



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

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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 school children. **Materials and Methods:** A cross-sectional study was conducted in 2022 on a representative sample of 300 school children. 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 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 – 0.023). **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: Dental Caries, Oral Health Impact Profile, DMFT, student's, Cross-sectional study

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Introduction:

Dental caries can affect a person's ability to eat, communicate, or socialise, making oral health a crucial component of overall health [1]. Indian children have a high frequency of oral problems, according to the 2004 National Oral Health Survey [2]. Measuring caries, fluorosis, malocclusion, hypodontia, periodontal disorders, and orofacial abnormalities are all part of an objective evaluation of oral health status. In this sense, evaluating illnesses also has a subjective element, and the most used tool for measuring oral disorders is the Oral Health Related Quality of Life (OHRQoL) questionnaire [3].

Due to the paradigm change from solely curative treatments to holistic well-being of the children, oral health related quality of life in children has emerged as one of the primary issues in the area of dentistry [4]. OHRQoL is a multi-dimensional term that takes into account a person's expectations, satisfaction with care, functional well-being, emotional well-being, and sense of self [5]. The Child Oral Health Impact Profile (COHIP), the Child Perceptions Questionnaire (CPQ 11–14), the Oral Impact on Daily Performance (OIDP), the Child Oral Health Quality of Life (COHQoL), and the Early Childhood Oral Health Impact Scale are the OHRQoL instruments that are now accessible [6].

Though COHIP has shown good results, it hasn't been used as often as other recommended surveys, despite having the most complete development process [5]. Oral health, functional well-being, social-emotional well-being, school environment, and self-image are among the five areas covered by the questionnaire. Dental caries is the most common oral health condition in children, according to the disease-specific nature of this questionnaire. In order to ascertain the association between dental caries status and the effect profile of oral health among 14-

year-old school children, a cross-sectional survey was conducted.

Materials and Methods

The three month cross-sectional research was place during Janto march 2022. An earlier study found that oral health issues in children affected their everyday functioning in 43.1% of cases [7]. To choose the schools, a multistage random sampling procedure was used. The list of all upper primary schools was compiled and divided into government and private institutions. Using a random table, three government schools and two private schools were picked at random. The research included all 12-year-old students was chosen schools based on a cluster sampling that was deemed sufficient and consisted of 300 students.

Only 12-year-olds who were willing to participate in the study were enrolled. Children with chronic illnesses or cognitive impairment were not included in the research.

Parents received beforehand information sheets and consent forms via their children. The institution's approval of the Ethical Committee was acquired, and permission was requested from the appropriate school's head.

Self-administered COHIP questionnaires and oral exams were used to obtain the data. Due to racial differences, the development and eruption patterns of teeth cannot be applied uniformly. It is not possible to generalise to an Indian situation from guidelines for teeth eruption patterns developed from a western population.

Among South Indian children, the mean age at which second molars emerge might range from 11.9 to 1.17 years to 12.64 to 1.13 years [8]. Consequently, a distinct index for each kid was created, one for permanent teeth (DMFT), and one for primary teeth (deft). The kids had their mouths examined, and the



DMFT (aggregate of decaying, missing, and filled teeth in the permanent dentition) and DEFT (aggregate of decayed, removed, and filled teeth in the primary dentition) indices were recorded to measure dental caries [10]. The tests were given in the classrooms with natural light, occasionally supplemented by artificial lighting. One investigator carried out the oral examination. By conducting repeat exams on 20 individuals, the intra-examiner reliability was verified, and a kappa value of 0.95 was achieved for DMFT/deft.

In order to assess a child's oral health status across five domains—oral health, functional well-being, social-emotional well-being, school environment, and self-image—the COHIP consists of 34 items [11]. On a five-point Likert scale with a score ranging from 0 to 4, participants are asked to rate the frequency of incidents during the previous three months. The answers for each of the five domains were "Never" (scoring 4), "Almost never" (3), "Sometimes" (2), "Fairly Often" (1), and "Almost all the time" (0). Both good and negative enquiries were made. The results of the negative questions were flipped,

with lower overall COHIP scores suggesting lower quality of life in relation to oral health. After weighing each choice according to positive and negative questions, frequency for each domain was computed. The scores ranged from 0 to 136 for 34 items, and higher scores indicated favourable OHRQoL [11]. Each youngster self-administered the questionnaire, and it took them each around 20 minutes to finish it before the survey papers were collected. The poll included questions in regional and English. The regional language questionnaire's reliability test result for Cronbach's alpha was 0.81. In order to analyse the data, SPSS version 20 was used (SPSS Inc., Chicago, IL, USA). Means and standard deviations were computed for continuous data. The corresponding frequencies for categorical variables were produced. Using Pearson's correlation coefficient, the relationship between each questionnaire domain and the Decay component of the DMFT was examined. The cutoff for statistical significance was 5% ($p < 0.05$).

Results

The test was administered to 300, 14-year-old students at school (45.05% of them were male). 175 of the sample's pupils were from government schools, while 125 were from private institutions.[Table 1].This population's caries prevalence was reported to be 75.5%. [Table1]

Table 1-Characteristics of population.

Characteristics	Percentage	Mean COHIP Score	Mean DMFT	Mean deft
Gender				
Male (n=135)	45.05%	100.05±11.50	2.05±2.01	0.40±1.01
Female (n=165)	55.45%	105.01±15.20	2.42±2.55	0.42±1.05
School				
Government (n=175)	66.90%	102.50±14.84	2.45±2.44	0.55±1.10
Private (n=125)	33.09%	98.52±12.05	2.01±2.01	0.35±0.50

Around 45.1%of children has experienced toothache often in the past three months. Due to oral health problems, 51.5%of children had missed school during the same period [Table 2]

Table 2- Frequency distribution of the responses to COHIP questionnaire (n=300).

In the past three months, have you.....	Never	AlmostNever	SomeTimes	FairlyOften	Almost all the time
Domain 1: Oral health					
Q1.Had pain in your teeth/toothache	8	10	151	51	80



Q2.Been breathing through your mouth or snoring	12	7	52	73	156
Q3.Had discoloured teeth or spots on your teeth	40	8	60	64	128
Q4.Had crooked teeth or spaces between your teeth	50	12	45	45	148
Q5.Had sores/sore spots in or around your mouth	8	15	80	45	152
Q6.Had bad breath	10	15	60	60	155
Q7.Had bleeding gums	20	10	89	50	131
Q8.Had food sticking in or between your teeth	24	27	127	60	62
Q9.Had pain or sensitivity in teeth with hot/cold things	20	14	75	40	151
Q10.Had dry mouth or lips	50	32	97	42	79
Domain 2: Functional Well-Being					
Q11. Had trouble biting/chewing apple, carrot/firm meat	15	5	45	37	198
Q15. Had difficulty eating foods you would like to eat	9	5	25	32	229
Q20. Had trouble sleeping	15	10	54	30	191
Q24. Had difficulty saying certain words	15	15	65	71	134
Q26. People had difficulty understanding what you were saying	10	10	50	50	190
Q28. Had difficulty keeping your teeth clean	15	20	60	70	135
Domain 3: Socio-emotional Well-Being					
Q12. Been unhappy or sad	15	18	65	50	152
Q16. Felt worried or anxious	10	15	65	60	150
Q19. Avoided smiling or laughing with other children	15	4	22	29	230
Q25. Felt that you look different	15	9	45	27	204
Q29. Been worried about what other people think	19	10	55	59	157
Q17. Felt shy or withdrawn	5	8	35	37	215
Q23. Been teased, bullied or called names by other children	15	13	70	55	147
Q21. Got angry	40	29	130	50	51
Domain 4: School/Environment					
Q13. Missed school	10	9	80	69	132
Q18. Had difficulty paying attention in school	10	19	45	40	186
Q22. Did not want to speak/read	20	10	30	39	202

out loud in class					
Q30. Did not want to go to school	12	7	40	39	198
Domain 5: Self-image					
Q14. Been reassured or put in trust through	10	13	50	70	157
Q27. Felt that you were good looking	80	50	60	40	70
Q31. Felt having healthy teeth	60	59	70	25	86
Q32. Felt good about himself	65	39	50	40	106
Q33. When I am older, I believe that I'll have good teeth	79	50	78	30	63
Q34. When I am older, I believe that I will be healthy	45	40	50	72	93

Correlation between DMFT and COHIP scores were not significant in both Government and Private schools [Table 3]

Table 3-Caries prevalence and correlation between COHIP and DMFT of Government and Private schools.

	Caries Prevalence	Pearsons Correlation for COHIP and DMFT	p-value
Government	75.7%	0.005	0.907
Private	74%	-0.054	0.602

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 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 [Table 5]

Table 4-Correlation between each domains of COHIP and DMFT

	Domains of COHIP	Pearsons correlation	p-value
DMFT	Domain 1	-0.030	0.670
	Domain 2	-0.015	0.900
	Domain 3	-0.025	0.740
	Domain 4	-0.020	0.790
	Domain 5	0.045	0.550

Table 5-Correlation between each domains of COHIP and decay component of DMFT

	Domains of COHIP	Pearsons correlation	p-value
Decay component of DMFT	Domain 1	0.145	0.597
	Domain 2	0.360	0.160
	Domain 3	0.322	0.215
	Domain 4	0.645	0.023*
	Domain 5	0.319	0.220

The percentile distribution of COHIP scores with caries experience is given in [Table 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 (15.5%) than children without caries (8.94%).

Table 6-Percentile of COHIP scores and Caries experience.



Caries Experience	COHIP Score (Below 78.32)		COHIP Score (78.33 to 118.8)		COHIP Score (Above 118.8)	
	n	%	N	%	N	%
Yes	15	15.5	10	79.05	10	9.81
No	20	8.94	170	85.5	20	9.5
Total	35	100	180	100	30	100

Discussion

The importance of subjective oral health evaluation has greatly increased in the modern era with the rise of psychosocial health influencing elements. Understanding how much a child's oral health impacts their overall quality of life can help in the development of efficient public health initiatives. It has been extensively studied how dental caries affects quality of life in relation to oral health. However, it's unclear which tool would be best for drawing this relationship. The ability of this instrument to separate between groups based on their experience with dental caries is the technique of justification for using COHIP to assess OHRQoL and tie it to dental caries in this population [11].

This research evaluates kids from two distinct types of schools (Government and Private), allowing for comparison of oral health quality of life between two different socioeconomic class strata. This study's strength is strengthened by the outstanding content creation technique of the COHIP questionnaire instrument that was used to examine this [6]. The age group of 12 years is also relevant since, with the exception of third molars, all permanent teeth emerge at this time. This makes this age group excellent for comparing disease trends and monitoring caries globally (WHO, 1997) [12]. In this study, the original questionnaire was translated into the local tongue. To attain equivalency, however, there is also a need for cross-cultural adaption of this questionnaire to Indian contexts and validation of the same.

Despite the significant incidence of oral illnesses and morbidity, the overall attitude of

Indian society toward oral disorders is one of low priority and disregard [13]. Due to oral health's low importance, this may be the reason why there is no discernible variation in the COHIP ratings between the two social classes. The fact that the youngsters found it difficult to distinguish between the various responses on this self-administered questionnaire was one of their cited challenges. Children of this age group may find it difficult to decide between answers like never, almost never, all the time, and almost all the time, which implies the necessity for response grouping for this age group in the future.

In India, dental caries can affect 30% to 95% of the population [14]. The prevalence of dental caries was determined to be 79.05% in the current study, which is high. Government and private schools can also be used as proxies for socioeconomic status [15]. Since dental caries frequency was similar in government and private schools, socioeconomic status may not be a risk factor for the high prevalence of dental caries in this study. With a focus on dietary determinants and oral hygiene behaviours, the cause of the high incidence of dental caries has to be further investigated.

It is discovered that the COHIP mean score used in this study (100.05 ±11.50) and the French COHIP mean score (101.9±16.84) are quite comparable [11]. When scores are compared, the USA and Canada had higher ratings, indicating a superior quality of life connected to dental health in these nations [16]. Poorer OHRQoL is indicated by lower COHIP scores in nations like Iran and Korea [17,18].



In our review of the literature, we were unable to locate any studies conducted in India using the full 34-item COHIP questionnaire; instead, the only research that were accessible used the 19-item COHIP short version, which made comparisons challenging. The findings of the investigation supported the hypothesis that dental caries decreases children's OHRQoL [19]. Additionally, a global score is required in order to identify, compare, and draw conclusions from the scoring. Dental caries has a substantial connection with low OHRQoL in India as well as other countries, according to studies employing several forms of Child OHRQoL questionnaires [7,4,19]. Children with two or more carious teeth experienced considerably greater oral symptoms and functional restrictions than children with fewer than two carious teeth, according to a study that evaluated the Dental Health Status (DHS) and child OHRQoL [20]. This result is consistent with our findings, which showed that 80% of kids reported chewing or biting issues on a regular basis.

45.1% of youngsters report getting a toothache at least once every three months. This is consistent with other research that has shown that children with poor oral health will likely experience dental pain, miss school, and perform poorly in academics, suggesting that an improvement in the quality of life related to oral health will in fact improve their educational experience [21–23]. A research that involved poor kids also had similar outcomes. As a result, it is possible to use the lost instructional time as a statistic to assess the effects of oral health on school-age children [24].

Schoolchildren need to learn early on how important keeping good dental health is for getting the best overall health. Therefore, it is strongly advised that oral health education be incorporated into the school health curriculum.

Even though dental caries and toothaches are prevalent in high rates in these kids, they do not significantly affect COHIP score. This may be attributed to the differences in perceptions among various cultures, which this study's limitation of which cross-cultural adaptation might be a remedy,

Conclusion

This study's cohort had a significant frequency of dental caries. However, there was no discernible relationship between the mean DMFT and deft scores and the COHIP questionnaire domains. However, a strong correlation between the domain of the school environment and the decay component (D) of the DMFT was discovered (p-value=0.023). The findings imply that dental caries has a detrimental impact on the quality of life connected to oral health. Planning effective oral health interventions for children requires accurate oral health indicators, such as the oral health impact profile.

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