

Dental Caries Experience and Its Impact on Oral Health Related Quality of Life among 12 and 15 years Old Private and Government School Going Children of Modinagar City

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Abstract

Background: In most developing countries, the level of dental caries was low until recent years but prevalence rate of dental caries is now showing a steady increase, as it affects 60–90% of school-aged children and vast majority of adults. **Materials and Methods:** Descriptive statistics such as mean, standard deviation, and percentage were used. Independent sample *t*-test was used to measure the association between mean of child oral impact on daily performance (OIDP) dimensions and prevalence of dental caries. $P < 0.05$ was considered as significant. **Results:** The difference in the OIDP scores between the subjects with caries and without caries was statistically significant for all the dimensions except for eating, cleaning, and emotion. (Independent *t*-test) and a positive correlation found between the mean decayed, missing, and filled teeth (DMFT) and smiling and emotion OIDP scores while in 15 years the significant correlation was found between OIDP variables such as sleeping, smiling, emotion, social contact, and overall score with DMFT. **Conclusion:** Hence, the use of oral-health-related quality of life measures among children should be promoted to gain an in-depth knowledge about the dental health and its impact on the general health of children

Keywords: Dental caries, Oral health, Oral impact on daily performance.

INTRODUCTION

Oral health is an essential part of general health and well-being and is an important factor that impacts an individual's quality of life. Health is no longer seen as the absence of disease but rather in terms of obtaining or maintaining optimal functioning and social and psychological well-being.^[1] The experience of pain, problems with eating, chewing, smiling and communication due to missing, discolored and damaged teeth have a major impact on people's daily lives and well-being. Oral diseases also restrict activities at school, at work and home causing millions of school and work hours to be lost each year throughout the world.^[2] Caries, the product of man's progress toward civilization, has a very high morbidity potential thus coming into focus of the mankind. Dental caries is a major health problem in most industrialized countries as it affects 60–90% of school-aged children and vast majority of adults. In most developing countries, the level of dental caries was low until recent years but prevalence rate of dental caries is now showing a steady increase. This is largely due to increasing consumption of sugar and inadequate exposure to fluorides.^[2]

The terms “quality of life” and “oral health-related quality of life” have gained broad recognition over the past few years due to a paradigm shift from the traditional clinical dental criteria such as caries or malocclusion toward a more patient-centric oral health-care delivery system that focuses on a person's social, emotional, and physical experience.^[3] There has been a growing recognition that more subjective, patient-based outcomes, such as those that assess quality of life, should be used to assess the impact of an individual's oral health status, as oral disorders can have a significant impact on one's physical, social, and psychological well-being.^[4,5] oral-health-related quality of life (OHR QoL) can be defined as “the absence of negative impacts

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of oral conditions on social life and a positive sense of dento-facial self-confidence.”^[6] OHR QoL measures are usually used in place of clinical measures, which do not account for the impact on people’s lives, and this is what is normally referred to as traditional methods. They only give a superficial overview of actual need. A major shortcoming of this standard normative approach is that it fails to take into account the way people really feel and therefore does not correspond to broader concepts of health and needs. To overcome this shortcoming, research has focused on developing broader socio-dental concepts of oral health, and numerous socio-dental or OHR QoL indicators are now available. The measures used to assess OHR QoL are very useful and provide essential information for assessing the treatment needs of individuals and populations.^[7] They help in making clinical decisions and in evaluating interventions, services, and programs.^[8] The use of OHR QoL measures has led to a shift from the traditional dental/medical criteria toward a more patient-centered, bio psychosocial approach to oral healthcare. OHR QoL assessment has become central to dental research, as it has implications for oral health disparities and access to care.^[3] The objective of this index is to measure the impacts of oral health problems on daily activities commonly performed by children. It comprises dimensions not tapped by clinical measures, such as functional, psychological, and social limitations. The index has applications in public health for the assessment of oral health needs and can be a valuable indicator for the evaluation of oral health programs.^[9]

Hence, an attempt to investigate whether a relationship exists between specific clinical dental measures and OHR QoL using the child-oral impact on daily performance (OIDP) index was carried out among children attending various schools located in Modinagar, India.

MATERIALS AND METHODS

Study design

A descriptive cross-sectional study was carried out to assess the dental caries experience and its impact on oral health related quality of life among 12 and 15 years old Urban and Rural school going children of Modinagar.

Ethical clearance and official permission

Before scheduling the survey, the official permission and ethical clearance were obtained from the Institutional Review Board of Divya Jyoti College of Dental Science and Research (DJD/IEC/2016/A-034), Modinagar. Before the start of the survey, official permission was obtained from the principals of the schools after duly explaining the purpose and methodology of the study. The written informed consent was obtained from parents of all the study subjects after duly explaining the purpose and methodology of the study.

Clinical examination

All the clinical assessment was carried out in the sequence/ order prescribed in the WHO Basic Oral Health Survey Performa, with the sterilized instruments and materials by the single trained and calibrated examiner in accordance with

the methods prescribed by WHO Basic Oral Health Survey Methodology 2013. Data were collected by means of an interviewer-administered questionnaire comprising 2 sections in the local language (Hindi). The first part was used to collect information on socio-demographic data, and the second part contained the Child-OIDP scale. The Child-OIDP index assesses the serious oral impacts on eight daily performances: Eating; speaking; cleaning teeth; relaxing, including sleeping; smiling, laughing, and showing teeth without embarrassment; maintaining emotional situations; study, including going to school and doing homework; and contact with other people.

Statistical analysis

The data were analyzed using SPSS v20.0 software package. Descriptive statistics such as mean, standard deviation, and percentage were used. Independent sample t- test was used to measure the association between mean of C-OIDP dimensions and prevalence of dental caries. $P < 0.05$ was considered as significant.

RESULTS

Table 1 shows the demographic characteristics of the subjects in the present study showed that among 12-year age group 179 (63.93%) were males in 280 whereas the

Table 1: Demographic details of 12- and 15-years variables

Variables	12 years		15 years	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
Gender				
Male	179 (63.93)	182 (65.00)	179 (63.93)	167 (59.64)
Female	101 (36.07)	98 (35.00)	101 (36.07)	113 (40.36)
Dental visit/year				
Yes	44 (15.72)	59 (21.07)	69 (24.64)	64 (22.86)
No	236 (84.28)	221 (78.93)	211 (75.36)	216 (77.14)
Dietary habit				
Vegetarian	189 (67.5)	171 (61.08)	161 (57.5)	171 (62.05)
Mixed	91 (32.5)	109 (38.92)	119 (72.5)	109 (37.05)
Sweet Score				
<5	166 (59.28)	177 (63.21)	182 (65.36)	183 (65.36)
Score 10	100 (35.72)	87 (31.07)	59 (21.07)	56 (20.00)
Score 15 and more	14 (5.00)	16 (5.72)	38 (13.57)	41 (14.64)
Oral Hygiene Practice				
Toothbrush and toothpaste	274 (97.86)	268 (95.72)	265 (94.64)	263 (93.92)
Toothbrush and toothpowder	6 (2.14)	12 (4.28)	15 (5.36)	17 (6.08)
Finger and Charcoal	0 (0)	0 (0)	0 (0)	0 (0)
Others	0 (0)	0 (0)	0 (0)	0 (0)
Frequency/day				
Once	278 (99.28)	276 (98.58)	274 (98.86)	276 (98.58)
Twice	2 (0.72)	4 (1.42)	6 (2.14)	4 (1.42)
More than twice	0 (0)	0 (0)	0 (0)	0 (0)
Decayed Teeth				
Decayed	172 (61.42)	176 (62.86)	172 (61.4)	186 (66.43)
Filled	19 (6.80)	22 (7.86)	25 (8.90)	21 (7.50)
Missing	24 (8.60)	29 (10.40)	24 (8.60)	28 (10.00)

remaining 101 (36.07%) students were females in urban group and among the 280 school children 182 (65 %) were males and 98(35 %) were females in rural group. Among the 280 students of 12-year-old urban school children majority of the subjects were 236 (84.28%) had no past dental visit. Only 44 (15.72%) students had past dental visit/year. Among the 280 students of rural school 221 (78.93%) students had no past dental visit while 59 (21.07%) had no past dental visit/year. Among the 280 students of urban school, majority of the subjects 189 (67.5%) were vegetarians while the rest 91 (32.5%) used mixed diet. Among the 280 students of rural school, 171 (61.08%) were vegetarians while the rest were 109 (38.92%) consuming mixed diet. Of the 280 students of urban school majority of 166 (59.28%) subjects had sweet score ≤ 5 , 100 (35.72%) subjects having sweet score of ten, and 14 (5.00%) having a sweet score of fifteen or more. Among the 280 students of rural school, it was noted that highest number of 177 (63.21%) of the subjects had sugar score ≤ 5 , 87 (31.07%) subjects were having a sugar score of ten and 16 (5.72%) subjects were having a sugar score of fifteen or more. Of the total number of 280 study subjects of urban school, it was found that 274 (97.86%) students used toothbrush with toothpaste for cleaning their teeth followed by 6 (2.14%) students used finger and toothpowder then none of them used others methods for cleaning their teeth. Among the students of the rural school, 268 (95.72%) of the subjects used toothbrush with toothpaste for cleaning the teeth whereas only five subjects used finger with toothpowder for cleaning their teeth. The frequency of tooth brushing was assessed among the study subjects. Of the total number of 280 students of 12-year age group from urban, it was found that majority of the subjects were 278 (99.28%) brushed once daily and rest 2 (0.72%) students brushed twice daily. Among the 280 of rural school children, it was found that 276 (98.58%) students brushed once daily while the rest of 4 (1.42%) brushed twice daily. Among the 280 urban school children of 15 years age group 179 (63.93%) were males and 101 (36.07%) students were females and of the 280 rural school students there were 167 (59.64%) male students and rest 113 (40.36%) were the females. Among the 280 students of urban school, it was noted that majority of the subjects were 211 (75.36%) had no past dental visit while only 69 (24.64%) had dental visit. Among the 280 students of rural school students 216 (77.14%) had no past dental visit while 64 (22.86%) visited dentist/year. Among the 280 students of urban school of 15-year age group it was noted that majority of the subjects were vegetarians 161 (57.5%), while the remaining 119 (42.5%) consumed mixed diet. Among the rural 280 school children, it was observed that the highest number of subjects 175 (62.5%) were vegetarians whereas only 105 (37.5%) individuals consumed mixed diet. Of the 280 students of urban school of 15-year age group 183 (65.36%) had sugar score ≤ 5 , 59 (21.07%) subjects had score of ten and 38 (13.57%) were having score of fifteen or more. Of the 280 students of rural school, 183 (65.36%) subjects had sugar score of ten, 56 (20.00%) had sugar score ≤ 5 , and 41 (14.64%) subjects had sugar score of 15 or more.

Of the total number of 280 study subjects of urban school, it was found that 265 (94.64%) students used toothbrush with toothpaste for cleaning their teeth followed by 15 (5.36%) students used finger and toothpowder then none of them used others methods for cleaning their teeth. Among the students of rural school 263 (93.92%) of subjects used toothbrush with toothpaste for cleaning their teeth, whereas 17 (6.08%) subjects used finger with toothpowder. Among the total of 280 students from urban school it was found that 274 (97.86%) brushed once daily while the rest of 6 (2.14%) brushed twice a day. Among the 15-year age group from rural school, it was found that 276 (98.58%) students brushed their teeth once daily, while only 4 (1.42%) brushed twice daily.

In Table 2, among the 12-year-old age group of urban school children, the mean OIDP score of all dimensions was higher among the subjects with caries as compared to subjects without caries. The difference in the OIDP scores between the subjects with caries and without caries was statistically significant for all the dimensions except for eating (independent *t*-test). Among the 12-year-old age group of rural school children, the mean OIDP score of all dimensions (except eating, work) was higher among the subjects with caries as compared to subjects without caries. The difference in the OIDP scores between the subjects with caries and without caries was statistically significant for all the dimensions except for eating, speaking, smiling and work (independent *t*-test). Among the 15-year-old age group of rural school children, the mean OIDP score of all dimensions (except eating) was higher among the subjects with caries as compared to subjects without caries. The difference in the OIDP scores between the subjects with caries and without caries was statistically significant for all the dimensions except for eating, speaking, cleaning and work (Independent *t*-test). Among the 15-year-old age group of rural school children, the mean OIDP score of all dimensions (except eating) was higher among the subjects with caries as compared to subjects without caries. The difference in the OIDP scores between the subjects with caries and without caries was statistically significant for all the dimensions except for eating, cleaning, and emotion (Independent *t*-test).

In Table 3, 12 years age group of urban school children, a positive correlation found between the mean decayed, missing, and filled teeth (DMFT) and decreased cleaning efficiency, speaking, emotion and overall OIDP scores where as in rural school children, a positive correlation found between the mean DMFT and decreased cleaning efficiency, emotion, social contact and overall OIDP scores while in 12 years the significant correlation was found between OIDP variables such as speaking, cleaning, emotion, social contact, and overall score with DMFT. In 15 years age group of urban school children, a positive correlation found between the mean DMFT and sleeping, smiling, and overall OIDP scores whereas in rural school children, a positive correlation found between the mean DMFT and smiling and emotion OIDP scores while in 15 years the significant correlation was found between OIDP variables such as sleeping, smiling, emotion, social contact, and overall score with DMFT.

Table 2: Association between caries and OIDP among rural and urban children in 12- and 15-years age group

OIDP Variables	12 years			15 years		
	Caries absent	Caries present	P-value	Caries absent	Caries present	P-value
Eating						
Rural	1.77±2.399	1.60±1.558	0.537	3.02±3.867	2.81±4.028	0.676
Urban	1.52±2.31	1.67±1.77	0.562	3.35±3.488	3.35±4.35	0.999
Speaking						
Rural	0.39±1.251	0.68±1.904	0.116	0.55±1.899	1.76±5.274	0.005**
Urban	0.09±0.45	0.49±1.64	0.002**	0.75±3.626	1.24±4.027	0.304
Cleaning						
Rural	0.86±1.721	1.73±2.257	0.001**	2.65±4.082	2.68±4.934	0.958
Urban	0.75±1.51	2.05±2.71	0.001**	2.64±3.554	2.98±4.602	0.488
Sleeping						
Rural	0.14±0.344	0.33±1.157	0.034**	0.05±0.434	0.73±2.257	0.001**
Urban	0.06±0.24	0.20±0.85	0.039**	0.09±0.647	1.06±3.452	0.001**
Smiling						
Rural	0.50±1.529	0.58±0.902	0.654	0.61±2.541	2.53±4.002	0.001**
Urban	0.31±0.72	0.61±0.91	0.003**	0.72±0.2.281	3.63±5.198	0.001**
Emotion						
Rural	0.32±1.156	0.66±1.424	0.032**	2.53±3.279	3.36±3.610	0.061
Urban	0.07±0.43	0.60±1.52	0.001**	2.25±3.195	3.52±3.834	0.003**
Work						
Rural	0.12±0.932	0.11±0.404	0.870	0.18±1.071	0.53±1.718	0.036**
Urban	0.03±0.22	0.27±1.23	0.011**	0.19±1.130	0.53±2.291	0.093
Social contact						
Rural	0.00±0.000	0.11±0.489	0.003**	0.47±1.783	1.10±3.050	0.033**
Urban	0.02±0.20	0.23±0.98	0.005**	0.31±1.409	0.92±2.336	0.007**
Overall						
Rural	4.10±4.633	5.81±5.680	0.007**	10.06±10.787	15.50±16.841	0.001**
Urban	2.86±3.39	2.86±3.39	0.001**	10.30±8.122	17.24±16.023	0.001**

Independent Sample t-test** Significant ($P \leq 0.05$)

DISCUSSION

The oral cavity has a multitude of functions in relation to daily life such as food intake, speech, social contact, and appearance. Poor oral health has thus the potential of hampering the quality of life.^[10,11] Decreased food intake because of oral pain or poor dental status can cause low growth in children and may worsen the nutritional status.^[12] While poor dental status among children has a negative effect on speech development, it may also have a socially stigmatizing effect in adolescent affecting social appearance.^[13] According to Gambhir *et al.*, dental disease restricts activities in school and home, and often significantly diminishes the quality of life for many children in India.^[14,15]

As there is no relevant published literature pertaining to the dental caries experience and its impact on oral health related quality of life among age groups of 12 and 15 years in Modinagar city, this present study assess the dental caries experience and its impact on oral health related quality of life among urban and rural school children.

The present study comprised 1120 school children from 32 (urban and rural) schools. A representative sample which included students of age group 12 and 15 years, belonging

to both urban and rural school from all the four regions were included and the generalizability or extrapolation of the data is possible since the sample size was scientifically estimated. Out of the total sample of 1120 students, 560 students were each from urban and rural school comprising 280 students each of 12- and 15-years age group, respectively. In the present study, it was seen that, there was a higher proportion of males in 12-year age group (63.93%) and 15-year age group (65.33%) in both the urban and rural schools. This finding of gender inequality in schools can be supported by the results seen in the study conducted by Pandita in Haryana, India, where it was noted that higher enrolment of boys in comparison to girls in schools might be because of social stigma and employing girl child into households at a premature age.^[16]

Regarding the dental history, it was seen that among the 15 years, the higher percentage of the subjects (24.64%) in the urban areas had past dental visits as compared to the rural children (22.86%). The disparity in the dental visits of the urban and rural school children might be attributed to factors such as fear, lack of dental knowledge among parents, family income, lack of facilities and infrastructure, misconception regarding dental treatments due to illiteracy, lack of awareness, accessibility to oral health services, and economic inequalities.

Tables 3: Correlation between DMFT and mean OIDP scores among 12 and 15 years

OIDP variables	Age (years)	Urban	Rural	Total
Eating	12	0.051	0.052	0.051
	15	0.048	0.013	0.034
Speaking	12	0.129*	0.068	0.093*
	15	0.017	0.004	0.012
Cleaning	12	0.208**	0.154**	0.184**
	15	0.006	0.001	0.001
Sleeping	12	0.051	0.096	0.074
	15	0.139*	0.100	0.118**
Smiling	12	0.064	0.017	0.036
	15	0.219**	0.167**	0.188**
Emotion	12	0.176**	0.120*	0.147**
	15	0.106	0.130*	0.118**
Work	12	0.082	0.005	0.049
	15	0.086	0.043	0.066
Social Contact	12	0.085	0.142*	0.100*
	15	0.093	0.076	0.085*
Overall	12	0.185**	0.125*	0.156**
	15	0.145*	0.098	0.118**

Pearson's correlation coefficient test ** Significant ($P \leq 0.05$)

The findings are in agreement with the study conducted by Sogi *et al.* and Saravanan *et al.* in Puducherry.^[17,18] Based on the sugar sweet score, only 5% of the 12 year old and 13.57% of the 15 year old urban school children were in the Watch out Zone for the Dental Caries (Sweet Score >15) whereas among the rural school children higher percentage of the school children were in the Watchout Zone for dental caries, that is, 5.72% of 12 year old students and 14.64% of 15-year-old students. The finding is in agreement to a study conducted by Prahlad *et al.* in Mathura, India, where they found frequency of sugar intake has a significant effect on dental caries.^[19] The educational status of parents might act as a promoting factor in restricting the consumption of added sugar foods.

Among the urban school children, 97.8% of the 12 year and 94.64% of the 15-year-old students used toothpaste and toothbrush whereas in rural school students, comparatively lower proportion of 12-year-old students (95.72%) and 15-year-old students (93.92%) used toothpaste and brush to maintain oral hygiene. These findings were similar to studies conducted by Singh *et al.* in Jammu, Shailee *et al.* in Himachal Pradesh, Halwai *et al.* in Nepal, and Bhayya *et al.* in Maharashtra which stated 97.0% of the urban school children used toothbrush and toothpaste.^[20-22]

With regard to frequency of oral hygiene maintenance, among the urban school children of 12 years and 15 years only 1.42% and 2.14%, respectively, brushed their teeth twice daily whereas in rural school children only 0.72% of children among 12-year-old and 1.42% among the 15-year-old brushed their teeth twice daily. The findings of the present study were in agreement with the study conducted by Avinash *et al.* in 2010, where a greater number of urban school children were in habit of cleaning their teeth twice. In the present study, the mean

caries experience of the study subjects was calculated based on DMFT index. The mean scores for the DT component of the DMFT index were substantially higher among rural school children (1.85) as compared to urban school children (1.65) in 15-year-old. In 12 years, age group, the DT scores in the urban school children were higher (1.54) as compared to rural (1.44) school children. Similarly, mean score for the Missing Component of DMFT index (MT) was marginally higher (0.10) in rural school children and as compared to urban school children (0.08). In 12-year-old, the mean score of missing teeth due to caries was higher among rural school children as compared to urban age group. The mean caries experience based on the DMFT scores was higher in rural school children (2.05) as compared to urban school children (1.85) in 15 years age group. In 12 years, age group, urban school children (1.71) had higher mean DMFT scores as compared to rural school children (1.66). The present findings are not in agreement to a study conducted by Bhatia *et al.* in Ghaziabad, where they reported a mean DMFT of 1.4 among school children aged 12 and 1.2 among school children aged 15 years.^[23] The results are similar to the presented by Avinash *et al.* in Bangalore, where they assessed urban school children of aged 15 years reported a lower mean DMFT of 2.34 and 2.73 in rural school children where as in 12 years the mean DMFT for urban school children was 1.73 and 1.64 in rural school children.^[23-26]

The association between caries and OIDP among rural and urban children in 12 years age group was found statistically significant in terms of cleaning, sleeping, emotion, social contact, overall whereas in 15-year case social contact, sleeping, smiling, and overall were found statistically significant. In 12 years, age group of urban school children, a positive correlation found between the mean DMFT and decreased cleaning efficiency, speaking, emotion and overall OIDP scores whereas in rural school children, a positive correlation found between the mean DMFT and decreased cleaning efficiency, emotion, social contact, and overall OIDP scores. In 15 years, age group of urban school children, a positive correlation found between the mean DMFT and sleeping, smiling and overall OIDP scores where as in rural school children, a positive correlation found between the mean DMFT and smiling and emotion OIDP scores.

CONCLUSION

Oral impacts on daily life of Modinagar children and adolescents were prevalent but not intense. Eating, cleaning teeth, and maintaining usual emotional state were most commonly affected for both age groups. Our data show a high prevalence of dental caries among 12-year-old school children from both urban and rural areas of Modinagar. The factors to be considered for the decreased level of oral health in rural children are the lack of access to health services coupled with other barriers such as remoteness of villages, socioeconomic status, lack of regular public transport system, cost of travelling, ill distribution of dental health-care network, and most importantly the cultural and behavioral barriers,

which adversely affects the effective utilization of the oral health services available. Hence, this study gives the baseline information regarding their oral health, which could form a base for planning oral health promotion, prevention, and curative programs for the school aged children.

The findings also suggest that the normative oral health status measurement is not comprehensive in itself, thus resonating the need for incorporation of a more standardized measurement incorporating both the normative needs and OHR QoL assessment. In addition, the need for a more sensitive index to help identify missed school days due to oral problems is needed. Longitudinal longer follow-up study initiatives to study the influence of various factors on the academic performance of school children should be undertaken. Further research utilizing children of various age groups especially in rural areas, assessing the missed school days in children due to oral problems and analyzing its impact on the academic performance should also be initiated.

A proper understanding of OHR QoL can only be achieved by interviewing the child about the impact of dental conditions on their day-to-day activities that may not be easy in children compared to adults. Hence, the use of OHR QoL measures among children should be promoted to gain an in-depth knowledge about the dental health and its impact on the general health of children.

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