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Original Research

Influence of dental caries on Oral health-related quality of life among school-going children of Bengaluru City

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ABSTRACT:
Background: Oral health outcomes were traditionally evaluated through clinical criteria based on the perceptions of clinicians, but were unable to determine the real impact of oral diseases on individual's quality of life. Thus, this study attempted to assess the impact of oral health conditions and oral health-related quality of life (OHRQoL) on the happiness of school going children of Bengaluru city. **Materials and methods:** A total of 814 participants aged 12-16 years old were selected from different schools of Bengaluru city using stratified random sampling technique. A specially designed proforma was used to collect information on participant's demographic details, oral health conditions and oral health-related quality of life using Child Perceptions Questionnaire and DMFT index. Pearson's Correlation test was used to assess the relationship between the CPQ, SHS scores and clinical oral health parameters. **Results:** The total mean CPQ score 17.59±10.84, with domain-wise CPQ scores being 4.87±2.98, 3.62±3.07, 5.08±4.04 and 4.01±3.47 respectively for oral symptom, functional limitation, social well-being and emotional well-being domains. With the increase in severity of oral health conditions, a decline in the mean CPQ scores was observed. Linear regression analyses showed that with one unit increase in DMFT scores the CPQ scores increased by 2 units. **Conclusion:** Our findings conclude that a higher percentage of children were having a negative impact on general health, development, productivity, school performance and happiness as well.
Keywords: Oral health-related quality of life, Dental caries, DMFT, CPQ, School-children

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INTRODUCTION

Oral health refers to the health of oral and related tissues and is recognised as an essential and integral component of overall health.[1] Over time, the concept of oral health has changed from a biologist approach to a social and psychological approach that takes into account the role of the oral cavity in self-esteem, communication and interaction and facial aesthetics.[2]It enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and thus contributes to general well-being.[1]Oral diseases are considered as epidemic and are not only a major cause of infection and tooth loss but can also undermine self-image and self-esteem, discourage normal social interaction, and cause other health problems and lead to chronic stress and depression as well as incur great financial cost.[3]Being traditionally measured by dental indices and clinical findings very little consideration was given to functionality of oral cavity or impact of symptoms on patients' quality of life.[4]

Oral health-related quality of life has gained attention in past and was recognised by WHO as an important segment of Global oral health program.[5]It marks the shift from materialistic values to self-determination and self-actualization.[6]Multidimensionality and subjectivity are the two fundamental elements with former including a broad range of content including physical, functional, emotional and social well-being. While the latter refers to patient's perspective and understands the impact of oral outcomes on individual's well-being.[7] Being a broad concept, it measures the subjective impact of oral conditions on daily functioning and well-being of an individual.[8]

Oral diseases are not only a major cause of infection and tooth loss but they can also undermine self-image

and self-esteem, discourage normal social interaction, and cause other health problems and lead to chronic stress and depression as well as incur great financial cost.[1] Untreated dental caries in permanent teeth being the most prevalent condition in followed by severe periodontitis and untreated caries in deciduous teeth affecting 35%, 11% and 9% globally.[9]Despite the incredible scientific advances and the fact that caries is preventable, the disease continues to be a major public health problem. The World Health Organization (WHO) has ranked dental caries, as number three among all chronic non-communicable diseases that require worldwide attention for prevention and treatment.[10]However, in National Health Survey conducted throughout India the prevalence of dental caries was 51.9 % in 5 year-old children, 53.8 % in 12 year-old children and 63.1 % in 15 year old teenagers.[11]

Poor oral health can have a detrimental effect on schoolchildren's performance in as they are 12 times more likely to have restricted-activity days which in turn affects their success in later life.[12,13] Dental caries is considered to be the major public health problem and single most common chronic childhood disease; 5 times more common than asthma and 7 times more common than hay fever.[14] Better oral enables an individual to eat, speak and socialize while those with impaired oral health are more likely to difficult chewing thus leading to decreased appetite, weight loss, sleep problems, behavioural changes.[15] The association of OHRQoL measure with clinical or normative health indicators will allow its utilization in future studies for evaluating interventions and programs.[16] Thus, the aim of the study was to assess the impact of dental caries on the oral health-related quality of life happiness of 12-16 year old school going children of Bengaluru city.

METHODS

A cross-sectional descriptive study was conducted on 12-16 year old school going children of Bengaluru South zone. Stratified random sampling technique was used to collect data from schools of different wards respectively. Prior ethical approval was obtained from Institutional Review Board and permissions were sought from the respective head of institutions before study. Informed assent was obtained from the participants prior to the study after explanation.

INCLUSION CRITERIA

1. School children aged 12-16 years with permanent dentition.
2. Those willing to give the informed assent to participate in the study.

EXCLUSION CRITERIA

1. Students who are not intellectually capable of responding to questionnaire.
2. Students who are not willing to participate in the study.
3. The subjects who are suffering from acute infections in the oral cavity (based on oral visual examination).
4. Subjects who are having any chronic systemic illness.

The sample size calculation was calculated using $Z^{2}_{(1-\alpha)X}$ PQ x D/ PE^{2} formula with 50% prevalence , 95% confidence level, design effect of 2. Considering non-response rate and sample loss due to attrition, minimum sample size needed would be n= 800. A specially designed proforma comprising of 3 sections was used to collect data on demographics, oral health related quality of life and clinical examination. Pilot study was done to check for validity and reliability before the start of the survey. Test and retest method was used to check for reliability, and the kappa value was found to be 0.80. Data on Oral-health related quality of life was assessed using Child Perceptions questionnaire (CPQ_{11-14} ;ISF).[17] It assessed the frequency of events in the previous three months and their impact on 4 domains: oral symptoms, functional limitations, emotional well-being and social well-being using 16 questions to be answered on a 5-point LIKERT scale. The higher the scores, greater is the impact of oral conditions on child's quality of life i.e poor OHRQoL.

All the participants fulfilling inclusion criteria were included in the study. WHO Type III clinical examination under adequate natural day light using a sterile mouth mirror, Tufts 17/23 explorer, CPI probe with the patient seated upright on the ordinary chair was done. Dental caries was assessed using the World Health Organization (WHO 1997) caries diagnostic criteria for DMFT (decayed, missing/extracted and filled teeth).[18]

Statistical analysis was done using Statistical Package for Social Sciences, IBM Corporation, Version 22.0.Descriptive analysis of was done using mean, standard deviation for continuous data & frequency and percentage for categorical data. Pearson's Correlation test and multiple step-wise linear regression analysis was used to done assess the impact of clinical oral health parameters on CPQ scores. The level of significance was fixed at $p<0.05$.

RESULTS

In the present study, a total of 422 (51.8%) were males and 392 (48.2%) were females respectively, with almost equal participation from all age groups was seen. (Table I)

Table I - Age and gender-wise frequency distribution of study participants

Age in years	Males n (%)	Females n (%)	Total n (%)
12	78 (18.5)	85 (21.7)	163 (20.0)

13	91 (21.6)	97 (24.7)	188 (23.1)
14	95 (22.5)	75 (19.1)	170 (20.9)
15	81 (19.2)	72 (18.4)	153 (18.8)
16	77 (18.2)	63 (16.1)	140 (17.2)
Total	422 (51.8)	392 (48.2)	814 (100)

The prevalence of dental caries was found to be 59.4% with almost equal distribution among both the genders. The DMFT scores ranged from 0-8, with the mean scores being 1.27±1.47 with a higher expressivity of decayed component. (Table II)

Table II- Distribution of mean DMFT scores and its components using Chi-square test among study participants

Dentition status	Males Mean ±SD	Females Mean±SD	Total Mean±SD	p-value
Decayed (D)	1.21±1.50	1.29±1.36	1.25±1.44	0.11
Missing(M)	0.02±0.17	0.02±0.23	0.02±0.20	0.90
Filled (F)	0.01±0.11	0.04±0.22	0.02±0.17	0.005*
DMFT score	1.22±1.52	1.31±1.41	1.27±1.47	0.17

*-Statistically significant

Comparison between CPQ scores and severity of dental caries showed that mean CPQ scores were higher among those having dental caries i.e. 21.19±10.72 as compared to those without dental caries i.e. 12.33±8.66. However, the highest affect was observed in emotional well-being with mean scores of 6.12±4.03. These associations were statistically significant (p<0.001). (Table III)

Table III - Comparison of mean CPQ Scores with dental caries using Mann Whitney U test among study participants

Dental Caries	Oral Symptoms Mean±SD	Functional Limitation Mean±SD	Emotional WB Mean±SD	Social WB Mean±SD	Total CPQ Mean±SD
Absent	3.49±2.52	2.45±2.41	3.56±3.56	2.83±2.85	12.33±8.66
Present	5.82±2.90	4.42±3.21	6.12±4.03	4.83±3.62	21.19±10.72
Total	4.87±2.98	3.62±3.07	5.08±4.04	4.01±3.47	17.59±10.84
p-value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

*Statistically significant

Pearson correlation test was done to assess the influence of dental caries on oral health-related quality of life of study participants (Table IV).

Table IV- Pearson correlation between dental caries and CPQ among study participants

Variable	Value	DT	MT	FT	DMFT
CPQ	r-value	0.42	0.08	0.09	0.42
	p-value	<0.001*	0.02*	0.007*	<0.001*

*-Statistically significant

A statistically significant correlation of 0.42, 0.08, and 0.09 was found between decayed component, missing component, filled component of DMFT and CPQ scoresrespectively (p< 0.05). With one unit increase in dental caries scores, the impact on oral health-related quality of life will increase by 2 units. (Table V)

Table V- Linear regression analysis of CPQ scores with dental caries among study participants

	Variables	Unstd. Coefficients		95% CI for β		p-value	R^2	F-value
		β	SE					
CPQ	(Constant)	5.68	0.11	5.46	5.90	<0.001*	0.42	192.96
	Dental caries	1.92	0.21	1.51	2.23	<0.001*		

*-Statistically significant

DISCUSSION

The present study was conducted to assess the influence of dental caries on oral health related quality of life of 12-16 year old children. At this age majority of permanent teeth except third molars would have erupted and were being exposed to oral environment for 3-9 years, the effect of adverse oral environment on them can be easily identified and is recommended as global monitoring age by WHO.[18]

In the present study, the prevalence of dental caries was 59.4%, however the prevalence among 12-15 year old was 53.8% to 63.1% in fluoride mapping study conducted in India in 2002-2003.[11] Untreated tooth decay reflected a low utilization of preventive

and curative dental services even where it is available, probably as a result of dental avoidance by parents and their children, lack of awareness by parents. A Kenyan study found that social and economic constraints, negligence in oral care and poor oral hygiene were leading to development of carious lesions.[19]Although lower prevalence was seen in study conducted by Tuchtenhagen S et al on Brazilian school-children and Prabu et al study on 12 year-old school-children of Tamil Nadu, India.[20,21] The mean DMFT scores were 1.27±1.47, with the higher expressivity of decayed component. Higher scores were seen in study conducted by Cortes et al and Ukraet al.[22,23]This could be attributed to the reason that awareness regarding tooth decay among people have increased over years and majority of the participants were brushing their teeth daily once with fluoridated dentifrices, and were following healthy oral hygiene practices.

In the present study, the overall mean CPQ scores were 12.33±8.66 in those not having dental caries while scores were higher among those having dental caries i.e. 21.19±10.72. Similar results were seen in Tuchtenhagenet al, Do LG et al study where children with carious lesions had more dental pain and chewing difficulties and were more worried, upset about their oral health status, which further impairs their quality of life.[20,24] Highest impact was observed in emotional well-being domain followed by oral symptoms, suggesting inclination of children towards developing an attractive personality and carious lesions let them to feel upset, irritated. The results of study conducted by Alves et al, Opondoet al were in affirmation with present study.[15,19] However, contrasting results were seen in study conducted by Ukraet al and Kolawoleet al.[23,25]With the increase in caries severity, the impact on oral health related quality of life also increases. Hence, our findings conclude that a higher percentage of children were having a negative impact on general health, development, productivity, school performance and happiness as well.

CONCLUSION

Young adults in particular have been found to attach great importance to an attractive dental appearance and have also been shown to have developed an oral perceptual awareness. Thus, findings are particularly important for use in health planning considering that clinical measurements of oral disease do not take into account children's oral health needs fully. Oral health planners need to design and implement efficient tailor made comprehensive oral health programme.

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