

Is there a relationship between asthma and dental caries?

A critical review of the literature

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Dental and medical problems tend to coexist,¹⁻⁵ but no definitive link has been established that allows clinicians or investigators to predict one on the basis of the other. Increases in dental caries (in terms of experience, severity or both) and in asthma (in terms of severity, frequency or both) may be two parts of a larger scenario of unequal distribution of diseases or separate domains that evolve independently. This confusion is heightened further by differences in patients' access to clinical care.

In an analysis of the National Health Interview Surveys conducted from 1993 through 1996, which examined medical care, dental care, prescription drugs and vision care, researchers found that 7.3 percent of American children younger than 18 years had at least one such health care need.³ Dental care was the most common unmet need (5.3 percent), and lack of insurance and low socioeconomic status (SES) were strong predictors of unmet health care needs overall. Infections and asthma contributed to more than one-half of all hospitalizations among children aged 1 to 4 years and nearly one-third of all hospitalizations among children aged 5 to 9 years.

Asthma affects an estimated 20 million Americans,⁶ and the preva-

ABSTRACT



Background. The authors conducted a critical review of the literature to ascertain the strength of the scientific and professional evidence supporting an association between dental caries and the experience and severity of asthma.

Types of Studies Reviewed. In March 2010, the authors searched Medline (1976-2010) by using the Ovid Web Gateway for the terms "asthma" and ["dental caries" or "dental caries susceptibility"] appearing in studies of humans published in English. The authors eliminated conference proceedings and abstracts, opinion pieces and unpublished studies; they included case series, cross-sectional, case-control and cohort studies and clinical trials.

Results. The review yielded 27 studies described in 29 articles. The authors found that researchers have investigated the hypothesized relationship between asthma and caries by means of diverse strategies, often using asthma cases clustered in pools of patients seeking clinical care. The strongest methodological designs were more likely to reveal little support for a positive association. The authors found no strong evidence suggesting that a causal link exists. Future research incorporating better-defined covariates and longitudinal designs is needed.

Clinical Implications. Asthma per se may not be a risk factor for caries. Patients who have extreme dryness of the mouth, whose use of nebulizers is persistent, whose consumption of carbohydrates is frequent, and who have used multiple medications or have used medications over the long term necessitate cautious dental health care.

Key Words. Restorative dentistry; dental disease; asthma; dental caries; caries management; oral health; oral-systemic health associations. *JADA 2010;141(9):1061-1074.*

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lence of asthma has been increasing since the 1980s across all age, sex and racial groups. Asthma appears to be, after dental caries, the most prevalent chronic childhood disease in the United States. In the 1980s, asthma was associated with 500,000 hospitalizations and 6.5 million office visits to physicians annually.⁷ Based on national survey results published in the late 2000s, 7 percent of adults and 9 percent of children in the United States have asthma, necessitating 10.6 million office visits to physicians. In 2006, 444,000 hospital discharges involved patients whose first-listed diagnosis was asthma.^{8,9}

Caries remains an important health problem across all age groups in the United States, but it is documented better in children than in adults. Mixed evaluations have resulted from looking at trends in terms of considering a glass half full or half empty. Namely, dental caries prevalence for many children has decreased in the past few decades,¹⁰⁻¹² but although the proportion of caries-free children has increased, the reduction in caries burden has not been shared equally among children.^{13(pp10,11)} If the caries experience in primary and permanent teeth is considered jointly, the proportions of caries-free children continue to decrease in adolescence: data from the Third National Health and Nutrition Examination Survey, conducted from 1999 through 2004, indicated that 59 percent of 12- to 19-year-olds have had dental caries in their permanent teeth and 23 percent have untreated decay.¹⁴

Our rationale for undertaking this review of the literature is that people with asthma may become more susceptible to caries directly (through biological mechanisms), indirectly (through pharmacological mechanisms) or both. The 2000 report of the U.S. surgeon general titled *Oral Health in America*¹⁵ indicated that asthma and caries, together with learning difficulties and social problems, are correlated closely enough with social disadvantage to be designated sentinel diseases. Questions that remain to be addressed are whether a link exists between asthma and caries and if so, what its nature is. Is the association between increased severity and frequency of asthma conditions and increased experience of caries a direct relationship? Is this relationship pharmacological or biophysiological in nature? Are asthma and caries separate sequelae of poor access to different health care services? Or are all of these the case? We present a semistructured review of the scientific and professional literature

in which we attempted to ascertain the strength of the evidence supporting an association between asthma and caries. Because many reports pertain to children, we will emphasize, but not limit the review to, younger age groups.

MATERIALS AND METHODS

We conducted a general literature review with substantial structured review components, rather than a definitive, systematic review.

Sources. In March 2010, two oral epidemiologists (G.M. and O.L.) searched Medline for articles published from 1976 through 2010 by using the Ovid Web Gateway. The search strategy included the National Library of Medicine Medical Subject Headings (MeSH) terms (“asthma” and [“dental caries” or “dental caries susceptibility”]). They limited the search to studies involving human participants and published in English. We designed this search strategy to ensure high sensitivity initially, rather than high specificity. Although we did not contact editors or authors (with one exception), we undertook a hand-search review of the list of references in every article we identified.

Study selection. Two oral epidemiologists (G.M. and J.D.S.) reviewed the list of titles and abstracts for articles generated by the search engine to identify those that appeared to be research reports addressing the structured review question. They explicitly eliminated conference proceedings and abstracts, editorials, opinion pieces and unpublished studies. Owing to the general nature of the question (association) and the limited number of research studies available,

ABBREVIATION KEY. **BOP:** Bleeding on probing. **dfs:** Decayed or filled surfaces (primary teeth). **DFS:** Decayed or filled surfaces (permanent teeth). **def:** Decayed, extracted or indicated for extraction, or filled surfaces (primary teeth). **def:** Decayed, extracted or indicated for extraction, or filled (primary) teeth. **dft:** Decayed or filled (primary) teeth. **dmfs:** Decayed, missing or filled surfaces (primary teeth). **DMFS:** Decayed, missing or filled surfaces (permanent teeth). **dmft:** Decayed, missing or filled (primary) teeth. **DMFT:** Decayed, missing or filled (permanent) teeth. **DS:** Decayed surfaces (permanent teeth). **ENO:** Exhaled nitric oxide. **FS:** Filled surfaces (permanent teeth). **MeSH:** Medical Subject Headings. **NA:** Not applicable. **NHANES III:** Third National Health and Nutrition Examination Survey. **SES:** Socioeconomic status. **SGH:** Salivary gland hypofunction. **WHO:** World Health Organization.

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