

Oral Health in Asthmatics: A Review

Tahir F^{*1} and Hafeez F²

¹Department of Prosthodontics, Institute of Dentistry, CMH Lahore Medical College, Lahore, Pakistan

²Institute of Dentistry, CMH Lahore Medical College, Pakistan

***Corresponding author:** Tahir F, Demonstrator, Department of Prosthodontics, Institute of Dentistry, CMH Lahore Medical College, Lahore, Pakistan, Tel: 03224413200, E-mail: fizza-t@hotmail.com

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Abstract

Asthma is a chronic inflammation of airway tract characterized by airway obstruction and hyper responsiveness presenting with symptoms of wheezing, coughing, chest tightness and dyspnoea. It is a serious health issue with the worldwide occurrence. Anti-asthmatic drugs have unfavorable effects on oral health causing dental caries, xerostomia, dental erosion, periodontal disease and orofacial deformities. This review concludes that asthma drastically affects oral health but preventive measures can help to improve quality of life.

Keywords: Asthma; Anti-Asthmatic Drugs; Dental Caries; Xerostomia

Introduction

Oral health is an integral part of an overall health of a patient [1]. Oral health is adversely affected by various medical problems one of which is asthma affecting the quality of life. Asthma is a chronic inflammation of airway tract characterized by airway obstruction and hyperresponsiveness presenting with symptoms of wheezing, coughing, chest tightness and dyspnoea [2]. It is a serious health issue with the worldwide occurrence [3]. According to global asthma network report published in 2014 approximately 334 million people are suffering from this disease and burden is increasing substantially [4]. Its treatment includes corticosteroids, anticholinergics, and bronchodilators which are taken orally or through inhalers [5,6]. Anti-asthmatic drugs have unfavorable effects on oral health as listed in Table 1 [5-7].

Oral health problems in asthmatic patients
Dental caries
Oral candidiasis
Dental erosion
Periodontal disease
Xerostomia
Halitosis
Altered taste
Orofacial anomalies

Table 1: Oral health problems in asthmatic patients

Materials and Methods

Two review authors separately scanned two electronic databases (PubMed and Google scholar). Literature was thoroughly read to evaluate oral problems encountered in asthmatic patients. Screening was done using key terms: asthma, oral health in asthma, anti-asthmatic medications and oral health. Inclusion and exclusion criteria were discussed. Review included articles that were published in English language. Retrospective and prospective clinical trials, observational studies and case reports were included. In-vitro studies, Animal studies and Publications with poor methodological quality were excluded.

Higher caries incidence

Dental caries is defined as an irreversible infectious disease of multi-factorial etiology causing demineralization of inorganic and destruction of an organic portion of tooth structure [8]. Several studies have shown an increased incidence of dental caries in

asthmatic patients [9](Figure 1). This increased risk is attributed to:

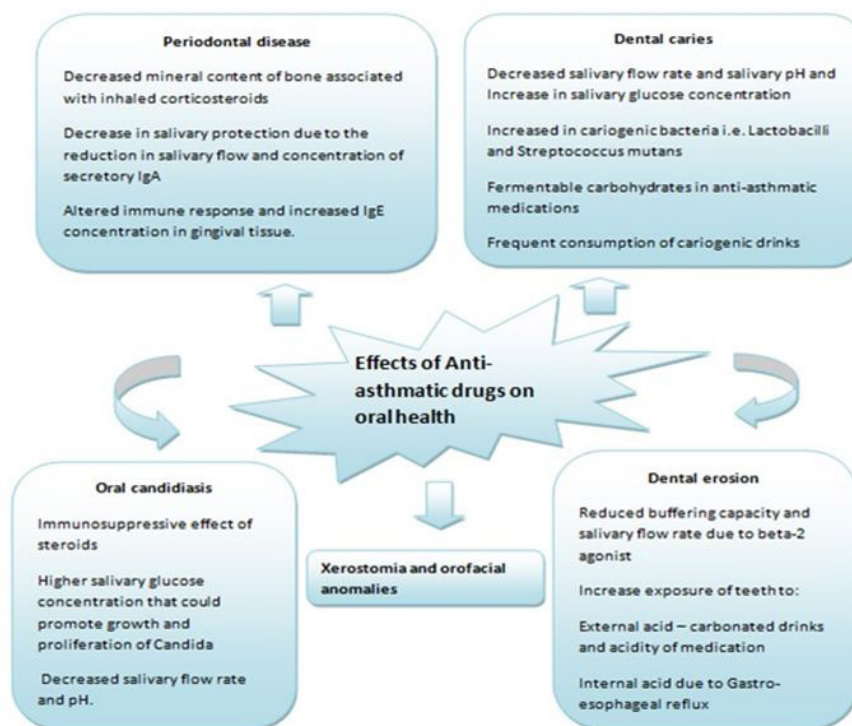


Figure 1: Summary of effects of Anti-asthmatic medications on oral health

- Low salivary flow rate
- Low salivary ph (reduced buffering capacity)
- Increased consumption of sweets and carbonating drinks
- Amplified desiccating effect due to mouth breathing

Shashikiran *et al.* and Milano M *et al.* reported that patients on anti-asthmatic medications have increased the incidence of dental caries [6,10].

Botelho *et al.* concluded that asthma is a significant risk factor for caries due to increased salivary levels of Streptococcus mutans [11]. Lactobacillus and Streptococcus mutans, two prominent cariogenic bacteria are reported to be high in asthmatic patients as compared to non-asthmatic due to reduced salivary flow rate [12].

Some studies have reported that fermentable carbohydrates (lactose monohydrate) are added in antiasthmatic drugs also contribute to increased prevalence of caries in asthmatic patients. These carbohydrates are added to enhance the flavor of medicine [13]. Taste of inhaled medications and the desiccating effect of mouth breathing along with low salivary rate are compensated with increased consumption of sweets between meals which plays synergistic effect in caries incidence [9,12].

Xerostomia

Xerostomia is defined as a sensation of dry mouth [14]. It is a common complaint in asthmatic patients due to a decrease in saliva production, mouth breathing and use of the inhaler [15]. Saliva plays a vital role in maintaining oral health as listed in Table 2. In asthmatic patients using Beta-2 agonist whole saliva is reduced by 26% and parotid saliva by 36% resulting in dryness of oral cavity and accompanying complications including dental caries, oral ulceration, halitosis, altered taste sensation, dysphonia, dysphagia and poor retention of dentures [16].

Role of saliva in oral health
Mechanical flushing of the oral cavity- less plaque accumulation
Buffering effect on acids produced by cariogenic organisms
Anti-bacterial activity
Lubrication of oral mucosa
Reduced enamel solubility and enamel remineralization

Table 2: Role of saliva in oral health

The relationship between asthma and xerostomia is well documented. Alcázar Navarrete *et al.* reported that there is a moderately strong relationship between the degree of asthma control and the severity of xerostomia [17].

Candidiasis

Inhaled corticosteroids are more commonly associated with oropharyngeal candidiasis [18]. Only 10 to 20% of the dose from an inhaler actually reaches the lungs, while the rest remains in the oropharynx, which can lead to most side effects like candidiasis. Candidiasis develops mainly due to immunosuppressive and anti-inflammatory effects of corticosteroids [19]. Decreased IgA can also contribute to the development of oral candidiasis. Also, Lactose is the main ingredient in the composition of inhaler [20]. This higher glucose concentration also promotes growth, proliferation, and adhesion of *Candida* to the oral mucosal cells [21]. Decreased salivary flow in patients treated with Beta- 2 agonists also contributes to the development of candidiasis [22].

Periodontal disease

Asthma is also a causative for periodontal disease due to pathological activation of the immune and inflammatory process. The concentration of IgE in gingival tissue is found to be elevated in asthmatic patients, which can also cause periodontal destruction [23]. Regular use of conventional doses of inhaled corticosteroids can suppress the adrenal function and decrease bone density. Higher doses of these drugs can cause systemic bone loss [24]. Topically potent inhaled corticosteroids involve a decrease in bone mineral density, especially in the mandible [24,25]. IgA, a first line defense for mucosa has been reported to decrease in asthmatic patients resulting in periodontal disease [25].

Many studies reported more incidence of gingivitis in asthmatic patients due to altered immune response; reduce salivary flow and the dehydration of alveolar mucosa due to mouth breathing [26]. Yaghobee *et al.* and Mehta *et al.* reported higher plaque index in asthmatics as compared to healthy individuals [7,27].

Dental erosion

Many studies have reported that there is a strong association between dental erosion and asthma due to change in saliva composition, decrease in saliva secretion and buffering effect of saliva [28,29]. With the introduction of dry powder inhalers, tooth erosion is more frequently seen in asthmatic patients as powder versions are usually acidic in nature with a pH below 5.5 and enamel starts dissolving at this pH. This powder can erode tooth enamel. Intake of carbonated and acidic drinks to compensate for oral dehydration and bad taste of inhalers also contribute to dental erosion [30].

Some studies have reported a high incidence of gastroesophageal reflux (50-60%) in asthmatic patients due to relaxation of smooth muscle of lower esophageal sphincter by the Beta-2 agonist [31,32]. This acid regurgitation causes dental erosion on lingual surfaces of teeth.

Abnormalities in orofacial structures

Asthmatic patients have increased tendency to switch to mouth breathing due to chronic nasal obstruction [33,35]. Mouth breathing is defined as a condition in which mouth is consistently used for breathing rather than the nose. To facilitate breathing patient places tongue in a lower position, half-opened lips, lowered position of the mandible, and reduced orofacial muscle tonicity [34-36].

Tanaka *et al.* and Faria *et al.* reported that asthma is strongly associated with malocclusion prevalence [35,37]. The severity of malocclusion is associated with age of onset of asthma. Early onset of asthma 96 during the first year of life is associated with more severe malocclusion [37].

Precautionary measures

As the incidence of asthma is increasing the entire health care providers must be aware of precautionary measures to maintain the quality of oral health in asthmatic patients. All patients should be counseled about the high risk of oral health problems. Medical physicians should encourage their asthmatic patients for regular dental check-ups. To prevent the incidence of dental caries fluoridated mouth rinses should be used after each inhaler therapy, pits and fissure sealant should be given in children. Patients should be advised to use xylitol gum and do not brush teeth immediately after using powder inhalers as it may damage weaken enamel [38]. Oral candidiasis can be prevented by using anti-microbial mouthwash and spacer devices with inhalers [23,39]. Spacer device which can be attached to the inhaler can reduce the local effect of steroids in causing oral candidiasis by minimizing the oropharyngeal deposition of the drug and maximizing the lung deposition [21]. Topical antifungal such as nystatin is also effective in the treatment of candidiasis [24]. Salivary substitutes must be prescribed to prevent xerostomia. Good oral hygiene and regular periodontal checkups can help in preventing bone loss. If the patient has a risk of osteoporosis, bone mineral density should be checked regularly [22].

Recommendations for dental treatment of asthmatic patients

Before Treatment

- For asthmatic patients, dental appointments must be scheduled at late morning or afternoon as patients are more prone to asthmatic attack early in the morning.
- The severity of the asthmatic condition must be assessed before treatment.
- Patients on corticosteroids must be given antibiotic prophylaxis. If the patient has been taking corticosteroids for a long time, prophylaxis for adrenal insufficiency must be given after consultation with a general physician.
- Have supplemental oxygen and bronchodilators available in case of an acute asthmatic exacerbation.

During Treatment

- Follow Anxiety reduction protocol.
- Avoid using barbiturates, nitrous oxide and rubber dam.
- Avoid eliciting a coughing reflex.
- Vasoconstrictors should be used judiciously.
- Drugs and materials that can exacerbate asthma should be avoided during dental treatment as listed in Table: 3 [40].

DRUGS AND MATERIALS TO BE AVOIDED IN ASTHMATIC PATIENTS DURING DENTAL TREATMENT
Aspirin
NSAIDS
Macrolide antibiotics
Opiates
Local anesthetics containing sulfite preservatives
Dentifrices
Tooth enamel dust
Methyl-methacrylate
Cotton rolls
Rubber dam

Table 3: Materials to be avoided in asthmatic patients during dental treatment

Conclusion

This review concludes that asthma drastically affects oral health but preventive measures can help to improve quality of life. Thus, regular dental check-up must be enforced in all asthmatic patients. All dental professionals must be aware of oral health problems and strategies to manage asthma patients in the dental setting.

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