Original Article

DOI: 10.7860/JCDR/2018/35029.11984

Dentistry Section

Association of Dental Caries and Oral Health Impact Profile in 12-Year-Old School Children: A Cross-Sectional Study

VIJAY S KUMAR[1], VINEETHA KARUVEETTIL[2], JOE JOSEPH[3], SRAVAN KUMAR YETURU[4], RAKESH P SUSEELA[5], CHANDRASHEKAR JANAKIRAM[6]

ABSTRACT

Introduction: The healthcare today is undergoing a paradigm shift from biomedical to biopsychosocial approaches. This holds true for dentistry as well, as the ultimate goal of oral health does not mean the mere absence of disease, rather the patients mental and social well-being. Oral health status in children is traditionally assessed by oral examination. But with the emergence of psychosocial factors affecting oral health and vice-versa, it is necessary to assess the subjective component of oral health in order to get a complete picture. Oral health related quality of life questionnaire can be used as a tool for the assessment of the impact of oral health on various dimensions of subjective well-being.

Aim: To determine the association between dental caries and oral health impact profile among 12-year-old school children in Ernakulam.

Materials and Methods: A cross-sectional study was conducted in 2017 on a representative sample of 281 school children aged 12 years from Ernakulam district. The data regarding caries experience were collected through oral examination using DMFT and deft indices. Oral health related quality of life was evaluated using a self-administered Child Oral Health Impact Profile questionnaire (COHIP). Descriptive statistics were computed for continuous data, whereas for categorical data, the respective frequencies were taken. Pearson's correlation was used to test the correlation between each domain of questionnaire and decay (D) component of DMFT.

Results: The mean COHIP score obtained for this population was 101.58±15.66. The prevalence of dental caries in this population was found to be 71.5%. The mean DMFT and deft scores did not have any significant correlation with the domains of the COHIP questionnaire. The association between the domain school environment and decay component (D) of DMFT was found to be significant (p-value – 0.024).

Conclusion: The results are conclusive that dental caries has a negative impact on the oral health related quality of life, thereby leading to loss of school hours and adversely affecting the student's academic performance.

Keywords: Caries experience, Children, Oral health related quality of life

INTRODUCTION

Oral Health is an essential part of general well-being, with dental caries influencing a person's capacity to eat, talk or socialise [1]. According to the National Oral Health Survey conducted in 2004 Indian children have high prevalence of dental diseases [2]. Objective evaluation of oral health status includes measurement of caries, fluorosis, malocclusion, hypodontia, periodontal diseases and orofacial deformities. In that respect, there is also a subjective component in measuring diseases and in the case of oral diseases, the most commonly utilised method is Oral Health Related Quality of Life (OHRQoL) questionnaires [3].

Oral health related quality of life in children has gone forth as one of the major concerns in the field of dentistry owing to the paradigm shift from mere curative approaches to holistic well-being of the children [4]. OHRQoL is a multi-dimensional concept that incorporates a subjective assessment of the individual's oral health, functional well-being, emotional well-being, expectations, satisfaction with care, and a sense of self [5]. The available OHRQoL tools are Child Oral Health Impact Profile (COHIP), Child Perceptions Questionnaire (CPQ 11-14), Oral Impact on Daily Performance (OIDP), Child Oral Health Quality of Life (COHQoL), and Early Childhood Oral Health Impact Scale [6].

Among the prescribed questionnaires COHIP has the most thorough development strategy and though it has demonstrated promising outcomes it has been utilised the least [5]. The questionnaire has five domains related to oral health, functional well-being, social–emotional well-being, school environment and self-image. This questionnaire is disease specific and in children, the most prevalent oral health disease is dental caries. Therefore, a cross-sectional survey was carried out to determine the relationship between dental caries status and oral health impact profile among 12-year-old school children in Ernakulam.

MATERIALS AND METHODS

This cross-sectional study was conducted in Ernakulam District, Kerala for a period of two months from February to March 2017. According to a previous study, 43.1%children had an impact on daily performances due to oral health problems [7]. The sample size was calculated based on this study using the formula n= $4PQ/d^2$, where P stands for prevalence, Q is (1-P), and d is the allowable error which was 20%of P. From this the sample size was estimated to be 85. Since the study involves a cluster (schools as clusters) sampling method, sample size is multiplied by two and was estimated to be 170. Multistage random sampling was done to select the schools. The list of all upper primary schools was obtained and stratified under Private and Government schools. Three Government schools and two Private schools were randomly chosen using a random table. All 12-year-old children in seventh standard of the selected schools were included in the study based on cluster sampling which comprised of 281 Children and was considered adequate.

Children of only 12 years of age willing to take part in the study were included. Children who have cognitive impairment or chronic diseases were excluded from the study.

Prior information sheets and consent forms were sent to Parents through children. Ethical Committee approval was obtained from the institution, and authority consents were taken from the Head of the respective schools.

The data collection included self-administered COHIP questionnaire and oral examinations. The growth and eruption patterns of the teeth cannot be universally applied owing to ethnic variations. The standards for tooth eruption patterns derived from a western population cannot be extrapolated to an Indian scenario. The mean eruption ages of second molars can vary from 11.9±1.17 years to 12.64±1.13 years among South Indian children [8]. Hence, each child was given a separate index, one for permanent teeth (DMFT) and another for primary teeth (deft). The children underwent oral examinations and the deft (aggregate of decayed, extracted and filled teeth in the primary dentition) [9] and DMFT (aggregate of decayed, missing and filled teeth in the permanent dentition) indices were recorded to assess Dental Caries [10]. The examinations were conducted in the classrooms under natural light and artificial illumination was used whenever required. The oral examination was performed by a single investigator. The intra-examiner reliability was confirmed by directing replicate examinations in 20 people, a kappa score of 0.95 was obtained for DMFT/deft.

The COHIP comprises of 34 questions that attempted to get an idea of a child's oral health status on five domains identified with oral health, functional well-being, social–emotional well-being, school environment and self image [11]. Participants are instructed to report on the frequency of events in the course of recent three months on a five-point Likert scale which is scored from 0-4. The responses for the five domains and the individual scores were: 'Never' (scoring 4); 'Almost never' (3); 'Sometimes' (2); 'Fairly Often' (1); and 'Almost all the time' (0). There were both positive and negative inquiries. The scores of the negative inquiries were reversed, with lower total COHIP scores indicating poorer oral health related quality of life. Frequency for each domain was calculated after assigning weights for each option considering positive and negative questions. For 34 questions the scores extended from 0 to 136 for which a higher score meant agreeable OHRQoL [11]. The questionnaire was self-administered and each child took around 20 minutes to complete the survey after which the survey sheets were collected back. The survey had inquiries in both English and regional language (Malayalam). The Cronbach's alpha score for reliability test for the regional language questionnaire was 0.81.

STATISTICAL ANALYSIS

Data analysis was done using the SPSS version 20 (SPSS Inc., Chicago, IL, USA).

For continuous data means and standard deviations were calculated. For categorical variables respective frequencies were generated. Correlation between each domain of questionnaire and Decay component of DMFT was analysed using Pearson's correlation co-efficient. Statistical significance was set at 5%($p < 0.05$).

RESULTS

The examination was conducted in 281 school children aged 12 years (43.77%males). 188 students in the sample belonged to Government schools (66.9%) and 93 students were from Private schools. COHIP scores obtained ranged from 42 to 132 [Table/Fig-1]. The mean COHIP score was 101.58 (±15.66). The caries prevalence in this population was found to be 71.5%.

Around 43.4%of children has experienced toothache often in the past three months. Due to oral health problems, 45.6%of children had missed school during the same period [Table/Fig-2].

The caries prevalence among government and private schools were found to be 71.8% and 71% respectively. Correlation between DMFT and COHIP scores were not significant in both Government and Private schools [Table/Fig-3].

An inverse correlation was obtained for all domains of the COHIP questionnaire except self image with dental caries experience, but it was not found to be significant [Table/Fig-4]. Overall mean DMFT and deft scores did not had any significant correlation with any of the five domains of the COHIP questionnaire. The association between healthy school environment (Domain 4) and decay component (D) of DMFT was found to be significant (p-value – 0.024) [Table/Fig-5].

The percentile distribution of COHIP scores with caries experience is given in [Table/Fig-6]. Considering the percentile distribution, children with a COHIP score below 78.32 indicating poor oral health related quality of life had a greater share of caries experience (12.5%) than children without caries (7.96%).

DISCUSSION

With the emergence of psycho social factors affecting health, subjective assessment of oral health has gained much significance today. The assessment of the extent to which oral health affects a child's quality of life can gain insights into devising effective public health interventions. Connecting dental caries to oral health related quality of life is a much researched area. But there is an ambiguity on which is the ideal tool to make this connection. The method of reasoning behind opting COHIP to asses OHRQoL and connecting it to dental caries in this population is the capacity of this instrument to segregate between groups relying upon their experience of dental caries [11].

Children from two different categories of schools (Government and Private) are assessed in this study, thus facilitating comparison of oral health quality of life among two different strata of socioeconomic class. The COHIP questionnaire tool used to assess this has been rated as having excellent content development methodology, thereby adding to the strength of this study [6]. The selected age group of 12 years is also appropriate owing to the fact that all permanent teeth except third molars are erupting in this age. Thus, making this age group ideal for global monitoring of caries and for comparison of disease trends (WHO, 1997) [12]. The original questionnaire was translated into the regional language in this study. However, there is also a need for cross cultural adaptation for this questionnaire to Indian settings and validation of the same in order to achieve equivalence.

The general attitude of Indian society to oral diseases is of low priority and neglect even though there is a high prevalence of oral diseases and morbidity [13]. This may be a cause for no significant difference in the COHIP scores between the two socioeconomic classes owing to low priority for oral health. This is a self-administered questionnaire and one of the difficulties the children reported while answering was that the demarcation between the different response was not clear cut. For example, choosing responses between never, almost never, almost all the time and all the time, may be confusing to children of this age group, which suggests the need for clubbing of responses in the future for this age group.

Characteristics	Percentage	Mean COHIP Score	Mean DMFT	Mean deft
Gender				
Male (n=123)	43.77%	103.85±13.30	2.11±2.05	0.35±0.97
Female (n=158)	56.23%	99.81±17.10	2.61±2.52	0.42±1.08
School				
Government (n=188)	66.90%	101.90±15.94	2.57±2.44	0.45±1.13
Private (n=93)	33.09%	100.92±15.12	2.03±2.07	0.27±0.78

[Table/Fig-1]: Characteristics of population.
COHIP: Child Oral Health Impact Profile, DMFT: Decayed, missing, and filled teeth of permanent dentition, deft: Decayed, extracted, and filled teeth of primary dentition

In the past three months, have you…..	Never	Almost Never	Some Times	Fairly Often	Almost all the time
Domain 1: Oral health					
Q1.Had pain in your teeth/toothache	4 (1.4%)	9 (3.2%)	146 (52.0%)	47 (16.7%)	75 (26.7%)
Q2.Been breathing through your mouth or snoring	12 (4.3%)	5 (1.8%)	52 (18.5%)	46 (16.4%)	166 (59.1%)
Q3.Had discoloured teeth or spots on your teeth	33 (11.7%)	8 (2.8%)	55 (19.6%)	58 (20.6%)	127 (45.2%)
Q4.Had crooked teeth or spaces between your teeth	47 (16.7%)	9 (3.2%)	41 (14.6%)	40 (14.2%)	144(51.2%)
Q5.Had sores/sore spots in or around your mouth	5 (1.8%)	9 (3.2%)	78 (27.8%)	40 (14.2%)	149 (53.0%)
Q6.Had bad breath	6 (2.1%)	9 (3.2%)	56 (19.9%)	55 (19.6%)	155 (55.2%)
Q7.Had bleeding gums	15 (5.3%)	8 (2.8%)	83 (29.5%)	40 (14.2%)	135 (48.0%)
Q8.Had food sticking in or between your teeth	20 (7.1%)	22 (7.8%)	120 (42.7%)	56 (10.9%)	63 (22.4%)
Q9.Had pain or sensitivity in teeth with hot/cold things	17 (6.0%)	10 (3.6%)	70 (24.9%)	35 (12.5%)	149 (53.0%)
Q10.Had dry mouth or lips	45 (16.0%)	28 (10.0%)	94 (33.5%)	39 (13.9%)	75 (26.7%)
Domain 2: Functional Well-Being					
Q11. Had trouble biting/chewing apple, carrot/firm meat	10 (3.6%)	3 (1.1%)	41 (14.6%)	31 (11.0%)	196 (69.8%)
Q15. Had difficulty eating foods you would like to eat	5 (1.8%)	3 (1.1%)	23 (8.2%)	28 (10.0%)	222 (79.0%)
Q20. Had trouble sleeping	10 (3.6%)	7 (2.5%)	50 (17.8%)	27 (9.6%)	187 (66.5%)
Q24. Had difficulty saying certain words	12 (4.3%)	12 (4.3%)	62 (22.1%)	69 (24.6%)	126 (44.8%)
Q26. People had difficulty understanding what you were saying	4 (1.4%)	4 (1.4%)	43 (15.3%)	47 (16.7%)	183 (65.1%)
Q28. Had difficulty keeping your teeth clean	7 (2.5%)	10 (3.6%)	37 (13.2%)	39 (13.9%)	188 (66.9%)
Domain 3: Socio-emotional Well-Being					
Q12. Been unhappy or sad	12 (4.3%)	11 (3.9%)	63 (22.4%)	46 (16.4%)	149 (53.0%)
Q16. Felt worried or anxious	8 (2.8%)	11 (3.9%)	60 (21.4%)	46 (16.4%)	156 (55.5%)
Q19. Avoided smiling or laughing with other children	9 (3.2%)	2 (0.7%)	18 (6.4%)	22 (7.8%)	230 (81.9%)
Q25. Felt that you look different	10 (3.6%)	4 (1.4%)	41 (14.6%)	25 (8.9%)	201 (71.5%)
Q29. Been worried about what other people think	14 (5.0%)	6 (2.1%)	51 (18.1%)	52 (18.5%)	158 (56.2%)
Q17. Felt shy or withdrawn	4 (1.4%)	6 (2.1%)	29 (10.3%)	30 (10.7%)	212 (75.4%)
Q23. Been teased, bullied or called names by other children	11 (3.9%)	10 (3.6%)	66 (23.5%)	52 (18.5%)	142 (50.5%)
Q21. Got angry	35 (12.5%)	23 (8.2%)	120 (42.7%)	47 (16.7%)	56 (19.9%)
Domain 4: School/Environment					
Q13. Missed school	8 (2.8%)	7 (2.5%)	75 (26.7%)	63 (22.4%)	128 (45.6%)
Q18. Had difficulty paying attention in school	5 (1.8%)	14 (5.0%)	41 (14.6%)	35 (12.5%)	186 (66.2%)
Q22. Did not want to speak/read out loud in class	16 (5.7%)	8 (2.8%)	26 (9.3%)	30 (10.7%)	201 (71.5%)
Q30. Did not want to go to school	9 (3.2%)	4 (1.4%)	35 (12.5%)	35 (12.5%)	198 (70.5%)
Domain 5: Self-image					
Q14. Been reassured or put in trust through	8 (2.8%)	9 (3.2%)	41 (14.6%)	50 (17.8%)	173 (61.6%)
Q27. Felt that you were good looking	77 (27.4%)	46 (16.4%)	58 (20.6%)	34 (12.1%)	66 (23.5%)
Q31. Felt having healthy teeth	56 (19.9%)	57 (20.3%)	66 (23.5%)	18 (6.4%)	84 (29.9%)
Q32. Felt good about himself	62 (22.1%)	31 (11.0%)	52 (18.5%)	35 (12.5%)	101 (35.9%)
Q33. When I am older, I believe that I'll have good teeth	71 (25.3%)	44 (15.7%)	74 (26.3%)	23 (8.2%)	69 (24.6%)
Q34. When I am older, I believe that I will be healthy	39 (13.9%)	34 (12.1%)	42 (14.9%)	40 (14.2%)	126 (44.8%)

[Table/Fig-2]: Frequency distribution of the responses to COHIP questionnaire (n=281).

	Caries Prevalence	Pearsons Correlation for COHIP and DMFT	p-value
Government	71.8%	0.008	0.909
Private	71%	-0.064	0.542

[Table/Fig-3]: Caries prevalence and correlation between COHIP and DMFT of Government and Private schools.
Pearson's Correlation test, *: p-value < 0.05, COHIP:Child Oral Health Impact Profile, DMFT:Decayed, missing, and filled teeth of permanent dentition

	Domains of COHIP	Pearsons correlation	p-value
DMFT	Domain 1	-0.028	0.640
	Domain 2	-0.011	0.859
	Domain 3	-0.022	0.710
	Domain 4	-0.018	0.770
	Domain 5	0.040	0.508

[Table/Fig-4]: Correlation between each domains of COHIP and DMFT
Pearson's Correlation test, *: p-value < 0.05, COHIP:Child Oral Health Impact Profile, DMFT:Decayed, missing, and filled teeth of permanent dentition

	Domains of COHIP	Pearsons correlation	p-value
Decay component of DMFT	Domain 1	0.139	0.595
	Domain 2	0.358	0.158
	Domain 3	0.318	0.213
	Domain 4	0.544	0.024*
	Domain 5	0.316	0.217

[Table/Fig-5]: Correlation between each domains of COHIP and decay component of DMFT
Pearson's Correlation test, *: p-value < 0.05, COHIP:Child Oral Health Impact Profile, DMFT: Decayed, missing, and filled teeth of permanent dentition

Caries Experience	COHIP Score (Below 78.32)		COHIP Score (78.33 to 118.8)		COHIP Score (Above 118.8)	
	n	%	n	%	n	%
Yes	10	12.5	63	78.75	7	8.75
No	16	7.96	166	82.5	19	9.4
Total	26	100	229	100	26	100

[Table/Fig-6]: Percentile of COHIP scores and Caries experience.
COHIP:Child Oral Health Impact Profile

The prevalence of dental caries across India ranges from 30% to 95% [14]. In the present study, the dental caries prevalence was found to be 71.5%, which can be considered as high. The two different types of schools—government and private can be used as a proxy for socioeconomic status [15]. The socioeconomic status may not be a risk factor for high prevalence of dental caries in this study since the caries prevalence were similar in government (71.8) and Private (71) schools. The cause for the high prevalence of dental caries needs to be further explored with focus on dietary factors and oral hygiene practices.

The COHIP mean score in this study (101.58±15.66) is found to be very similar to that of French COHIP mean score (101.9±16.84) [11]. The scores when compared, are higher in the USA and Canada indicating better oral health related quality of life in these countries [16]. Lower COHIP scores are noticed in countries like Korea and Iran indicating poorer OHRQoL [17,18].

In our literature search we couldn't find any study in India using the complete 34 item COHIP questionnaire, only studies with the short form of COHIP (19 item) is available which made the comparisons difficult. The results of that study confirmed that dental caries lead to reduced OHRQoL in children [19]. Also, there is a need for a global score to identify and make comparisons and inferences from the scoring. Studies using other types of Child OHRQoL questionnaires are showing similar results that, dental caries has a significant association with low OHRQoL in India as well as other countries [7,4,19]. In a study where the Dental Health Status (DHS) and child OHRQoL was assessed, it was found that children with two or more carious teeth suffered from significantly higher oral symptoms and functional limitations compared with those having less than two carious teeth [20]. This finding strikes a similar chord with our findings, in which 79%of children had problems with chewing or biting food fairly often.

Around 43.4%children have often experienced toothache at least once in three months. Almost 68%children had often missed their school due to oral health problems. This is in line with other studies which has proved that children with poor oral health status will probably encounter dental pain, miss school, and perform inefficiently in academics, thereby indicating that improvement in the oral health related quality of life will indeed enhance their educational experience [21-23]. Similar results were also obtained in a study conducted among disadvantaged children. Thus, the loss of school hours can be considered as a useful statistic in measuring the impact of oral health in school children [24].

The necessity of maintaining adequate oral health for achieving optimum general health, needs to be taught to school children from a very young age. Therefore integration of oral health education into the school health curriculum is highly recommended.

LIMITATION

Even though toothache and dental caries is present in high proportions in these children it does not correlate significantly with COHIP score. This may be attributed to the variation of perceptions between various cultures for which cross-cultural adaptation may be a solution, which is a limitation of this study.

CONCLUSION

The dental caries prevalence in this study population was found to be high (71.5%). But there was no significant correlation between the mean DMFT and deft scores and the domains of the COHIP questionnaire. However, an association was found to be significant between the domain school environment and decay component (D) of DMFT (p-value–0.024). The results suggest that dental caries has a negative effect on the oral health related quality of life. Accurate oral health indicators like oral health impact profile is necessary to plan successful oral health interventions in children.

REFERENCES

[1] Parker EJ, Jamieson LM. Oral health comparisons between children attending an Aboriginal health service and a Government school dental service in a regional location. Rural Remote Health. 2007;7(2):625.
[2] Bagramian RA, Garcia-Godoy F, Volpe AR. The global increase in dental caries. A pending public health crisis. Am J Dent. 2009;22(1):3–8.
[3] Gherunpong S, Tsakos G, Sheiham A. A sociodental approach to assessing dental needs of children: concept and models. Int J Paediatr Dent. 2006;16(2):81–88.
[4] Mathur V, Dhillon J, Logani A, Agarwal R. Development and validation of oral health-related early childhood quality of life tool for North Indian preschool children. Indian J Dent Res. 2014;25(5):559–66.
[5] Sischo L, Broder HL. Oral Health-related Quality of Life: What, Why, How, and Future Implications. J Dent Res. 2011;90(11):1264.
[6] Gilchrist F, Rodd H, Deery C, Marshman Z. Assessment of the quality of measures of child oral health-related quality of life. BMC Oral Health. 2014;14:40.
[7] Athira S, Jayakumar HL, Chandra M, Gupta T, Dithi C, Anand PS. Oral health-related quality of life of school children aged 12-17 years according to the child-oral impacts on daily performances index and the impact of oral health status on index scores. Int J. 2015;1(2):25.
[8] Lakshmappa A, Guledgud MV, Patil K. Eruption times and patterns of permanent teeth in school children of India. Indian J Dent Res Off Publ Indian Soc Dent Res. 2011;22(6):755–63.
[9] Gruebbel AO. A measurement of dental caries prevalence and treatment service for deciduous teeth. J Dent Res. 1944;23:163–68.
[10] WHO (1987). Individual tooth status and treatment need. In:Oral health surveys: basic methods. 3rd ed. Geneva: World Health Organization, pp. 34-9.
[11] El Osta N, Pichot H, Soulier-Peigue D, Hennequin M, Tubert-Jeannin S. Validation of the child oral health impact profile (COHIP) french questionnaire among 12-year-old children in New Caledonia. Health Qual Life Outcomes. 2015;13:176.
[12] Moreira R da S. Epidemiology of dental caries in the world. Res Epidemiol Clin Pract. InTech;2012.
[13] Janakiram C, Sanjeevan V, Br R, Joseph J, Stauf N, Benzian H. Political priority of oral health in India: analysis of the reasons for neglect. J Public Health Dent. 2017 Oct 30;
[14] Peedikayil FC, Kottayi S, Kenchamba V, Jumana MK. Dental caries prevalence and treatment needs of school going children in Kannur District, Kerala. SRM J Res Dent Sci. 2013;4(2):51.
[15] Sharma N. Understanding adolescence. NBT India; 1999.
[16] Broder HL, Wilson-Genderson M. Reliability and convergent and discriminant validity of the Child Oral Health Impact Profile (COHIP Child's version). Community Dent Oral Epidemiol. 2007;35 Suppl 1:20–31.
[17] Ahn Y-S, Kim H-Y, Hong S-M, Patton LL, Kim J-H, Noh H-J. Validation of a Korean version of the Child Oral Health Impact Profile (COHIP) among 8- to 15-year-old school children. Int J Paediatr Dent. 2012;22(4):292–301.
[18] Asgari I, Ahmady AE, Broder H, Eslamipour F, Wilson-Genderson M. Assessing the oral health-related quality of life in Iranian adolescents: validity of the Persian version of the Child Oral Health Impact Profile (COHIP). Oral Health Prev Dent. 2013;11(2):147–54.
[19] Pratap R, Puranik MP, Uma SR. Caries experience and its relationship with oral health related quality of life among orphanage children in Bengaluru City: A cross-sectional study. J Indian Assoc Public Health Dent. 2016;14(4):397.
[20] Alsumait A, ElSalhy M, Raine K, Cor K, Gokiert R, Al-Mutawa S, et al. Impact of dental health on children's oral health-related quality of life: a cross-sectional study. Health Qual Life Outcomes. 2015;13:98.
[21] Guarnizo-Herreño CC, Wehby GL. Children's dental health, school performance, and psychosocial well-being. J Pediatr. 2012;161(6):1153–59.
[22] Jackson SL, Vann WF, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health. 2011;101(10):1900–06.
[23] Paula JS de, Mialhe FL. Impact of oral health conditions on school performance and lost school days by children and adolescents: what are the actual pieces of evidence? Braz J Oral Sci. 2013;12(3):189–98.
[24] Seirawan H, Faust S, Mulligan R. The impact of oral health on the academic performance of disadvantaged children. Am J Public Health. 2012;102(9):1729.

PARTICULARS OF CONTRIBUTORS:
1. Reader, Department of Public Health Dentistry, Amrita School of Dentistry, Ernakulam, Kerala, India.
2. Post Graduate Student, Department of Public Health Dentistry, Amrita School of Dentistry, Ernakulam, Kerala, India.
3. Professor, Department of Public Health Dentistry, Amrita School of Dentistry, Ernakulam, Kerala, India.
4. Assistant Professor, Department of Public Health Dentistry, Amrita School of Dentistry, Ernakulam, Kerala, India.
5. Assistant Professor, Department of Community Medicine, Amrita Institute of Medical Sciences, Ernakulam, Kerala, India.
6. Professor, Department of Public Health Dentistry, Amrita School of Dentistry, Ernakulam, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Vineetha Karuveettil,
Department of Public Health Dentistry, Amrita School of Dentistry, AIMS, Ponekkara, Kochi 682041, Ernakulam, Kerala, India.
E-mail: kvineetha 2016@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Dec 08, 2017**
Date of Peer Review: **Feb 12, 2018**
Date of Acceptance: **May 16, 2018**
Date of Publishing: **Sep 01, 2018**