

# Prevalence and Pattern of Dental Caries and Their Association with Age and Gender in Preschool Children: An Observational Study

Vinay Kumar Srivastava

## ABSTRACT

**Context:** Dental caries is the most common oral disease in preschool children. It is considered to be due to multifactorial etiology, affecting primary molars with various caries patterns.

**Aim:** The aim of the study was to determine prevalence and patterns of dental caries in primary molars of preschool children. Prevalence and patterns of dental caries were correlated with age and gender.

**Settings and design:** The study design adopted was analytical observational study.

**Materials and methods:** Caries examination was done using plain mouth mirror, probe, and tweezers with cotton pellets under standardized environment. Children's age was measured in years, and the age in years and months were merged with nearest round off number.

**Statistical analysis used:** Obtained data were subjected to statistical analysis using SPSS software. Test for significance was done with the help of Chi-square test.

**Results:** In Maxilla, max. rt 2nd molars ( $p$  value = 0.036), max rt 1st molars ( $p$  value = 0.035), max Lt 1st primary molars (0.095), and max Lt 2nd primary molars ( $p$  value = 0.005) showed significantly different caries patterns at different ages of preschool children, while no significant differences were observed in caries patterns in male and female gender. In mandible, man. Lt 2nd primary molars ( $p$  value = 0.005), and man. rt 2nd primary molars ( $p$  value = 0.004) showed significantly different caries patterns in different ages of preschool children, while Mand. Lt 1st primary molars ( $p$  value = 0.389) and Mand. Rt 1st primary molars ( $p$  value = 0.272) showed nonsignificant differences in caries patterns with different ages of preschool children. A nonsignificant difference in caries patterns was noted in male and female gender.

**Conclusion:** Mandibular primary molars were more vulnerable for caries development when compared to maxillary primary molars in preschool children. The number of caries patterns present in mandibular and maxillary primary molars, were as follows: Mn. Rt 1st PM > Mn. 1st Lt PM & max Lt 1st PM > max Lt 2nd PM and max rt 1st PM > Mn. Rt 2nd PM > Mn. Lt 2nd PM > max rt 2nd PM.

**Keywords:** Pattern of dental caries, Prevention of dental caries, Primary molars.

*International Journal of Clinical Pediatric Dentistry* (2020): 10.5005/jp-journals-10005-1803

## INTRODUCTION

Children are prone to development of dental caries, especially during eruption stage, because of less mineralized enamel. Children are also not very keen to oral hygiene practice. This behavior also plays an important role in the development of dental caries. World Health Organization reported 60–70% prevalence of dental caries in children.<sup>1</sup> The need of the study is to find out the patterns and areas or surfaces of the teeth most susceptible to caries development in the primary molars. If we know the susceptible areas and progression pattern of caries, then we could take preventive measures accordingly. In this study, pattern of dental caries in primary molars have been studied in preschool age. Different strategies for prevention of dental caries in preschool children was formed by government using water and salt fluoridation, dental health education program, and school oral health program. In this study, we find out the percentage of different caries patterns and progression in primary molars in preschool children aged 3, 4, 5, and 6 years in association with male and female gender.

## MATERIALS AND METHODS

The present study was done to identify the pattern of dental caries in preschool children aged between 3 and 6 years. Children with

Department of Pedodontics and Preventive Dentistry, Faculty of Dental Sciences, IMS, Banaras Hindu University, Varanasi, Uttar Pradesh, India

**Corresponding Author:** Vinay Kumar Srivastava, Department of Pedodontics and Preventive Dentistry, Faculty of Dental Sciences, IMS, Banaras Hindu University, Varanasi, Uttar Pradesh, India, Phone: +91 9415087360, e-mail: dr.vinaypedo@gmail.com

**How to cite this article:** Srivastava VK. Prevalence and Pattern of Dental Caries and Their Association with Age and Gender in Preschool Children: An Observational Study. *Int J Clin Pediatr Dent* 2020;13(5):442–450.

**Source of support:** Nil

**Conflict of interest:** None

any systemic disease, special need children, and erupted permanent teeth were excluded from the study. Ethical clearance was obtained from the institution, and signed written consent was taken from parents/caretaker of the children participating in the study. Data were collected from children aged 3–6 years who visited the Faculty of Dental Sciences, IMS BHU Varanasi, India. Caries patterns were recorded, and all the children were examined under standardized environment by qualified examiners. Children's age was measured

in years, and age in years and months was merged to nearest round off number.<sup>2</sup>

Caries examination was done using plain mouth mirror, probe, and tweezers with cotton pellets just to clean the tooth surfaces before recording, under optimal light source. Each tooth surface was scored independently. No radiographic examination was done. In all, 28 caries patterns were recorded in the primary molars of preschool-aged children.

Chi-square test was done to compare the study population to age and gender. Student's *t* test was used to compare the data between males and females. Sample size of the study was  $N = 900$ , males 56.7% and females 43.3%.

## RESULTS

### Prevalence and Caries Pattern in Maxillary Rt 2nd Primary Molar (Table 1)

Eight pattern of carious lesions was detected. 47.3% of the evaluated Rt 2nd primary molars had no caries (means 52.7% molars were carious), while 22.7% of evaluated molars had occlusal caries at preschool age. Highest prevalence of occlusal caries was observed at 5 and 6 years of age, and minimum prevalence of caries was seen at 3 years of age. The second most common caries pattern was mesial caries that occupied 11% of evaluated primary 2nd Rt molars. The prevalence of mesial caries pattern was highest seen at the age of 3 years followed by 4, 6, and 5.

The third most common caries pattern in Rt 2nd primary molars is mesio-occlusal caries that occupied 9% of total evaluated Rt primary 2nd molar. Prevalence of mesio-occlusal caries pattern was highest at the age of 5, followed by 6, 3, and 4 years. Others caries are mesio-lingual distobuccal caries occupying 5% of total evaluated caries, with maximum prevalence of caries at 4 years of age, followed by 6 and 5 years. This pattern was not detected at 3 years of age. Buccal caries and mesiobuccal-occlusal caries prevalence was 2% each of total evaluated the caries. Maximum prevalence of buccal caries was observed at 3 years of age followed by 4 and 6 years. This pattern was not detected at 5 years of age. Highest prevalence of mesiobucco-occlusal caries was noted at 3 years of age followed by 6 years and 5 years. This pattern was not detected at 4 years of age.

Prevalence of bucco-occlusal and mesio-linguo-bucco-occlusal caries is 0.7% and 0.3%, respectively. Highest prevalence of bucco-occlusal caries was observed at 5 years of age. This pattern was not detected at 3, 4, and 6 years age-group. Highest prevalence of mesio-linguo-bucco-occlusal caries pattern was observed at 4 years of age. This pattern was not detected at 3, 5, and 6 years of age. *p* value is 0.036. A significant difference in caries pattern and prevalence was observed at different age of preschool children, while no significant differences were found in male and female gender.

### Prevalence and Caries Pattern in Maxillary Rt 1st Primary Molar (Table 2)

Thirteen carious patterns were detected and more caries patterns and prevalence were seen in 1st Rt primary 1st molar when compared to maxillary Rt 2nd primary molar. It means that tooth surfaces of Rt 1st primary molar were more susceptible to caries when compared to the max. rt 2nd primary molar.

In all, 45% of total evaluated maxillary Rt 1st primary molars had no caries (meaning 55% of the molars were carious in preschool children). The occlusal caries predominates in Rt 1st primary molars in 3, 4, 5, and 6 years of age, which occupied 18% of total evaluated the molars. Highest prevalence was observed at 3 years followed by 4, 6, and 5 years of age. Distal caries and mesio-lingual-distobuccal occlusal caries present 8.7% each of total evaluated caries in preschool children. Prevalence of distal caries was highest in 5 years of age and 3 years of age, while prevalence of mesiolingual-disto-buccal occlusal caries pattern was highest at 4 years of age. Disto-occlusal caries pattern and prevalence were seen in 6.7% of evaluated molars in preschool children. Its occurrence is highest in 5 years of age followed by 6, 4, and 3 years.

Prevalence of mesial caries pattern was present in 1% of the total evaluated primary 1st Rt molars, with highest prevalence of mesial caries present at 3 years of age. Prevalence of buccal caries pattern was 4.7 % of total evaluated Rt primary 1st molars, and highest prevalence was seen at 3 years of age. Others caries patterns were also seen, such as mesio-occlusal caries, mesio-bucco-occlusal caries, mesio-disto-occlusal caries, disto-bucco-occlusal caries, bucco-occlusal caries, mesio-disto-bucco-occlusal caries, and mesio-lingual-bucco-occlusal caries, with respective percentages

**Table 1:** Age, gender-wise prevalence and pattern of caries in maxillary right second primary molar

Pattern of caries (Max. Rt 2nd pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 years		Male	Female
No caries, % within age	58.8	47.9	40.2	44.2	47.3	48.8	45.4
Mesial caries, % within age	14.7	12.3	8.5	9.1	11	10.6	11.5
Buccal caries, % within age	4.4	2.7	0.0	1.3	2	1.8	2.3
Occlusal caries, % within age	13.2	23.3	26.8	26	22.7	22.9	22.3
Mesio-occlusal caries, % within age	4.4	4.1	15.9	10.4	9	8.2	10
Mesio-bucco-occlusal, % within age	4.4	0.0	1.2	2.6	2	0.0	4.6
Mesio lingual-distobuccal-occlusal, % within age	0.0	8.2	4.9	6.6	5	6.5	3.1
Bucco-occlusal, % within age	0.0	0.0	2.4	0.0	0.7	1.2	0.0
Mesiolingual bucco-occlusal, % within age	0.0	1.4	0.0	0.0	0.3	0.0	0.8
Total	100	100	100	100	100	100	100
Total % within Max. Rt 2nd pri. molar (N = 900)	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 37.78, p = 0.036$ (S)				$\chi^2 = 13.01, p = 0.112$ (NS)		

**Table 2:** Age, gender-wise prevalence and pattern of dental caries in maxillary right 1st primary molar

Pattern of caries (Max. Rt 1st pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	32.4	47.9	46.3	51.9	45.0	46.5	43.1
Mesial caries, % within age	4.4	0.0	0.0	0.0	1.0	1.2	0.8
Distal caries, % within age	10.3	8.2	11	5.2	8.7	5.3	13.1
Buccal caries, % within age	11.8	4.1	1.2	2.6	4.7	4.1	5.4
Occlusal caries, % within age	23.5	19.2	13.4	16.9	18.0	20.6	14.6
Mesio-occlusal caries, % within age	4.4	0.0	1.2	3.9	2.3	1.8	3.1
Mesio-bucco-occlusal caries, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Mesio-distal-occlusal caries	0.0	0.0	1.2	1.6	0.7	0.6	0.8
Mesio lingual-distal-buccal occlusal caries, % within age	4.4	13.7	7.3	9.1	8.7	7.6	10.0
Distal-occlusal caries, % within age	2.9	5.5	11	6.5	6.7	7.1	6.2
Distal-buccal occlusal caries, % within age	1.5	0.0	0.0	0.0	0.3	0.0	0.8
Bucco-occlusal, % within age	2.9	0.0	3.7	0.0	1.7	1.8	1.5
Mesio-distal-buccal occlusal caries, % within age	1.5	0.0	1.2	0.0	0.7	1.2	0.0
Mesiolingual bucco-occlusal, % within age	0.0	1.4	1.2	2.6	1.3	1.8	0.8
Total	100	100	100	100	100	100	100
Total % within Max. Rt 1st Pri. molar (n = 900)	22.7	24.3	27.3	25.7	100	56.7	43.35

 $\chi^2 = 56.498, p = 0.035$  (S) $\chi^2 = 12.486, p = 0.488$  (NS)

of 2.3%, 0.3%, 0.7%, 0.3%, 1.7%, 0.7%, and 1.3% of total evaluated 1st Rt primary molars of preschool children. Caries patterns and prevalence of Rt 1st primary molars were significantly different with different age-group, ( $p$  value = 0.035), while no significant difference in caries pattern and prevalence was observed in male and female gender ( $p$  value = 0.488).

### Prevalence and Caries Pattern in Maxillary Left 1st Primary Molar (Table 3)

Fifteen carious patterns were detected. 49.3% left 1st primary molars showed no caries in preschool children (meaning 50.7% was carious). Prevalence of occlusal caries pattern was 16.3% in the evaluated molars of preschool-aged children. Maximum occlusal caries prevalence was present at the age of 3 years, followed by 5 years, 6 years, and 4 years. Another caries pattern was distal caries that counted 10.7% of the evaluated molars. Minimal prevalence of distal caries pattern found at 3 years of age, and prevalence of carious percentage at 4, 5, and 6 years was almost equal.

Prevalence of mesiolingual-distal-buccal-occlusal caries patterns was 6.3% of total evaluated primary left 1st molars of preschool-aged children. This pattern of caries least affected the molars at 3 years of age and showed maximum effect at 6 years of age. Prevalence of distal-occlusal patterns were present in 4% of total evaluated left 1st primary molars, and maximum prevalence of distal-occlusal pattern was present at 4 years of age followed by 3, 5, and 6 years. Prevalence of mesio-occlusal caries pattern was counted 3% of total evaluated Lt primary 1st molars. Its prevalence was minimum at 4 years of age and maximum at 6 years of age. Prevalence buccal caries pattern was 2.7 % of total evaluated primary left 1st molars in preschool children. Maximum prevalence of buccal caries was present at the age of 3 years followed by 4, 5, and 6 years.

Prevalence of bucco-occlusal caries pattern accounted for 2% of total evaluated maxillary left 1st primary molars. The prevalence of bucco-occlusal caries was highest at the age of 3 years. Mesial caries pattern and mesio-bucco-occlusal caries pattern counted 1.7% of total evaluated maxillary Lt 1st primary molars in preschool children. The prevalence of mesial caries pattern was highest at the age of 3 years followed by 6, 5, and 4 years. The Prevalence of mesio-buccal occlusal caries pattern was highest at 5 years followed by 6 years, and these caries patterns were not detected at 3 and 4 years. Prevalence of mesio-distal-occlusal caries pattern accounted for 0.7% of total evaluated maxillary Lt 1st primary molars, and this pattern was highest at 3 and 6 years of age, and this caries pattern was not detected at 4 and 5 years of age. Prevalence of mesiodistal, linguodistal-buccal-occlusal, distal-buccal caries, distal-bucco-occlusal caries, and mesio-distal-buccal caries patterns was counted as 0.3% each of total evaluated maxillary Lt 1st primary molars. Prevalence of mesiodistal caries, and linguo-distal-buccal occlusal patterns were highest at the age of 5 years, and these patterns were not detected at the age of 3, 4, and 6 years. Distal-buccal caries and distal-bucco occlusal pattern were highest at the age of 4 years, and this pattern was not detected at 3, 5, and 6 years of age. Prevalence of mesio-distal-buccal caries pattern was highest at the age of 6 years. This pattern was not detected at the age of 3, 4, and 5 years.  $p$  value is 0.095. A significant difference in prevalence of caries pattern was observed at different ages of preschool children, while no significant differences were found in prevalence carious pattern in male and female gender ( $p$  value = 0.219).

### Prevalence and Caries Pattern in Maxillary Left 2nd Primary Molars (Table 4)

Thirteen carious patterns were detected in maxillary left 2nd primary molars of preschool children. Of the evaluated maxillary

**Table 3:** Age, gender-wise prevalence and pattern of dental caries in maxillary left 1st primary molar

Pattern of caries (Max. Lt 1st Pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	39.7	56.2	50.0	56.6	49.3	48.2	50.8
Mesial caries, % within age	4.4	0.0	1.2	1.3	1.7	0.6	3.1
Distal caries, % within age	8.8	11.0	11.0	11.7	10.7	10.6	10.8
Buccal caries, % within age	8.8	1.4	1.2	0.0	2.7	2.9	2.3
Occlusal caries, % within age	22.1	12.3	15.9	15.6	16.3	17.6	14.6
Mesio-occlusal caries, % within age	2.9	1.4	3.7	3.9	3.0	4.1	1.5
Mesiodistal caries, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Mesio-bucco-occlusal % within age	0.0	0.0	3.7	2.6	1.7	0.6	3.1
Mesio-distal-occlusal	1.5	0.0	0.0	1.3	0.7	0.0	1.5
Mesio-lingual disto-buccal occlusal, % within age	1.5	8.2	6.1	9.1	6.3	7.1	5.4
Linguo-distobucco occlusal, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Disto-occlusal, % within age	4.4	6.8	3.7	1.3	4.0	4.7	3.1
Disto-buccal caries, % within age	0.0	1.4	0.0	0.0	0.3	0.6	0.0
Disto-bucco-occlusal caries, % within age	0.0	1.4	0.0	0.0	0.3	0.6	0.0
Bucco- occlusal, % within age	5.9	0.0	1.2	1.3	2.0	0.6	3.8
Mesio-distal-buccal caries, % within age	0.0	0.0	0.0	1.3	0.3	0.6	0.0
% within Max. Lt Pri.1st molar	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 57.807, p = 0.095$ (NS)				$\chi^2 = 18.895, p = 0.219$ (NS)		

left 2nd primary molars of preschool children, 52.3% showed no caries (meaning 47.7% molars were carious). Prevalence of occlusal caries occupied 19% of total evaluated maxillary Lt 2nd primary molars, while highest prevalence of occlusal caries was detected at 5 years of age followed by 6 years, 4 years, and lowest at 3 years of age. Mesial caries was second predominant caries and accounted for 11.3% of total evaluated caries. The prevalence of mesial caries was highest at 3 years of age followed by 4, 6, and 5 years.

Prevalence of mesio-occlusal caries counted 6.3% of total evaluated Mx. LT. 2nd primary molars. Highest prevalence of the mesio-occlusal caries was detected at 4 years of age followed by 6, 5, and 3 years. Prevalence of mesio linguo-distal-buccal-occlusal caries pattern accounted for 4% of total evaluated Mx. Lt 2nd primary molars. Highest prevalence of the caries was present at 6 years followed by 4 and 5 years of age. No mesio linguo-distal-buccal-occlusal caries pattern was detected at 3 years of age. Buccal caries pattern counted only 2% of total evaluated Mx. Lt 2nd primary molars, with highest prevalence detected at 3 years of age followed by 4 years. Buccal caries pattern was not detected at 5 and 6 years of age.

Mesio-bucco-occlusal caries and mesio-linguo-bucco-occlusal caries were counted only 1.3% each, of total evaluated Mx. Lt 2nd primary molars. Highest prevalence of mesio-bucco-occlusal caries pattern was present at 5 years followed by 4 years of age. This caries pattern was not detected at 3 years and 6 years of age. The highest prevalence of mesio-lingual-bucco-occlusal caries pattern was detected at 5 years followed by 6 years of age. This pattern was not detected at 3 and 4 years of age.

Prevalence of bucco-occlusal pattern of caries was counted 0.7 % of total evaluated Mx. Lt 2nd primary molars. This pattern was detected at 3 and 6 years of age only. Prevalence of mesio-buccal caries, mesiodisto-occlusal caries, disto-occlusal caries, disto-bucco-occlusal caries, and mesio-distobucco-occlusal caries pattern were 0.3 % each of total evaluated Mx. Lt 2nd primary molars. Mesio-buccal caries and mesio-distal occlusal caries pattern

were detected at 5 years of age only. Disto-occlusal caries pattern was detected at 3 years of age only. Disto-bucco-occlusal caries and mesio-distal-bucco-occlusal caries patterns were detected at 6 years of age only. There was a significant difference in prevalence and caries pattern at different age-groups of preschool children ( $p$  value = 0.005), while no significant differences in caries pattern and prevalence was detected in male and female gender ( $p = 0.587$ ).

### Prevalence and Caries Pattern in Mandibular Lt 1st Primary Molars (Table 5)

Only 36% of total evaluated ( $N = 900$ ) mandibular Lt 1st primary molars was caries free or having no caries (meaning 64% molars were carious) in preschool children. Prevalence of occlusal caries occupied 16.7% of total evaluated mandibular Lt 1st primary molars of preschool children. Highest percentage of caries prevalence was present at 3 years followed by 5, 4, and 6 years of age. Prevalence of mesio-linguo-distal-buccal-occlusal caries pattern was almost equal to that of occlusal caries pattern, i.e., 16.3%, but prevalence was highest at 6 years followed by 5, 4, and 3 years of age. Prevalence of distal caries pattern was the third most common pattern of caries in mandibular Lt 1st primary molars and represented 11.7% of the total evaluated molars in preschool children. Prevalence of distal caries pattern was highest at 3 years followed by 4, 5, and 6 years of age. Another caries pattern was disto-occlusal caries. This pattern occupied 9.3% of total evaluated molars. Highest occurrence of this pattern was seen at 6 years of age followed by 4, 5, and 3 years of age.

Prevalence of mesio-distal-bucco-occlusal caries pattern was 1.7% only in total evaluated mandibular Lt primary 1st molars of preschool children. This pattern was observed to be highest at the age of 3 and 6 years of age. This pattern was not detected in 4 and 5 years of age. Prevalence of mesial caries pattern, mesio-distal-occlusal caries, and disto-buccal-occlusal caries pattern occupied 1.3% each of the total evaluated mandibular Lt 1st primary molars of preschool children. Prevalence of mesial caries was most observed

**Table 4:** Age, gender-wise prevalence and pattern of dental caries in maxillary left 2nd primary molar

Pattern of caries (Max. Lt 2nd Pri. molar)	Age				Total (n = 300)	(% within gender)	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	67.6	54.8	41.5	48.1	52.3	51.8	53.1
Mesial caries, % within age	14.7	12.3	9.8	9.1	11.3	10.6	12.3
Buccal caries, % within age	5.9	2.7	0.0	0.0	2.0	2.4	1.5
Occlusal caries, % within age	7.5	12.3	30.5	23.4	19.0	21.2	16.2
Mesio-occlusal caries, % within age	1.5	11.0	4.9	7.8	6.3	5.9	6.9
Mesio-buccal caries, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Mesio-bucco- occlusal, % within age	0.0	1.4	3.7	0.0	1.3	1.8	0.8
Mesio-disto-occlusal caries, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Mesio-lingualdisto-buccal occlusal, % within age	0.0	5.5	3.7	6.5	4.0	4.1	3.8
Disto-occlusal, % within age	1.5	0.0	0.0	0.0	0.3	0.6	0.0
Disto-bucco-occlusal caries), % within age	0.0	0.0	0.0	1.3	0.3	0.0	0.8
Bucco-occlusal caries, % within age	1.5	0.0	0.0	1.3	0.7	0.0	1.5
Mesio-disto-bucco-occlusal caries, % within age	0.0	0.0	0.0	1.3	0.3	0.0	0.8
Mesio-lingual bucco-occlusal caries, % within age	0.0	0.0	3.7	1.3	1.3	0.6	2.3
Total	100	100	100	100	100	100	100
% within Max. Lt Pri. 1st molar	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 65.080, p = 0.005$				$\chi^2 = 11.284, p = 0.587$		

**Table 5:** Age, gender-wise prevalence and pattern of caries in mandibular left 1st primary molar

Pattern of caries (mandibular Lt 2nd Pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 year		Male (count 1)	Female (count 2)
No caries, % within age	50.0	26	18.3	19.5	27.7	25.9	30
Mesial caries, % within age	13.3	19.2	14.6	13.0	15.0	13.5	16.9
Buccal caries, % within age	1.5	1.4	0.0	0.0	0.7	1.2	0.0
Occlusal caries, % within age	14.7	24.7	34.1	40.3	29.0	30	27.7
Mesio-occlusal caries, % within age	17.6	11.0	12.2	15.6	14.0	14.1	13.8
Mesio-bucco-occlusal, % within age	1.5	0.0	0.0	2.6	1.0	1.2	0.8
Mesio-lingual-distobuccal occlusal, % within age	0.0	15.1	15.9	6.5	9.7	11.2	7.7
Linguo-occlusal, % within age	0.0	1.4	1.2	0.0	0.7	0.6	0.8
Distobucco-occlusal, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Bucco-occlusal, % within age	1.5	0.0	1.2	1.3	1.0	0.6	1.5
Mesiodistobucco-occlusal, % within age	0.0	1.4	0.0	1.3	0.7	0.6	0.8
Mesiolinguobucco-occlusal,% within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0
Total	100	100	100	100	100	100	100
% within Mn. Lt Pri. 2nd molar	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 57.788, p = 0.005 (S)$				$\chi^2 = 6.000, p = 0.873 (NS)$		

at 4 years followed by 3 and 5 years of age. Prevalence of mesio-bucco-occlusal caries pattern was most observed at 4 years of age. Disto-bucco-occlusal caries pattern was most observed at 3 years followed by 4 year of age. This pattern was not detected at 5 and 6 years of age.

Prevalence of buccal caries, mesio-occlusal caries, and bucco-occlusal caries occupied 1% each of the total evaluated mandibular Lt primary 1st molars of preschool children. Buccal caries pattern was most observed at 3 years followed by 4 years of age. This caries pattern was not detected at 5 and 6 years of age. Prevalence of

mesio-occlusal caries pattern was most observed at 3 years followed by 4 and 6 years of age. This pattern was not detected at 5 years of age. Bucco-occlusal pattern of dental caries was most observed at 3 years of age followed by 6 and 5 years, and this pattern was not detected in 4 years of age. Mesio-distal caries pattern, mesio-bucco-occlusal, linguo-occlusal, and mesio-linguo-bucco-occlusal pattern of dental caries were 0.3% each of evaluated mandibular 1st Lt primary molars of preschool children. Mesiodistal caries pattern was observed to be highest at 6 years of age. This pattern was not detected at 3, 4, and 5 years of age. Mesio-bucco-occlusal pattern



was observed to be highest at 4 years of age, and this pattern was not detected at 3, 5, and 6 years of age. Linguo-occlusal caries pattern was seen highest at 6 years of age, and this pattern was not detected at 3, 4, and 5 years of age. Mesio-linguo-bucco-occlusal caries pattern was observed to be highest at 5 years of age, and this pattern was not detected at 3, 4, and 6 years of age.  $p$  value = 0.389. Prevalence and caries patterns were nonsignificant at different age-groups, while no significant difference in prevalence and caries pattern was detected in male and female gender ( $p$  value = 0.331).

### Prevalence and Caries Pattern in Mandibular Lt 2nd Primary Molars (Table 6)

Eleven pattern of carious lesions detected in mandibular Lt 2nd primary molars. In all, 27.9% of total evaluated mandibular Lt primary second molars were caries free in preschool children (meaning 72.3% molars were carious molars). Prevalence of occlusal caries pattern was 29% of the total evaluated mandibular Lt 2nd primary molars of preschool children. Prevalence of the caries pattern was observed to be highest at the age of 6 years followed by 5, 4, and 3 years. Prevalence of mesial caries and mesio-occlusal caries occupied 15% and 14%, respectively, of the evaluated molars of preschool children. Prevalence of mesial caries was highest observed at the age of 4 years followed by 5, 3, and 6 years. Prevalence of mesio-occlusal caries pattern was observed to be highest at the age of 3 years followed by 6, 5, and 4 years. Prevalence of mesio-linguo-distobuccal-occlusal caries pattern occupied 9.7% of total evaluated mandibular Lt primary 2nd molars. Prevalence of this pattern was observed to be highest at the age of 5 years and 4 years followed by 6 years. This pattern was not

detected at 3 years of age. Prevalence of mesiobucco-occlusal and bucco-occlusal caries pattern occupied only 1% each of the total evaluated the molars of preschool children. Maximum prevalence of mesio-bucco occlusal caries pattern was seen at the age of 6 years followed by 3 years. This pattern was not detected at 4 and 5 years of age. Prevalence of bucco-occlusal caries pattern was observed to be highest at the age of 3 years followed by 6 and 5 years, and this pattern was not detected at the age of 4 years.

Prevalence of buccal caries, linguo-occlusal caries and mesio-distobucco-occlusal caries patterns occupied only 0.7% each, of total evaluated mandibular Lt primary 2nd molars in preschool children. Prevalence of these caries pattern was observed to be highest at the age of 3 years followed by 4 years of age but these patterns were not detected at 5 and 6 years of age.

Prevalence of linguo-occlusal caries was highest at the age of 4 years followed by 5 years. This pattern was not detected at 3 and 6 years of age, while prevalence of mesiodisto-bucco-occlusal caries pattern was observed to be highest at 4 and 6 years of age. This pattern was not detected at 3 and 5 years of age. Prevalence of disto-bucco-occlusal pattern and mesio-linguo-bucco-occlusal caries patterns occupied only 0.3% each of the evaluated mandibular 2nd Lt primary molars in preschool children. Prevalence of disto-bucco-occlusal caries pattern and mesio-linguo-bucco-occlusal caries patterns were only detected at 5 years of age.  $p$  value is 0.005, and prevalence and caries patterns were significantly different at different age-groups, while no significant difference in prevalence and caries pattern was observed between male and female gender ( $p$  value = 0.873).

**Table 6:** Age, gender-wise prevalence and pattern of caries in mandibular left 1st primary molar

Pattern of caries (mandibular Lt 1st Pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	35.3	31.5	37.8	39.0	36.0	35.3	36.9
Mesial caries, % within age	1.5	2.7	1.2	0.0	1.3	1.8	0.8
Distal caries	16.2	12.3	9.8	9.1	11.7	8.8	15.4
Buccal caries, % within age	2.9	1.4	0.0	0.0	1.0	1.2	0.8
Occlusal caries, % within age	22.1	17.8	18.3	9.1	16.7	14.1	20.0
Mesio-occlusal caries, % within age	1.5	1.4	0.0	1.3	1.0	1.2	0.8
Mesio-distal caries	0.0	0.0	0.0	1.3	0.3	0.0	0.8
Mesio-bucco-occlusal, % within age	0.0	1.4	0.0	0.0	0.3	0.6	0.0
Mesio-distobucco-occlusal caries, % within age	0.0	1.4	2.4	1.3	1.3	1.2	1.5
Mesio-lingual-distobuccal occlusal, % within age	5.9	17.8	19.5	20.8	16.3	20.0	11.5
Linguo-occlusal, % within age	0.0	0.0	0.0	1.3	0.3	0.0	0.8
Disto-occlusal caries, % within age	5.9	9.6	8.5	13.0	9.3	11.8	6.2
Disto-buccal-occlusal, % within age	2.9	2.7	0.0	0.0	1.3	1.8	0.8
Bucco-occlusal, % within age	1.5	0.0	1.2	1.3	1.0	0.6	1.5
Mesio-distobucco-occlusal, % within age	4.4	0.0	0.0	2.6	1.7	1.2	2.3
Mesio-linguo-bucco-occlusal, % within age	0.0	0.0	1.2	0.0	0.3	0.6	0.0%
Total	100	100	100	100	100	100	100
% within Mn. Lt Pri. 1st molar	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 47.033, p = 0.389$				$\chi^2 = 16.803, p = 0.331$		

### Prevalence and Caries Pattern of Mandibular Rt 1st Primary Molars (Table 7)

Eighteen patterns of caries were recorded in Mandibular Rt 1st primary molars. In all, 33.7% evaluated mandibular Rt 1st primary molars of preschool children were free of dental caries (meaning 66.3% of molars were carious). Prevalence of mesio-linguo-distobuccal-occlusal caries pattern occupied 23% of the total evaluated mandibular Rt 1st primary molars. The highest prevalence of the pattern was observed at 6 years of age followed by 4, 5, and 3 years. Second most common prevalence of caries pattern was occlusal caries that occupied 20.7 % of the evaluated mandibular Rt 1st primary molars. Prevalence of occlusal caries was observed to be highest at the age of 3 years followed by 5, 6, and 4 years.

Prevalence of distal caries pattern occupied 7% of the evaluated molars in preschool children. The highest prevalence of distal caries pattern was observed at the age of 3 years followed by 4, 6, and 5 years. Another common pattern that occupied 5.3% of total evaluated molars in preschool children was disto-occlusal caries. Prevalence of disto-occlusal caries pattern was observed to be highest at the age of 4 years followed by 5, 3, and 6 years.

Prevalence of mesio-occlusal caries pattern was 3% of the evaluated molars in preschool age, with the highest prevalence of mesio-occlusal caries pattern observed at 4 years of age followed by 5, 3, and 6 years. Prevalence of mesio-disto-occlusal and mesio-linguo-bucco-occlusal caries patterns occupied 1% each of the total evaluated molars of preschool children. Prevalence of mesio-distal caries pattern was observed to be highest at the age of 4 years, and this pattern was not detected at the age of 3, 5, and 6 years.

Prevalence of mesio-linguo-bucco-occlusal caries pattern was observed to be highest at 4 years of age followed by 6 and 5 years. This pattern was not detected at 3 years of age. Mesio-bucco-occlusal pattern, mesio-linguo-distobuccal caries, disto-buccal caries, disto-bucco-occlusal caries, and bucco-occlusal caries patterns occupied 0.7% each of the evaluated molars in preschool children. Prevalence of mesio-bucco-occlusal caries pattern was observed to be highest at the age of 3 years followed by 4 years. This pattern was not detected at 5 and 6 years of age.

Prevalence of mesio-linguo-distobuccal caries pattern was observed to be highest at the age of 3 and 5 years. This pattern was not detected at 4 and 6 years of age. Prevalence of disto-buccal caries was observed to be highest at the age of 3 years followed by 6 years. This pattern was not detected at 4 and 5 years of age. Disto-bucco-occlusal caries prevalence was observed to be highest at the age of 5 years followed by 6 years. Prevalence of bucco-occlusal caries pattern was observed to be highest at the age of 3 years followed by 4 years. This pattern was not detected at 5 years and 6 years of age.

Mesial caries, buccal caries, linguo-occlusal caries, linguo-distobuccal-occlusal caries, mesio-distobuccal caries, and mesio-distobucco-occlusal caries patterns occupied 0.3% each of the evaluated molars in preschool children. Prevalence of mesial caries and buccal caries and Linguo-occlusal caries was observed to be highest at the age of 3 years, this caries pattern was not detected at 4, 5 and 6 years of age. Prevalence of linguo-distobuccal-occlusal caries pattern was observed to be highest at the age of 6 years, and this pattern was not detected at 3, 4, and 5 years of age. Prevalence of mesio-distobuccal caries was

**Table 7:** Age, gender-wise prevalence and pattern of dental caries in mandibular right 1st primary molar

Pattern of caries (mandibular Rt 1st Pri. molar)	Age				Total (n = 900)	% within gender	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	33.8	27.4	36.6	36.4	33.7	34.7	32.3
Mesial caries, % within age	1.5	0.0	0.0	0.0	0.3	0.0	0.8
Distal caries	13.2	6.8	2.4	6.5	7.0	6.5	7.7
Buccal caries, % within age	1.5	0.0	0.0	0.0	0.3	0.0	0.8
Occlusal caries, % within age	23.5	16.4	23.2	19.5	20.7	18.8	23.1
Mesio-occlusal caries, % within age	2.9	4.1	3.7	1.3	3.0	3.5	2.3
Mesio-bucco-occlusal % within age	1.5	1.4	0.0	0.0	0.7	0.0	1.5
Mesio-disto-occlusal, % within age	0.0	4.1	0.0	0.0	1.0	0.6	1.5
Mesio-linguo-distobuccal caries, % within age	1.5	0.0	1.2	0.0	0.7	1.2	0.0%
Mesiolingual distobuccal occlusal, % within age	11.8	26.6	24.4	28.6	23.0	24.7	20.8
Linguo-occlusal caries, % within age	1.5	0.0	0.0	0.0	0.3	0.6	0.0
Linguo distobuccal occlusal, % within age	0.0	0.0	0.0	1.3	0.3	0.6	0.0
Disto-occlusal caries, % within age	4.4	9.6	6.1	1.3	5.3	5.3	5.4
Disto-buccal caries, % within age	1.5	0.0	0.0	1.3	0.7	0.6	0.8
Distobucco-occlusal caries, % within age	0.0	0.0	1.2	1.3	0.7	0.6	0.8
Bucco-occlusal, % within age	1.5	1.4	0.0	0.0	0.7	1.2	0.0
Mesio-distobuccal caries, % within age	0.0	1.4	0.0	0.0	0.3	0.6	0.0
Mesiodistobuccal-occlusal, % within age	0.0	0.0	0.0	1.3	0.3	0.0	0.8
Mesiolinguobucco-occlusal caries, % within age	0.0	1.4	1.2	1.3	1.0	0.6	1.5
Total	100	100	100	100	100	100	100
% within Mn. Rt Pri. 1st molar	22.7	24.3	27.3	25.7	100	56.7	43.3
Chi-square test	$\chi^2 = 59.835, p = 0.272$				$\chi^2 = 15.086, p = 0.656$		

observed to be highest at 4 years of age. Prevalence of mesio-distobucco-occlusal caries pattern was observed highest at the age of 6 years, and this pattern was not detected at 3, 4 and 5 years of age.  $p$  value = 0.272, prevalence of caries patterns were nonsignificant at different age-groups, while no significant difference in prevalence and caries patterns was observed in male and female gender ( $p$  value = 0.656).

### Prevalence and Caries Pattern in Mandibular Rt 2nd Primary Molars (Table 8)

Twelve patterns of dental caries were observed in mandibular Rt 2nd primary molars. In all, 27.1% of total evaluated mandibular Rt 2nd primary molars of preschool children were free of dental caries (meaning 72.9% molars were carious). Occlusal caries occupied 28.8% of evaluated molars in preschool children. Prevalence of occlusal caries was observed to be highest at the age of 5 years followed by 6, 4, and 3 years. Mesial caries occupied 12.5% of the evaluated molars in preschool children. Prevalence of mesial caries was observed to be highest at the age of 4 years followed by 3, 6, and 5 years. Another common caries pattern was mesio-occlusal caries that occupied 11.9% of total evaluated molars in preschool children. This pattern was most observed at the age of 6 years followed by 4, 3, and 5 years. Prevalence of mesio-linguo-distobucco-occlusal caries occupied 11.2% of total evaluated the molars in preschool children. Prevalence of mesio-linguo-distobucco-occlusal caries was observed to be highest at the age of 4 years followed by 5, 6 and 3 years. In all, 3.4% of evaluated molars of preschool children had mesio-bucco-occlusal caries. Prevalence of this pattern was observed to be highest at the age of 5 years followed by 6, 4, and 3 years. Prevalence of linguo-occlusal pattern was 1.7% of the evaluated mandibular Rt 2nd primary molars of preschool children. The highest prevalence of the linguo-occlusal pattern was observed at the age of 5 years followed by 4 and 6 years. This pattern was not detected at 3 years of age. Prevalence of mesio-linguo-bucco-occlusal caries pattern occupied 1.4% of the

total caries of the evaluated mandibular Rt 2nd primary molars of preschool children. Prevalence of this pattern was observed to be highest at the age of 6 years followed by 5 years, and this pattern was not detected at 3 and 4 years.

Disto-occlusal caries affected 0.7% of the evaluated the molars in preschool children. Prevalence of this pattern was observed to be highest at the age of 4 years followed by 5 years. This pattern was not detected at 3 and 6 years of age. Prevalence of buccal caries, mesio-buccal, mesio-linguo-occlusal, and mesio-distobuccal-occlusal caries pattern occupied 0.3% each of the total evaluated the molars. Prevalence of buccal caries was observed to be highest at the age of 3 years, and this pattern was not detected at 4, 5, and 6 years of age. Prevalence of mesio-buccal caries was observed to be highest at 4 years of age, and this pattern was not detected at 3, 5, 6 years of age. Prevalence of mesio-linguo-occlusal and mesio-distobucco-occlusal caries patterns was observed to be highest at the age of 6 years. These patterns were not detected at 3, 4, 5 years of age.  $p$  value = 0.004. Prevalence and caries patterns were significantly different at different age groups, while no significant differences in caries patterns and prevalence was noted in-between male and female gender ( $p$  value = 0.801).

## DISCUSSION

Among the study group, prevalence of caries was slightly more in primary molars of male (56.7%) when compared to primary molars of female children (43.3%). This means caries had some predilection for sex. Same findings were reported by other authors.<sup>3-5</sup>

Interrelationship of arch-wise prevalence of caries was distinct. In this study, primary molars of mandibular arch were more vulnerable for caries development than maxillary arch,<sup>6-9</sup> but the number of caries patterns was less in maxilla arch molars when compared to the mandibular arch molars.

Dental caries were more prevalent in right side of maxillary and mandibular arch when compared to their respective left sides.

**Table 8:** Age, gender-wise prevalence and pattern of dental caries in mandibular right 2nd primary molar

Pattern of caries (mandibular Rt 2nd Pri. molar)	Age				Total (n = 900)	(% within gender)	
	3 years	4 years	5 years	6 years		Male (count 1)	Female (count 2)
No caries, % within age	53.8	19.4	20.7	18.4	27.1	27.4	26.8
Mesial caries, % within age	13.8	19.4	8.5	9.2	12.5	12.5	12.6
Buccal caries, % within age	1.5	0.0	0.0	0.0	0.3	0.0	0.8
Occlusal caries, % within age	16.9	26.4	35.4	34.2	28.8	27.4	30.7
Mesio-occlusal caries, % within age	9.2	12.5	8.5	17.1	11.9	10.6	13.4
Mesio-buccal, % within age	0.0	1.4	0.0	0.0	0.3	0.6	0.0
Mesio-bucco-occlusal % within age	1.5	2.8	4.9	3.9	3.4	3.6	3.1
Mesio-linguo-occlusal, % within age	0.0	0.0	0.0	1.3	0.3	0.6	0.0
Mesio-lingual distobuccal occlusal, % within age	3.1	15.3	14.6	10.5	11.2	13.1	8.7
Linguo-occlusal, % within age	0.0	1.4	3.7	1.3	1.7	1.2	2.4
Disto-occlusal caries, % within age	0.0	1.4	1.2	0.0	0.7	1.2	0.0
Mesio-distobucco-occlusal, % within age	0.0	0.0	0.0	1.3	0.3	0.6	0.0
Mesio-linguo-bucco occlusal caries, % within age	0.0	0.0	2.4	2.6	1.4	1.2	1.6
Total	100	100	100	100	100	100	100
% within Mn. Rt Pri. 2nd molar	22.0	24.4	27.8	25.8	100	56.9	43.1
Chi-square test	$\chi^2 = 62.778, p = 0.004$				$\chi^2 = 7.800, p = 0.801$		



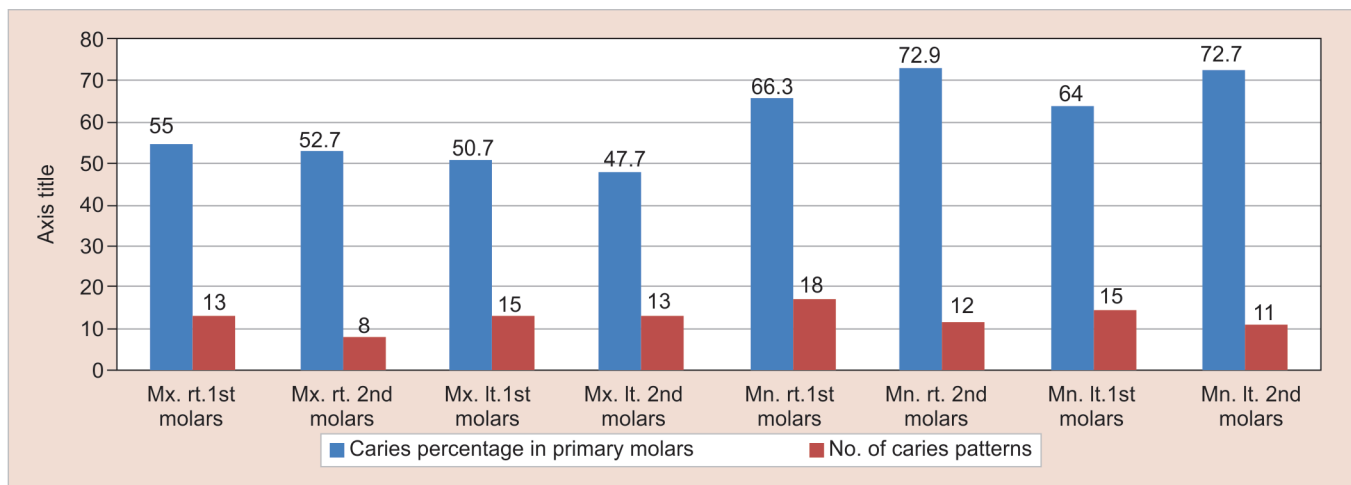


Fig. 1: A comparative column diagram of prevalence of dental caries and caries patterns in primary molars of preschool children

Number of caries patterns was more in the left side of maxillary primary molars when compared to right side of maxillary molars, but in case of mandible, number of caries pattern was more in the right side of mandibular molars when compared to left side of mandibular primary molars. More caries patterns were reported in mandibular arch's primary molars when compared to maxillary arch's primary molars. Right side of the mandibular molars were slightly more vulnerable than left side of the mandibular molars for the development of dental caries,<sup>10,11</sup> but caries patterns were more in number in the right side of the molars than left side of the mandibular molars (Fig. 1).

In the present study, primary first molars in both the arches were less susceptible to caries, while primary second molars were observed to be highest caries experience.<sup>10,12,13</sup> The high susceptibility of second primary molars when compared to first primary molars might be due to deep fissure topography of second primary molars.<sup>10,14</sup> Caries prevalence was higher in mandibular molars than maxillary primary molars; this finding was similar to finding of Roy Chowdhary et al.<sup>15</sup> and Chawla et al.<sup>16</sup>

## CONCLUSION

Various patterns and prevalence of dental caries have been evaluated and following conclusions had been advocated:

- Mandibular primary molars were more vulnerable for caries development when compared to maxillary primary molars in preschool children.
- Vulnerability of caries development in mandible and maxilla were as follows:
  - Mn. rt 2nd PM > mn. lt 2nd PM > mn. rt 1st PM > mn. lt 1st PM.
  - Max. rt 1st PM > max. rt 2nd PM > max lt 1st PM > max. lt 2nd PM.

Based on caries pattern, the highest caries patterns of mandible and maxilla were found in following decreasing order:

- Mn. rt 1st PM > Mn. lt 1st PM > mn. rt 2nd PM > mn. lt 2nd PM.
- Max. lt 1st PM > max. lt 2nd PM and max rt 1st PM > max. rt 2nd PM

Based on the number of caries patterns present in mandibular and maxillary primary molars, the order was as follows:

- Mn. rt 1st PM > Mn.1st lt PM and Max Lt 1st PM > max lt 2nd PM and max rt 1st PM > Mn. rt 2nd PM > Mn. lt 2nd PM > max rt 2nd PM.

## REFERENCES

1. WHO. <http://www.who.int/mediacentre/factsheets/fs318/en/http://www.who.int/mediacentre/factsheets/fs318/en/>.
2. Srivastava VK. Prevalence and pattern of caries in primary anterior teeth of preschool children: An observational study. *J Indian Soc Pedod Prev Dent* 2020;38(1):26-33.
3. Vacher BR. Dental survey of school children in Amritsar (Punjab). *J Indian Dent Assoc* 1952;24:13.
4. Aukland S, Bjelkaroev J. The dental health of school children in Betul district Madhya Pradesh. *J Indian Dent Assoc* 1982;54(10):367-369.
5. Joshi N, Rajesh R, Sunitha M. Prevalence of dental caries among school children in Kulasekharam village; a correlated prevalence survey. *L Indian Soc Pedod Prev Dent* 2005;23(3):138-140. DOI: 10.4103/0970-4388.16887.
6. Sathe PV. A text book of community dentistry. 1st ed., Hyderabad: Paras Medical Publisher; 1998. pp. 84-94.
7. Tewari A, Chawala, Singh H. A study of prevalence of dental caries in an urban area of India. *N J Ind Dent Assoc* 1977;49:231-237.
8. Jawadekar SL, Dandare MP, Nato M, et al. Dental caries susceptibility pattern. *J Ind Dent Assoc* 1989;60(10):200-203.
9. Cheyne H, Peter S. Essentials of preventive and community dentistry. 1st ed., New Delhi: Arya Publication; 1999. p. 137.
10. Finn SB. Clinical pedodontics. 4th ed., Philadelphia: WB Saunders Company; 1986. pp. 454-474.
11. Dunning JM. Epidemiology: dental caries. Principles of Dental Public Health. 4th ed., Cambridge; 1986.
12. Koch G, Poulsen S. Pediatric dentistry a clinical approach. 1st ed., Munksgaard 2001. p. 192.
13. Pinkham. Pediatric dentistry infancy through adolescence. 3rd ed., W.B. Saunders Company; 1999. p. 263.
14. Mc Donald RE, Avery DR. Dentistry for the child and the adolescent. 7th ed., Mosby Co; 2000. p. 212.
15. Sarkar S, Roy Chowdhary KS. Incidence of caries on various surfaces of deciduous teeth. *J Ind Dent Assoc* 1992;63(10):421-425.
16. Chawla HS, Gauba K, Goyal A. Trend of dental caries in children of Chandigarh over the last sixteen years. *J Indian Soc Pedo Prev Dent* 2000;18(1):41-45.