

# Evaluation of Unmet Restorative Treatment Needs among Pediatric Patients of King Faisal University Dental Clinics, Saudi Arabia

Sulaiman Y Alfayz<sup>1</sup> , Mahmoud Alabdulsalam<sup>2</sup> , Abdulrahman Alabdulathim<sup>3</sup>, Ravi GR<sup>4</sup> 

## ABSTRACT

**Aim:** To evaluate unmet restorative treatment needs (URTN) among the children visiting Dental Clinics Complex (DCC), King Faisal University in Al Ahsa region of Eastern Province, Kingdom of Saudi Arabia (KSA).

**Materials and methods:** A cross-sectional study was conducted among 332 children, 3–13 years old. All the children were grouped based on dentition and gender. Details of patient history, clinical examination, radiographs, and the proposed treatment plan was accessed from Titanium patient management software to assess URTN.

**Result:** Only 37 children (11.14%) reported to be caries free while the remaining 295 children (88.16%) had one or more carious teeth which needed treatment. Unmet restorative treatment needs were higher for restorable teeth and stainless steel (SS) crown in deciduous dentition group while mixed dentition group showed higher URTN for unrestorable teeth, missing tooth due to caries, filled tooth with caries, remaining root and space maintenance. Based on gender, URTN like restorable teeth and filled tooth with caries were more among girls while missing tooth due to caries and SS crown were more among boys.

**Conclusion:** Majority of the children had untreated carious teeth. Children in the mixed dentition group showed higher URTN.

**Clinical significance:** More emphasis on addressing URTN is needed. Improving dental healthcare services to meet the oral healthcare needs, eventually promotes overall quality of life of an individual.

**Keywords:** Deciduous dentition, Mixed dentition, Unmet restorative treatment needs.

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## INTRODUCTION

Dental caries is a common public health problem all over the world, especially in children which is known to affect the well-being of individuals across all age groups.<sup>1,2</sup> It is evident from the available research that the prevalence of dental caries is more among the developing countries than in developed ones. In spite of emphasis on preventing dental caries, it still remains the most common chronic disease and a major public health concern.<sup>2,3</sup> The distribution and severity of dental caries varies in different parts of the world and within the same region or country.<sup>3</sup> In KSA, most of the studies were conducted among preschool and primary school students to estimate the prevalence of dental caries.<sup>4</sup> Khan et al. in their meta-analysis on prevalence of dental caries in Saudi population reported a high percentage of decayed, missing, and filled teeth (DMFT) in every age-group across the regions of KSA.<sup>5</sup>

Providing essential health services to children is more important as they are vulnerable due to under developed cognitive and psychomotor skills.<sup>6</sup> Many studies have reported that there is a disparity among children for every marker of health and it is worrying in terms of oral health as dental caries is the most common chronic disease of childhood.<sup>6,7</sup> It has been the most prevalent unmet health need among children in USA as nearly 25% of them live in poverty and have untreated caries.<sup>2</sup> Most of the dental caries in developing countries remains untreated.<sup>1</sup> Untreated dental caries can lead to problems with eating, speaking, and learning.<sup>2</sup> Further, the clinical consequences of untreated dental caries vary according to its severity among children all over the world.<sup>8-10</sup> Although many studies have been conducted to estimate the prevalence of dental

<sup>1-4</sup>Department of Preventive Dental Sciences, King Faisal University, Al Ahsa, Eastern Province, Saudi Arabia

**Corresponding Author:** Ravi GR, Department of Preventive Dental Sciences, King Faisal University, Al Ahsa, Eastern Province, Saudi Arabia, Phone: +91 9948444007, e-mail: gummarajuravi@gmail.com

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caries in KSA, studies estimating the unmet restorative needs are sparse. So, the present study was done to evaluate URTN among the children visiting DCC, King Faisal University in Al Ahsa region of Eastern Province, KSA.

## MATERIALS AND METHODS

### Study Design

A cross-sectional study was conducted among children 3–13 years old, visiting DCC. The study was approved by the Research Ethics Committee, Deanship of Scientific Research, King Faisal University (KFU-REC/2020-11-16 dated 23rd November 2020). Permission was obtained from the Clinical Director of DCC to retrieve the required data from Titanium patient management software. WHO oral

assessment form for children (2013) was used to assess the oral health status and treatment needs.<sup>11</sup>

### Study Population

Three hundred and fifty one children reported to the DCC between June 2020 and December 2020. Out of 351, 11 children were excluded due to age being above 13 years and six were excluded due to incomplete data. A total 332 were finally included in the study.

### Sampling

Convenience sampling was employed for selecting the subjects. The data of children who visited DCC from June 2020 to December 2020 were collected.

### Data Collection

All the children were grouped as follows: Group 1 (3–5 years: deciduous dentition) and Group 2 (6–13 years: mixed dentition). Both groups were further categorized into Group A for girls and Group B for boys. Details of patient history, clinical examination, radiographs, and the proposed treatment plan were accessed from Titanium patient management software to categorize each tooth under the following: caries—restorable, caries—unrestorable, filled with caries, missing due to caries, SS crown, space maintainer, remaining root, ulcer, fistula, and abscess. Each tooth was scored under one of the above parameters based on the condition of the tooth (Table 1). If a tooth which is unrestorable had developed abscess then it was counted for both the parameters/variables.

### Training and Calibration

All the examiners were trained to use the software and fill the WHO oral health assessment form for children (2013). A pilot study was conducted on a sample data of 15 patients to calibrate the examiners.

### Statistical Analysis

Statistical software for Social Sciences (SPSS) version 26, IBM USA was used to analyze the data. Independent t test was performed to analyze the tabulated data and *p* value less than 0.05 was considered statistically significant.

**Table 1:** Criterion used for recording unmet restorative treatment needs

Variable/Parameter	Description
Caries—restorable	Crown of the tooth is intact and can be restored with restorative materials.
Caries—unrestorable	Badly broken down tooth with poor prognosis.
Filled with caries	Filled tooth with carious lesion on the same surface or other surface.
Missing due to caries	Tooth extracted due to caries.
Stainless steel crown	Multi-surface restorations, after pulpotomy, ECC.
Space maintainer	Premature loss of primary tooth.
Remaining root	Complete loss of crown and presence of root stumps.
Ulcer	Presence of any ulcerative lesion.
Fistula	Presence of fistula.
Abscess	Presence of dentoalveolar abscess.

## RESULTS

The demographic distribution of sample based on dentition and gender is shown in Table 2. Out of 332 children, 24 were 3–5 years old (Group 1) while 308 were 6–13 years old (Group 2). Further, 170 were girls (Group A) and 162 were boys (Group B). The frequency distribution of caries among the children (Table 3) showed that, only 37 children (11.14%) reported to be caries-free while the remaining 295 children (88.16%) had one or more carious tooth which needed treatment. Further, 18 girls (10.58%) and 19 boys (11.72%) were caries free.

When the mean scores of URTN in deciduous (Group 1) and mixed dentition (Group 2) groups were studied (Table 4), the mean value for caries restorable was  $4.92 \pm 4.485$  and  $3.70 \pm 3.261$  among Group 1 and Group 2, respectively ( $p = 0.24$ ). Further, the mean value for caries unrestorable was  $0.63 \pm 1.377$  among Group 1 and  $0.85 \pm 1.511$  among Group 2 ( $p = 0.449$ ). However, none of these differences were statistically significant. On the contrary, mean values for filled with caries ( $0.00$ —Group 1;  $0.24 \pm 0.615$ —Group 2), missing due to caries ( $0.08 \pm 0.282$ —Group 1;  $0.66 \pm 1.107$ —Group 2), and remaining root ( $0.00$ —Group 1;  $0.26 \pm 0.703$ —Group 2) were statistically significant ( $p = 0.000$ ). The mean values for SS crown ( $2.00 \pm 2.750$ —Group 1;  $1.18 \pm 1.852$ —Group 2;  $p = 0.163$ ), space maintainer ( $0.17 \pm 0.381$ —Group 1;  $0.33 \pm 0.470$ —Group 2;  $p = 0.060$ ), and abscess ( $0.13 \pm 0.338$ —Group 1;  $0.14 \pm 0.438$ —Group 2;  $p = 0.843$ ) were statistically not significant. Test statistic could not be computed for ulcer and fistula as none of the children had them.

Table 5 describes the mean values of URTN based on gender (girls—Group A and boys—Group B). The mean caries restorable value was  $3.86 \pm 3.407$  and  $3.72 \pm 3.411$  among Group A and Group B, respectively ( $p = 0.692$ ). Further, the mean caries unrestorable was  $0.84 \pm 1.450$  among Group A and  $0.83 \pm 1.557$  among Group B ( $p = 0.991$ ). However, none of these differences were statistically significant. The mean values for filled with caries ( $0.27 \pm 0.686$ —Group A;  $0.17 \pm 0.480$ —Group B;  $p = 0.132$ ), remaining root ( $0.24 \pm 0.673$ —Group A;  $0.25 \pm 0.690$ —Group B;  $p = 0.812$ ) were statistically not significant. Similarly, the mean values for SS crown ( $1.19 \pm 1.833$ —Group A;  $1.29 \pm 2.045$ —Group B;  $p = 0.634$ ), space maintainer ( $0.31 \pm 0.462$ —Group A;  $0.33 \pm 0.471$ —Group B;  $p = 0.678$ ), and abscess ( $0.13 \pm 0.456$ —Group A;  $0.15 \pm 0.405$ —Group B;  $p = 0.692$ ) were also statistically not significant. On the contrary, missing due to caries ( $0.51 \pm 0.885$ —Group A;  $0.73 \pm 1.086$ —Group B) was statistically significant ( $p = 0.042$ ). Test statistic could not be computed for ulcer and fistula as none of the children had them.

## DISCUSSION

The present cross-sectional study conducted to evaluate URTN among 3–13 years old children found that majority of the children (88.16%) had at least one carious tooth. This finding corroborates with that of previous studies conducted in Saudi Arabia by Maghbool<sup>12</sup> and Khan et al.<sup>13</sup> However, another study conducted in India reported higher prevalence among primary dentition (51.2%) when compared to permanent dentition (19.5%).<sup>14</sup> To the best of our knowledge, this is the first study conducted to estimate the URTN among children in Al Ahsa. Most of the previous studies have used one or more indices like DMFT index, pulpal involvement ulceration due to trauma fistula abscess (PUFA) index, specific caries index, and unmet treatment need index.<sup>3,5,7,10,12-14</sup> However, the use of these conventional indices to estimate the restorative treatment need can lead to gross underestimation of actual restorative needs.<sup>13</sup> This could be attributed to the fact that none of these

**Table 2:** Demographic distribution of sample

Dentition	Gender		Total
	Group A: girls (N = 170)	Group B: boys (N = 162)	
Group 1—deciduous dentition (N = 24)	10 (5.88%)	14 (8.64%)	24
Group 2—mixed dentition (N = 308)	160 (94.12%)	148 (91.35%)	308
Total	170	162	332 (grand total)

**Table 3:** Frequency of caries distribution among children

Caries	Dentition				Total
	Deciduous dentition		Mixed dentition		
	Girls	Boys	Girls	Boys	
Caries free	2 (0.17%)	2 (1.23%)	16 (9.41%)	17 (10.49%)	37
Caries present	08 (4.71%)	12 (7.40%)	144 (90%)	131 (80.86%)	295
Total	10	14	160	148	332 (grand total)

**Table 4:** Unmet restorative treatment needs among deciduous and mixed dentitions

URTN	Dentition	N	Mean	Std. deviation	p value
Caries—restorable	Deciduous dentition	24	4.92	4.845	0.240
	Mixed dentition	308	3.70	3.261	
Caries—unrestorable	Deciduous dentition	24	0.63	1.377	0.449
	Mixed dentition	308	0.85	1.511	
Filled with caries	Deciduous dentition	24	0.00	0.000	0.000*
	Mixed dentition	308	0.24	0.615	
Missing due to caries	Deciduous dentition	24	0.08	0.282	0.000*
	Mixed dentition	308	0.66	1.017	
SS crown	Deciduous dentition	24	2.00	2.750	0.163
	Mixed dentition	308	1.18	1.852	
Space maintainer	Deciduous dentition	24	0.17	0.381	0.060
	Mixed dentition	308	0.33	0.470	
Remaining root	Deciduous dentition	24	0.00	0.000	0.000*
	Mixed dentition	308	0.26	0.703	
Ulcer	Deciduous dentition	24	0.00	0.000 <sup>a</sup>	Not applicable
	Mixed dentition	308	0.00	0.000 <sup>a</sup>	
Fistula	Deciduous dentition	24	0.00	0.000 <sup>a</sup>	Not applicable
	Mixed dentition	308	0.00	0.000 <sup>a</sup>	
Abscess	Deciduous dentition	24	0.13	0.338	0.843
	Mixed dentition	308	0.14	0.438	

Independent t-test \* $p < 0.05$  = significant.

a = t cannot be computed because the standard deviations of both groups are 0.

provide an insight about the restorability of the tooth to the clinician. Although classification and index for assessing the restorability of the permanent tooth are proposed, no particular classification is available for primary teeth.<sup>15-17</sup> The present study was designed to estimate the unmet restorative need specific to the tooth condition in terms of restorability and type of restorative need from the available data recorded in the patient management system.

In the present study it was observed that the unmet treatment needs was higher for restorable teeth and SS crown in deciduous dentition group than the mixed dentition group. In contrast, mixed dentition group showed higher URTN for unrestorable teeth, missing tooth due to caries, filled tooth with caries, remaining

root and space maintenance. No differences were seen between the groups with regard to abscess. None of the children had ulcer or fistula. In the present study, our observation about premature loss of teeth due to caries among children in mixed dentition age group is similar to the findings reported by Aljanakh<sup>3</sup> and Almulga<sup>18</sup> which could be attributed to higher rate of caries prevalence in the Saudi Arabia.<sup>5,19</sup> When URTN was evaluated based on gender, restorable teeth and filled tooth with caries were more among girls while missing tooth due to caries and SS crown were more among boys.

Since convenience sampling was used to determine the sample size, using the data from June 2020 to December 2020 unequal

**Table 5:** Unmet restorative treatment needs among girls and boys

URTN	Gender	N	Mean	Std. deviation	p value
Caries—restorable	Girls	170	3.86	3.407	0.692
	Boys	162	3.72	3.411	
Caries—unrestorable	Girls	170	0.84	1.450	0.991
	Boys	162	0.83	1.557	
Filled with caries	Girls	170	0.27	0.686	0.132
	Boys	162	0.17	0.480	
Missing due to caries	Girls	170	0.51	0.885	0.042*
	Boys	162	0.73	1.086	
SS crown	Girls	170	1.19	1.833	0.634
	Boys	162	1.29	2.045	
Space maintainer	Girls	170	0.31	0.462	0.678
	Boys	162	0.33	0.471	
Remaining root	Girls	170	0.24	0.673	0.812
	Boys	162	0.25	0.690	
Ulcer	Girls	170	0.00	0.000 <sup>a</sup>	Not applicable
	Boys	162	0.00	0.000 <sup>a</sup>	
Fistula	Girls	170	0.00	0.000 <sup>a</sup>	Not applicable
	Boys	162	0.00	0.000 <sup>a</sup>	
Abscess	Girls	170	0.13	0.456	0.692
	Boys	162	0.15	0.405	

Independent *t*-test \**p* < 0.05 = significant.

a = *t* cannot be computed because the standard deviations of both groups are 0.

distribution of sample among the groups based on dentition was observed while distribution of sample based on gender was almost equal. It is difficult to draw accurate comparisons with other studies owing to the differences in sampling and study design.

## CONCLUSION

Majority of the children had untreated carious teeth. Children in the mixed dentition group showed higher URTN. Moreover, in order to properly identify and assess the current dental needs of the children and to provide appropriate oral health care, studies on larger sample are recommended.

## CLINICAL SIGNIFICANCE

Unmet restorative dental needs can levy high burden on the health system at community and individual level. Therefore, more emphasis on addressing URTN is needed. Improving dental healthcare services to meet the oral healthcare needs eventually promotes overall quality of life of an individual.

## ORCID

Sulaiman Y Alfayz  <https://orcid.org/0000-0002-7697-8430>

Mahmoud Alabdulsalam  <https://orcid.org/0000-0001-6436-9673>

Ravi GR  <https://orcid.org/0000-0001-5197-7477>

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