

The Burden and Management of Dental Caries in Older Children



John Timothy Wright, DDS, MS

KEYWORDS

• Pit • Fissure • Occlusal • Caries • Prevalence • Sealant • Cost • Adolescent

KEY POINTS

- Dental caries affects most children.
- Pit and fissure surfaces represent a disproportionate amount of disease compared with the total number of surfaces at risk.
- Pit and fissure sealants are effective in preventing pit and fissure caries.
- Pit and fissure sealants are effective stopping the progression of noncavitated caries lesions.

INTRODUCTION

Dental caries is a complex and multifactorial chronic disease that is endemic in populations around the world. Dental caries continues to be highly prevalent in the United States, beginning for many people in early childhood and continuing throughout their life.¹ Although dental caries is infrequently associated with mortality, it does cause significant morbidity, including pain, suffering, loss of work and school time, loss of income, and the spending of billions of health care dollars.² The genetic and environmental determinants associated with disease risk and resistance exert dynamic influence on this disease process. Genetic studies suggest that the heritable influence on pit and fissure caries development varies from about 20% to 50%, indicating that an individual's genetic determinants play an important role in their risk/resistance.³ The environment is a modifier of caries risk that influences tooth development (eg, fluoride exposure, risk of enamel defects), oral hygiene, topical fluoride exposure, carbohydrate exposure, microbiome exposure, and many other potential dental caries modifiers. Tooth formation is highly regulated at the molecular level and the

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Department of Pediatric Dentistry, School of Dentistry, The University of North Carolina, Brauer Hall #7450, Chapel Hill, NC 27599, USA

E-mail address: tim_wright@unc.edu

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shape; size, mineralization, and even pit and fissure morphology are strongly determined by the individual's genetic makeup or genome.

It is not surprising that the dental caries experience faced by the 6- to 18-year-old is indeed different in many ways from the disease afflicting the infant/toddler or elderly person. Children younger than 6 years mostly have primary teeth, which are structurally and compositionally different than the permanent dentition, have dynamic diet and feeding issues, and depend on caregivers for their oral health care. As children get older new teeth begin to erupt that are genetically coded for at conception but are then exposed to different environmental influences throughout their development that modified their risk and resistance to dental caries. Emergence of the first permanent molars and subsequent permanent teeth results in having new at-risk dental surfaces (because of increased total number of teeth transitioning from 20 primary to 32 permanent teeth) and provides an opportunity for applying targeted preventive strategies. Alignment and spacing of the early permanent dentition, dietary changes, and exposure to orthodontic appliances are just a few of the factors affecting caries risk in older children. This article focuses on how dental caries continues to affect the 6- to 18-year-old and how different treatment modalities, such as pit and fissure sealants, can be useful for reducing the risk of developing caries lesions.

CARIES PREVALENCE AND RISK FACTORS

The prevalence of dental caries increases with age so that by the time most individuals are young adults they will have experienced dental caries. In 2011 to 2012, 21% of US children aged 6 to 11 years experienced dental caries in permanent teeth.⁴ Dental caries is not distributed evenly across populations; in the United States, 27% of hispanic children aged 6 to 11 years are affected compared with 19% of non-Hispanic white children.⁴ Children of lower socioeconomic status (SES) have an increased prevalence of caries compared with children of higher SES.^{5,6} The prevalence of having experienced dental caries increases to 59% of US adolescents aged 12 to 19 years, with 15% having untreated caries lesions.⁴ The severity of caries varies with age and SES but nearly 7% of US 6- to 8-year-olds already are classified as having severe caries (ie, 3 or more decayed surfaces).⁵

The human dentition varies in its anatomy with the anterior teeth having smooth surfaces, whereas the posterior teeth have smooth surfaces between the teeth and more tortuous anatomy on the biting surfaces. Although the smooth surfaces of teeth can develop caries lesions, it is the biting surfaces of the molar teeth that have the greatest risk for having caries. The biting or chewing surfaces of teeth are typically decorated with incompletely coalesced areas of enamel that are seen clinically as pits, fissures, and grooves. These pit and fissure areas of teeth represent stagnation sites for both biofilm and cariogenic substrates. The pit and fissure surfaces account for a disproportionate amount of the caries experience and result in restorations in permanent tooth surfaces in 12- to 19-year-olds.⁵ The occlusal or biting surfaces of teeth, which typically have significant pit and fissure anatomy, account for just 12.5% of the at-risk tooth surfaces in the permanent dentition; however, they account for most of the caries. Similar caries prevalence and progression in children aged 6 to 18 years are reported around the world.^{6,7} The first permanent molars are the most caries-prone permanent teeth followed by the second permanent molars.^{8,9} Although the premolars have occlusal surfaces with pits and fissures, they have a much lower caries prevalence compared with the molars.

Children with caries in the primary dentition are more likely to have caries in the permanent dentition.^{6,10} This is most likely best explained because these children have

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