthmatic adolescents of both sexes, with an age range from 10 to 18 years (median – 14 years) were recruited. Asthma was diagnosed by an allergy specialist, according to the GINA criteria, and all patients had mild or moderate persistent asthma.[16]

The inclusion criteria for the asthmatics were the use of inhaled corticosteroids for at least three months and relief inhaled beta-2 agonists for less than once a week. Asthmatics using any inhaled drug other than corticosteroids and with diagnosed oral candidiasis, systemic diseases, including concomitant persistent allergic rhinitis were excluded. All asthmatic children used steroid by dry powder inhaler. Age- and sex-matched healthy non-asthmatics were recruited as the comparative group from the same socioeconomic stratum and they denied any inhaled medication use, confirmed by their parents.

For the sample size calculation we considered the work of McDerra et al.[17] who found the occurrence of caries risk ratio of 2.78 between exposed and non-exposed children to inhaled corticosteroids. To detect a difference of this magnitude, with alpha and beta errors respectively of 5% and 20%, it was estimated that 39 subjects were needed per group. The study was conducted with 40 adolescents in the case group and 40 in the comparison group.

The sample was also characterised with regard to age, gender, *per capita* income and mother's schooling. Patients were recruited from the Allergy Pediatric Clinic of the Hospital das Clínicas of the Federal University of Pernambuco, Recife, Brazil, from September to December 2006. Non-asthmatics were recruited from the neighbouring community. Oral examinations and data recording were performed by the same researcher (Santos, NCN a dentist). The presence of dental caries was assessed by the number of decayed, missing and filled surfaces (DMFS) and decayed, missing and filled teeth (DMFT) according to WHO.[18] On this same occasion, visible plaques were also assessed through the Visible Plaque Index (VPI) obtained as a percentage of dental surfaces with visible plaque from the total number of examined surfaces.[19] Visual inspection was complemented by the use of a probe to measure pocket depth.

In order to measure the non-stimulated salivary flow, adolescents were seated in an upright posture, with the head tilted forward, as motionless as possible, allowing the saliva to drain passively into a disposable plastic cup for fifteen minutes. A resting flow rate of less than 0.1 ml/min is considered abnormal and this rate was adopted as the cut-off point.[20]

The assessment of pH and leucocytes in saliva was performed using reagent paper strips with methyl-red and bromothymol-blue for pH and an esterase detection strip for leucocyte.

Descriptive statistics was used to show frequencies of occurrence, measures of central tendency and dispersion. Comparative analyses were performed by the non-parametric Mann–Whitney Test and Chi-square Test and were considered significant for a p value <0.05.

Results

The study included 40 asthmatic adolescents using inhaled corticosteroids (case group) and 40 non-asthmatic adolescents, non-users of any type of drug (comparison group). The age ranged from 10 to 18 years (median: 13 years), 38 (55%) were male, 36 (40%) mothers had only primary education and 33 (42.5%) adolescents came from families with income less than US$ 100.00 per capita/month. No differences were found between groups regarding these baseline data. In relation to the frequency of oral hygiene, the majority (90%) of those studied reported that they usually brushed their teeth three or more times per day although only 36 patients (40%) had received any kind of instructions regarding oral hygiene directly from a dentist.

The saliva data of 13 of the 80 adolescents were not assessed as some refused to perform the examination, while others could not provide enough saliva for the sample collection.

In the assessment for dental caries (Table 1), the median number of DMFT in asthmatic adolescents using inhaled steroids was 3.0 (interquartile 25–75%, range: 1.5–5.0) and 1.5 (interquartile 25–75%, range: 0.0–3.5) in non-asthmatics. It was also observed that the asthmatic adolescents presented more tooth surfaces affected by cavity disease (MDFS) in relation to the control group ($p = 0.007$).

Table 2 illustrates the parameters of oral hygiene by assessing the presence of visible bacterial plaque. The median of the Visible Plaque Index in the asthmatic group was 70.5% and when compared to the non-asthmatic comparison group, this difference was statistically significant ($p = 0.03$).