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ORIGINAL ARTICLE

RISK FACTORS AND PATTERNS RELATED TO DENTAL CARIES EVALUATED WITH CARIES ASSESSMENT SPECTRUM AND TREATMENT (CAST) AMONG SCHOOLCHILDREN OF BHUBANESWAR, INDIA

Ramesh Nagarajappa[1], Debasruti Naik[2], Dharmashree Satyarup[3], Radha Prasanna Dalai[4]

[1]Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
[2]Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
[3]Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
[4]Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

ABSTRACT

Objectives. To determine the complete range of carious conditions and furthermore to compare the risk factors and patterns of dental caries amongst schoolchildren aged 12 and 15 years in Bhubaneswar.

Material and Methods. Cross-sectional descriptive survey was performed among 800 schoolchildren to assess the dental caries status by Caries Assessment Spectrum and Treatment (CAST) scoring. Chi-square, parametric t-test, one-way ANOVA with post hoc Bonferroni and stepwise multiple linear regression were utilized for statistical analysis.

Results. Study population comprised of 476 (59.5%) boys and 324 (40.5%) girls, of which 356 (44.5%) and 444 (55.5%) represented the 12- and 15-years age group respectively. Prevalence of dental caries was 60.6% (Mean 0.38 ± 0.545). Younger age group children presented a significant ($p<0.05$) lower caries prevalence (54.8%) as against 65.3% in 15 years children. Majority, 189 (23.6%) revealed distinct visual change in enamel (code 3). Acuteness of disease constructed on maximum CAST score for each subject showed that teeth with morbidity (28.5%) is higher followed by reversible pre-morbidity (23.6%) and serious morbidity (6.5%). Predominantly first molars were generally influenced. Significant interpreters in plunging order for DMFT were frequency of cleaning teeth and sweet score.

Conclusions. A creative instrument named CAST index describes full continuum of dental caries. Its utilization in epidemiological studies is exceptionally encouraging as it is less tedious and more cost effective. It can possibly be a useful tool for planning caries control programs in both individual and community levels.

Key words: *Caries status, caries assessment spectrum and treatment index, children, risk factors*

INTRODUCTION

Being a multifactorial oral disease, dental caries shows clinically as a strategy from introductory visual change in enamel to blunt cavitation. Assessing the different phases of enamel carious lesions prepares for dental specialist and patient to control caries advancement by execution of different caries-preventive strategies. This likewise encourages policy makers to introduce a more unflinching portrayal of caries status of a specific population [20].

Predominance of dental caries in developed nations is diminishing, while in underdeveloped and developing nations, prevalence is on the rise [3, 25]. According to statistics available from World Health Organization (WHO), caries prevalence among 12-year-old children from several European Union States (EU) has decreased significantly from 1970's to 2006. It is the most common illness among school going children and its commonness is multifactorial relying upon age, sex, socioeconomic status, geographical location, food habits particularly sugar/sucrose utilization and oral cleanliness propensities. WHO announced 60-90% of schoolchildren worldwide has encountered caries with the ailment being most pervasive in Asian and Latin American countries [25].

Dental caries, whenever left untouched can prompt agony, loss of teeth, and impaired quality of life. Demand exists for outlining procedures to govern, avoid, and treat caries lesions and their outcomes through legitimate

Corresponding author: Dr. Debasruti Naik, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar - 751003, Odisha, India, mobile: 9439238604, e-mail – smilewithdebshruti@gmail.com

and consistent information from people and societies. Henceforth a constant scrutiny of dental epidemiological position and its risk factors is of foremost importance. For substantial populations, such information must be gathered using epidemiological studies [9].

From the applied viewpoint, greatest beneficial arrangement in epidemiological studies is to utilize a solitary index portraying the comprehensive range of a disease. As of late, an advanced tool named Caries Assessment Spectrum and Treatment (CAST) was presented by *Frencken* et al. for epidemiological examinations [12]. Consequently, this CAST tool has exhibited to be a promising instrument for practice universally in oral health surveys. It is presently being operated in populace of diverse age clusters and circumstances in a number of nations illustrated by the report from Poland [8].

Although CAST has been utilized in various studies [8, 11, 20] to our knowledge there has been no studies previously reported on the schoolchildren in Bhubaneswar. Hence, the current study was aimed to determine the complete range of carious conditions and also to compare the risk factors and patterns of dental caries amongst schoolchildren of Bhubaneswar.

MATERIAL AND METHODS

This cross-sectional descriptive survey was steered from July to October 2018. Schoolchildren who were permanent residents of Bhubaneswar city and were logically and physically proficient of responding to questionnaire were included in the study. Medically compromised children or children with physical impediments and on antibiotic treatment in the preceding six months, also those having mixed dentition and undergoing orthodontic treatment were excluded.

Survey procedure was studied and ethical clearance granted by Institutional Ethical Committee (Ref No/ DMR/IMS.SH/SOA/180047). Prior to initiation of primary investigation, certified list of all schools (Government and Private) of Bhubaneswar was attained from District Education Office (DEO), Bhubaneswar. An official authorization was obtained from respective Heads of selected schools. Subjects who decided to take part got consent form signed from their parents and also provided the assent independently.

A preliminary survey was done amongst 80 students from 2 schools to determine the plausibility of utilizing CAST index in our population. Regarding content, language, recording technique and relevance - its application was found to be simple. Modifications were not required, and the subjects stated satisfaction with the investigation convention, which was subsequently utilized for directing the examination. Based on the earlier reported prevalence of dental caries in schoolchildren aged 12 and 15 years in Odisha (54% and 63%), 5% allowable error and 95% confidence level, the sample size was calculated as 382 which was rounded off to 400 per age group.

Study sample were enrolled by a two-stage cluster sampling procedure. In the first stage, Bhubaneswar city was randomly alienated into 4 topographical areas, and 5 schools from each area were arbitrarily chosen. Out of the total number of Government (65) and private schools (119), 8 Government and 12 private schools were randomly picked. In the second stage, eligible schoolchildren were stratified by age and gender and randomly selected in proportion to aggregate number of 12 and 15-year-old students registered into each school for accomplishing the sample of about 800.

Data were collected on a structured proforma, which comprised of two sections. Initial segment was utilized to gather information on sociodemographic data and the next portion encompassed oral hygiene practices and CAST index scoring. Dental examination was performed by trained and calibrated examiner alongside a recording assistant. Teeth were evaluated according to CAST recommendations (Table 1) [12].

Table 1. Description of Caries Assessment Spectrum and Treatment (CAST) codes

Characteristics	Code	Description	Concept of health
Sound	0	No visible evidence of a distinct carious lesion is present	Healthy
Sealed	1	Pits and/or fissures are at least partially sealed with a sealant material	
Restored	2	A cavity is restored with a (in) direct restorative material	
Enamel	3	Distinct visual change in enamel only. A clear caries discolouration is visible with or without localised enamel breakdown	Reversible premorbidity
Dentin	4	Internal caries-related discolouration in dentine. The discoloured dentine is visible through enamel which may or may not exhibit a visible localised breakdown of enamel	Morbidity
	5	Distinct cavitation into dentin. The pulp chamber is intact	
Pulp	6	Involvement of pulp chamber. Distinct cavitation reaching the pulp chamber or only root fragments are present	Serious morbidity
Abscess/ Fistula	7	A pus containing swelling or a pus releasing sinus tract related to a tooth with pulpal involvement	
Lost	8	The tooth has been removed because of dental caries	Mortality
Other	9	Does not correspond to any of the other categories	

Preceding the survey, a training session entailing theoretical and practical sections was conducted. The theoretical portion incorporated the learning of literature and resources provided by authors of CAST index. The practical part incorporated, training and intra-examiner calibration which was carried out by a senior Faculty member on 20 schoolchildren to confirm even interpretations, comprehension and application of codes and criteria for dental caries assessment and furthermore to ensure consistent examination. The intra-examiner reliability for CAST was evaluated with kappa statistics, which was observed to be 90%.

A plain dental mirror and periodontal probe ending with a 0.5 mm ball was used for examination of dental caries. Tooth surface was not air-dried but relatively, when essential, surplus saliva was removed with cotton rolls [as endorsed for application of CAST] [12]. If an abscess or a fistula was existing, all surfaces with an open cavity were counted with code 7. The maximum code for individual tooth was chosen for additional scrutiny. Approximately 5% of the assessed population were re-evaluated toward the finish of each day to determine the intra-examiner reliability.

Statistical analysis

SPSS version 21.0 (SPSS Inc., Chicago, Illinois, USA) was used for data analysis. *Chi*- square test (χ^2) was used for comparisons of dental caries prevalence amongst different age and gender groups. The parametric t- test and one-way ANOVA with post hoc analysis (Bonferroni) was used for comparison of mean dental caries scores between various variables. Stepwise multiple linear regression analysis was executed to estimate the linear relationship between DMFT as dependent variable and other independent variables. For all tests, confidence interval and p value were established at 95% and < 0.05 respectively.

RESULTS

A total of 800 schoolchildren, 476 (59.5%) boys and 324 (40.5%) girls were examined, out of which 356 (44.5%) and 444 (55.5%) represented the 12- and 15-years age group respectively (Table 2). Majority (55.1%) parents had pre-university level of education followed by graduates (39.4%). None of the parents were illiterate or had post-graduation qualifications. About two-third 542 (67.8%) had a family income of rupees 30 to 50,000 per month and only 160 (20%) were having income above rupees 50,000. Around 490 (61.3%) children were representatives of Government schools and the remaining 310 (38.8%) were from private schools.

Table 2. Prevalence of dental caries according to demographic variables

Independent variables	Study subjects n (%)	Caries affected subjects n (%)	χ2 value	p-value	DMFT (Mean±SD)	t/F value	p-value
Age (years)[@]							
12	356 (44.5)	195 (54.8)	4.882	0.027*	0.39±0.56	0.311	0.035*
15	444 (55.5)	290 (65.3)			0.46±0.21		
Gender[@]							
Male	476 (59.5)	290 (60.9)	0.044	0.834	0.39±0.55	0.308	0.758
Female	324 (40.5)	195 (60.2)			0.38±0.52		
Parents education[#]							
Illiterate	0 (0)	0 (0)	32.033	0.001*	-	8.262	0.001*
Primary	16 (2)	15 (93.8)			0.38±0.5[ab]		
Higher Secondary	28 (3.5)	24 (85.7)			0.36±0.42[a]		
Pre-University	441 (55.1)	284 (64.4)			0.33±0.546[b]		
College							
Graduate	315 (39.4)	162 (51.4)			0.29±0.12[ab]		
Post Graduate	0 (0)	0 (0)			-		
Family Income (INR)[#]							
<30,000	98 (12.3)	40 (40.8)	23.721	0.001*	0.34±0.536[a]	1.938	0.021*
30,000 – 50,000	542 (67.8)	331 (61.1)			0.37±0.555[b]		
50,000 – 1,00,000	160 (20)	114 (71.2)			0.46±0.512[ab]		
>1,00,000	0 (0)	0 (0)			-		
Type of School[@]							
Government	490 (61.3)	294 (60)	0.207	0.649	0.38±0.57	0.404	0.686
Private	310 (39.8)	191 (61.6)			0.39±0.502		
Total	800 (100)	485 (60.6)			0.38±0.545		

Test applied: Chi square test or Fischer's exact test, [@]t test, [#]One way ANOVA, *indicates statistically significant difference
Post hoc analysis: Values with same letters superscripted shows statistically significant difference

Overall caries prevalence in our population was 60.6%, Mean DMFT was 0.38±0.545. Younger children presented a lower caries prevalence of 54.8%, (mean DMFT 0.39±0.56) as against 65.3%, (mean DMFT 0.46±0.21) in 15 years children and the difference observed was found to be statistically significant (*P*=0.035). Almost a similar gender wise prevalence (60.9% males and 60.2% females) was observed which was not statistically significant (*P*=0.758). Those children whose parents were less qualified and also belonged to higher income class had greater caries prevalence which were again statistically significant (*P*=0.021). This difference was quite evident among the primary and graduate level of education.

Almost all the participants reported use of toothbrush and toothpaste for cleaning their teeth (Table 3). Majority, 630 (78.8%) practiced the frequency of once daily tooth brushing, 732 (91.5%) used soft bristles toothbrush and method of cleaning practiced was predominantly circular followed by combined method among 422 (52.8%) and 362 (45.3%) subjects respectively. Those using soft and medium bristles toothbrush demonstrated a caries prevalence of 60.5% and 61.8% respectively which was significant (*P*=0.016). Subjects brushing once daily showed higher caries prevalence (66.7%) which was statistically significant (*P*=0.001). Method and material used for cleaning was not statistically significant. Furthermore, a favourable sweet score was found as none were in the watch out zone which resulted in lower proportion of caries (44.1%) among subjects with excellent sweet score that was found to be significant.

Table 3. Prevalence of dental caries according to oral hygiene practices and sweet score

Independent variables	Study subjects n (%)	Caries affected subjects n (%)	χ2 value	p-value	DMFT (Mean±SD)	t/F value	p-value
Type of cleaning							
Tooth Brush	800 (100)	485 (60.6)	-	-	0.38±0.545	-	-
Finger	0 (0)	-			-		
Twig	0 (0)	-			-		
Type of toothbrush bristles[@]							
Soft	732 (91.5)	443 (60.5)	20.889	0.001*	0.45±0.54	4.183	0.016*
Medium	68 (8.5)	42 (61.8)			0.29±0.49		
Method of cleaning[#]							
Horizontal	0 (0)	-	13.729	0.126	-	1.695	0.184
Vertical	16 (2)	15 (93.8)			0.38±0.5		
Circular	422 (52.8)	270 (64)			0.42±0.57		
	362 (45.3)	200 (55.2)			0.35±0.515		
Combination							
Material used for cleaning teeth[@]							
Tooth paste	795 (99.4)	481 (60.5)	0.791	0.374	0.38±0.545	0.004	0.947
Tooth powder	5 (0.6)	4 (80)			0.4±0.548		
Sand	0 (0)	-			-		
Brick Powder	0 (0)	-			-		
Charcoal	0 (0)	-			-		
Frequency of cleaning per day[@]							
Once	630 (78.8)	420 (66.7)	136.048	0.001*	0.39±0.528	27.919	0.001*
Twice	170 (21.3)	65 (38.2)			0.35±0.563		
Thrice	0 (0)	-			-		
Sweet Score[@]							
Excellent	136 (17)	60 (44.1)	12.770	0.001*	0.4±0.648	25.53	0.001*
Good	664 (83)	425 (64)			0.34±0.511		
Watch out Zone	0 (0)	-			-		
Total	800 (100)	485 (60.6)			0.38±0.545		

Test applied: Chi square test or Fischer's exact test, [@]t test, [#]One way ANOVA, *indicates statistically significant difference

Distribution of study population according to highest Caries Assessment Spectrum and Treatment index scores is as exemplified in Table 4. About 315 (39.4%) participants demonstrated sound tooth structure (code 0). Among those affected, 189 (23.6%) participants revealed distinct visual change in enamel (code 3) followed by code 4 - internal caries related discolouration in dentin (16.3%), code 5 -distinct cavitation into dentin (12.3%) and code 6 - involvement of pulp chamber (6.5%). It was surprising to observe that there were no missing teeth and only 16 (2%) children had his or her tooth filled.

Table 4. Distribution of study population according to highest Caries Assessment Spectrum and Treatment (CAST) Index Score

CAST score	Number of subjects (n)	Percentage of subjects (%)
Code 0	315	39.4
Code 1	0	0
Code 2	16	2
Code 3	189	23.6
Code 4	130	16.3
Code 5	98	12.3
Code 6	52	6.5
Code 7	0	0
Code 8	0	0
Code 9	0	0

Table 5. Distribution of different carious stages (*Frencken* et al.) according to demographic variables among study population

Independent variables	Healthy dentition n (%)	Reversible premorbidity stage n (%)	Teeth with morbidity n (%)	Teeth with serious morbidity n (%)	Teeth with mortality n (%)	p-value
Age (years)						
12 (n= 356)	171 (48)	77 (21.6)	98 (27.5)	10 (2.8)	0	0.036*
15 (n=444)	160 (36)	112 (25.2)	130 (29.2)	42 (9.4)	0	
Gender						
Male (n=476)	192 (40.3)	106 (22.2)	150 (31.5)	28 (5.8)	0	0.872
Female (n= 324)	139 (42.9)	83 (25.6)	78 (24)	24 (7.4)	0	
Parents education						
Illiterate (n=0)	-	-	-	-	-	0.001*
Primary (n=16)	3 (18.8)	10 (62.5)	3 (18.7)	0	0	
Higher Secondary (n=28)	0	13 (46.4)	11 (39.2)	4 (14.2)	0	
Pre-University College (n= 441)	205 (46.5)	91 (20.6)	117 (26.5)	28 (6.3)	0	
Graduate (n= 315)	123 (39)	75 (23.8)	97 (30.7)	20 (6.3)	0	
Post Graduate (n=0)	-	-	-	-	-	
Family Income (INR)						
<30,000 (n=98)	52 (53.1)	21 (21.4)	24 (24.4)	1 (1)	0	0.001*
30,000 – 50,000 (n=542)	229 (42.3)	132 (24.3)	159 (29.3)	22 (4.0)	0	
50,000 – 1,00,000 (n=160)	50 (31.2)	36 (22.5)	45 (28.1)	29 (18.1)	0	
>1,00,000 (n=0)	-	-	-	-	-	
Type of School						
Government (n=490)	201 (41)	112 (22.8)	155 (31.6)	22 (4.4)	0	0.341
Private (n=310)	130 (41.9)	77 (24.8)	73 (23.5)	30 (9.6)	0	
Total (n=800)	331 (41.4)	189 (23.6)	228 (28.5)	52 (6.5)	0	

Test applied: Chi square test or Fischer's exact test, *indicates statistically significant difference

Severity of the disease based on maximum CAST score per subject shows that teeth with morbidity (28.5%) was higher followed by reversible pre-morbidity (23.6%) and serious morbidity (6.5%). This difference observed was statistically significant in relation to age, education and income only (P<0.05) (Table 5). Correspondingly, type of bristles used, method followed and frequency practiced for oral hygiene maintenance also showed significance along with sweet score (P<0.05). Likewise, statistically significant results were observed in relation to sweet score (Table 6).

Table 6. Distribution of different carious stages (Frencken et al) according to oral hygiene practices and sweet score among study population

Independent variables	Healthy dentition n (%)	Reversible premorbidity stage n (%)	Teeth with morbidity n (%)	Teeth with serious morbidity n (%)	Teeth with mortality n (%)	p-value
Type of cleaning						
Tooth Brush (n=800)	331 (41.4)	189 (23.6)	228 (28.5)	52 (6.5)	0	
Finger (n=0)	-	-	-	-	-	-
Twig (n=0)	-	-	-	-	-	
Type of toothbrush bristles						
Soft (n=732)	291 (39.8)	171 (23.4)	218 (29.8)	52 (7.1)	0	0.01*
Medium (n=68)	40 (58.8)	18 (26.5)	10 (14.7)	0	0	
Methods of cleaning						
Horizontal (n=0)	-	-	-	-	-	
Vertical (n=16)	3 (18.8)	5 (31.2)	8 (50)	0	0	0.044*
Circular (n=422)	158 (37.4)	114 (27.0)	125 (29.6)	25 (5.9)	0	
Combination (n=362)	170 (47)	70 (19.3)	95 (26.2)	27 (7.4)	0	
Material used for cleaning teeth						
Tooth paste (n=795)	329 (41.4)	188 (23.6)	226 (28.4)	52 (6.5)	0	
Tooth powder (n=5)	2 (40)	1 (20)	2 (40)	0	0	
Sand (n=0)	-	-	-	-	-	0.685
Brick Powder (n=0)	-	-	-	-	-	
Charcoal (n=0)	-	-	-	-	-	
Frequency of cleaning per day						
Once (n=630)	216 (34.2)	159 (25.2)	208 (33)	47 (7.4)	0	
Twice (n=170)	115 (67.6)	30 (17.6)	20 (11.7)	5 (2.9)	0	0.001*
Thrice (n=0)	-	-	-	-	0	
Sweet Score						
Excellent (n=136)	50 (36.7)	25 (18.3)	43 (31.6)	18 (13.2)	0	
Good (n=664)	281 (43.9)	164 (24.6)	185 (27.8)	34 (5.1)	0	0.001*
Watch out Zone (n=0)	-	-	-	-	0	
Total (n=800)	331 (41.4)	189 (23.6)	228 (28.5)	52 (6.5)	0	

Test applied: Chi square test or Fischer's exact test, *indicates statistically significant difference

Table 7 shows the distribution of CAST codes among the dentition. Code 3 is mostly found among maxillary (5.3%) and mandibular first molars (5.5%) followed by second molars (3.8%) and (0.2%) respectively along with couple of right central incisors (0.2%). Codes 4 and 5 also was mainly recorded in maxillary first molars (3.5% and 2.5%) and mandibular first molars (3.6% and 2.9%). None of the maxillary second molars showed deep caries (code 5 or 6). Couple of children required pulpal therapy for second molars. Filled teeth were more in mandibular compared with maxillary teeth.

Stepwise multiple linear regression analysis was performed to assess the linear relationship between DMFT as dependent variable and other independent variables (Table 8). The best predictors in downward order for DMFT were frequency of cleaning teeth and sweet score. Amount of variance obtained for frequency of cleaning teeth and sweet score was 1.9% and 3.5% respectively. Based on F-value (15.748 and 14.646) and P-value (<0.05), both predictors were found to be statistically significant.

Table 7. Distribution of CAST codes among maxillary and mandibular teeth

Tooth number	CAST Codes n (%)									
	0	1	2	3	4	5	6	7	8	9
11	797 (99.6)	0	0	2 (0.2)	0	1 (0.1)	0	0	0	0
12	800 (100)	0	0	0	0	0	0	0	0	0
13	800 (100)	0	0	0	0	0	0	0	0	0
14	796 (99.5)	0	0	1 (0.1)	1 (0.1)	2 (0.3)	0	0	0	0
15	799 (99.8)	0	0	0	1 (0.1)	0	0	0	0	0
16	708 (88.5)	0	3 (3.8)	34 (4.2)	25 (3.1)	20 (2.5)	10 (1.3)	0	0	0
17	796 (99.5)	0	0	3 (3.8)	1 (0.1)	0	0	0	0	0
21	799 (99.8)	0	0	1 (0.1)	0	0	0	0	0	0
22	800 (100)	0	0	0	0	0	0	0	0	0
23	800 (100)	0	0	0	0	0	0	0	0	0
24	798 (99.7)	0	0	1 (0.1)	0	1 (0.1)	0	0	0	0
25	786 (98.3)	0	0	1 (0.1)	1 (0.1)	3 (0.3)	1 (0.1)	0	0	0
26	698 (87.2)	0	3 (3.8)	42 (5.3)	28 (3.5)	18 (2.3)	11 (1.3)	0	0	0
27	798 (99.7)	0	0	1 (0.1)	1 (0.1)	0	0	0	0	0
31	800 (100)	0	0	0	0	0	0	0	0	0
32	800 (100)	0	0	0	0	0	0	0	0	0
33	800 (100)	0	0	0	0	0	0	0	0	0
34	789 (98.6)	0	0	7 (0.9)	2 (0.2)	2 (0.2)	0	0	0	0
35	789 (98.6)	0	0	3 (0.3)	8 (1)	0	7 (0.9)	0	0	0
36	692 (86.5)	0	3 (0.3)	44 (5.5)	24 (3)	23 (2.9)	14 ((1.8)	0	0	0
37	795 (99.4)	0	0	2 (0.2)	1 (0.1)	1 (0.1)	1 (0.1)	0	0	0
41	800 (100)	0	0	0	0	0	0	0	0	0
42	800 (100)	0	0	0	0	0	0	0	0	0
43	800 (100)	0	0	0	0	0	0	0	0	0
44	795 (99.4)	0	0	1 (0.1)	2 (0.2)	2 (0.2)	0	0	0	0
45	791 (98.8)	0	2 (0.2)	1 (0.1)	4 (0.5)	2 (0.2)	14 (1.8)	0	0	0
46	687 (85.8)	0	5 (0.6)	43 (5.3)	29 (3.6)	11 (1.4)	5 (0.6)	0	0	0
47	794 (99.2)	0	0	2 (0.2)	2 (0.2)	2 (0.2)	0	0	0	0

Table 8. Stepwise multiple linear regression analysis with DMFT as dependent variables

Model	R	R^2	F-value	p-value
DMFT				
1	0.139[a]	0.019	15.748	0.000[a]
2	0.188[b]	0.035	14.646	0.000[b]

a. Predictors: (Constant), Frequency of cleaning teeth.

b. Predictors: (Constant), Frequency of cleaning teeth, sweet score.

R= Correlation coefficient, R^2= Coefficient of determination

DISCUSSION

Our current investigation analyzed the progression and pattern of dental caries and the impact of sociodemographic influences among schoolchildren utilizing CAST index. Children of 12 and 15 years were decided for this study, as these are international scrutinizing ages for dental caries for worldwide correlations and nursing of disease inclinations. Correspondingly, at these ages all permanent teeth, except third molars will be erupted. Schoolchildren from both Government and private schools were chosen to represent children from all societal, financial and cultural backgrounds.

In both age groups nearly, every individual utilized tooth brush and tooth paste for cleaning their teeth. This obviously demonstrates their mindfulness about oral cleanliness. Brushing once a day was practiced among a large portion of the children (78.8%) which was similar with findings of *Joshi* and *Rajesh* [18]. In our study, as the frequency of brushing improved, prevalence of dental caries decreased (66.7% to 38.2%) which was predictable with other studies [6, 22]. There was no significance of supervised tooth brushing on school premises in preventing cavitated dentine carious lesions in high-caries risk occlusal surfaces of first permanent molars [16]. Nonetheless advantages and cost effectiveness of supervised tooth brushing in children for preventing dental caries over other treatment modalities are reported [14, 16].

WHO, 2005 bulletin reports 60-90% occurrence of dental caries among schoolchildren in various countries [25]. Caries prevalence in the present study was 60.6%, alike to outcomes reported in other studies [23]. Higher caries prevalence was found in contemplates done by *Sudha* et al 82.5% [27] and *Aragannal* et al 68.8% [1].

Age wise proportion of dental caries reported in the National Oral Health Survey was 53.8% among 12-year-old and 63.1% in 15-year-old children [23]. Caries prevalence in our sample population was higher at the age of 15 years (65.3%) than at 12 years (54.8%) which corresponds to outcomes reported earlier [15, 21]. Caries being a consistent and cumulative process might have obviously increased over a range of 3 years; besides, number of teeth are more at the age of 15 years. Higher caries prevalence with advancing age could also be due to susceptibility of newly erupted teeth to become decayed in the existing poor oral hygiene conditions [1]. In addition, absence of protective actions like application of pit and fissure sealants may well be an alternative cause which enhances the risk [2, 28].

No significant relationship between prevalence of dental caries and gender was found ($p>0.05$), however boys were marginally observed to be influenced more as conveyed in other studies [19, 27]. On the contrary, girls were found to have higher caries prevalence [1]. The augmented vulnerability of girls to caries might be ascribed to early eruption of teeth; morphological contrasts among teeth; greater inclination towards sweets and hormonal changes [10].

The load of oral disease is predominantly high for deprived and underprivileged people in both emerging and industrialized countries. Adding to deprived living situations, the foremost risk factors relate to unhealthy lifestyles (i.e. poor diet, nutrition and oral hygiene), and inadequate availability and accessibility of oral health care facilities [25]. A factually noteworthy distinction and an immediate relationship was found between mean DMFT and level of education which is predictable with findings of de *Almedia* et al. [7], yet as opposed to outcomes detailed by *Ojofeitimi* et al. [24]. Higher DMFT might be due to lack of awareness with respect to significance of timely dental care, scarcity of health care information and underutilization of accessible facilities.

Caries was too high in those children whose guardians had a higher pay (71.2%). Contrasts in their dietary patterns and extravagant lifestyles may build the susceptibility to caries in this group of population. Dietary propensities, and continuous nibbling by children might also clarify these perceptions. Few studies have identified the predominance of dental caries among children belonging to family with a lower income and also those having in excess of one kin[3]. The likely cause might be related to benefits of prevention not reaching these population.

Overall mean DMFT was clearly observed to be higher among 15-year-old children in our present study. *Bhoopathi* et al, reported similar results 0.22 and 0.29, respectively, which shows that caries experience for the 15-year old subjects is higher than 12-year-olds [5]. Global Oral Health Data Bank reports a mean DMFT of 2.97 among 12-year-old for the South East Asian countries. Despite the fact that India relatively reports better mean DMFT of 1.95, it is as yet higher contrasted with developed nations in African, European and Eastern Mediterranean and Western Pacific areas of World Health Organization who report a mean DMFT of 1.06, 1.64, 1.81 and 1.05 respectively [17]. This could likely be credited to absence of any sorted-out projects for dental caries reduction/prevention in India.

Children from higher financial foundations were by and large selected in private schools, and those from lesser financial foundations essentially get connected with government schools. Thus, school type was selected to evaluate children from diverse socioeconomic upbringings. We observed a relatively comparative caries distribution in these groups, though contrasting findings were reported in other literature which demonstrated that private schoolchildren had a lesser mean DMFT value (4.62±3.08) than government schoolchildren (5.11±3.6) [23].

Among all participants, 315 (39.4%) have sound tooth structure with no visible evidence of a distinct carious lesion and 16 (2%) have undergone sealant restorations and one fourth were in the stage of reversible pre-morbidity. This indicates the lack of awareness for prevention of oral diseases and firmly suggests application of pit and fissure sealants for susceptible tooth surfaces in high risk population employing appropriate material and technique [26]. More than one third of the study population required curative services which requires accessibility of skilled professionals and different assets. These findings recommend that absence of alertness for inhibition of oral diseases is essentially important to deteriorating oral health status of developing countries [20]. Number of filled teeth was less in our study population, which might be because of negative attitude and low dental awareness among parents of children which is replicated in child's oral health care.

In the current study, proportion of molars with a thoughtful morbidity (involvement of pulp and tooth surrounding tissues) was particularly excessive for first molars (3.6%), and these additionally demonstrated the maximum tooth mortality (CAST code 5 and 6). This perception is like numerous past examinations where first molars were accounted for to be more influenced than second molars [11]. First molars were observed to be exceptionally helpless for caries than second molars due to number of variables, for example, age, early eruption, anatomy, large crown size and position in the

oral cavity [13]. A certain level of symmetry in caries distribution was also observed for teeth in upper and lower jaws, which is as per past reports [29]. However, in 2004, *Batchelor* and *Sheiham* [4] have established that a factual symmetry of dental caries does not occur.

Occlusal surfaces of permanent molars and buccal pits of lower molars are utmost inclined to advancement of caries lesions, sealants are strongly suggested in the high peril populaces. Participants who have internal caries related discolouration in dentin (code 4) demonstrated that there is an elevated possibility of progression toward cavity unless timely attention and monitoring is provided. Reporting the advanced nature of dental caries using CAST, will enable the health care workers to present the genuine representation of preventable carious lesions to the strategy creators, which up till currently was just accounted as cavities in epidemiological study [23].

In our study, the best predictors for dental caries prevalence was frequency of cleaning teeth and sweet score. This reconfirms the significance of sugar (sucrose) as one of the prime etiological components. However, this was precisely inverse to the findings of *Weissenbach* et al [30] who found no relationship between consumption of sugary snacks and beverages and dental caries.

This epidemiological survey provided baseline information to support the execution of oral health programmes. In light of high prevalence of dental caries, wellbeing strategy that stresses oral health promotion and prevention would appear more worthwhile in addition to traditional curative care. Nature of the study was cross-sectional, thus blocking the capacity to draw inductions about causal relationships. Different confinements can be that CAST does not give information on treatment or preventive measure required for each code. Furthermore, additional research is required including longitudinal examination on a similar target population impinging different other risk factors engaged with causation of oral illness.

CONCLUSIONS

CAST file has presented another worldview by reassessing the pathogenesis of dental caries. Its utilization in epidemiological reviews is extremely encouraging as it is less tedious and more cost effective. Despite logical advances and the way that it is a preventable infection, dental caries keeps on being a noteworthy general medical issue. Its high commonness among our school youngsters likewise becomes a social issue. Instilling great oral cleanliness propensities for standard brushing, less sugar consumption, through dynamic association of guardians and instructors can go far in lessening dental caries. Normal dental wellbeing examinations ought to be led in all schools with reliable subsequent meet-ups. Oral wellbeing training ought to be consolidated inside the normal exercises of the school.

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Authors contributions

RN and DN contributed with the conception, design, acquisition, analysis and interpretation of data and took part in drafting of the manuscript, critical revision and final approval. DS and RPD contributed with design, analysis and interpretation of data, drafting of the manuscript and revised it critically until final approval. All authors listed on the title page have read the manuscript, attest to the validity and legitimacy of the data and its interpretation, and agree to its submission.

Conflict of interest

None declared.

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