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Original Article

Dental caries experience and treatment needs in the mixed dentition in North East Malaysia

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Abstract Dental caries is an important community dental health problem with limited studies in the mixed dentition stage. The aim of this study was to determine the caries prevalence and treatment needs among 7- 9 year old school children in Kelantan which is situated in North East Malaysia. A retrospective dental record review of fully documented dental records belonging to primary school children attending a paediatric dental clinic was conducted. Dental caries was recorded using dmft index and DMFT index for deciduous teeth and permanent teeth respectively. Three hundred and nineteen dental records of 175 (54.9%) boys' and 144 (45.1%) girls' were selected and subjected to a 'dental record study'. The prevalence of dental caries was 93% (95% CI : 89,97) in primary dentition and 50.5% (95% CI : 42.2, 58.8) in permanent teeth. Mean dmft and DMFT was 6.2(SD 3.39) and 1.04(SD 1.34) respectively. Regarding treatment needs in the primary dentition, 35.4% of teeth needed one surface filling, 34.7% needed extraction, 24.5% needed two or more surfaces filling and 5.6% needed pulp care. In the permanent dentition, 54.7% required sealants and 21.9% required one surface restoration. The caries prevalence and treatment needs were high among this study population in the mixed dentition stage, particularly showing the early involvement of newly erupted permanent teeth. It appears that high caries prevalence in the primary dentition is a risk factor for caries in newly erupted permanent teeth. Oral health promotions programmes are required in the mixed dentition stage and may reduce the risk of caries in permanent dentition.

Keywords: dental caries, mixed dentition, prevalence, school children, severity, treatment needs.

Introduction

Dental caries is a major health problem and its consequences include pain, suffering and diminished quality of life in children (Casamassimo *et al.,* 2009). A recent nationwide oral health survey of school children in Malaysia revealed a caries prevalence of 74.5% among 6-year-olds (Oral Health Division, Ministry of Health, Malaysia, 2009). Majority of the studies and national surveys on caries prevalence concentrate on age groups of 6, 12 and 16 years which allow comparison between geographical areas and countries. However, equally important is data of caries experience in the mixed dentition, a period when both primary and permanent teeth exists and last normally from 6 to 11 years. Total caries experience in this period is the sum total of dmft and DMFT recorded on the primary and permanent dentition respectively. In general, caries in the mixed dentition has not been studied widely.

Reports of caries prevalence among 6 to 11 year old in US remained unchanged at approximately 55% between 1988 and 1994 & 1999 and 2004, while caries experience increased significantly from 4.18 to 5.02 in the

same period (Dye *et al.,* 2010). In contrast, the trend among 7-year-old Belgian children showed an increase in the percentage of caries free children from 26% to 44% and a decrease in dmft from 4.1 to 2.24 from 1983 to 1996 (Vanobbergen *et al.,* 2001). Nearby in Spain, caries prevalence among 9-year-olds in primary and permanent teeth was found to be 62.8% and 49.1% respectively (Alvarez-Arenal *et al.,* 1998). In India, mixed dentition caries was prevalent in 92.11% in Chandigarh among 9 year olds (Goyal *et al.,* 2007), 67.26% in Nainital among 7 to 9 year olds (Grewal *et al.,* 2009) and 49.23% in Udaipur among 8 to 10 year old (Dhar and Bhatnagar, 2009). Caries experience ranged from 1.97 to 4.61 in the above studies in India (Dhar and Bhatnagar, 2009; Goyal *et al.,* 2007; Grewal *et al.,* 2009). Elsewhere, in Saudi Arabia, 6 to 9 year old children had a mean dmft and DFT of 4.23 and 1.85 respectively with only 26.1% being caries free (Alamoudi *et al.,* 1996). From these studies, it can be noted that caries prevalence in the mixed dentition is high and varies widely regardless of the public dental health services available.

A number of factors make the mixed dentition period particularly at risk for caries. Social factors include the start of schooling for the child that entails a new and busy schedule for the child and parent, likely to result in neglect of oral hygiene. Concurrently, the child is not dexterous in brushing teeth. The child is also free to exert independent choices regarding food and drink from the school canteen, without the parents influence. Moreover, caries in the mixed dentition is predictive of caries in the permanent dentition (Kassawara *et al.,* 2010), which makes it imperative to study this particular age group and to do the necessary intervention. Consequences of early loss of deciduous teeth due to caries in this age group can result in space discrepancies, malocclusion and periodontal problems in adulthood.

In the School of Dental Sciences, Universiti Sains Malaysia, primary school children are invited for oral health examination and provided treatment accordingly by dental students during their paediatric dentistry clinical training. Since caries prevalence in the mixed dentition has not been reported in Malaysia previously, the aim of the present study is to determine the caries prevalence and treatment needs in 7 to 9 year old school children attending the dental clinic of Universiti Sains Malaysia.

Material and methods

This is a retrospective record review study on school children attending the dental clinic, School of Dental Sciences, Universiti Sains Malaysia between July and December 2008. Dental records of children aged 7-9 years in the above period were selected for the study. Criteria for inclusion were presence of clearly recorded data, written consent given by the parent for examination and treatment and records checked and countersigned by a paediatric dental specialist. Those records not fulfilling the above criteria were excluded from the study. The selected dental records were then subjected to a 'Dental Record Study' that investigated the clinical parameters which included caries experience, dental trauma experience, malocclusion and dental treatment needs. All teeth were referred to using the FDI notation. Dental caries was recorded using the DMFT (D = decayed, M = missing, F = filled, T = teeth) and dmft (d = decayed, m= missing due to caries, f = filled, t = teeth) indices for permanent teeth and primary teeth respectively according to WHO criteria (1997). Students who examined the children were calibrated according to the above criteria during the course of their training through a lecture and multiple clinical sessions which was followed by an assessment. From the dental charting, each tooth was categorized into sound tooth, decayed tooth, filled tooth with decay, filled tooth without decay, missing tooth and tooth to be extracted, tooth with fissure

sealants, tooth with partial loss of fissure sealants with or without caries and traumatized tooth. For the treatment needs, each tooth was categorized as no treatment needed, tooth requiring preventive resin restoration, tooth requiring fissure sealant, tooth needing one surface filling, tooth needing two or more surfaces filling and tooth requiring pulp care and restoration, tooth to be extracted and children requiring space maintainer following extraction of teeth. The data from the completed forms were entered into the SPSS v12.0 (SPSS, 2003). The descriptive statistics is presented as mean (SD) and frequency (%). The difference between male and female was tested using independent *t*-test.

Results

Study sample

A total of 319 well documented dental records which were approved by the school faculty were reviewed, belonging to 175 (54.9%) boys and 144 (45.1%) girls. The total numbers of permanent and deciduous teeth examined were 2379 and 3618 respectively. The age of the children ranged from 7 to 9 years, with a mean of 8.0 (SD 0.75). The mean age of boys was 7.99 (SD 0.81) and girls was 8.04 (SD 0.86), which were not significantly different (P=0.557). The fully documented dental charts clearly revealed the following parameters.

Dental caries experience

Deciduous teeth

Three hundred children (93.0% [95% CI: 89, 97]) were found to suffer from one or more carious teeth in the deciduous dentition. The distribution of children suffering between 1 and 12 carious teeth is shown in Table 1. Table 2 shows the mean dmft scores among boys and girls. The dental status of deciduous molars in ages 7, 8 and 9 year old children are shown in Table 3, 4 and 5 respectively. Among teeth with caries, untreated caries was found in most teeth, followed by missing teeth. There were very few filled teeth. There were no significant differences in caries experience between the different types of molars.

Permanent teeth

One hundred and fifty eight children (49.5%) had no caries in the permanent teeth. Caries prevalence was 50.5% (95% CI: 42.2, 58.8). Children with caries had DMFT ranging from 0 to 8 of which 142 (44.6%) had between 1 and 3 DMFT. The distribution of DMFT scores is shown in Table 1 and the mean DMFT among boys and girls is shown in Table 2.

Table 1 Distribution of DMFT Index for deciduous and permanent teeth of study sample

dmft/ DMFT	Deciduous teeth		Permanent teeth	
	n	(%)	*n*	(%)
0	19	(6.0)	158	(49.5)
1	16	(5.0)	68	(21.3)
2	14	(4.4)	43	(13.5)
3	23	(7.2)	31	(9.7)
4	27	(8.5)	14	(4.4)
5	25	(7.8)	3	(0.9)
6	25	(7.8)	1	(0.3)
7	35	(11.0)	0	(0.0)
8	42	(13.2)	1	(0.3)
9	26	(8.2)		
10	36	(11.3)		
11	21	(6.6)		
12	10	(3.1)		
Total	319	(100)	319	(100)

Table 2 Comparison of dmft / DMFT between male and female

	dmft/ DMFT Mean (SD)	*t* stat. (*df*)[a]	*P* value[a]
Deciduous Teeth			
Male	6.5 (3.30)	0.91 (317)	0.366
Female	6.2 (3.35)		
Permanent Teeth			
Male	1.1 (1.36)	0.66 (317)	0.510
Female	1.0 (1.33)		

[a] Independent *t*-test.

Percentage of each permanent tooth affected

The total number of each permanent tooth present and the percentage of caries affecting each of these teeth are

shown in Figure 1. Caries rates on 45, 14 and 44 were found to be 22.6%, 14.5% and 10.8% respectively. More numbers of lower first permanent molars (19.1%) were carious when compared to upper first permanent molars (12.3%).

Teeth with fissure sealants

There were no teeth showing presence of fissure sealants, either complete or partial, with or without caries.

Teeth affected with trauma

Traumatized teeth were detected in three children involving two (0.7%) maxillary right central incisors and three (1.1%) maxillary left central incisors.

Treatment needs

Deciduous teeth

A total of 3,618 deciduous teeth were recorded among the 319 children, of which 1,989 teeth needed various forms of treatment. The various treatment needs in the deciduous dentition is shown in Table 6. It was found that 35.4% required one surface restoration, 24.7% required extraction and 24.5% required two surface restorations.

Permanent teeth

From a total of 2379 permanent teeth among 319 children, 514 teeth were found to require treatment. The treatment needs in the permanent dentition is shown in Table 7. Fissure sealant was required in 54.7% of the teeth while 21.9% of teeth required one surface restoration.

Other treatment needs

With regard to the conditions that required orthodontic treatment, (13.4%) children suffered from problems related to crowding (9.7%), increased overjet and open bite (2.5%) and spacing (1.2%).

Table 3 Dental status of 8 deciduous teeth among 7 years old students

n	No. (%)					
	0	1	2	3	4	5
D55 85	21 (24.7)	59 (69.4)	0 (0.0)	2 (2.4)	3 (3.5)	0(0.0)
D54 84	30 (35.3)	48 (56.5)	1 (1.2)	1 (1.2)	4 (4.7)	0(0.0)
D65 86	19 (22.4)	53 (62.4)	2 (2.4)	4 (4.7)	8 (9.4)	0(0.0)
D64 84	22 (25.9)	52 (61.2)	1 (1.2)	3 (3.5)	6 (7.1)	0(0.0)
D75 86	11 (12.9)	57 (67.1)	1 (1.2)	5 (5.9)	11 (12.9)	1(1.2)
D74 85	16 (18.8)	62 (72.9)	1 (1.2)	4 (4.7)	2 (2.4)	0(0.0)
D85 86	14 (16.5)	51 (60.0)	2 (2.4)	3 (3.5)	16 (18.8)	0(0.0)
D84 85	15 (17.6)	54 (63.5)	1 (1.2)	4 (4.7)	11 (12.9)	0(0.0)

Dental Status: 0=Sound; 1=Decayed; 2=Filled with decay; 3=Filled without decay; 4=Missing due to caries 5= Pulp care and restoration.

Table 4 Dental status of 8 deciduous teeth among 8 years old students

n	No. (%)				
	0	1	2	3	4
D55 134	40 (29.9)	73 (54.5)	2 (1.5)	7 (5.2)	12 (9.0)
D54 128	40 (31.3)	71 (55.5)	1 (0.8)	4 (3.1)	12 (9.4)
D65 130	29 (22.3)	81 (62.3)	2 (1.5)	5 (3.8)	13 (10.0)
D64 128	26 (20.3)	75 (58.6)	0 (0.0)	5 (3.9)	22 (17.2)
D75 133	22 (16.5)	80 (60.2)	2 (1.5)	6 (4.5)	23 (17.3)
D74 132	24 (18.2)	79 (59.8)	2 (1.5)	7 (5.3)	20 (15.2)
D85 126	30 (23.8)	69 (54.8)	1 (0.8)	3 (2.4)	23 (18.3)
D84 127	19 (15.0)	85 (66.9)	1 (0.8)	8 (6.3)	14 (11.0)

Dental Status: 0=Sound; 1=Decayed; 2=Filled with decay; 3=Filled without decay; 4=Missing due to caries.

Table 5 Dental status of 8 deciduous teeth among 9 years old students

n	No. (%)				
	0	1	2	3	4
D55 63	20 (31.7)	34 (53.9)	1 (1.6)	6 (9.5)	2 (3.1)
D54 46	14 (30.4)	30 (65.2)	0 (0.0)	1 (2.2)	2 (4.3)
D65 67	21 (31.3)	41 (61.2)	1 (1.5)	1 (1.5)	3 (4.5)
D64 51	12 (23.5)	23 (45.0)	0 (0.0)	1 (2.0)	4 (7.8)
D75 62	16 (25.8)	36 (58.0)	1 (1.6)	2 (3.2)	7 (11.2)
D74 63	9 (14.3)	34 (54.0)	1 (1.6)	4 (6.3)	5 (7.9)
D85 60	12 (20.0)	36 (60.0)	0 (0.0)	3 (5.0)	9 (15.0)
D84 54	15 (27.8)	28 (51.9)	0 (0.0)	4 (7.4)	7 (13.0)

Dental Status: 0=Sound; 1=Decayed; 2=Filled with decay; 3=Filled without decay; 4=Missing due to caries.

Table 6 Treatment needs of deciduous teeth

Tooth no.	n	Treatment needs for standing deciduous teeth, n (%)							
		NTR	1	2	3	4	5	6	7
55	282	100	3 (1.06)	1 (0.00)	57 (20.21)	49 (17.37)	20 (7.09)	38 (13.47)	14 (4.96)
54	259	96	1 (0.00)	0 (0.00)	40 (15.44)	58 (22.39)	9 (3.47)	41 (15.83)	14 (5.40)
53	285	172	0 (0.00)	0 (0.00)	86 (16.14)	10 (3.50)	0 (0.00)	16 (5.61)	0 (0.00)
52	112	56	0 (0.00)	0 (0.00)	38 (33.92)	3 (2.67)	0 (0.00)	14 (12.5)	0 (0.00)
51	28	7	0 (0.00)	0 (0.00)	10 (35.71)	2 (7.14)	0 (0.00)	9 (32.14)	0 (0.00)
61	29	6	1 (3.44)	0 (0.00)	9 (31.03)	3 (10.34)	0 (0.00)	10 (34.48)	0 (0.00)
62	103	55	0 (0.00)	0 (0.00)	26 (25.24)	4 (3.88)	0 (0.00)	18 (17.47)	0 (0.00)
63	289	175	0 (0.00)	0 (0.00)	88 (30.44)	8 (2.76)	1 (0.34)	16 (5.53)	0 (0.00)
64	252	83	1 (0.00)	0 (0.00)	36 (14.28)	61 (24.20)	12 (4.76)	40 (15.87)	19 (7.53)
65	283	88	0 (0.00)	0 (0.00)	67 (23.67)	48 (16.96)	18 (6.36)	46 (16.25)	15 (5.30)
75	281	69	6 (0.02)	0 (0.00)	41 (14.59)	47 (16.72)	22 (7.82)	62 (22.06)	34 (12.09)
74	271	71	1 (0.00)	0 (0.00)	46 (16.97)	71 (26.19)	12 (4.42)	50 (18.45)	20 (7.38)
73	266	210	1 (0.00)	0 (0.00)	42 (15.78)	6 (2.25)	0 (0.00)	7 (2.63)	0 (0.00)
72	44	40	0 (0.00)	0 (0.00)	1 (2.27)	0 (0.00)	0 (0.00)	3 (6.81)	0 (0.00)
71	7	5	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (28.57)	0 (0.00)
81	6	4	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (33.33)	0 (0.00)
82	36	33	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (8.33)	0 (0.00)
83	250	200	0 (0.00)	0 (0.00)	38 (15.20)	6 (2.40)	0 (0.00)	5 (2.00)	0 (0.00)
84	264	75	2 (0.01)	0 (0.00)	39 (14.77)	70 (26.51)	11 (4.16)	46 (17.42)	21 (7.95)
85	271	84	5 (0.02)	0 (0.00)	40 (14.76)	41 (15.13)	7 (2.58)	64 (23.61)	30 (11.07)
Total	3618	1629	21(0.01)	1 (0.00)	704 (19.45)	487 (13.46)	112 (30.95)	492 (13.59)	167 (4.61)

Treatment need: NTR = No Treatment Required; 1= PRR; 2= Fissure sealant; 3= One surface restoration 4= Two surface restoration; 5= Pulp care and restoration; 6= Extraction; 7=Space maintainer.

Table 7 Treatment needs of permanent teeth

Tooth no.	n	Treatment needs for standing permanent teeth, n (%)						
		NTR	1	2	3	4	5	6
16	297	202	15 (0.63)	63 (2.65)	16 (0.67)	0 (0.00)	1 (0.04)	0 (0.00)
15	26	24	0 (0.00)	0 (0.00)	1 (0.00)	0 (0.00)	0 (0.00)	1 (0.04)
14	48	41	1 (0.04)	0 (0.00)	2 (0.08)	4 (0.17)	0 (0.00)	0 (0.00)
12	153	152	0 (0.00)	0 (0.00)	1 (0.04)	0 (0.00)	0 (0.00)	0 (0.00)
11	273	266	0 (0.00)	0 (0.00)	7 (0.29)	0 (0.00)	0 (0.00)	0 (0.00)
21	271	265	0 (0.00)	0 (0.00)	5 (0.21)	1 (0.04)	0 (0.00)	0 (0.00)
22	162	160	0 (0.00)	0 (0.00)	2 (0.08)	0 (0.00)	0 (0.00)	0 (0.00)
24	57	52	0 (0.00)	0 (0.00)	2 (0.08)	3 (0.13)	0 (0.00)	0 (0.00)
25	23	22	1 (0.04)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
26	304	188	17 (0.71)	78 (3.28)	21 (0.88)	0 (0.00)	0 (0.00)	0 (0.00)
36	310	188	28 (1.18)	66 (2.77)	27 (1.13)	1 (0.04)	0 (0.00)	0 (0.00)
35	21	20	0 (0.00)	1 (0.04)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
34	2	2	1 (0.04)	0 (0.00)	1 (0.04)	0 (0.00)	0 (0.00)	0 (0.00)
33	25	24	0 (0.00)	0 (0.00)	1 (0.04)	0 (0.00)	0 (0.00)	0 (0.00)
43	29	28	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.04)	0 (0.00)	0 (0.00)
44	37	32	1 (0.04)	1 (0.04)	1 (0.04)	2 (0.08)	0 (0.00)	0 (0.00)
45	31	23	2 (0.08)	1 (0.04)	1 (0.04)	4 (0.17)	0 (0.00)	0 (0.00)
46	310	176	34 (1.43)	71 (2.98)	26 (1.09)	2 (0.08)	1 (0.04)	0 (0.00)
Total	2379	1865	100 (4.20)	281 (11.81)	114 (4.87)	18 (0.75)	2 (0.08)	1 (0.04)

Treatment need: NTR = No Treatment Required; 1= PRR; 2= Fissure sealant; 3= One surface restoration 4= Two surface restoration; 5= Pulp care and restoration; 6= Extraction

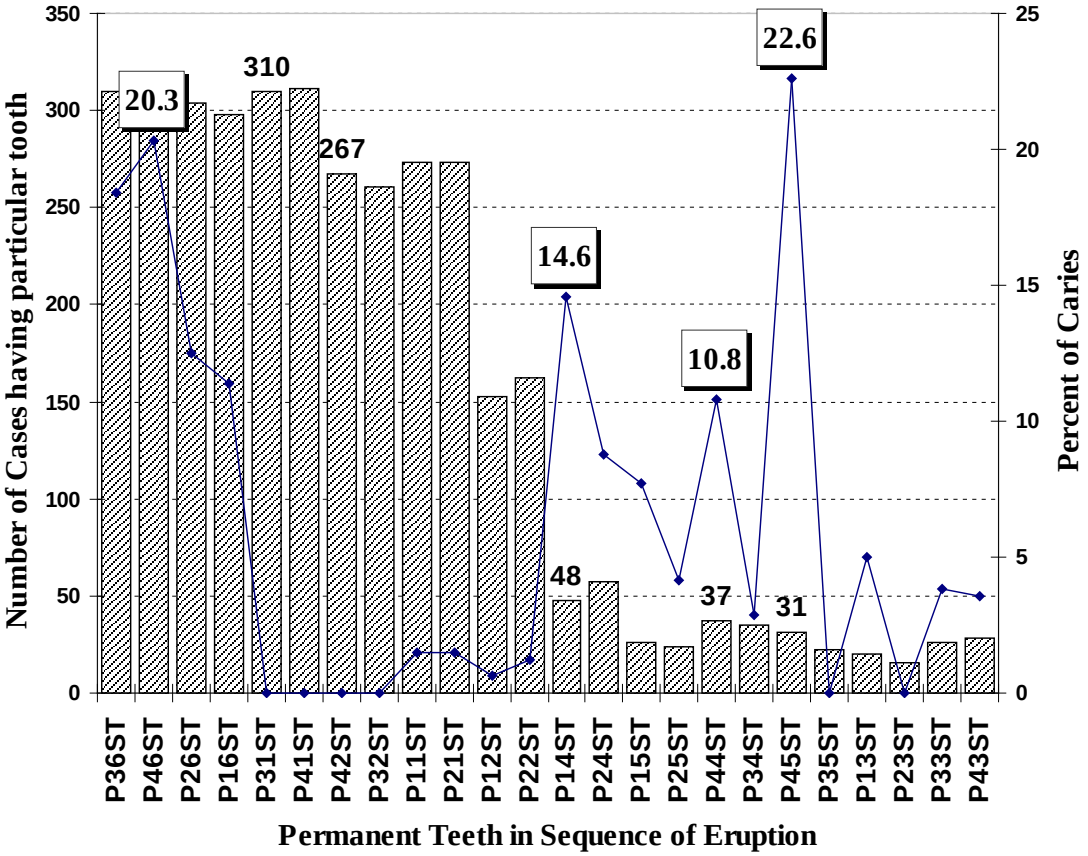

Figure 1 Number of each permanent tooth and percentage affected by caries.

Discussion

The high caries prevalence of 93% in deciduous teeth among the school children of this study is comparable to the caries prevalence among 6-year-old school children in Kelantan, Malaysia reported in the last two national oral health surveys, which were 94.7% and 95.6% respectively (Oral Health Division, Ministry of Health, Malaysia, 1998; Oral Health Division, Ministry of Health, Malaysia, 2009). The dental caries experience among children in this study is reflected in the dmft and DMFT scores which were 6.1 and 1.04 respectively. The latest national oral health survey among 6-year- olds in Kelantan revealed the highest dmft scores in Malaysia, which was 9.2 (Oral Health Division, Ministry of Health, Malaysia, 2009). The slightly lower figure in this study is likely to be due to the difference in age group studied, as more number of deciduous teeth may have exfoliated at the time of examination of the children in this study. One of the reasons for the high caries experience is the lack of water fluoridation in this region which was discontinued in 1995, while the rest of the country continues to benefit from water fluoridation (Oral Health Division, Ministry of Health, Malaysia, 2006). Other reasons for the high caries experience may be unhealthy eating habits which are found to increase in children (Dye *et al.,* 2010) and poor oral hygiene practices (Martens *et al.,* 2004). When compared with other studies of mixed dentition caries, this study is comparable to some parts of India (Goyal *et al.,* 2007), but reveals a higher caries prevalence than other studies (Alamoudi *et al.,* 1996; Alvarez-Arenal *et al.,* 1998; Dye *et al.,* 2010; Vanobbergen *et al.,* 2001).

Overall, studies show that caries in the mixed dentition is higher than that in 6 and 12 year age groups (Dye *et al.,* 2010; Goyal *et al.,* 2007). This is because caries in the 6-year-old and 12-year-old primarily reflects the status of the primary and

permanent dentition respectively. However, in the mixed dentition, the remaining deciduous teeth tend to develop caries due to the cumulative nature of the disease, while newly erupting permanent teeth are highly susceptible to caries during this period. Newly erupting teeth are known to have higher carbonate content in dental enamel, which causes changes in the hydroxyapatite crystal lattice, resulting in a more acid-susceptible enamel surface (Kassawara *et al.,* 2010). In addition, erupting teeth have no functional occlusal contact, which increases the likelihood of dental biofilm accumulation and hinder tooth brushing (Kassawara *et al.,* 2010). Caries experience in the deciduous molars has also been found to accelerate the emergence of the premolars by 2-8 months (Leroy *et al.,* 2003). These factors are likely to explain premature presence of premolars in these children and the high rate of caries in the newly erupted premolars and molars found in this study (Figure 1). A number of additional risk factors contribute to the high rate of caries in the first permanent molars, such as being the most posterior tooth in the oral cavity in the mixed dentition period, inadequate dexterity of brushing of the child at the age of its eruption, and having deeper pits and fissures than primary teeth. In a longitudinal study, caries in the permanent dentition was found to triple over 18 months, suggesting that caries in the first permanent molars in the mixed dentition may afford a reasonably, precise, simple and economic clinical screening tooth for identify children likely to develop new caries (Vallejos-Sánchez *et al.,* 2006). In this study, about 20% of lower first permanent molars were carious (Figure 1), which indicates that these children are clearly at higher risk for caries in the permanent dentition. The caries rate for the proximal surface of the first permanent molar was found to be 15 times higher if the distal surface of the second primary molar had developed enamel/ enamel-dentin border caries compared to a radiographically sound tooth (Leroy *et al.,* 2005; Mejàre *et al.,* 2001). Since dmfs was not recorded in this study, effect of caries on the distal surface of second deciduous molars on the mesial surface of first permanent molar could not be appreciated.

A major concern of high caries prevalence in the mixed dentition is the high risk for caries in the permanent dentition. It has been found that children with DMFT and dmft>0 were significantly more prone to develop caries in the permanent dentition, when compared to caries-free children in both dentitions (Kassawara *et al.,* 2010).

The treatment needs in this study were high, with deciduous dentition mostly requiring one or two surface restoration or extraction (Table 6). There was also a need for space maintenance (8.3%) and pulp care (5.6%). However, the permanent dentition required more preventive treatment like pit and fissure sealants (54.7%) and PRR (25.3%) and some restorative treatment like one surface restoration (21.9%). Hence, these children may need to seek dental treatment during school hours, or have a lower quality of life. The need for prevention in the deciduous dentition is great in these children. The exceptional high caries prevalence is a likely cause for the unmet treatment needs. Other contributing factors include poor knowledge and attitude among parents towards health of deciduous teeth, which has been noted elsewhere (Szatko *et al.,* 2004).

Conclusion

The prevalence of dental caries and treatment needs in a community is useful for health care planners to identify resources needed for dental services in the community and to provide preventive and curative services to combat dental health problems. It is clear from this study that the treatment needs are high and prevention should play a large role in controlling the widespread dental caries problem in this part of the world. Moreover, since oral disease has been shown to affect school attendance and results in days with restricted activities (Casamassimo *et al.,* 2009); emphasis should be on planning for an oral health promotion programme in schools as early as the mixed dentition stage.

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