

Prevalence of dental caries and treatment needs in children in coastal areas of West Bengal

DULAL DAS, JIBAN MISRA¹, MALAY MITRA¹, BHASHWAR BHATTACHARYA¹, ANANDAMOY BAGCHI

Abstract

Objective: This study was carried out to measure the caries prevalence and treatment needs in school children of 6-14 year old residing in coastal areas of West Bengal. **Materials and Methods:** A total of 1764 children of 6-14 years age group, studying in different primary and high schools of the coastal areas were examined using World Health Organization criteria (1997) to record the prevalence of dental caries. The treatment needs were also calculated according to that given criteria. **Statistical Analysis:** The results were subjected to statistical analysis using the Chi-square test and unpaired 't' test. **Results:** Dental caries were founded low in the studied population. The overall all caries prevalence in the permanent dentition was 28.06%, in boys it was 25.39% and in girls it was 30.86%. Therefore caries prevalence in female was higher and which was statistically highly significant ($P < 0.05$). The most frequently required treatment was one surface filling followed by other treatments irrespective of sex and age group. **Discussion:** The presence of sea foods containing high fluoride and least availability of refined carbohydrate in the diet may be the reason of lower prevalence. **Conclusion:** child oral health is always a matter of concern for a developing country so further research is required to explore actual causes.

Key words: Coastal areas, dental caries, prevalence, treatment needs

Introduction

Dental caries is the most prevalent chronic infectious disease in developed and as well as in developing countries and it prevails as a worldwide epidemic^[1]. More than 40% of Indian children are found to be afflicted with dental caries^[2]. A large number of those children are residing in the coastal areas of West Bengal.

Geographical location plays a great role in caries prevalence, It varies with the change in location. According to National Oral Health Survey report 2004^[3], caries prevalence in India was 51.9%, 53.8% and 63.1% at ages 5, 12 and 15 years respectively in different parts of India. Available literature from 1940-1960, the prevalence of dental caries in India showed a varied picture^[4,5,6]. In spite of conflicting reports it has been observed that during 1940 the prevalence of dental

caries in India^[7] was 55.5%, during 1960 it was reported to be 68.4%.

Materials and Methods

The area of the study was coastal districts of West Bengal and it was conducted in between 2010 and 2011. The Bay of Bengal is situated in the southern border of West Bengal. Schools were randomly selected from the two coastal districts (East Midnapore and South 24 Parganas) and dental investigation was carried out for 6-14 years aged children. Cluster sampling technique was used for the study because it was more beneficial to examine a cluster of children rather than an individual

At first informed consent, after discussing the risk and benefit of the study, was taken from the school authority as well as from the guardian of the children. The dental examination of children studying in different Primary and high schools in different region of the coastal area was conducted. The examination was carried out in the respective school of the students, sitting in an ordinary chair with the help of a simple mouth mirror and dental explorer. CPITN (Community Periodontal Index for Treatment need) probe was used for diagnosis of dental caries to differentiate between cavitated lesion and surface demineralization. Dental caries were assessed as per the World Health Organization criteria 1997^[8] and treatment needs was also calculated accordingly. A simple questioner season was carried out with the child keeping his parent in front, regarding their socioeconomic status and oral hygiene practice. Last 7 days dietary history was also taken.

There was a source of natural light in the room in which examination was conducted. The light was consistent as far as

Departments of Pedodontics and Preventive Dentistry, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, ¹Dr. R. Ahmed Dental College and Hospital, Kolkata, West Bengal, India

Correspondence: Dr. Dulal Das, Department of Pedodontics and Preventive Dentistry, Clinical Tutor, North Bengal Dental College and Hospital, Darjeeling, West Bengal.
E-mail: drdulaldas@gmail.com

Access this article online	
Quick Response Code:	Website: www.contempclindent.org
	DOI: 10.4103/0976-237X.123048

possible throughout the survey. A torch light was kept by the operator for extra illumination if required. The examination area was partitioned and arranged in such a way that the subject entered at one way and left another way along his or her guardians. They were not allowed to crowd around examination table. No radiograph was taken.

Results

The study was carried out among 1764 children of 6 to 14 years of age from different government primary and high schools in coastal areas of West Bengal mainly in East Midnapore and South 24 Parganas districts.

Total children those who were examined in the present study were divided into three age groups (6-8 years, 9-11 years and 12-14 years). The distributions of boys and girls of those age groups were shown in Table 1.

The distribution table [Table 2] depicts a comparative evaluation of a number of children with caries and caries free permanent teeth in 6-8 years age group. When statistical analysis was performed to evaluate the frequency of carious children, it reveals statistically insignificant ($\chi^2 = 0.956$, $df = 1$, $P = 0.328$). On the other hand in spite of high decayed,

Table 1: Age and sex wise sample distribution

Distribution	6-8 years	9-11 years	12-14 years
Boys	208	334	360
Girls	209	289	364
Total	417	623	724

Total sample size=1764. Boys: 902; Girls: 862

Table 2: DMFT index and caries prevalence in permanent teeth of 6-8-year-old children

Distribution	With caries	With out caries	Total	Prevalence (%)	Meas DMFT	Standard deviation
Boys	35	173	208	16.83	1.53	±0.656
Girls	28	181	209	13.4	1.67	±0.838
Total	63	354	417	15.11		

DMFT: Decayed, missing and filled teeth permanent teeth

Table 3: Deft index and caries prevalence in primary teeth of 6-8-year-old children

Distribution	With caries	With out caries	Total	Prevalence (%)	Mean deft	Standard deviation
Boys	126	82	208	60.58	3.85	±2.188
Girls	120	89	209	57.42	3.54	±1.91
Total	246	171	417	58.99		

DMFT: Decayed, missing and filled teeth primary teeth

Table 4: DMFT index and caries prevalence only in permanent teeth of 9-11-year-old children

Distribution	With caries	With out caries	Total	Prevalence (%)	Meas DMFT	Standard deviation
Boys	79	255	334	23.65	2.09	±0.819
Girls	95	194	289	32.87	1.76	±0.827
Total	174	449	623	27.93		

DMFT: Decayed, missing and filled teeth permanent teeth

missing and filled teeth DMFT in boys statistical analysis gave an insignificant interpretation ($t = 0.74$ $P = 0.460$ $df = 61$).

The deft index and caries prevalence in primary teeth of 6-8 year- old children is summarized in Table 3. Though the prevalence in boys were higher but the frequency was statistically insignificant ($\chi^2 = 0.430$, $df = 1$, $P = 0.512$), similarly the mean deft was higher in boys but statistically insignificant ($t = 1.18$ $P = 0.239$ $df = 244$).

The contingency table [Table 4] shows the mean DMFT index and caries prevalence in permanent teeth of 9-11 years old children. Chi-square statistical test was performed to analyze the frequency of caries in boys and girls and revealed a significantly higher ($\chi^2 = 6.542$, $df = 1$, $P = 0.011$) caries prevalence in the permanent dentition in boys. Similarly when statistical analysis was performed for the two mean (mean DMFT), it revealed significantly higher ($t = 3.16$ $P = 0.002$ $df = 272$) DMFT index in boys than girls.

Table 5 express the caries prevalence in primary teeth of 9-11 year old children residing in coastal areas of West Bengal. Chi-square test was performed to evaluate the data and test revealed an insignificant variation in caries prevalence in boys and girls ($\chi^2 = 1.515$, $df = 1$, $P = 0.218$). The unpaired t test was also performed to explore the difference between two mean (mean deft) and it showed a significantly higher ($t = 2.16$ $P = 0.031$ $df = 312$) deft index in boys than girls.

Table 6 depict a comparative evaluation of caries prevalence of permanent teeth in boys and girls of 12-14 years age group children. Statistical analysis revealed that $\chi^2 = 2.913$, $df = 1$,

$P = 0.088$, which signifies that in this age group there was no significant variation in caries prevalence. Although there was a difference present in mean DMFT index and statically significantly higher DMFT index proved in boys ($t = 2.10$ $P = 0.036$ $df = 305$).

The contingency table [Table 7 and Figure 1] depicts the prevalence of dental caries in permanent teeth of the total sample examined for the present study. Chi-square test revealed a significantly higher ($\chi^2 = 6.534$, $df = 1$, $P = 0.011$) caries prevalence in girls than boys.

Table 8 and Figure 2 highlight the status only of primary teeth of the total sample. The prevalence dental caries in the primary dentition in boys and girls were 55.72% and 51.81% respectively. The chi-square test showed a statistically insignificant co-relation ($\chi^2 = 1.598$, $df = 1$, $P = 0.206$) in caries prevalence.

Tables 9-11 and Figures 3-5 depict the treatment need for the affected teeth of the children studied. Irrespective of age group and sex the most frequently required treatment were one surface filling followed by multiple surface filling pulp therapy and extraction except for the primary teeth of 9-11 years of age group where the most frequently required treatment was extraction.

Discussion

Dental caries is a multi-factorial, microbial, infectious, transmissible disease of hard tissues of teeth characterized by the demineralization of inorganic structures and subsequent breakdown of organic moieties along with remineralization of the demineralized structures until there is cavitation. A plenty of influencing factors have been postulated by various authors regarding its etiology. Socioeconomic status, availability of the sticky carbohydrate containing foods, dietary intake of fibrous foods, the presence of fluoride or other micronutrients in diet, sugar intake frequency and oral hygiene maintenance all have to some extent influence over the causation of dental caries.

The present study was carried out among 1764 school children from 6-14 years of age and the overall all caries prevalence in permanent teeth were 28.06%, in boys it was 25.39% and in girls it was 30.86%.

Hence, it was seen that the prevalence of dental caries was much lower in the studied population than many other studies conducted by different researchers in different parts of the globe. However the burden of treatment need was high. Not a single tooth was found treated by any dentist in the total studied children.

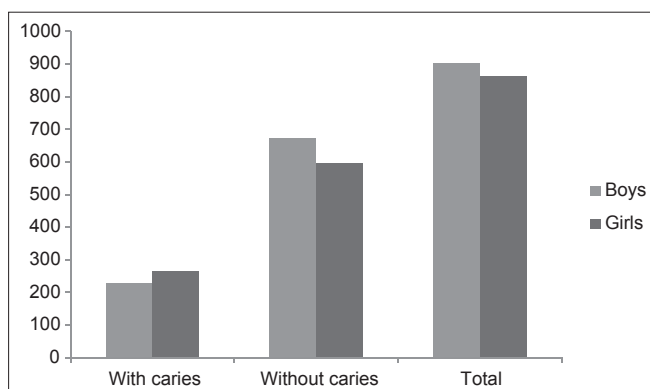


Figure 1: Caries prevalence in permanent teeth in total children

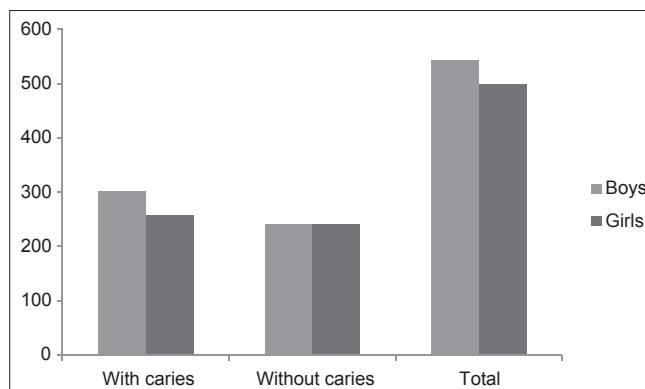


Figure 2: Caries prevalence in primary teeth of total children

Table 5: Deft index and caries prevalence in primary teeth of 9-11-year-old children

Distribution	With caries	With out caries	Total	Prevalence (%)	Mean deft	Standard deviation
Boys	176	158	334	52.69	3.00	±1.294
Girls	138	151	289	47.75	2.65	±1.573
Total	314	309	623	50.40		

DMFT: Decayed, missing and filled teeth primary teeth

Table 6: DMFT index and caries prevalence in permanent dentition of 12-14-year-old total children

Distribution	With caries	With out caries	Total	Prevalence (%)	Mead DMFT	Standard deviation
Boys	164	196	360	45.56	2.36	±1.055
Girls	143	221	364	39.29	2.12	±0.926
Total	307	417	724	42.40		

DMFT: Decayed, missing and filled teeth permanent teeth

Few unique features of the samples might be the key factors of this kind of result. These were.

- Almost all the children used to take sea fish 4-5 times a week in their diet which is a rich source of fluoride, the principal caries inhibiting substance
- As the areas were very remote and the study children were from socioeconomically backward families so

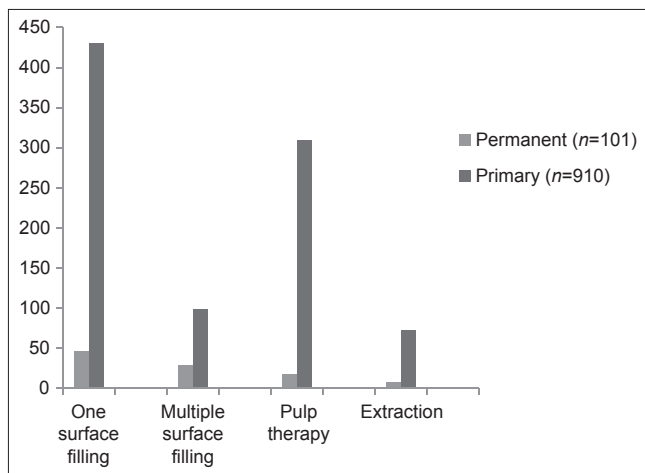


Figure 3: Treatment need for 6-8-year-old children

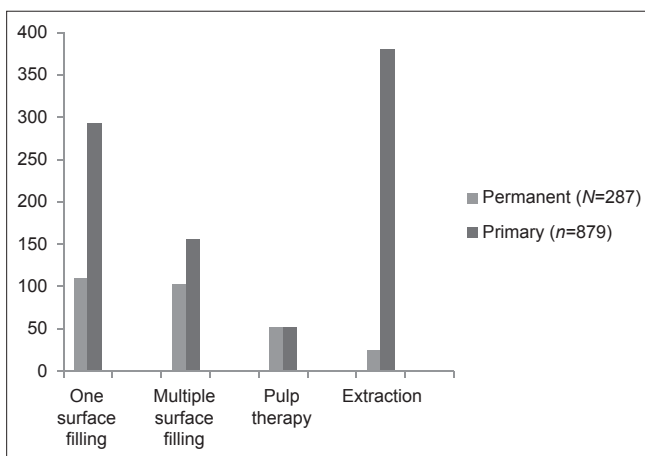


Figure 4: Treatment need for 9-11-year-old children

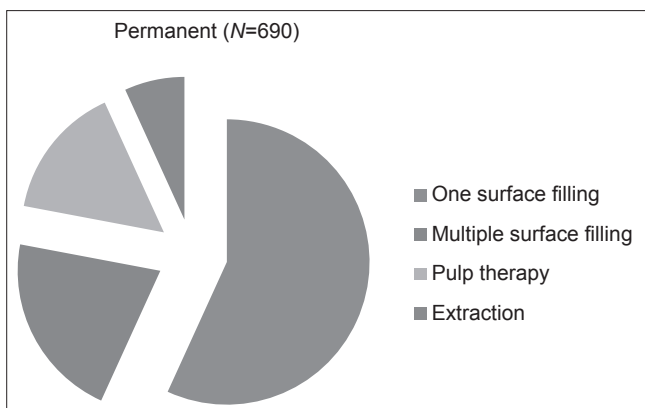


Figure 5: Treatment need for 12-14-year-old children

Table 7: Caries prevalence in permanent teeth in total children

Distribution	With caries	With out caries	Total	Prevalence (%)
Boys	229	673	902	25.39
Girls	266	596	862	30.86
Total	495	1269	1764	28.06

Table 8: Caries prevalence in primary teeth of total children

Distribution	With caries	With out caries	Total	Prevalence (%)
Boys	302	240	542	55.72
Girls	258	240	498	51.81
Total	560	480	1040	53.85

Table 9: Treatment need for 6-8-year-old children

Treatment	Permanent (n=287)	Primary (n=879)
One surface filling	110 38.3%	292 33.2%
Multiple surface filling	102 35.5%	156 17.7%
Pulp therapy	51 17.8%	51 5.8%
Extraction	24 8.4%	380 43.2%

Table 10: Treatment need for 9-11-year-old children

Treatment	Permanent (n=101)	Primary (n=910)
One surface filling	46 45.5%	430 47.3%
Multiple surface filling	29 28.7%	99 10.9%
Pulp therapy	18 17.8%	309 33.9%
Extraction	8 7.9%	72 7.9%

Table 11: Treatment need for 12-14-year-old children

Treatment	Permanent (N=690)
One surface filling	392 56.8%
Multiple surface filling	146 21.2%
Pulp therapy	105 15.2%
Extraction	47 6.8%

the availability and accessibility to refined a sticky carbohydrate food was very meagre

- One good sign regarding the study group was that 65% to 78% children use toothbrush regularly.

A similar result was reported by Saravanan *et al.*^[9] in 2005. They reported the prevalence of caries in the permanent dentition was 26.5%. The prevalence of caries increases significantly with age in the permanent dentition.

A very low level of dental caries was reported by Frencken *et al.*^[10] in 12 year old school children of urban Kenya in 1984. Nearly 22% caries prevalence and 0.5 DMFT were reported by the author.

Low caries prevalence was reported by Knutson^[11] in 1947. He reported the caries prevalence of 6 years old in Nicollet Country, Minnesota. The caries prevalence was 24.3%.

In 1939 Sarkar^[12] examined 18,445 school children up to 16 years of age in West Bengal. He reported that 13.3% children had defective teeth. furthermore in 1931 he examined 2,000 children and found 14.4% had defective teeth.

Similar findings like the present study was also seen in studies of Bagramian *et al.*^[2] on Amish children and Sgan-Cohen *et al.*^[2] founded the prevalence of dental caries to be very low among 5 and 12-year old children.

On the other hand the findings of the present study were dissimilar with the study performed by Bhat Meghashyam *et al.*^[2] among coastal fisherfolk communities of the Uttera Kannada district of Karnataka in 2007. They reported a very high prevalence of dental caries in permanent dentition of around 63.87% with a mean DMFT of 1.896 at the age of 10-14 years. The authors had concluded that the availability of sticky carbohydrate rich diet and certain trace elements such as selenium, relative humidity might have influenced the occurrence of dental caries in the study population.

Kulkarni and Deshpande^[13] in 2002 carried out a study among 2005 school children in 11-15 years age at Belgaum city. The prevalence of dental caries in the population was 45.12%. The mean DMFT was 1.18. Males and low socioeconomic groups showed a higher prevalence.

Dash *et al.*^[14] in 2002 also reported a high level of dental caries in children from Cuttack, Orissa. The point prevalence of dental caries was reported to be 64.3% with an average DMFT index of 2.38 at the age of 5-15 years. According to them the prevalence of caries showed a pattern of occurrence, i.e., prevalence consistently increased from 5 years to 8 years age group and subsequently decreased at 11 years and 15 years age.

Rao *et al.*^[15] in 1999 also examined the dental caries status among school children of Moodbidri and the reported caries

prevalence was as high as 76.9%. They also blamed the presence of refined carbohydrate in the diet and lack of oral hygiene maintenance for such high caries prevalence

Tayebe *et al.*^[16] in 1985 reported the caries prevalence of 10-14 year old children of urban Sudan. They found 64% of children were affected by dental caries with a mean DMFT index of 1.7.

In 1941 Shourie^[6] reported an overall 55.5% of caries prevalence in Indian children.

On the other hand in the present study the overall caries prevalence in primary teeth was 53.85% (in Boys- 55.72% and in girls 51.81%). Though the prevalence was slightly higher in boys but the difference was statistically insignificant ($P > 0.05$).

In 2005 Saravanan *et al.*^[9] reported dental caries was more prevalent in the primary dentition in boys and the prevalence of caries was 71.1% and not associated with increasing age.

King^[17] in 1938 reported In West Ross-Shire country school 53.3% of deciduous teeth were carious. In the Lewis country primary school 24.2% of deciduous teeth were carious.

Ainsworth and Young^[18]. In 1925 examined a total of 4600 school children of 5-13 years age of the British Isles. They reported that 43.3% of all upper deciduous teeth were carious.

Conclusion

The present study was carried out to assess the caries prevalence and treatment need for the children of 6-14 years of age of coastal areas of West Bengal. Following conclusions can be drawn from the results:

- The overall all caries prevalence in the permanent dentition was 28.06%, in boys it was 25.39% and in girls it was 30.86%. Therefore caries prevalence in female was higher and which was statistically highly significant ($P < 0.05$)
- The overall caries prevalence in the primary dentition was 53.85% (in Boys- 55.72% and in girls 51.81%). Though the prevalence was slightly higher in boys but the difference was statistically insignificant ($P > 0.05$)
- Caries prevalence in the study was lower than most of the national study done in India. Frequent dietary intake of sea fish containing high fluoride and less availability of refined carbohydrate may be the probable reasons of such low prevalence
- Regarding treatment need the most frequently required treatment was one surface filling followed by other treatments irrespective of sex and age group.

References

1. Jams SW, Kevin JD. Cariology. Dent clin North Am 1999; 43:569-78.
2. Meghashyam B, Nagesh L, Ankola A. Dental caries status and treatment needs of children of fisher folk communities, residing in the coastal areas of Karnataka region, south India. West Indian Med J 2007;56:96-8.
3. National oral health care program implementation strategies. DGHS. MOH and FW; Govt. of India:2004.
4. Damle SG, Patel AR. Caries prevalence and treatment needs amongst children at Dharavi, Mumbai. J Community Dent Oral Epidemiol 1994; 22:62-3.
5. Antia FE. The dental caries experience of school going children in the City of Bombay. J Indian Dent Assoc. 1962; 39:325.
6. Shourie KL. Dental Caries in Indian Children. Ind J Medical Res. 1941; 29:709-21.
7. Oral Health. ICMR Bulletin. 1994 (Apr.); 24:4.
8. Oral Health Survey Basic Methods – 4th Edition 1997.
9. Saravanan S, Madivanan I, Subashini B, Felix JW. Prevalence pattern of dental caries in the primary dentition among school children. Indian J Dent Res 2005;16:140-6.
10. Frencken J, Manji F, Mosha H. Dental caries prevalence amongst 12-year-old urban children in East Africa. Community Dent Oral Epidemiol 1986;14:94-8.
11. A survey of the literature of dental caries. Prepared for the Food and Nutrition Board. Washington D.C.: National Academy of Science-National Research Council; 1952.
12. Sarkar S N. Dental condition in India. Calcutta Med J 1939; 35:369.
13. Kulkarni SS, Deshpande SD. Caries prevalence and treatment needs in 11-15 year old children of Belgaum city. J Indian Soc Pedod Prev Dent 2002;20:12-5
14. Dash JK, Sahoo PK, Bhuyan SK, Sahoo SK. Prevalence of dental caries and treatment needs among children of Cuttack (Orissa). J Indian Soc Pedo Prev Dent. 2002; 20:139-43.
15. Rao A, Sequeira SP, Peter S. Prevalence of dental caries among school children of Moodbidri. J Indian Soc Pedod Prev Dent. 1999; 17:45-8.
16. El Tayeb Y, Bratthall D, Carlsson P. Dental caries and streptococcus mutans in Suanese school children. Odontostomatol Trop 1985;8:77-80.
17. King JD. Dental caries in Lewis and parts of West Ross-shire. Lancet 1938; 235:109.
18. Ainsworth NJ, Young M. The incidence of dental disease in children, London. Spec. Rep. Ser., Med. Res. Council. II.1925.

How to cite this article: Das D, Misra J, Mitra M, Bhattacharya B, Bagchi A. Prevalence of dental caries and treatment needs in children in coastal areas of West Bengal. Contemp Clin Dent 2013;4:482-7.

Source of Support: Nil. **Conflict of Interest:** None declared.

Announcement

Android App



Download
**Android
application**

FREE

A free application to browse and search the journal's content is now available for Android based mobiles and devices. The application provides "Table of Contents" of the latest issues, which are stored on the device for future offline browsing. Internet connection is required to access the back issues and search facility. The application is compatible with all the versions of Android. The application can be downloaded from <https://market.android.com/details?id=comm.app.medknow>. For suggestions and comments do write back to us.