

# Caries-related and Preventive Dental Care of 5-, 12-, and 15-year-old Syrians in Bursa, Türkiye

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## ABSTRACT

**Objectives:** Türkiye has implemented an open-door policy for Syrians since the beginning of the Syrian crisis in 2011 and has been providing medical and dental services for Syrian asylum seekers. Bursa, being the 5th largest city in the Western region of the Turkish Republic, hosts 1,83,355 registered Syrians. The present study was designed to analyze the caries-related dental services and preventive applications among 5-, 12-, and 15-year-old Syrian patients admitted to a state-affiliated dental hospital in Bursa, Türkiye.

**Design:** This study comprises retrospective data analysis.

**Place and duration of study:** The data from 1<sup>st</sup> January 2016 to 1<sup>st</sup> September 2021 were derived from the Bursa Oral and Dental Health Training and Research Hospital.

**Materials and methods:** The dental records of Syrian patients aged 5, 12, and 15 years were reviewed for caries-related (restorations, extractions, and root canal treatments) and preventive applications (fissure sealants and topical fluoridation); others were excluded.

**Results:** A total of 3,388 dental records of 1,179 Syrian children aged 5 (N = 369), 12 (N = 498), and 15 (N = 312) years were analyzed. The highest percentages of dental services offered to 5-, 12-, and 15-year-old were "tooth extractions" (n = 369; 42.2%), "fissure sealants" (n = 555; 33.7%), and "restorative treatments" (n = 384; 44.4%), respectively (p < 0.001). Considering all years (2016–2021), male subjects [odds ratio (OR)—1.42, 95% confidence interval (CI) 1.09–1.85; p = 0.01] and 12-year-old (OR—1.87, 95% CI 1.31–2.66; p = 0.001) were more likely to visit a dentist more than once per year.

**Conclusion:** Caries-related dental services, which are an indicator of poor oral health, are common in 5-, 12-, and 15-year-old Syrian patients.

**Keywords:** Dental care for children, Preventive dentistry, Refugees.

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## INTRODUCTION

Dental caries has long been a global oral health burden with high prevalence in children and adults.<sup>1</sup> The index age-groups of children (5, 12, and 15 years), according to the World Health Organization (WHO), present specific populations for determinations of oral health parameters (e.g., dental caries) in both primary and permanent dentition, promoting public health research.<sup>2</sup>

Examining 5-year-old children is important to accurately establish the relationship between dental caries and primary dentition, which exhibit changes over a shorter time span.

About 12 years of age has been chosen as the global monitoring period for caries and is also when all permanent teeth, except third molars, erupt. At 15 years of age, it is important to assess the prevalence of caries in permanent teeth which have been exposed to the oral environment for 3–9 years.

It has been reported that one of the most influential variables in the development of dental caries is immigration status, which is one of the main humanitarian crises resulting in life patterns, habits, and priority changes.<sup>3</sup>

The Syrian civil war, which began in 2011, resulted in the displacement of >6 million people. According to 2019 United Nations High Commissioners for Refugees data, 3,643,870 Syrians sought asylum and were registered in Türkiye.<sup>4</sup> On 22<sup>nd</sup> October 2014, temporary protection identity cards were issued to all Syrians, granting them access to social rights and services, including health care, education, and entry to the labor market in Türkiye.<sup>5</sup> Bursa,

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the 5th largest city in the western region of the Turkish Republic, hosted 1,83,355 registered Syrians in 2021.

A recent study in Jordan stated that Syrian refugees have a high prevalence of caries and poor oral hygiene.<sup>6</sup> Another study concluded that the decayed, missing due to caries, and filled teeth (DMFT) value is high among the people displaced as one of the consequences of the war in Syria.<sup>7</sup> Around 5- and 12-year-old, immigrant children demonstrated higher caries rates and had elevated dental treatment needs.<sup>8</sup> The results were in agreement with our study. While children aged 5-, 12-, and 15-year-old,

were investigated in this study, which will also shed light on the planned policies for permanent and permanent dentition individuals.

Preventive programs, which are provided by funding agencies and host countries, may reduce the burden of dental caries in underprivileged populations, such as Syrian refugees.<sup>6</sup>

Dental sealants are preventive applications that comprise a coverage mainly in the pits and fissures of occlusal tooth surfaces with resinous materials and create an accessible Based on Cochrane data from 2013,<sup>9</sup> resin-based fissure sealants will reduce the proportion of carious surfaces to 18.92% in children, aged 5–10 years. Another study favored resin-based fissure sealants instead of fluoride varnish (5%) applications in order to prevent potential caries located in the occlusal pits and fissures of permanent teeth.<sup>10</sup>

Thus, the present study was designed to analyze the caries-related dental services and preventive applications for 5-, 12-, and 15-year-old Syrian patients admitted to a state-affiliated dental hospital in Bursa, Türkiye.

## MATERIALS AND METHODS

The present study was approved by the Ethics Committee of Clinical Researches, Faculty of Medicine, Bursa Uludag University (Number: 2011-KAEK-26/540 Date: 08.09.2021).

A total of 6-year data from 1st January 2016 to 1st September 2021 were derived from the Bursa Oral and Dental Health Training and Research Hospital patient registration software (Trtek Web Patient Information Management System ver. 10.0.795) and reviewed retrospectively. Syrian patients with temporary protection identity cards (IDs) were included in the analysis; other records were excluded. Records of children aged 5, 12, and 15 years were retrieved by the difference between their admission/procedure dates and birth dates. The focus group was filtered as Syrian patients with temporary protection IDs. Clinical and radiological examinations and nondental records were excluded from the data. The remaining records were categorized as caries-related (restorations, tooth extractions, and root canal treatments), fissure sealants, and other treatments (topical fluoridation, Odontectomy, soft tissue surgery, prosthodontics, oral prophylaxis, and gingival treatment).

The results are presented as frequencies and percentages. Categorical variables were analyzed by using Pearson's Chi-square and Fisher's exact tests. Multiple comparisons were performed using the Bonferroni test. Binary logistic regression was applied, and the crude ORs, along with their 95% CIs, were reported. Multivariable binary logistic regression analysis was performed, and the adjusted ORs and 95% CIs were obtained. A  $p < 0.05$  was considered significant. Statistical analyses were performed with IBM Statistical Package for the Social Sciences ver. 23.0 (IBM Corp. Armonk, New York, United States of America).

## RESULTS

The present retrospective study analyzed a total of 25,591 patients comprising children aged 5 ( $n = 5,137$ ), 12 ( $n = 9,623$ ), and 15 ( $n = 10,831$ ). The dental records of 1,179 Syrian children aged 5 ( $n = 369$ ), 12 ( $n = 498$ ), and 15 ( $n = 312$ ) years who met the inclusion criteria were examined. There were no significant differences by sex for any age group ( $p = 0.278$ ). Detailed descriptive variables and the distribution of dental records are given in Table 1.

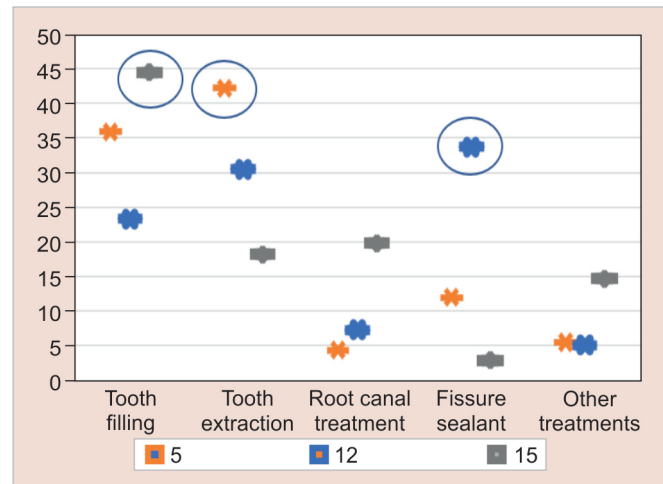


Fig. 1: Pooled distribution of caries-related dental services, preventive applications, and other treatments by age group between 2016 and 2021

Among the dental services offered to 5-year-old Syrian children, the treatment with the highest percentage was "tooth extraction" (42.2%) (Fig. 1), where the sex distribution was homogeneous ( $p = 0.675$ ). Of all extracted teeth, 50.4% ( $n = 184$ ) were anterior teeth.

The highest percentage of fissure sealants was in children aged 12 years. In this age group, 33.5% ( $n = 186$ ) of the fissure sealants were applied to the first molars, and 52.8% ( $n = 293$ ) were applied to the premolars.

Restorative treatments were the most common dental services accounting for 44.4% ( $n = 390$ ) of the caries-related dental services delivered to 15-year-old, of which 68.2% ( $n = 266$ ) were applied to posterior teeth.

The circled data indicate the dental procedure with the highest frequency in each age group.

Considering all years (2016–2021), male subjects (OR—1.42 95% CI 1.09–1.85;  $p = 0.01$ ) and 12-year-old (OR—1.87 95% CI 1.31–2.66;  $p = 0.001$ ) were more likely to visit a dentist more than once per year.

## DISCUSSION

Migration is being recognized as an important social determinant of general health and oral health<sup>8</sup>. Thus, the present study aimed to examine caries-related and preventive dental services provided to 5-, 12-, and 15-year-old Syrian patients. Considering all the studied years (2016–2021), males (OR—1.42 95% CI 1.09–1.85;  $p = 0.01$ ) were more likely to have <1 dental visit per year, which can be associated with the higher caries prevalence detected in boys in Middle Eastern countries and the need of these patients for treatment.<sup>11</sup>

Tooth extractions (42.2%) constituted the highest proportion of caries-related dental services in 5-year-old Syrian patients. Profound caries with extensive pathologies was considered the main etiological factor of tooth loss in 3–13-year-old.<sup>12</sup> In addition, irregular dental visits with poor compliance and parental cooperation were another indication of tooth extractions. Being an immigrant was closely associated with higher caries prevalence and experience. Parental attitudes toward oral hygiene, diet, indulgence, and caries-related behaviors distinguished immigrants. Being displaced (e.g., Syrian families) may be a reason for low parental compliance due to changed daily routines and priorities, language barriers, and the inability to provide adequate oral hygiene for their children.<sup>13,14</sup>

**Table 1:** Descriptive variables and the distribution of dental records of the study groups

	Age groups			p
	5 years N = 369 n = 874	12 years N = 498 n = 1,649	15 years N = 312 n = 865	
Sex				
Female	187 (50.7)	235 (47.2)	171 (54.8)	0.106
Male	182 (49.3)	263 (52.8)	141 (45.2)	0.266
Years of procedures were provided				
2016	193 (22.1)	283 (7.2)	137 (15.8)	<0.001
2017	251 (28.7)	363 (22.0)	207 (23.9)	0.002
2018	114 (13.0)	372 (22.6)	181 (20.9)	0.036
2019	153 (17.5)	373 (22.6)	173 (20.0)	0.028
2020	55 (6.3)	92 (5.6)	44 (5.1)	0.466
2021	108 (12.4)	166 (10.1)	123 (14.2)	0.033
Caries-related dental services				
Tooth restorations	314 (35.9)	384 (23.3)	384 (44.4)	<0.001
Tooth extractions	369 (42.2)	503 (30.2)	157 (18.2)	<0.001
Root canal treatments	39 (4.4)	119 (7.3)	171 (19.8)	0.233
Preventive applications				
Fissure sealants	105 (12.0)	555 (33.7)	25 (2.9)	<0.001
Topical fluoridation	24 (2.7)	2 (0.1)	0 (0.0)	0.078
Other treatments				
Odontectomy	21 (2.6)	85 (5.4)	128 (14.7)	N/A
Soft tissue surgery				
Dentures				
Oral prophylaxis				

The vast majority (82.5%) of all treatments provided to 5-year-old comprised tooth extractions, restorations, and root canal treatments. In the literature, a high prevalence of dental caries and the need for treatment have been noted in this age group.<sup>15</sup>

The age of 12 years is critical in global monitoring for caries lesions while all permanent teeth except third molars erupt. In many Eastern European and South American countries, the prevalence of caries among 12-year-olds has been reported to be moderate or high.<sup>1</sup> A recent cross-sectional oral health survey in Syria showed that the prevalence of caries was high (79.1%) among 8–12-year-old Syrian children and that the most affected teeth were the permanent first molars.<sup>16</sup> Preventive procedures are highly recommended<sup>17</sup> in this age group, decreasing the burden of dental caries. In our study, fissure sealants covered the highest proportion of all dental services provided to 12-year-old. The fact that 12-year-old had more dental visits per year compared to the other age groups also plays a role in this result. A recent review underlined the efficacy of resin-based fissure sealants applications in preventing dental caries for children and adolescents.<sup>9</sup> Resin-based fissure sealants are used in the state dental hospital where we conducted the study. The reason why most of the fissure sealant applications (63.8%) were applied to the premolars and second permanent molars rather than the first molars (33.5%) is probably because of the lost integrity of the first molar teeth, which usually erupt between the ages of 6–7 years, due to caries.<sup>16,18</sup> Since this indicates a high caries risk in patients, dentists may have aimed to prevent caries formation on posterior teeth other than first molars.

At the age of 15, most dental restorations to posterior carious teeth are applied at a high rate (68.2%) as an indicator of poor

oral hygiene.<sup>19</sup> Therefore, the highest rate (12.1%) of periodontal procedures (e.g., oral prophylaxis and supragingival/subgingival scaling) provided to this age group indicated poor oral hygiene. There are several reasons for poor oral hygiene in this age group. Elevated hormone levels due to puberty, improper oral hygiene habits, sugar, and carbohydrate-based diets, and the changing microbial flora of the oral cavity make these children susceptible to caries.<sup>20</sup> Kuzmina et al. stated an association between higher median decayed, missing, and filled permanent teeth or surfaces and plaque, gingival bleeding, the intake of cariogenic snacks, and maternal education of high school or less ( $p \leq 0.02$ ).<sup>21</sup> According to a report examining the education levels of Syrian asylum seekers in Türkiye, 89.7% of the Syrian women had a high school education or less.<sup>22</sup>

According to the findings of our study, the fact that the 15-year-old had fewer extractions compared to the 5- and 12-year-old may be due to the positive correlation between increased cooperation and age.<sup>23</sup> Considering that the mixed dentition period had ended, tooth extraction became the last option for permanent teeth. Advanced adhesive dentistry techniques make it possible to restore teeth with extensive material loss and high longevity.

The sharp decrease in all dental services in 2020 compared to other years was presumably due to the nationwide lockdowns of 0–18-year-old due to the COVID-19 pandemic. Dental services decreased significantly during the COVID-19 pandemic in Türkiye as in other countries.<sup>24</sup> In addition, 78.5, 69.9, and 75.4% of all procedures performed for 5-, 12-, and 15-year-old, respectively, were performed in Türkiye before the first confirmed case

on 11<sup>th</sup> March 2020. Since all aerosol- and droplet-generating treatments and elective procedures were postponed by state regulations,<sup>25,26</sup> tooth extractions consisted of 99.2% of the dental services during the COVID-19 pandemic for all age groups.

### Limitations of the study

There was no information about socioeconomic status, oral hygiene habits (frequency of tooth brushing, etc.), or parental education of the study groups to correlate with the findings of the study. In addition, a lack of information on the number of existing caries and filled and extracted teeth prevents our research from being properly compared with decayed missed filled permanent teeth (DMFT) and decayed filled primary teeth (dft) index studies.

### CONCLUSION

This study was the first comprehensive analysis investigating all dental services provided to WHO-indexed age groups of Syrian patients in Türkiye. According to the dental services provided to Syrian patients, the highest percentages were tooth extractions, fissure sealants, and tooth restorations for 5-, 12-, and 15-year-old, respectively.

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