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TO STUDY THE ORAL MANIFESTATIONS IN ASTHMATIC PATIENTS USING CORTICOSTEROID INHALERS

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ABSTRACT

Background: Asthma is a chronic inflammatory disorder of the airways characterized by recurrent episodes of wheezing, breathlessness, chest tightness and coughing. Corticosteroid inhalers are the main – stay therapeutic agents for the management of bronchial asthma. **Aims & Objectives:** The aims and objectives of this study are to study the oral health status in patients using inhalation corticosteroid therapy and to assess the oral candidal count in these patients. **Material and methods:** This study will comprise of 30 asthmatic patients using inhaled corticosteroid therapy as study group and 30 outpatient healthy volunteers as control group. A detailed oral examination will be carried out and findings will be recorded on a specially prepared proforma. The samples will be collected using oral rinse technique and inoculated on Sabouraud's dextrose agar medium for isolation of candida. Candidal colony count/ml will be determined and data will be statistically analyzed. **Results:** An increase in mean DMFT index and Russel's Periodontal index was found in asthmatic group as compared to controls. A statistically significant increase in CFU / ml of saliva of Candida albicans was found in study group as compared to controls. **Conclusion:** Assessment of local adverse effects of inhaled corticosteroids could provide a greater understanding of the extent and severity of these effects and could aid in determining the risk-benefit ratio of their use in clinical practice.

KEYWORDS: Asthma; Corticosteroids; Inhalation therapy; Oral cavity.

1. INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways characterized by recurrent episodes of wheezing, breathlessness, chest tightness and coughing.[1] Bronchial hyper responsiveness and variable airflow obstruction in asthma are a consequence of the activity of numerous mediators and inflammatory cells that can cause persistent airway inflammation and remodeling of the airways through fibrosis and smooth muscle cell proliferation.[2]

The prevalence of asthma is increasing worldwide. At least 300 million people currently suffer from asthma; it accounts for approximately one in every 250 deaths worldwide; annually, approximately 15 million disability – adjusted life years are lost because of the disease.[3]

The objectives of therapeutic interventions for asthma include prevention and control of symptoms, reduction in the frequency and severity of asthma exacerbations and reversal of airflow obstruction. Pharmacologic agents provide only empirical or symptomatic relief with proven adverse effects. Though there have been number of medications for quick relief of symptoms including short – acting bronchodilators, anticholinergic drugs; the efficacy of systemic corticosteroids has proved to be highest.

Most asthma drugs are inhaled using various forms of inhalers or nebulizers. Inhalation has long been established as an effective way to deliver drug to the lungs, as inhaled medicines are delivered directly to the airways and allow a smaller dose to be administered leading to a quicker onset of action and fewer side – effects. A range of devices that are used to deliver inhaled drugs include pressurized metered – dose inhalers (pMDIs), spacers, dry – powder inhalers (DPIs) and nebulisers.[4]

Corticosteroid inhalers are the main – stay therapeutic agents in the management of bronchial asthma. High dosage and long duration of inhaled corticosteroid therapy has been closely linked with several adverse effects on oral tissues.[5] Potential systemic side effects of inhaled corticosteroid therapy include suppression of the hypothalamic – pituitary – adrenal axis, osteoporosis,

reduced growth velocity in children, skin thinning, cataracts and glaucoma. Local side effects commonly associated with inhaled corticosteroids include oropharyngeal candidiasis, xerostomia, dental caries, ulceration, gingivitis, periodontitis, taste changes, dysphonia, reflex cough and pharyngitis. Although not generally as serious as systemic side effects, these local side effects can be clinically significant, affect patient's quality of life and compliance with treatment and mask symptoms of more serious disease.[6]

The incidence of oropharyngeal candidiasis reported in the literature is highly variable and a high incidence of Candida has been reported in users of inhaled corticosteroids regardless of the dose used. Hence, this study was planned to evaluate the candidal count in oral cavity of asthmatic patients using inhaled corticosteroids and also to assess their related dental status.

2. AIMS AND OBJECTIVES

1) To study the oral health status in patients using inhalation corticosteroid therapy.
2) To assess the oral candidal count in patients on inhalation corticosteroid therapy.
3) To compare the oral health status and oral candidal count in patients on inhalation corticosteroid therapy with healthy controls.

3. MATERIALS AND METHODS

3.1 Source of data

This study was conducted in the Department of Oral Medicine & Radiology, Government Dental College and Research Institute, Bangalore during the period from September 2016 to November 2016. The study comprised of 60 patients who were selected on the basis of set inclusion and exclusion criteria. The study was conducted in full accordance with ethical principles and was reviewed and approved by an ethical board of the institution.

3.2 Method of collection of data

The present study comprised of 60 patients who were divided into two groups:

a) Group I (Study group) – 30 patients diagnosed with moderate or severe persistent asthma who have been using inhaled corticosteroids regularly for atleast six months

b) Group II (Control group) – 30 age and sex matched controls

3.3 Inclusion criteria

a) Patients above 18 years of age.
b) Patients diagnosed with moderate or severe persistent asthma.
c) Patients who had been using inhaled corticosteroids regularly for atleast six months.

3.4 Exclusion criteria

a) Patients who used oral, parenteral, ocular, or topical corticosteroids in the last three months prior to the beginning of the study.
b) Patients with diabetes mellitus, chronic pulmonary disease, congestive heart failure, chronic renal failure, severe bronchiectasis, history of tuberculosis, history of lung operation.
c) Patients taking systemic antibiotics within the last 6 months.
d) Patients with habit of tobacco chewing and smoking.

3.5 Materials

- Dental chair with adequate artificial illumination facility.
- A pair of disposable gloves
- Disposable mouth mask.
- Sterilized stainless steel Kidney tray
- Sterilized cotton holder
- Plane mouth mirrors
- Straight probes
- Tweezers
- 10 ml of 0.9% normal saline
- Sterilized containers for collection of oral rinse
- Sabouraud's Dextrose Agar (SDA) plates
- Standard calibrated loop with an internal diameter of 4 mm
- Incubator

The patients who satisfied the above inclusion and exclusion criteria and were willing to participate were selected for the study. All the patients were informed about the details of the study and a written informed consent was obtained in their local language. A detailed case history was recorded on a specially prepared case history proforma and thorough intraoral examination was carried out. Under a well illuminated light source, a thorough intraoral examination was carried out. The findings were recorded and oral health status assessment was done using DMFT index by Klein and Palmer and Russel's Periodontal index. Following this, the subjects were subjected to sample collection to assess the oral microflora with special reference to Candida. Subjects were asked to gargle 0.9% normal saline for 1 min and then the contents were collected in a sterile container and transported to the lab within 30 min. The washings were inoculated on Sabouraud's dextrose agar medium for isolation of candida using standard calibrated loop with an internal diameter of 4 mm. The inoculated plates were incubated for 24–48 h at 37^0C. Colony forming units / ml were determined and the obtained data was statistically analyzed.

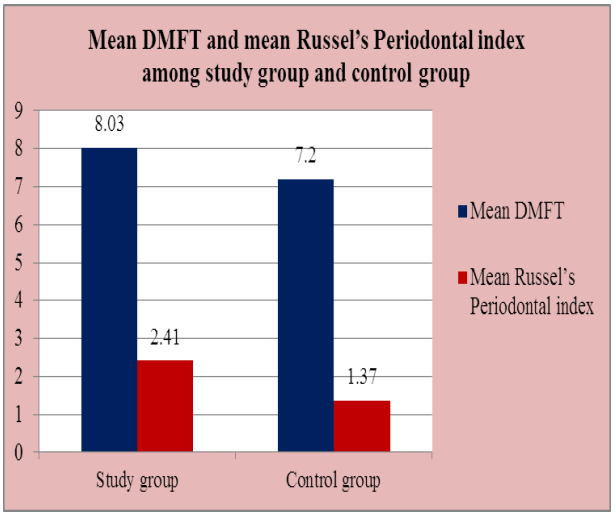
3.6 Statistical methods

Proportions were compared using Chi square test and Student't' test was used to determine the statistically significant difference between the groups. A statistically significant difference was considered to be present when 'p' values were < 0.05.

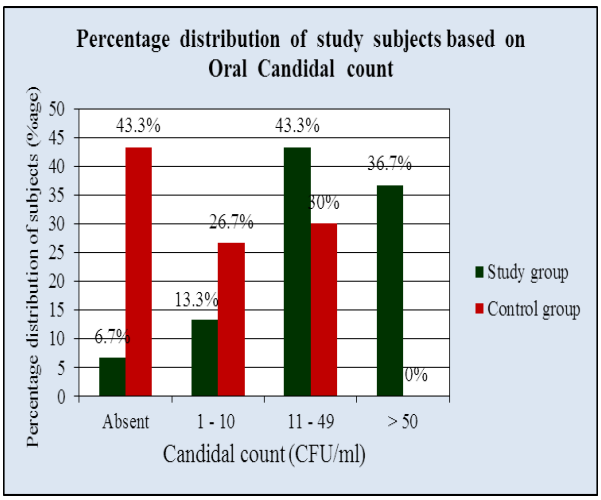
4. RESULTS

In the present study, the mean age in study group was 42.53 ± 7.47 years whereas it was 40.02 ± 7.87 years in control group and the difference was found to be statistically insignificant. The mean DMFT index in study group was 8.03 ± 6.08 whereas it was 7.20 ± 4.38 in control group and the difference was found to be statistically insignificant with a p value of 0.545. However, a statistically significant increase in mean Russel's Periodontal index was found in study group (2.41 ± 1.28) as compared to controls (1.37 ± 1.22) with a p value of 0.002. (Graph 1).

On comparison of Candidal count in study group and control group, a statistically significant increase in CFU / ml of saliva was found in study group as compared to controls with a p value of 0.000. Majority of subjects using inhaled corticosteroids (43.3%) had candidal count in range of 11 – 49 CFU / ml of saliva whereas candidal colonies were absent in maximum number of subjects in control group (43.3%). (Graph 2).



Graph 1: Showing mean DMFT and mean Russel's Periodontal index among study group and control group.



Graph 2: Showing percentage distribution of study subjects based on Oral Candidal count.

5. DISCUSSION

Asthma is a respiratory disorder associated with high incidence, prevalence and mortality rate. Management of asthma has two main objectives: to control and to reduce the airway inflammation and reopen the airways.[7] Glucocorticosteroids are the most potent antiinflammatory agents currently available for the treatment of asthma, but given systemically have many serious side effects.[8] They are recommended in national and international guidelines as first – line therapy at low doses for mild persistent asthma and as the preferred therapy at medium doses or in combination with long-acting β2-agonists for moderate persistent asthma.[9]

Inhaled corticosteroids are believed to exert their effects after translocation into the nucleus of the respiratory epithelial cell and other cells in the airway, via the glucocorticoid receptors.[10] Their clinical benefits include decreased asthma symptoms, fewer exacerbations, fewer hospitalizations, decreased airway hyperresponsiveness, improved pulmonary function, decreased exhaled nitric oxide and fewer asthma-related deaths.

Systemic adverse effects of Inhaled corticosteroids are dose – related. The more the drug deposited in the lung, the greater the systemic absorption and the greater are the systemic adverse effects. However, the most common oropharyngeal side effects associated with Inhaled corticosteroids are oropharyngeal candidiasis, dysphonia (hoarseness), pharyngitis (sore throat) and reflex cough. Local side effects that generally occur at low incidence include perioral dermatitis and tongue hypertrophy. The sensation of thirst after delivery of steroids is a more common effect but is likely secondary to pharyngitis and oropharyngeal candidiasis.[6]

In the present study, the mean DMFT index in study group was 8.03 ± 6.08 whereas it was 7.20 ± 4.38 in control group. This is in accordance with the study conducted by Karova and Christoff, 2012 who reported high DMFT-index for asthmatic group (18.07) as compared to controls (13.00). The obtained results can be explained with the decreased quantity and protective functions of saliva as a result of the prescribed treatment.[11] Decreased salivary flow rate causes decrease in buffering capacity of saliva and the benefit of saliva in elimination of the fermented food from the oral environment cannot be gained. Besides indirect side effects of asthma medications, fermentable carbohydrates present in asthma medications may also increase the risk for dental caries. Sugars like lactose monohydrate are added within the composition of some inhalers to promote the tolerance of the patient towards the taste of the medication. Frequent consumption of cariogenic drinks to remove the taste left by asthma medications in the mouth also increases the risk for caries. Ignorance of oral hygiene by patients due to their medical conditions and indulgent attitude of parents

towards their children's sugar intake are among the factors that further promote dental caries.[12]

A statistically significant increase in mean Russel's Periodontal index was found in study group (2.41 ± 1.28) as compared to controls (1.37 ± 1.22) with a p value of 0.002. The association between asthma and periodontal disease can be both attributed to the side effects of asthma medications and explained by the pathological activation of the immune and inflammatory mechanisms triggered by asthma. Hyyppa indicated that gingivitis in asthmatic children develops due to an altered immune response as well as dehydration of the alveolar mucosa related with mouth breathing. Hanania et al. in their study showed that regular use of conventional doses of ICS by patients with asthma can suppress the adrenal function and decrease bone density in a dose-related fashion. Systemic bone loss caused by these drugs, especially when high doses are used for a long time, may have an impact on the onset and progression of periodontal disease.[13]

A statistically significant increase in oral Candidal count i.e. CFU / ml of saliva was found in asthmatics as compared to controls with a p value of 0.000. Oropharyngeal candidiasis is commonly associated with the use of inhaled corticosteroids. Approximately 10-20% of the inhaled corticosteroid reaches the lungs and the rest is deposited on the oropharynx.[13] This occurs in terms of regular use of high-dose inhaled corticosteroids. Immunosuppressive potency of corticosteroids also plays a role in progression of candidiasis. Repeated contact of steroid inhalant on the oral mucosa can result in development of acute pseudomembranous candidiasis (oral thrush) because of fungal overgrowth in an area of localized immunosuppression.[14]

6. CONCLUSION

Treatment with inhaled corticosteroids increases risk for dental health in asthmatics. Assessment of local adverse effects of ICSs could provide a greater understanding of the extent and severity of these effects and could aid in determining the risk-benefit ratio of the use of ICSs in clinical practice. Although ICSs are highly effective in the treatment of asthma, their rational use, on the basis of a step-down therapeutic approach, must be ensured in order to reach the lowest maintenance dose consistent with the best level of disease control.

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