Prevalence of Dental Caries in First Permanent Molar among 12 Years Old School Going Children in Lucknow City

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ABSTRACT

Introduction: Dental caries is a multi-factorial and the most widespread disease. 12 years age has been universally accepted as global monitoring age for dental caries. The first permanent molar (FPM) is the most important unit of mastication and has an important role in establishing the occlusion.

Methodology: A descriptive cross sectional study was conducted to determine the prevalence of dental caries in FPM among 12 year old school going children of either gender of Lucknow City. The participants were informed of the nature of the study and a verbal consent was obtained. Pilot study was conducted to assess the validity and feasibility of the study. Multistage stratified random sampling technique was employed, and the study was done in two stages. The tooth surface was dried with a cotton pellet and the teeth were examined for dental caries using DMFT indices. The data collected were analyzed using SPSS 18.0 for descriptive and analytical studies. Type III clinical examination was carried out to record the specific findings.

Result: It was seen that from the total enumeration of 100% (n= 601), 250 study subjects were present with caries in first permanent molar making the prevalence of dental caries among 12 years old school going children to be 41.6%.
Conclusion: It could be concluded that the prevalence of caries in FPM among 12 years old government/ private school going children is high and a proper health care system is needed to prevent dental caries.
Keywords: First Permanent Molar, Dental caries, Prevalence, School children

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INTRODUCTION:

Dental caries is a multi-factorial disease involving various factors such as diet, microorganisms, tooth morphology, saliva, as well as genetic predisposition and time. [1] Globally dental caries remains the most widespread disease and has a direct impact on the quality of life, particularly on children's health and development.[2]

12 years age has been universally accepted as global monitoring age for dental caries since all permanent teeth; except third molars would have been erupted. [3] The first permanent molar (FPM) is unquestionably the most important unit of mastication and has an important role in establishing the occlusion. Also, they have a role in delimiting the space where the other permanent teeth will erupt, and their premature loss can disrupt the eruption and the migration of the other definitive teeth[4]. The FPMs are important as they are very prone to caries because of their anatomical structure and early eruption in the mouth. [5] The most common index to determine the oral health is DMFT. [6] In 2007 the WHO reported that 60-90% of school children worldwide have dental caries. [2]

Thus, first permanent molars related studies can be used as a powerful aid for planning a proper health care system at early ages. [3] Considering this, the objective of the present study was to determine the prevalence of dental caries in FPM based on gender, dental arch, school type, and distribution in the oral cavity (unilateral/ bilateral).

MATERIAL AND METHOD:

A descriptive cross sectional study was conducted to determine the prevalence of dental caries in FPM among 12 year old school going children of either gender of Lucknow City. Ethical clearance was obtained from the IEC committee before the start of study. Permission was obtained from the concerned school authorities. The participants were informed about the nature of the study and a verbal consent was obtained. Pilot study was conducted to assess the validity and feasibility of the study. The study was conducted from 10am to 1pm i.e. within the working hours of schools; in the month of July to October 2017 till the sample size was obtained.

Multistage stratified random sampling technique was employed, and the study was done in two stages. In the first sampling stage, Lucknow was divided into 5 zones; later two schools were selected from each of five zones, so that there was one private and one public school in each region. In the second sampling stage, 12 year old school children were randomly selected from each school. The age of the children were obtained from the records maintained in the respective schools. A total of 601 (based on previous study) students were examined and interviewed. Included in the study were: school (government/ private) going children who completed 12 years or running in 12^{th} year of life, present on the day of examination and willing to participate. Children suffering from any systemic disease and non co-operative children's were excluded. Sufficient numbers of autoclaved mouth mirror and dental explorer were used to assess the status of FPM based on DMFT index. A number of 25-30 children were examined daily by the examiner herself in the school premises. The teeth were examined for dental caries using WHO modification of DMFT index (1987).[7] After examination all the instruments were carried back to the college and were autoclaved.

Survey instruments consist up of a predesigned proforma, which was divided into 2 parts: The first part mentioned information regarding demographic details of the residential school children, oral hygiene practice, and dietary habits. The second part was used to record the status of FPM. The data collected were analyzed using SPSS 18.0 for descriptive and analytical studies.

Type III clinical examination was carried out by the investigator herself with the help of recording clerk to record the specific findings. The examiner organized camps in various zones of Lucknow City on the scheduled dates. Two tables along with chairs were arranged by the school staff, and data was collected in the school premises. The subjects were examined under natural light sitting on the chair provided. Prior to the data collection to maintain the consistency of the examination the examiner was trained, calibration exercises were carried out on DMF-T index. Immediately after the survey proper oral health education was given to the participants regarding the maintenance of oral hygiene. Participants requiring dental treatment were referred to the specialized dental departments for the needful.

p value < 0.05 was considered to be statistically significant.

RESULT:

For the study purpose 601 school going children attending both Government and Private schools of either gender were selected.

It was seen from **chart a,** that from the total enumeration, 250 study subjects were present with caries in first permanent molar making a prevalence of dental caries in FPM as 41.6%.

From **table 2,** it is clear that, when gender was considered females experienced higher prevalence of caries i.e. 61.6% (N= 154) when compared to 38.4% (N= 96) males in FPM, which is found to be statistically significant at p value= 0.001.

When type of school was considered higher prevalence of dental caries was seen amongst private school going children i.e. 59.6% (N= 149) as compared to 40.4% (N= 101) government school going children, which is found to be statistically significant at p value < 0.001.

From **table 3,** it was seen that from the total enumeration, 32.8% (N= 197) mandibular FPM were affected more with dental caries when compared with 16.6% (N= 100) maxillary FPM.

Table 4 shows unilateral distribution of dental caries in maxillary FPM was found to be more i.e. 12.1% (N= 73) when compared to 4.5% (N= 27) bilateral caries in maxillary FPM. Unilateral distribution of dental caries in mandibular FPM was found to be more i.e. 19.3% (N= 116) when compared to 13.5% (N= 81) bilateral caries in mandibular FPM.

Chart a: Prevalence of dental caries in first permanent molar of 12-year-old school children

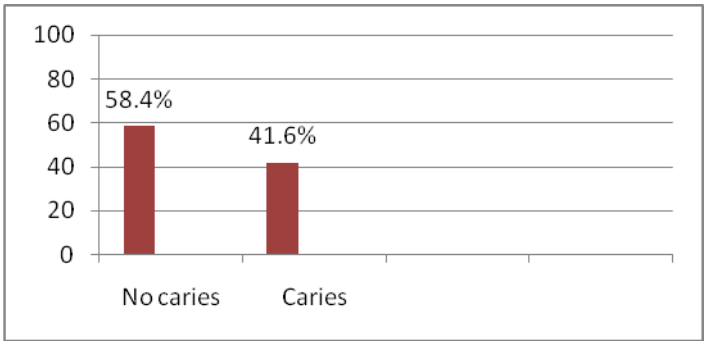

Table 1: Distribution of study participants based on gender, type of school attended, personal, dietary habits.

Table1		N	%
Gender	Male	185	30.8%
	Female	416	69.2%
School type	Private	295	49.1%
	Government	306	50.9%
How many times do you clean your teeth?	Never	3	.5%
	Once	507	84.4%
	Twice	91	15.1%
How do you clean your teeth?	None	3	.5%
	Brush	589	98.0%
	Finger	0	.0%
	Neem stick	9	1.5%
What material do you use for cleaning your teeth?	None	12	2.0%
	Paste	586	97.5%
	Powder	3	.5%
	Other	0	.0%

Number of visit to dentist per year	0	557	92.7%
	1	23	3.8%
	2	21	3.5%
Any other oral hygiene aids used	No	455	75.7%
	Yes	146	24.3%
Source of drinking water	Tap water	443	73.7%
	Ground water	158	26.3%
Type of Diet	Veg	292	48.6%
	Non-Veg	309	51.4%

Table 2: Prevalence of dental caries in first permanent molar of 12-year-old school children according to type of school and gender

TABLE 2		Decay				P-value
		No caries		Caries		
		N	%	N	%	
Gender	Male	89	25.4%	96	38.4%	0.001; Sig
	Female	262	74.6%	154	61.6%	
School type	Private	146	41.6%	149	59.6%	<0.001; Sig
	Government	205	58.4%	101	40.4%	

Chi-square test

Table 3: To determine the prevalence of dental caries in first permanent molar based on the dental arch (maxillary/ mandibular).

Table 3		N	%
16	No caries	533	88.7%
	Caries	68	11.3%
26	No caries	542	90.2%
	Caries	59	9.8%
36	No caries	450	74.9%
	Caries	151	25.1%
46	No caries	474	78.9%
	Caries	127	21.1%
Maxillary	No caries	501	83.4%
	Caries	100	16.6%
Mandible	No caries	404	67.2%

	Caries	197	32.8%
Total	No caries	351	58.4%
	Caries	250	41.6%

Table 4: To determine the prevalence of dental caries in FPM according to distribution in the oral cavity (unilateral/ bilateral)

Table 4:		N	%
Upper	No caries	501	83.4%
	Caries unilateral	73	12.1%
	Caries Bilateral	27	4.5%
Lower	No caries	404	67.2%
	Caries unilateral	116	19.3%
	Caries Bilateral	81	13.5%

DISCUSSION:

WHO has drafted new goals for 2020, entitled "Goals for Oral Health 2020". The updated objectives are intended to act as a framework for the formulation of regional and national oral health goals as the slogan "*Think globally, act locally*" implies. The new goals are allowing for the fact that not all recommendations are applicable equally to all countries and populations. Appropriate differentiation is therefore important. [8]

For the study purpose 601 school going children attending both Government and Private schools of either gender were selected.

In the present study, the overall prevalence of dental caries was found to be much higher i.e. 41.6% when compared with another study done by Barman, et al (2016) [03] where the prevalence was 13.7% in FPM. The reason for higher prevalence of dental caries in FPM among 12 year old may be due to prolonged exposure of the molars to cariogenic factors therefore Health organizations (WHO and FDI) have declared twelve to be the most important age for making prevention strategies against caries.[8]

When gender was considered, it was seen that females experienced higher prevalence of caries (61.6%, N= 154) when compared to males (38.4%, N= 96), which can be due to their easy access towards food products when compared to males, and is found to be statistically significant at p value= 0.001. Similar findings were reported in a study done by Barman M. et al. (2016)[03] where females (34.2%) were found to be experiencing higher dental caries than males. In a study conducted by Malvania (2014) [9] it was found that 20.26% female and 15.02% male were present with dental caries in permanent dentition among 12 years school going children, in Gujarat, India, whereas contradictory results were found by Devaki (2011) [10] with 50.72% males affected with decayed FPM against 44.23% females.

The reason could be the age of eruption of first permanent molars which appears earlier in females than in males thus exposing tooth long time in the oral cavity. [11] Salivary composition and flow rate varies in males and females. Salivary flow rate is less in females than in males [12]. Saliva helps in washing, buffering and remineralization of teeth thus helps in preventing caries. IgA is a salivary protein which protects against caries. This IgA is less in females compare to males. Also expected females have shown decreased salivary flow, thus more at risk of developing caries.[13]

In the present study when type of school was considered, higher prevalence of dental caries was seen amongst private school going children (59.6%, N= 149) as compared to government school going children (40.4%, N= 101) which is found to be statistically significant at p value < 0.0001. The reason for higher prevalence of dental caries among private school children can be attributed to their easy accessibility towards refined dietary products when compared to government school children. The findings are not concurrent with the study done by Barman M. et al. (2016) [03] where (19.2%, N= 87) children attending government school were affected with dental caries in FPM when compared to private (7.2%, N= 28) school children. Findings of the study also do not match with study done by Bharadwaj V.K. in Shimla city (2014). [14]

In the present study mandibular FPM were at higher risk (32.8%, N= 197) of developing caries when compared to maxillary FPM i.e. (16.6%, N= 100). The reason for the same could be attributed to mandibular FPM morphology and eruption time. The mandibular FPM has more number of pits and supplementary grooves which can act as food retentive areas promoting caries. Another factor could be subjected to the fact that in the majority of children mandibular FPM erupts slightly earlier than its maxillary counterpart. Hence, mandibular FPM is exposed to the oral environment for a longer time, which makes it more susceptible to caries than maxillary FPM. Findings of the present study are concurrent with the study done by Barman et al (2016) [3], where number of decayed teeth in mandibular arch was 165 as compared to 13 decayed teeth in maxillary arch. The mandibular arch may be attributed to greater food and plaque accumulation potential. There is also a hierarchy of caries susceptibility by tooth type and the surface of the teeth. [15]

When the distribution of decayed teeth in FPM was considered, occurence of unilateral dental caries in FPM was seen higher in both the maxillary and mandibular arch when compared to bilateral occurrence of dental caries in FPM. The findings of our study do not match with the study done by Barman M. (2016) [03], where unilateral first molars caries were lower (6.7%) as compared to those having bilateral molars caries (7%). There was no significant difference in the bilateral occurrence of dental caries between the right and left FPM. [16]

CONCLUSION:

Out of 601 students, 250 children were found having dental caries in first permanent molar teeth making the prevalence of caries in FPM as 41.6%. Caries prevalence in mandibular FPM was

higher than in maxillary FPM. Bilateral dental caries occurrence was found to be lower than unilateral caries. Subjects studying in government schools had lesser caries in FPM than those in private schools. Hence in a country like India with limited resources and manpower the most feasible method in preventing oral disease should be community based, tailor-made directed towards school children to improve various oral health education and preventive programs.

RECOMMENDATION:

1. Early visits to the dental office will ensure effective preventive programs including sealant application and fluoride application along with oral health education.
2. Parents should be invited regularly for presentation on oral and general health.
3. Teachers must be involved in the school brushing and educational programs as school children are greatly influenced by their teachers.
4. Periodic reinforcing of Oral Health education programs would thereby improves knowledge and improves skill based technique of tooth brushing and dental flossing.
5. Perception of children regarding Oral health needs to be positively reinforced, which will enable them to understand and seek early professional dental care behavior and relationship between oral and general health.

REFERENCES:

1. Togoo RA, Yaseen SM *et al*; Prevalence of first permanent molar caries among 7-10 years old school going boys in Abha city, Saudi Arabia; Journal of International Oral Health; Volume 3; Issue 5: October 2011.
2. Ali N S, Ali N S, Khan M, Qamruddin I *et al*; Prevalence of dental caries in the first permanent molars in children between 8-12 years; Journal of Pakistan Dental Association; Vol. 22: No. 02; Apr-June 2013.
3. Barman M, Tirth A, Tandon V,Chandra1 S, Ain T.S. ; Prevalence of Dental Caries in First Permanent Molars among 12 Years School Going Children in Purba Medinipur City, West Bengal; International Research Journal of Clinical Medicine; Vol 1; Issue 1:Jan 2016.
4. Chirca E M, Luca R., Georgescu D E; The prevalence of caries in first permanent molar in a group of school children aged 6 to 7 years in Pitești: The Publishing House of Romanian Academy., Series B, Supplement 1, 4th Edition, 2015. pg. 41-44.
5. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3313570/ as on 20/ 4/ 17 at 3:55pm.
6. Wyne AH. The bilateral occurrence of dental caries among 12-13 and 15-19 year old school children. J Contemp Dent Pract. 2004; 1: 42-52.
7. Peter S. 2011, Indices in Dental Epidemiology, Essentials of Preventive and Community Dentistry, 4th Edition, pp 345.
8. Sadeghi M. Prevalence and Bilateral Occurrence of First Permanent Molar Caries in 12-Year-Old Students. J Dent Res Clin Dent Prospects. 2007 Summer. 1 (2). Pg. 86- 92.

9. Malvania EA, Ajithkrishnan CG, Thanveer K, Hongal S. Prevalence of dental caries and treatment needs among 12 year old school going children in Vadodara City, Gujarat, India: A cross-sectional study. Indian J Oral Sci 2014; 5:3-9.
10. Devaki T. Permanent first molar caries status and treatment needs among school going children aged 6-14 years in Tenali, Guntur (Dt) – A cross sectional study. J Indian Assoc Public Health Dent 2011; 18: 455-61.
11. Demirci M, Tuncer S, Yuceokur AA. Prevalence of Caries on Individual Tooth Surfaces and its Distribution by Age and Gender in University Clinic Patients. Eur J Dent. 2010; 4: 270–279.)
12. R. S. Percival, S. J. Challacombe, and P. D. Marsh, "Flow rates of resting whole and stimulated parotid saliva in relation to age and gender," J. of Dent Res, 1994. 73, 1416–1420.
13. Eliasson L., Birkhed D., Osterberg T., and Carlen A., "Minor salivary gland secretion rates and immunoglobulin A in adults and the elderly," Eur J. of Oral Sci, 2006. 114, 494– 499.
14. Bhardwaj V.K. Dental caries prevalence in individual tooth in primary and permanent dentition among 6-12-year-old school children in Shimla, Himachal Pradesh. International Journal of Health & Allied Sciences. Vol. 3: Issue 2. Apr-Jun 2014.pp 125- 28.
15. Fazeli SA, Fazeli SA. First molar caries in primary school children of a Northern City of Iran. Pak Oral Dent J 2005; 25: 93-6.