



Dental Caries Experience in Children Using Anti-Asthmatic Medicines

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INTRODUCTION

Dental caries and asthma are the most prevalent chronic diseases in children. Both are associated with decreased quality of life, and chronic school absenteeism.^{1,2} Naavaal et al.³ found that 34 million school hours are lost annually due to acute and unplanned dental care. Like dental caries, childhood asthma is one of the leading causes of school absenteeism in the United States, accounting for more than 10 million missed school absences annually.⁷ Also similar to dental caries, asthma has a high prevalence rate within the Bluegrass state. According to the Kentucky Cabinet for Health and Family Services the current prevalence of asthma in the children of Kentucky is 10.6% for ages 11 and younger, 13.6% for middle school students, and 11.8% for high school students.⁸ Inhalers are the most used form of treatment for asthma and contain ingredients that may further impact the oral health in the pediatric population.⁹ Studies show they may affect salivary flow, cause dental erosion, oral candidiasis, periodontal disease and even tooth loss.¹⁰ These consequences may not only impact a child's primary dentition, but their permanent dentition as well, causing long-term effects. Due to the prior association and the high prevalence of dental caries and asthma in the state of Kentucky, there is reason to examine a correlation between these two entities

OBJECTIVE(S)

This study aimed to assess the association between dental caries experience and the use of anti-asthmatic inhalers among young children .

METHODS AND MATERIALS

STUDY DESIGN: Institutional review board (IRB) approval for this study was obtained through the University of Kentucky IRB (protocol IRB #83472). A 12-question survey was applied using REDCap (Research Electronic Data Capture; Vanderbilt University), a secure, web-based application for building and managing online surveys and databases. Informed consent was obtained prior to participation. A dental exam was performed in each participant after prophylaxis with pumice and rubber cup by a single examiner. The number of decayed, missing, and filled teeth (DMFT/dmft) were recorded for each patient.

INCLUSION/EXCLUSION: The study population consisted of children aged 1-10 years of all genders and ethnic backgrounds with a history of childhood asthma, treated at the University of Kentucky Pediatric Dental Clinic located in Lexington, KY for routine dental examination. Same age children without asthma diagnosis were included as controls. Patients with any other systemic condition or those who's parents refused to participate in the study were excluded.

STATISTICAL ANALYSIS: Descriptive statistics were calculated for demographic variables and patient-reported outcomes. To assess univariate relationships between dmft/DMFT scores and these measures, quasi-Poisson regression models were fit, allowing for overdispersion. Across all analyses, a *p*-value of less than 0.05 was considered significant. All analyses were completed in R 4.1.2 (R Foundation for Statistical Computing; Vienna, Austria).

RESULTS

1. Overall look

Twenty-nine children participated in the present study. Thirteen of them reported history of childhood asthma and were included in the asthmatic group (n=13) while 16 had no asthma diagnosis and were assigned to the control (n=16) group. Mean age was 4.4 (±2.2) years. Nearly 45% of the participants had DMFT/dmft score 0 (Figure 1).

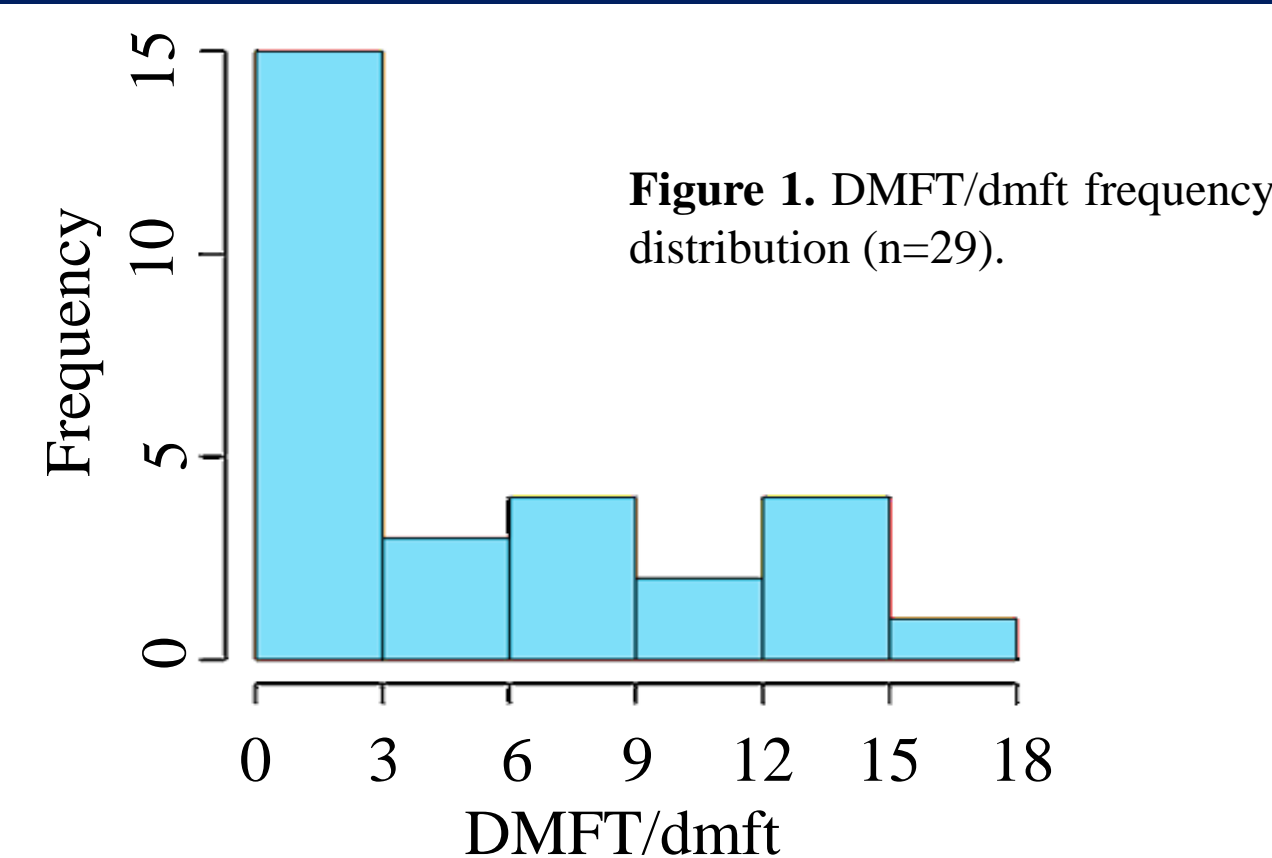


Figure 1. DMFT/dmft frequency distribution (n=29).

2. Asthma, type of inhaler used, and nebulizer use

Differences in DMFT/dmft score between asthmatic and non-asthmatic children were not significant [$\chi^2 = 1.76$ on 1 df, *p*-value = 0.184] (Figure 2). DMFT/dmft median for control group was 0 (0 to 8) and for the asthmatic group 6 (0 to 11). All patients with asthma reported using some type of inhaler. Most of them (n=6) used a combination inhaler, followed by controller inhaler (n=4). No differences were observed in DMFT/dmft among the inhalers (Figure 3) ($\chi^2 = 2.71$ on 2 df, *p*-value = 0.258). Five participants from the asthmatic group reported using nebulizer. DMFT/dmft median values were 11 (2 to 13) and 5.5 (0 to 8) for children using and not using nebulizer, respectively (Figure 4). No differences in DMFT/dmft scores were observed ($\chi^2 = 0.39$ on 1 df, *p*-value = 0.534).

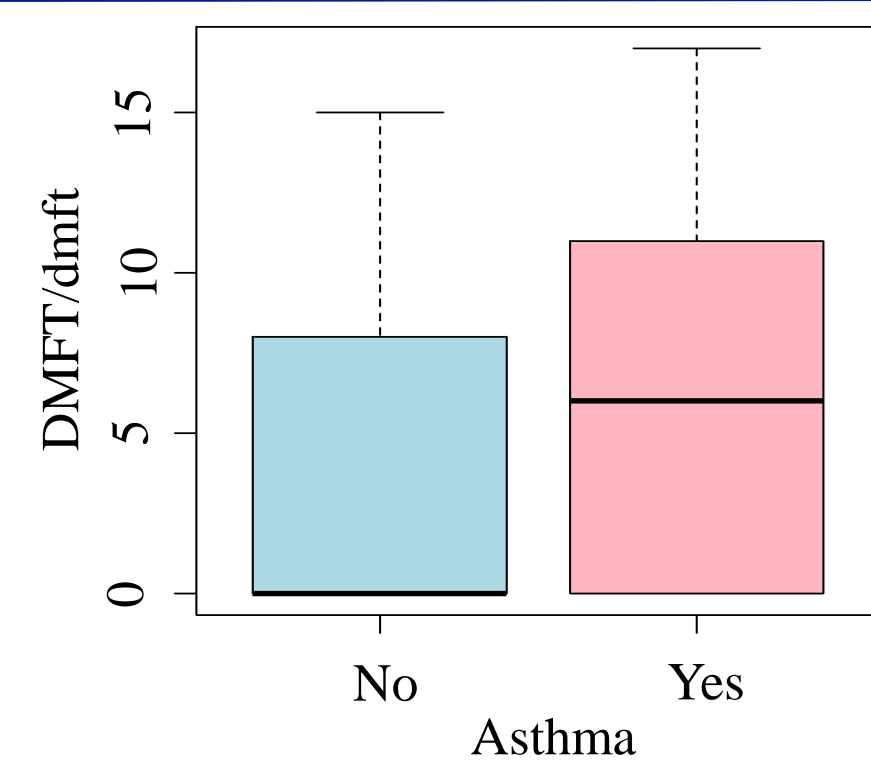


Figure 2. DMFT/dmft median for asthmatic and non-asthmatic participants.

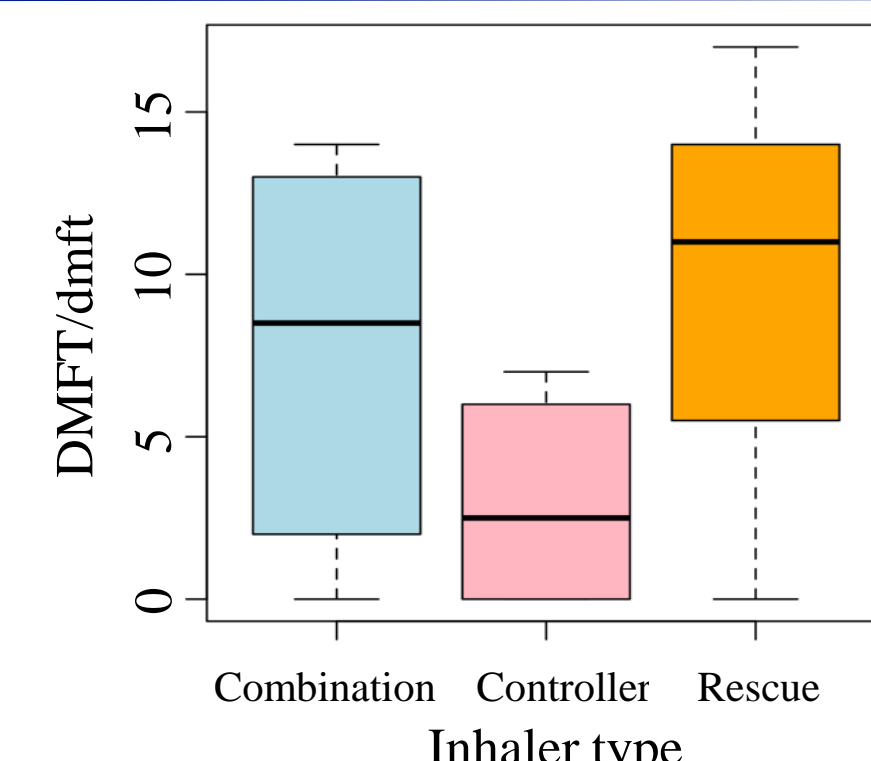


Figure 3. DMFT/dmft median according to inhaler type.

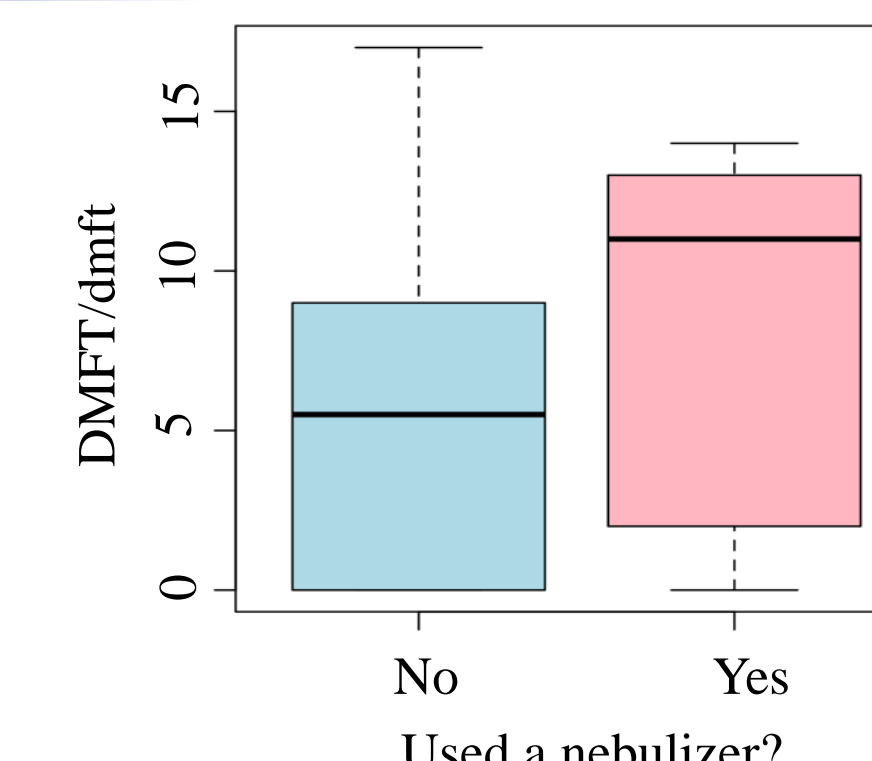


Figure 4. DMFT/dmft median according to nebulizer use.

3. Brush teeth after inhaler use, rinse water after inhaler, and aware that inhalers may contain sugar

Seven participants reported brushing their teeth after inhaler use. DMFT/dmft median values were 7.0 (4 to 11) and 2.5 (0 to 11) for children brushing and not brushing teeth, respectively (Figure 5). No differences in DMFT/dmft scores were observed ($\chi^2 = 0.46$ on 1 df, *p*-value = 0.499). Nine participants reported rinsing their mouth with water after inhaler use. DMFT/dmft median values were 6.0 (2 to 11) and 5.5 (0 to 12) for children rinsing and not rinsing mouth, respectively (Figure 6). No differences were observed ($\chi^2 = 0.02$ on 1 df, *p*-value = 0.889). Most participants reported not being aware that some inhalers contain sugar (n=8). DMFT/dmft median values were 7.0 (6 to 11) and 2.5 (0 to 11.5) for participants reporting being aware or not of the presence of sugar in some inhalers, respectively (Figure 7). No differences were found ($\chi^2 = 0.77$ on 1 df, *p*-value = 0.380).

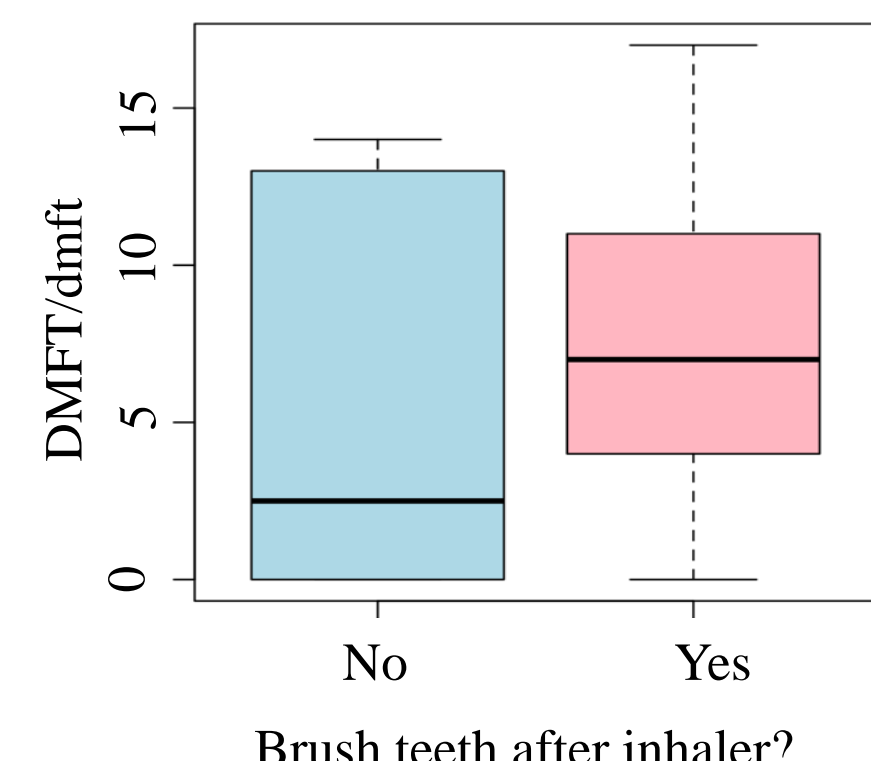


Figure 5. DMFT/dmft median according to brushing teeth after inhaler use.

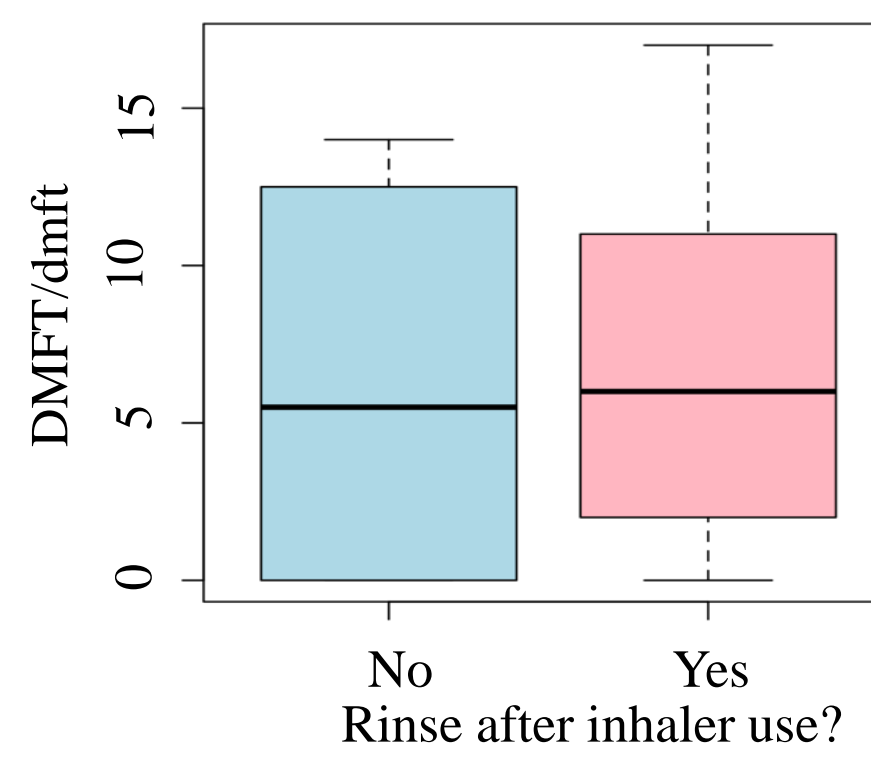


Figure 6. DMFT/dmft median according to rinsing with water after inhaler use.

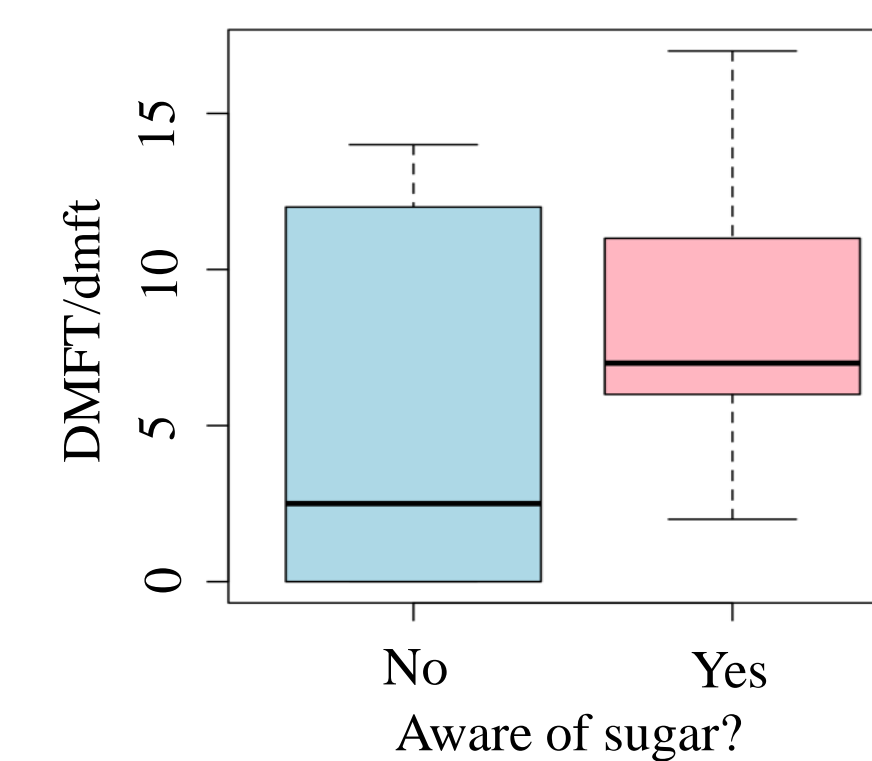


Figure 7. DMFT/dmft median according to awareness of sugar presence.

4. Inhaler used and suffered from thrush

Eleven participants reported using Albuterol inhaler (Figure 8) while 5 uses Flovent inhaler. Two reported other inhalers. DMFT/dmft median values were 7 (2 to 12) and 4 (3 to 5) for children using and not using Albuterol, respectively. No differences in DMFT/dmft scores were observed for Albuterol ($\chi^2 = 0.50$ on 1 df, *p*-value = 0.478) or Flovent ($\chi^2 = 0.03$ on 1 df, *p*-value = 0.862). Only 2 participants reported suffering from thrush. No difference were found between dose suffering or not from thrush (Figure 9). No differences were found ($\chi^2 = 2.47$ on 1 df, *p*-value = 0.116).

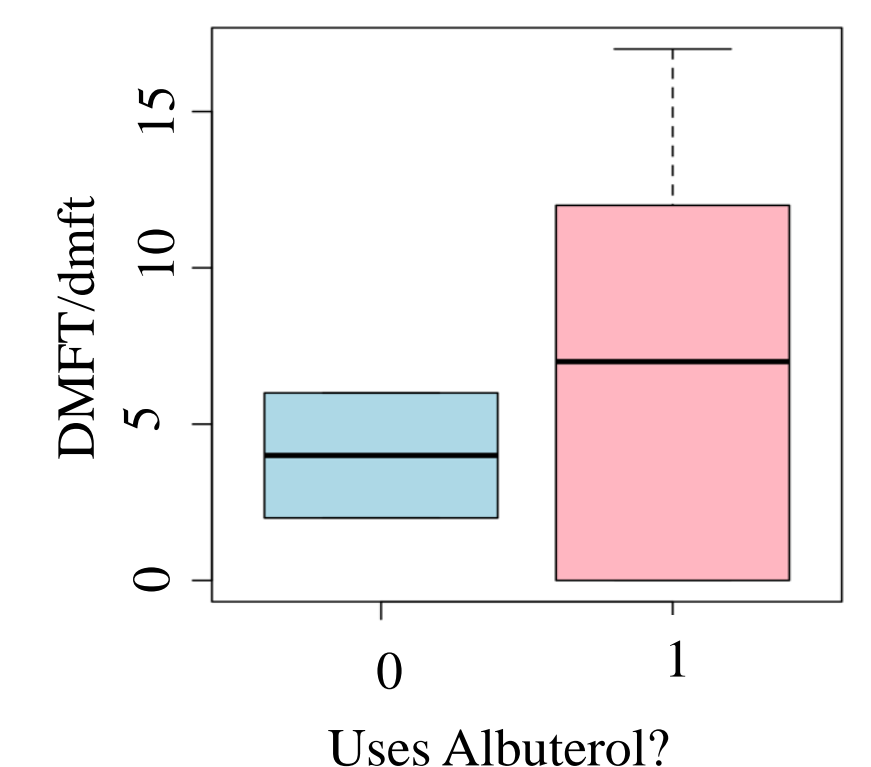


Figure 8. DMFT/dmft median according to the use of Albuterol.

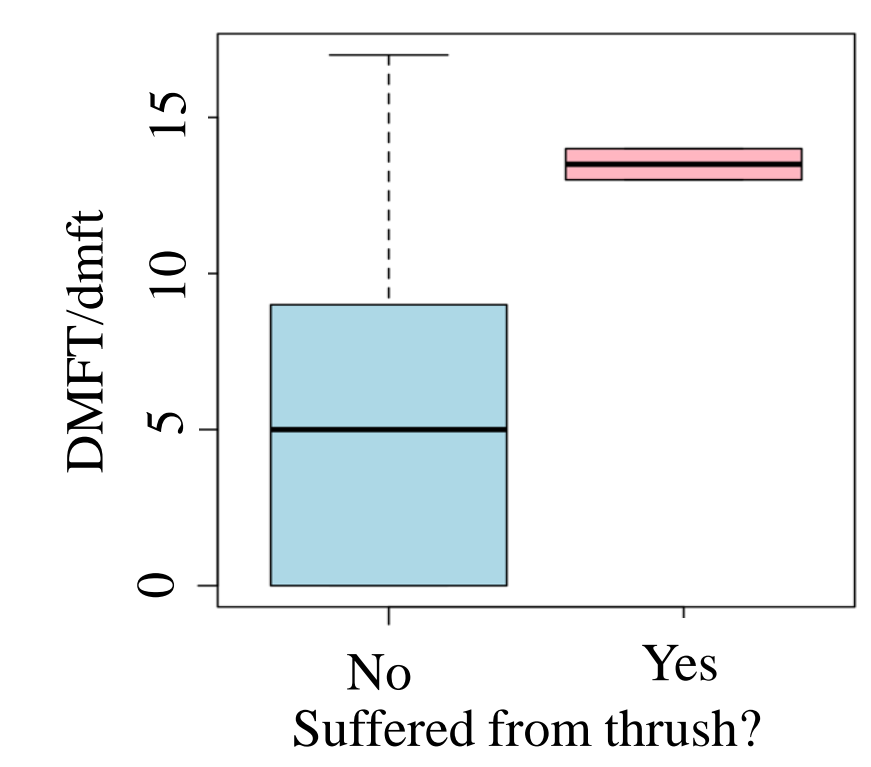


Figure 9. DMFT/dmft median according to thrush suffering.

5. Complained of dry mouth, and missed school/daycare due to asthma

Five patients complained of dry mouth while 7 missed school/daycare for asthma. DMFT/dmft median values were 7 (2 to 14) and 5.5 (0 to 11) for children complaining and not complaining of dry mouth, respectively (Figure 10). No differences in DMFT/dmft scores were observed ($\chi^2 = 0.40$ on 1 df, *p*-value = 0.527). DMFT/dmft median values were 6 (1 to 9) and 8 (1 to 12.5) for children that missed or not school/daycare for asthma, respectively (Figure 11). No differences were observed ($\chi^2 = 0.08$ on 1 df, *p*-value = 0.771).

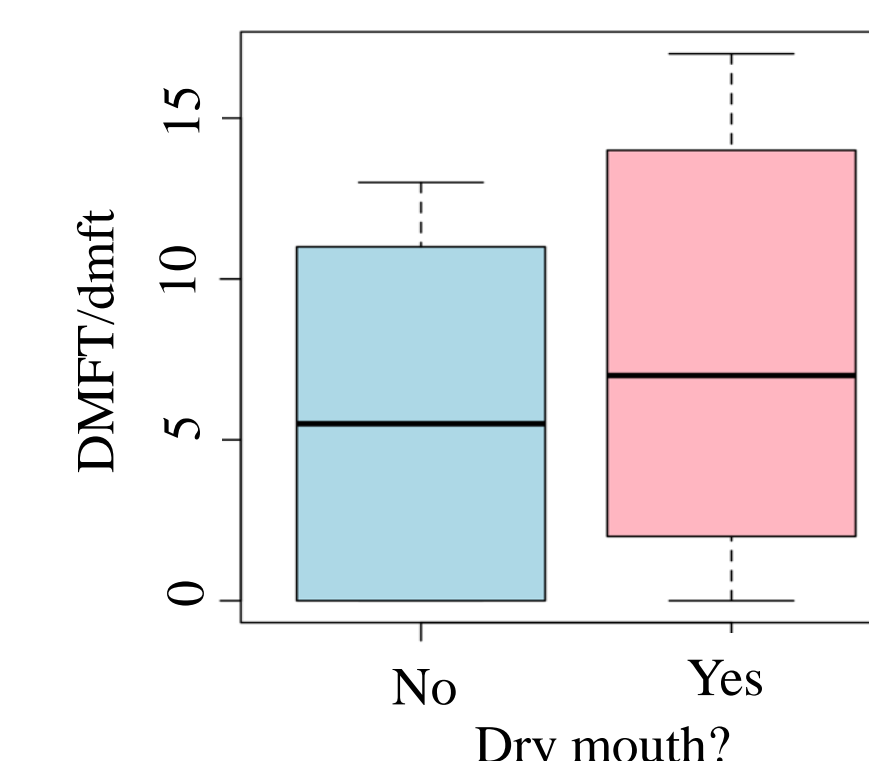


Figure 10. DMFT/dmft median according to dry mouth complaining.

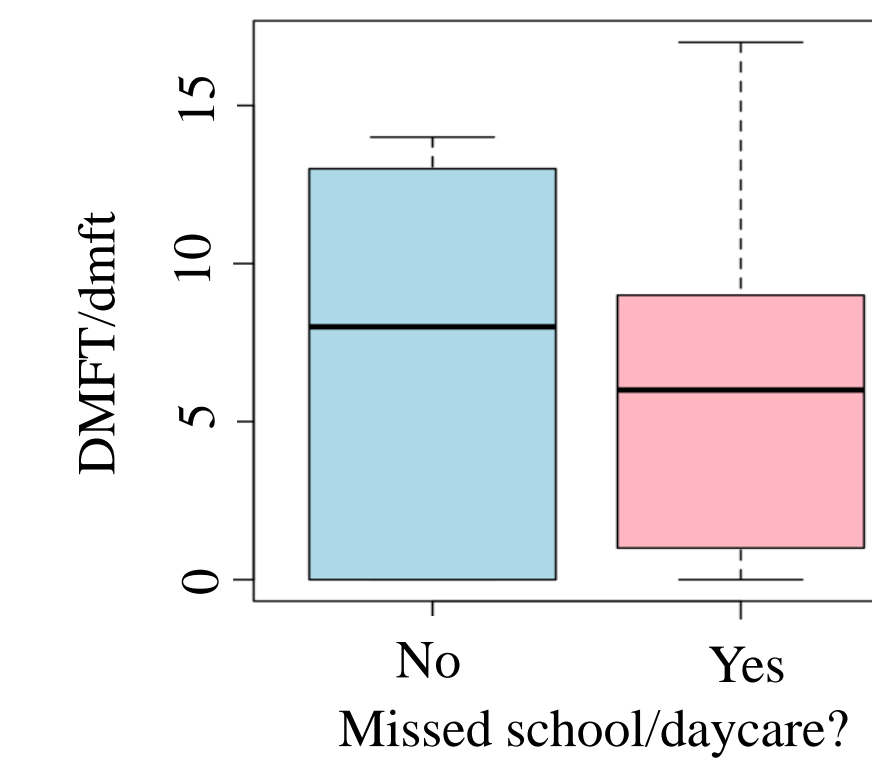


Figure 11. DMFT/dmft median according to missing school/daycare.

DISCUSSION

Anti-asthmatic inhalers may cause a range of adverse effects on oral health, including dental caries (Figure 12). However, the correlation between the use of these asthma medications and dental caries is not straightforward. While some studies suggest that prolonged use of asthma medications may increase the risk of tooth erosion and oral candidiasis, other factors, such as the type of inhaler used, duration of inhaled corticosteroid use, use of nebulizers, and rinsing after medication administration, can also affect dental caries, plaque, and gingival health. The present study failed to show association between these drugs and dental caries experience. However, the limited number of participants involved in the present study must be considered. Dental practitioners should be aware of the potential impact of asthma treatment on oral health and educate their patients on preventive measures, including oral hygiene, diet, and inhaler use, to maintain good oral health.

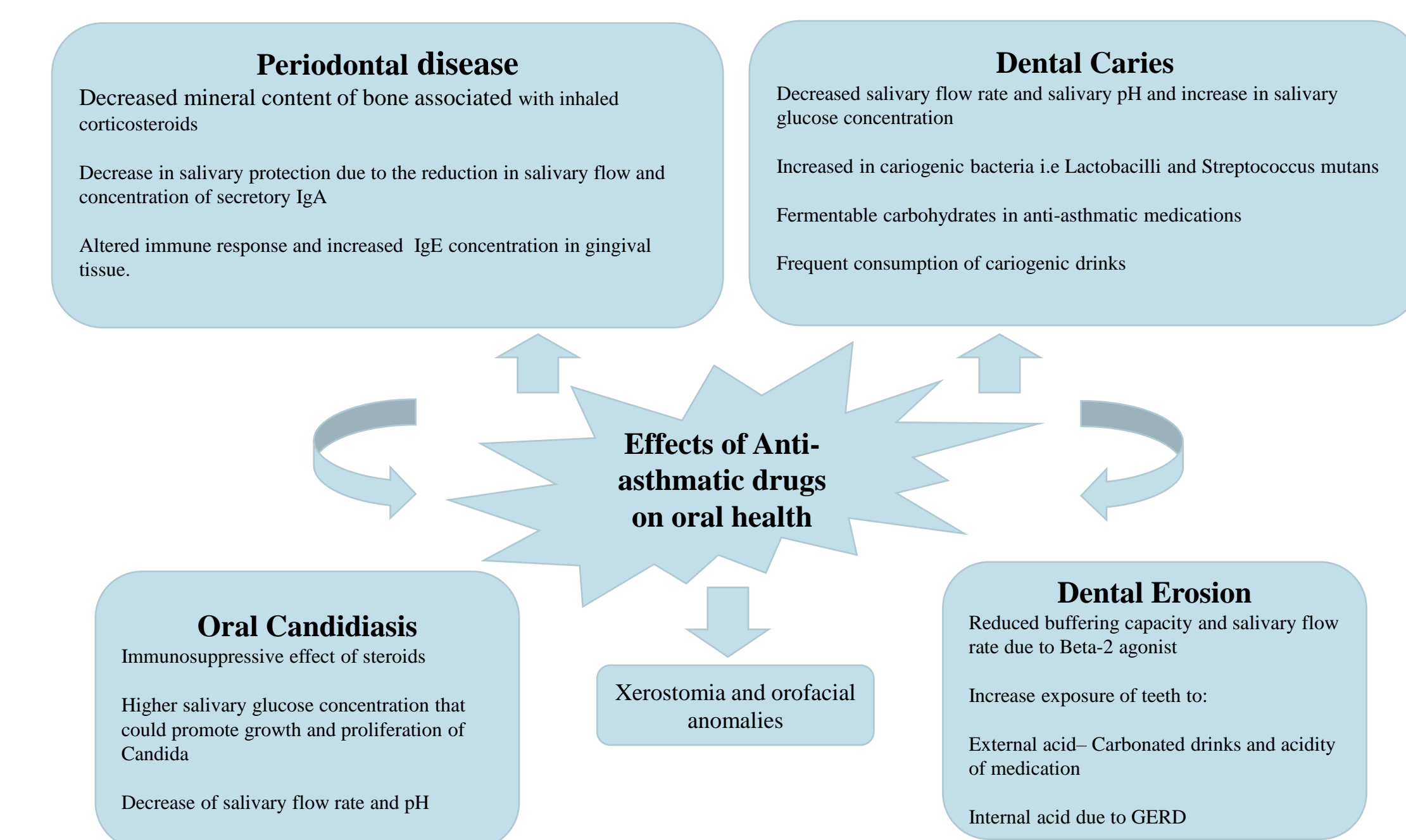


Figure 12. Summary of effects of anti-asthmatic drugs on oral health.

CONCLUSIONS

This study found no statistically significant association between asthmatic inhalers and dental caries experience.

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