

Introduction

Dental caries is the most common chronic disease in children in the United States with a prevalence reported as high as 70% in disadvantaged groups in developed countries.^{1,2} For patients with congenital heart disease (CHD), invasive dental procedures have the risk of inducing transient bacteremia which may lead to infective endocarditis (IE). Injury to the cardiac endothelium can occur in the presence of turbulent blood flow due to valvular defects or incompletely repaired cardiac defects. Seeding of damaged cardiac endothelium and subsequent IE is thought to be caused by transient bacteremia, which is known to occur during dental procedures.^{3,6}

While IE is a rare condition, it is associated with high rates of morbidity and mortality. Approximately 35% to 60% of cases of IE in children occur in patients with underlying CHD, and it is estimated that one eighth of children with CHD may develop infective endocarditis if exposed to oral bacteremia after a dental procedure without antibiotic prophylaxis.^{3,4} With increasing survival rates of children with CHD, it is now one of the leading predisposing conditions of children with IE.⁵ It is well known that collective risk of bacteremia from daily activities such as chewing and toothbrushing have higher cumulative exposure of bacteremia compared to a single dental procedure. However, the frequency of bacteremia is much higher with a single dental extraction versus a single episode of toothbrushing.

There is debate in the literature surrounding the caries risk of patients with CHD. In some studies, those at elevated risk requiring the greatest caries preventive strategies are CHD patients in both the primary and the permanent dentition.^{3,7} Based on a 2019 study's findings, pediatric patients with CHD are at higher risk for caries, and therefore requiring the greatest caries preventive strategies in both the primary and the permanent dentition.³ In a case-control study in Sweden, children with CHD were found to be more susceptible to caries when compared to healthy control groups.⁸

Objective

The objective of this study is to evaluate the caries experience in children with CHD at risk for IE as compared to their healthy counterparts by assessing their decay-missing-filled teeth (dmft) indices.

Study Design and Methods

This study was a retrospective chart review of children seen at Montefiore Medical Center Pediatric Dental Clinics in the Bronx, NY from January 2016 to December 2022. Inclusion criteria for the study subjects required that:

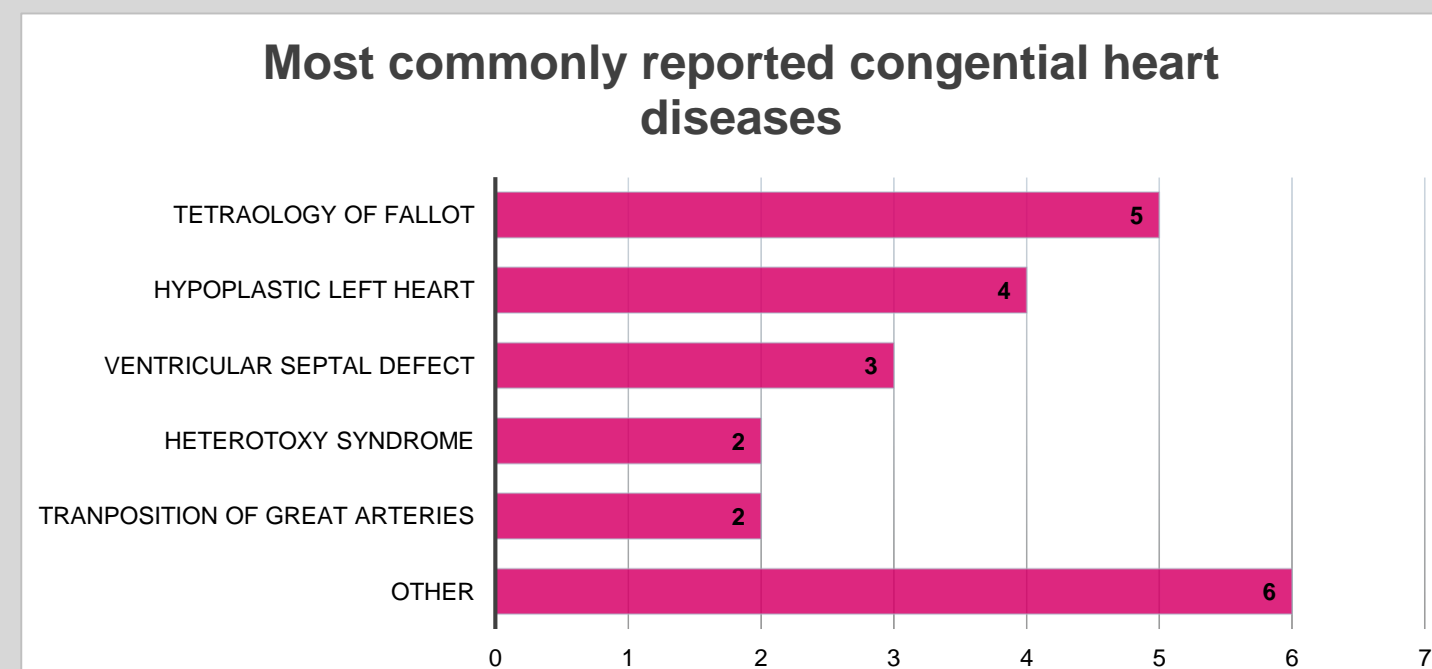
1. They were between 1 and 6 years old with diagnosed CHD;
2. They were in primary dentition only;
3. They presented for a comprehensive oral evaluation (D0150);
4. Without any other significant medical history, including diseases or syndromes, other than the CHD;
5. At risk for IE according to current American Heart Association guidelines and thus requiring "ABX Prophylaxis" per the dental charting.

An equal number of healthy control subjects were matched by age, sex, and provider. Inclusion criteria for the control subjects required that:

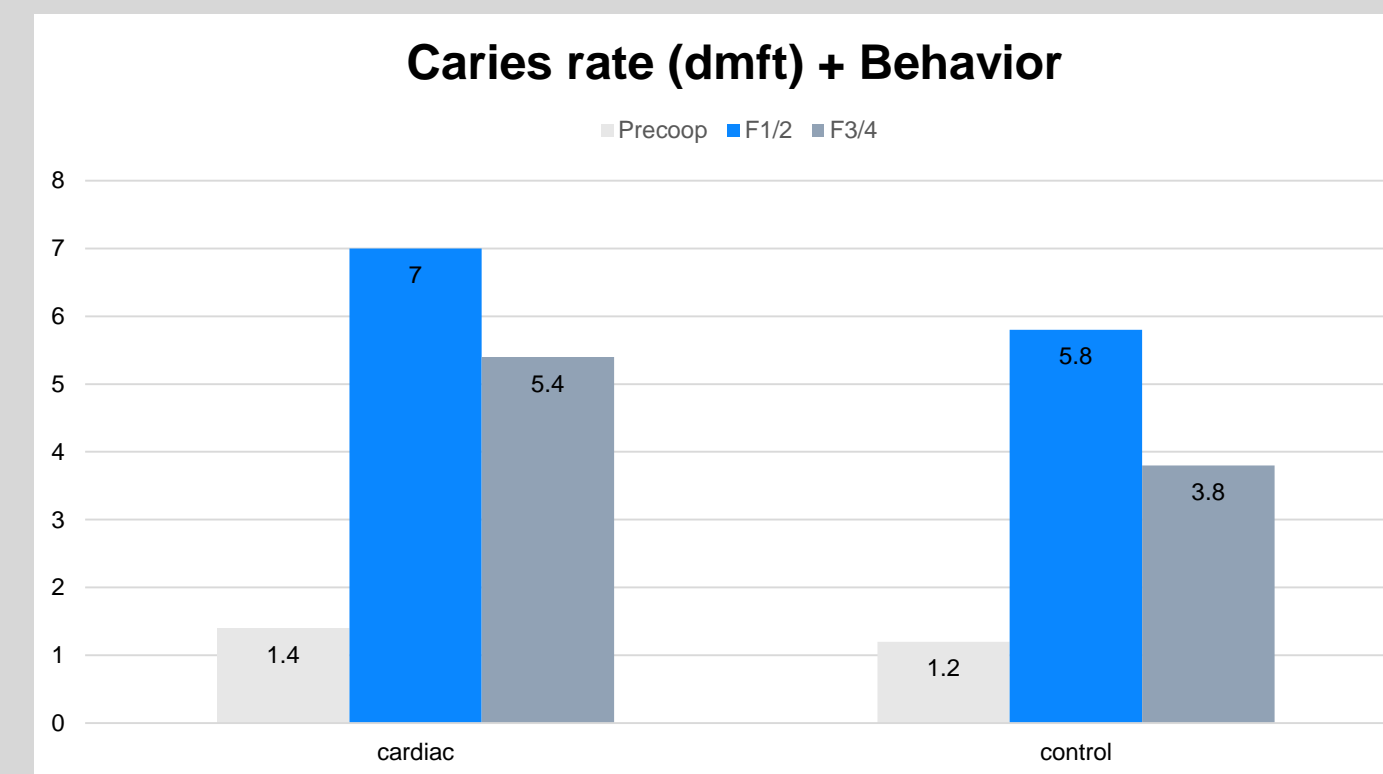
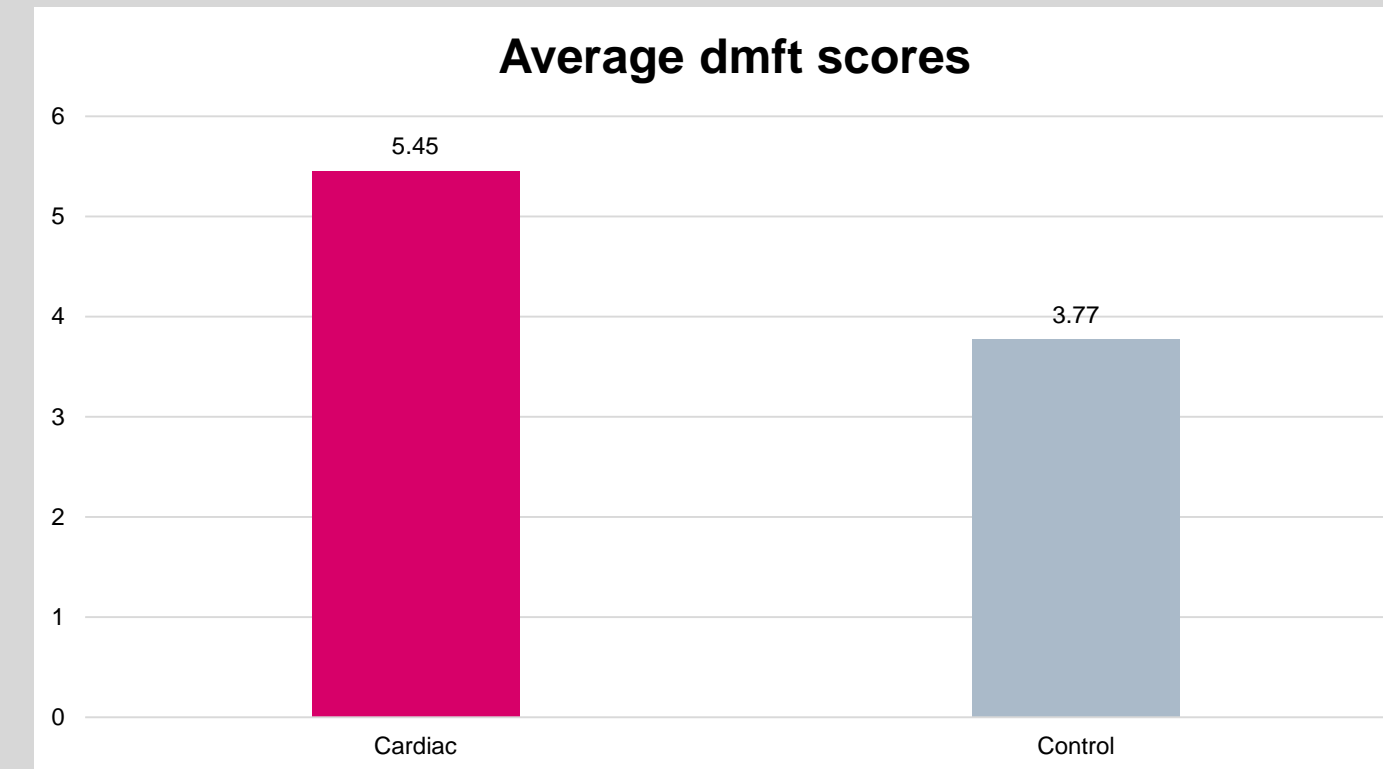
1. They were between 1 and 6 years old;
2. They were in primary dentition only;
3. They presented for a comprehensive oral evaluation (D0150);
4. They have "NSF" listed in their past medical history;
5. They do not require "ABX Prophylaxis" per the dental charting.

The following data were recorded for research and control subjects: age, sex, behavior (Frankl score), and number of decayed, missing, and filled teeth. The dmft score for each subject was calculated from the data and is the index used to measure caries experience.

Results



Results



A total of 44 subjects were reviewed for this study (22 subjects with CHD requiring antibiotic prophylaxis and 22 control subjects). The average age for all subjects was 48.1 months. The average dmft score for all patients was 4.61. The average dmft score of the CHD subjects was 5.45, while the average dmft of the control subjects was 3.77. Of note, 13 out of 22 CHD subjects met the AAPD definition of severe early childhood caries compared to 10 out of 22 control subjects.

Children who were perceived to have had more positive dental experiences and/or had higher levels of cooperation (Frankl 3 and 4) had lower dmft scores between both the CHD and control groups of 5.4 and 3.8, respectively, than those with negative experiences (Frankl 1 and 2), with dmft scores of 7 and 5.8 respectively. Those children who were perceived as pre-cooperative had similar dmft scores.

Conclusion and Discussion

While not statistically significant, this study found that patients with CHD have higher dmft scores than their healthy counterparts, and therefore poorer oral health and perhaps lower oral health literacy.

This study only included pediatric patients with CHD and without concomitant disease to eliminate variables caused by other medical conditions or intellectual or physical disability that may also affect the dentition or ability to execute proper oral hygiene.

Maintenance of excellent oral hygiene and regular dental visits remain the most effective method of prevention of the occurrence of IE. Since caring for a child with CHD can be overwhelming with their frequent medical appointments/procedures, medication requirements, and acute issues such as illness or hospitalizations, parents may overlook other aspects of their child's healthcare, such as their oral and dental health. Families of children with CHD should be educated on the importance of oral health and preventive measures to reduce the risk of IE.

While dentists must be up-to-date with the American Heart Association guidelines for dental procedures and IE, the medical team should help emphasize the importance of preventive dental care for such patients. A dental home should be established no later than 12 months of age, and the relationship between systemic and oral health must consistently be reinforced by the health care team, including dentists, cardiologists and pediatricians.

One of the main limitations of this study was sample size; many patients were excluded from this study due to having one or more comorbidities outside of any CHD. More research is indicated as this study demonstrates a relationship between CHD and higher caries experience in children.

References

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