

ORAL HEALTH STATUS OF ASTHMATIC CHILDREN: A REVIEW

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Abstract: Asthma is a chronic inflammatory condition that causes the airways to constrict, making breathing difficult. It is characterized by the obstruction of airflow which is variable over a short period of time. This condition is reversible, either spontaneously or can be controlled with the help of drugs. Asthma medication comprises bronchodilators, corticosteroids and anticholinergic drugs. Most of these drugs are inhaled using various forms of inhalers or nebulizers. The effect of these drugs on oral health is the subject of debate among dental practitioners. Patients taking asthma medication may be at risk of dental caries, dental erosion, periodontal diseases and oral candidiasis. Hence, patients with bronchial asthma on medication should receive special prophylactic attention. This article reviews the oral health status of asthmatic children, and suggests various measures to counter possible oral health problems related to asthma.

Keywords: Asthma, beta-2 agonist, dental caries, inhaled corticosteroids, periodontal disease.

INTRODUCTION

Asthma has become one of the most common chronic diseases in industrialized countries and its prevalence is increasing throughout the world.^[1] Asthma affects all age groups and is often persistent, accounting for a large proportion of health care spending and loss of work.^[2-5] Asthma is characterized by chronic airway inflammation and increased airway hyper-responsiveness, leading to symptoms such as wheezing, coughing, chest tightness and dyspnoea. It is characterized by the obstruction of airflow which varies over a short period of time and is reversible, either spontaneously or with treatment.^[6]

Asthma is a growing public health problem affecting over 300 million people world-wide. It is estimated that an additional 100 million may be diagnosed with asthma by 2025.^[7] In India, about 15 to 20 million people are suffering from bronchial asthma.^[8]

Saliva plays a major role in the health of the oral cavity and any changes in the amount or quality of saliva may alter the oral health status.^[9,10] Saliva contains several defence systems aiming to protect dental enamel and oral

fungal and viral species present in human saliva have been extensively studied in vitro.^[11,12] However, little is known of their possible significance in vivo, and in particular with respect to systemic medication or systemic disease.^[13-15] Asthmatic children have an altered immune response and a high tendency to mouth breathing especially during an episode of rhinitis or an attack thus predisposing them to serious oral health problems.

Relatively few studies exist on the oral health of asthmatic patients. Findings, indicating an increased risk of oral diseases in asthmatic patients are mainly obtained from studies on children and adolescents. According to most published reports, young asthmatic patients suffer more from caries and/or periodontal diseases than non-asthmatic subjects.^[16-22] These findings were mainly obtained from small-scale studies and there are two recently published studies that found no association between dental caries and childhood asthma^[23], or association over time between asthma and caries increment.^[24] In their reports **Ryberg et al.(1987)**^[25] linked the increased incidence of dental caries to the regular use of inhaled β_2 -agonists used in the treatment

of asthma. However, during the 1990's the treatment modalities of asthma has changed dramatically. **Hahtela *et al.* (1992,1994)**^[26,27] have shown that the regular use of inhaled β_2 -agonists is not efficient and the early introduction of inhaled steroids is an internationally approved approach to the treatment of asthma.^[28,29] **Ryberg *et al.* (1987)** have also reported differences in salivary flow rate and saliva composition between asthmatic and non-asthmatic children.^[30,31]

The two most common oral diseases dental caries and periodontal disease are preventable to some extent and early recognition of populations at high risk may help to focus dental health care resources more effectively on the prevention of these diseases. Based on clinical experience, asthmatic patients are also sometimes worried about the possible side effects of inhaled anti-asthma medications on their mouths. Hence the present review has been focussed on "oral health status of Asthmatic children".

DISCUSSION

Human body is affected by many systemic diseases; of which asthma is one of the serious health problems affecting more than 100 million people worldwide. Pediatric asthma is a serious global health problem. It accounts for a large number of lost school days. Furthermore, asthma can considerably impair the child's social interaction and academic achievement. It can affect child's ability to enjoy and even affect sleep patterns and their academic and career success because of poor school attendance associated with asthma attacks. Childhood asthma can even lead to severe psychosocial disturbances in the family and also places strain on healthcare resources as a result of doctor and hospital visits and the cost of treatment. Most cases of asthma begin in childhood with peak prevalence the ages of 6 and 11 years.^[2]

(a) Asthma in Gender

Lower proportion of female subjects (39%) and considerable higher proportion of male subjects (60.9%) was studied by **Jayakumar *et al.* (2011)**.^[65] Some studies have noted a higher male: female ratio of 1.8:1.^[15,19] A study conducted by **Kankaala *et al.* (1998)**^[22] where he observed that the male predominance may be related to a greater degree of bronchial lability in males. In contrast another study conducted by **Kirstila *et al.* (1994)**^[15] where she observed that a female preponderance was found, which was attributed to the fact that living in ill-ventilated houses, use of cow-dung cakes and agriculture waste as fuel for cooking and girls always helping the mothers to cook in the kitchen lead to airway inflammation and asthma.

(b) Asthma in Age Group

In a study by **Jayakumar *et al.* (2011)**^[65] majority of asthmatic children belong to 4-10 years (55.8%) followed by 11-16 years (44.1%). Similar study was done by **Sowmya *et al.* (2007)**^[45] in Mysore city in

which a total of 63 asthmatic children of age group of 6-12 years were examined, out of which 63 asthmatic children were males (46%) and females (57.1%).

(c) Oral Hygiene Practices in Asthmatic Children

Practice of toothbrush and tooth paste by higher asthmatic children (87.7%) to clean their teeth and the remaining (12.3%) used finger to clean their teeth was reported by **Jayakumar *et al.* (2011)**^[65] in Bangalore city, India with the frequency of cleaning their teeth was reported higher in once a day (86.8%) and lesser in twice a day (10.2%). **Sowmya *et al.* (2007)**^[45] found that 63 (100%) asthmatic children in her study group brushed once a day, while regarding brushing habit (77.8%) higher proportion of children in the asthmatic group used brush, while lower percent of children (22.2%) asthmatic children used fingers to clean their teeth.

This could be attributed to the poor awareness of the children with regard to proper oral hygiene practices including the importance of brushing after every meal in the maintenance of oral health and also could be the fact due to increased attention given by the asthmatics to their general health condition, than to oral hygiene.

(d) Para-functional habits

Study conducted by **Sowmya *et al.* (2007)**^[45] in which asthmatic children (76.2%) gave the history of mouth breathing habit. So it could be inferred that due to enlarged adenoids and tonsils, and swelling of the mucous membranes in the nasal airways blockage might lead to the mouth breathing in the asthmatics.

(e) Asthma and Dental Caries

In a study conducted by **Reddy *et al.* (2003)**^[38] (Mean \pm SD) DMFT was more 5.17 \pm 4.54. Similar study findings were by **Ersin *et al.* (2006)**^[66] which showed (Mean \pm SD) DMFT (3.3 \pm 2.8) in asthmatics. Another study conducted by **Soheila K *et al.* (2007)**^[46] where (Mean \pm SD) DMFT was 4.30 \pm 2.81 in study group. A Study conducted by **Wierchola B *et al.* (2006)**^[69] where the (Mean \pm SD) DMFT was 6.76 \pm .24 observed in asthmatic children.

So, this could be attributed that (Mean \pm SD) DMFT in asthmatic was reported higher due to reduced salivary flow, consumption of sugar-containing medications and leads to increased (Mean \pm SD) DMFT.

But in a study conducted by **Stensson *et al.* (2008)**^[49] where the (Mean \pm SD) DMFT was 2.5 \pm 3.9. In a study conducted by **Shashikiran ND *et al.* (2007)**^[68] found mean DMFT 1.40 \pm 1.19 in asthmatic children. Another study was conducted by **McDerra *et al.* (1998)**^[21] where the (Mean \pm SD) DMFT in the asthmatic children was 2.48 \pm 0.32.

In contrast to the above mentioned studies, there are other studies that do not demonstrate a positive association between asthma and dental caries. In a study

conducted by **Thomas *et al.* (2010)**^[1] the relationship between asthma and caries, was observed but the authors did not find that asthmatic patients had a higher risk of developing dental diseases.

A review by **Maupome *et al.* (2010)**^[70] observed the association between asthma and caries majority from Scandinavian countries and Asia. The authors found no strong evidence that there exist a causal link between caries and asthma. The studies with a large number of participants showed a negative or even inverse association between caries and asthma disease. Another study conducted by **Bjerkeborn *et al.* (1987)**^[71] showed that there was no statistical significant difference concerning caries prevalence with extrinsic asthmatic children.

(f) Medications of asthma with the prevalence of dental caries

Asthma is treated using many types of drugs. In the studies beta-2 agonist, steroids and combination of beta 2 agonist and steroids drugs were used in the asthmatic children. The (Mean±SD) DMFT was more in beta-2 agonist than the steroids and combination of beta-2 agonist and steroids. findings were in agreement with the studies conducted by **McDerra *et al.* (1998)**^[21], **Taina MK *et al.* (1998)**^[72] and **Pia W *et al.* (2004)**^[73] where all asthmatic children were taking beta-2 agonist having (Mean±SD) DMFT more. A study conducted by **Reddy *et al.* (2003)**^[38] where (Mean±SD) DMFT was higher among who were taking syrup medication. A similar study conducted by **Sowmya *et al.* (2007)**^[45] where the (Mean±SD) DMFT was higher among those taking syrups/suspensions (96.8%). Another study conducted by **Soheila *et al.* (2007)**^[46] where (Mean±SD) DMFT was more in asthmatic children.

Study conducted by **Reddy *et al.* (2003)**^[38] where (Mean±SD) DMFT was found to be more in the asthmatic children using inhalers.

So this might be attributed to long term consumption of liquid oral medication which contains sweeteners, among asthmatic children lead to increase caries experience.

But in study by **Eloot *et al.* (2004)**^[41] did not recognize any connection between the period of exposure to medication and the prevalence of caries.

(g) Duration of asthma and dental caries

Study conducted by **Ersin *et al.* (2006)**^[66] and **Milano *et al.* (1999)**^[67] in which they reported a positive association between caries prevalence and duration of the asthma disease.

So this could be attributed to the long term exposure of medication results to less salivary flow and also which contains fermentable sugar leading to the caries experience in the asthmatics.

McDerra *et al.* (1998)^[21] reported that families may overindulge children with frequent consumption of sweets, leading to an increase in caries levels. Moreover, the increased attention to their general asthmatic condition may result in oral hygiene care being neglected.

This is in contrast to the study conducted by **Eloot *et al.* (2004)**^[41] Where the (Mean±SD) DMFT revealed that neither the period nor the severity of the asthma had a significant influence on the risk of caries in asthmatic children.

(h) Gingival Status

A study conducted by **Abhishek *et al.* (2009)**^[74] where (Mean±SD) GI score was more. Studies conducted by **Karl *et al.* (2002)**^[75], **Wotman *et al.* (1973)**^[76] and **Lenanader *et al.* (1998)**^[77] suggested that asthmatic children had more periodontal disease and lower stimulated salivary flow rate.

Therefore, it can be inferred that the gingivitis in asthmatic children could be due to inhaled medication (corticosteroids) and an altered immune response and by their tendency to breathe through the mouth, especially during an episode of an acute asthmatic attack and the dehydration of alveolar mucosa during mouth breathing.

A study conducted by **Sowmya *et al.* (2007)**^[45] where the (Mean±SD) GI score in the asthmatic group was less.

O'Sullivan *et al.* (1998)^[41] reported that the majority of the dry-powder inhalers have a lower pH than the metered-dose inhalers. **Tootla *et al.* (2004)**^[79] investigated the demineralising potential of asthma inhalers in subsurface enamel and they found no significant acidogenic/cariogenic effect from asthma inhalers.

McDerra *et al.* (1998)^[21] found a higher intake of sugary drinks, although it was not statistically significant, in children with asthma compared with healthy individuals.

(i) Oral Hygiene Status (OHI-S)

Studies conducted by **wotman *et al.* (1973)**^[76] and **McDeera *et al.* (1998)**^[21] where they observed more calculus. So this could be attributed that higher levels of calculus in asthmatics compared with non-asthmatics may be explained by increased levels of calcium and phosphorus in sub maxillary and parotid saliva. However, this is in contrast to **Ryberg *et al.* (1991)**^[19] who reported decreased levels of calcium in stimulated parotid saliva.

CONCLUSION

Hence, the present review reflects that the oral health status of asthmatic children were comparatively poor with dental caries experience and poor gingival health. The prevalence of increased dental caries, gingivitis and compromised oral hygiene status had a positive

association with the duration of asthma, medication taken.

Suggestions

- Preventive measures such as promoting oral hygiene practices that include proper tooth brushing after every meal and use of dental floss at least once a day.
- Encourage regular periodic dental check-ups for children who are at high risk of developing dental caries.
- Institute dietary modification that includes restriction of sugary foods or drinks between meals, avoiding refined carbohydrates and consuming food rich in starch and fiber. Foods like fruits, vegetables, cheese, peanuts have low cariogenic potential. Sugar substitutes such as aspartame, saccharin, xylitol and sorbitol can be used as sweeteners. Prescribe nutritional supplements and advice more fluid intake.
- Instruct the patients to adequately rinse the mouth with neutral pH or basic mouth rinses (milk, water, sodium fluoride 0.05% mouth rinses) immediately after using an inhaler especially before bedtime. This is to counteract the acidic pH of the dry powder inhalers.
- Recommend the use of anti-microbial mouth rinses such as chlorhexidine gluconate mouth rinses (0.12%).
- Educate the patients about the possible oral adverse effects of the inhalation therapy.

Immediate brushing of the teeth after using inhaler should be avoided as it may damage the already weakened enamel due to acidic pH.

- Government hospital should supply more of metered dose inhalers in order to reduce the consumption of medication through the systemic route.
- Insist on the use of inhalers with a spacer device to reduce the medication deposits in the oral cavity and oropharynx. The time lag in delivery permits more of the particles to evaporate; hence, more particles are inhaled into the lung.
- Recommend professional application of pit and fissure sealants, and fluoride varnishes and gels.
- Including the provision of appropriate preventive medical and dental care and children and their families possessing good asthma knowledge and management skills.

Research on all aspects of childhood asthma should be encouraged as it is not well understood as asthma in adults.

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