



Impact of early childhood caries on quality of life: Child and parent perspectives



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ABSTRACT

Background: The aim of present study was to examine early childhood caries' impact on oral health-related quality of life from children's self report and parental perception.

Methods: 200 healthy children in the age group of 3–5 years and their parents/guardians were enrolled in the study. 100 children diagnosed with early childhood caries (interventional group) and 100 children without caries (control group) along with their parents/guardians participated in face to face interview and responded to Michigan oral health related quality of life scale - child and parent version. Four weeks after full mouth rehabilitation children with ECC and their parents responded to a survey for a follow-up assessment. Data was analyzed and evaluated using Statistical Package for Social Sciences Version 21.0 statistical software and Chi square test.

Results: In our study we have found that ECC subjects had poorer oral health-related quality of life compared to caries free subjects. Further one month follow up after complete treatment, the oral health-related QoL improved significantly in ECC children.

Conclusions: Early childhood caries has a definite negative impact on the OHRQoL of children. At one month follow up after complete oral rehabilitation, the quality of life improved significantly as assessed by children's self reports as well as parental perceptions of their child's OHRQoL.

1. Introduction

Early childhood caries is a severe dental condition affecting many preschooler children around the world.¹ Dental caries affects children's oral and general well-being throughout their lives.

There are two different ways where pediatric patients differ from adult patients. First, children are not self-explanatory about their behavior and health related issue. The second major difference is their experiences, perceptions and assumptions about the world.

Oral health is a state of being free from facial pain, oral cancer, infections, gingival and periodontal diseases, carious teeth and other disorders that limit an individual's capacity and ability in chewing, laughing, and psychosocial well-being.^{2,3}

Oral Health Related Quality of Life is an important part of general health and well being. WHO has been recognized as an important sector of the Global Oral Health Program. Disease in the oral cavity during childhood can have a negative impact on the life of preschool children and their parents.⁴ Early childhood caries has a negative impact on

children's life includes pain on having hot and cold beverages, chewing and biting difficulties, reduced appetite, weight loss, sleeping difficulties, change in behavior like irritability and low self-esteem and decrease in school performance.^{5,6}

This interventional study was done to evaluate the effect of early childhood caries on oral health related QoL as reported by the children as well as by their guardians and to observe the impact of treatment of ECC on the child patient's oral health-related QoL after they return to their routine life.

2. Methodology

The present study evaluated early childhood caries effects on oral health-related quality of life from children's self report and parental perception .

200 healthy participants in the age group of 3–5 years and their parents were enrolled in the present study. Early childhood caries was diagnosed according to WHO criteria and dmft was calculated in terms

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of decayed, missing (indicated for extraction) and filled primary teeth.

The subjects were divided into two groups. First group comprised of 100 subjects diagnosed with ECC and their parents/guardians. All 100 children took part in the baseline survey. Full mouth rehabilitation (functional and esthetic) was done with or without pharmacological behavior management technique in 44 subjects in subsequent visits and they participated in both baseline and follow up survey after 4 weeks. Forty six children could not complete the treatment till assigned date and ten children completed the treatment but did not respond for follow-up survey.

The second group was control group. It comprised of 100 caries free subjects who participated in baseline survey.

The baseline data of the children and guardians in group I was compared with the data of Group II. The pre intervention scores of OHRQoL of Group I children were compared with post intervention scores on a 4 week follow up.

Filstrup et al. (2003) used Michigan oral health scale for children and parental perception.⁷ In present study similar scale was used with addition of two more questions in parent scale to determine the effect of ECC on child's learning and family impact. In the present study, nine questions for child and twelve for parents were chosen. The questionnaire was given in English which was translated in Hindi also. It was done for the convenience of the children and their parents. Answers were either 'yes' or 'no' for child version and answers were given on 5-point rating scale, (from 1 = strongly disagree to 5 = strongly agree) for parents/guardians.

3. Results

The study population included 56% males and 44% females in both caries and control group. Mean age was (4.79 ± 1.11) years, height was (84.90 ± 9.60) cm and weight was (15.53 ± 2.67) kg in case group. In control group mean age was (4.82 ± 0.97) years, height was (85.76 ± 9.43) cm and weight was (14.95 ± 2.92) kg respectively. Statistically no significant difference was seen between the two groups .

Table 1 displays the distribution of parental response according to each question. "Toothache at the time of evaluation" was perceived as the most concerning factor (Mean = 3.50) followed by their "children's unhappiness with teeth" (Mean = 3.46). In Group II the responses from parents for all the parameters were significantly better from that of Group I.

Table 2 depicts distribution of response of Early childhood caries group I and control group II to the OHRQoL scores. Maximum number of children (74%) complained of "toothache at the time of evaluation" followed by "pain while chewing and biting (66%)" in ECC group. All the parameters showed significant difference from control group.

Table 1
Itemwise Comparison of Quality of Life Scores as perceived by Parents.

SN	Item	Cases (n = 100)			Controls (n = 100)			Statistical significance	
		Mean	SD	Md	Mean	SD	Md	'z'	'p'
1.	Difficulty in chewing	2.92	1.47	4	1.05	0.22	1	9.98	< 0.001
2.	Difficulty in biting	3.03	1.39	3	1.04	0.20	1	11.32	< 0.001
3.	Sensitivity to hot and cold	3.07	1.17	3	1.09	0.29	1	11.25	< 0.001
4.	Sensitivity to sweet food	2.67	1.17	2	1.07	0.26	1	10.81	< 0.001
4.	Toothache or pain now	3.50	1.27	4	1.04	0.20	1	11.64	< 0.001
6.	Toothache resulting into night awakening	2.98	1.46	2	1.17	0.38	1	9.90	< 0.001
7.	Happy with his/her teeth (reversed)	3.46	1.10	4	1.12	0.33	1	12.08	< 0.001
8.	Complains about teeth	3.44	1.22	4	1.05	0.22	1	11.91	< 0.001
9.	Barrier in playing	2.51	1.16	2	1.01	0.10	1	10.99	< 0.001
10.	Barrier in school learning	2.33	1.21	2	1.04	0.32	1	9.99	< 0.001
11.	Affects financially	2.89	1.46	3	1.03	0.17	1	10.08	< 0.001
12.	Affects family work	2.91	1.56	3	1.03	0.17	1	9.85	< 0.001

Md = Median; Higher scores depict poorer quality of life. The responses were given on a 5-point rating scale ranging from 1 = "disagree strongly" to 5 = "agree strongly." The responses to the question "My child is happy with his/her teeth" were reversed to achieve unidirectional.

Table 3 among all the factors the greatest impact of ECC perceived by the parents was that "it affected their routine family work" (mean = 4.16) followed by "financial impact" (3.89). After intervention all the factors improved significantly.

Table 4 depicts that before intervention, most common complaint from children was that "they were not liking their teeth (86%)" followed by "toothache at the time of evaluation (72.7%)". All the scores improved significantly after intervention.

4. Discussion

The present interventional study assessed of Early childhood caries' impact on oral health-related quality of life from children's self report and parental perception . . Cognitive theory says that 2–6 years children are landmark for inception of abstract thinking and building of own self-image⁸ and in this phase they compare themselves with other children in appearance, identity and qualities.⁸ Michigan OHRQoL scale was used in present study as it is widely accepted. However, later an Indian scale was developed and validated for assessment of children's OHRQoL.⁹ In the present study, 200 preschool and school going children and their parent/guardian were enrolled. Out of them, 100 ECC respondents, forty four subjects completed both the baseline and follow-up surveys, while in forty six subjects intervention could not be completed till assigned date and ten children completed the treatment but did not reported for follow-up survey.

ECC children responded differently compared to the children in the control group. ECC Children had remarkably less oral health related quality of life compared to disease free children as evaluated by the children and the parents at baseline. Children with early childhood caries who received dental rehabilitation had significantly better oral health-related quality of life at the follow-up assessment, on comparing with their baseline as measured with the subject's self-assessment and parental perception .

The subjective evaluations reflect people's comfort while eating, sleeping and interacting socially, confidence and satisfaction with respect to one's oral health. OHRQoL is a shift from conventional methods of care and assessment that focus on a person's physical functioning, social and emotional experiences.^{10,11}

Following dental treatment, a child and guardian may be condition into the fact that the child's disease was sequentially treated .To evaluate the child's actual oral health-related QoL after 4 weeks of dental rehabilitation, this study measured the child's oral health-related QoL and the parent's/guardian's proxy assessment when the child had returned to life's routines. Researchers have found that children's self reports of their health-related quality of life are valid and reliable tool, child questionnaires should always be used in the documentation of

Table 2
Itemwise Comparative Evaluation of Children's Quality of Life Perceptions between cases and controls.

SN	Item	Cases (n = 100)		Controls (n = 100)		Statistical significance	
		No.	%	No.	%	χ ²	'p'
1.	Teeth hurting at time of evaluation	74	74	0	0	117.46	< 0.001
2.	Hurt when eat hot/cold	48	48	0	0	63.16	< 0.001
3.	Hurt when eat sweet	23	23	0	0	25.99	< 0.001
4.	Hurt when wake up at night	41	41	0	0	51.57	< 0.001
5.	Hurting tooth stops from playing	27	27	0	0	31.21	< 0.001
6.	Hurt when chew and bite	66	66	0	0	98.51	< 0.001
7.	Like your teeth	52	52	100	100	63.16	< 0.001
8.	Happy with teeth and smile	38	38	100	100	89.55	< 0.001
9.	Kids make fun of your teeth	53	53	0	0	72.11	< 0.001

The responses to the questions “Do you like your teeth?” and “Are you happy with your teeth and smile?” were reversed to achieve unidirectional scores.

Table 3
Item wise Comparison of Quality of Life Scores as perceived by Parents.

SN	Item	Before intervention (n = 44)			After intervention (n = 44)			Statistical significance		
		Mean	SD	Md	Mean	SD	Md	'z'	'p'	
1.	Difficulty in chewing	3.25	1.48	4	1.18	0.39	1	-5.119	< 0.001	
2.	Difficulty in biting	3.57	1.35	4	1.20	0.41	1	-5.360	< 0.001	
3.	Sensitivity to hot and cold	3.39	0.99	3	1.20	0.41	1	-5.516	< 0.001	
4.	Sensitivity to sweet food	3.20	1.11	3	1.25	0.46	1	-5.362	< 0.001	
5.	Toothache or pain now	3.68	1.12	4	1.34	0.48	1	-5.585	< 0.001	
6.	Toothache resulting into night awakening	3.34	1.31	4	1.34	0.48	1	-5.247	< 0.001	
7.	Happy with his/her teeth	3.25	0.94	3	1.61	0.69	1.5	-5.152	< 0.001	
8.	Complains about teeth	3.68	0.98	4	1.95	0.78	2	-5.262	< 0.001	
9.	Barrier in playing	2.84	1.10	3	1.45	0.50	1.5	-4.768	< 0.001	
10.	Barrier in school learning	2.67	1.16	2	1.50	0.51	1	-4.617	< 0.001	
11.	Affects financially	3.89	0.84	4	1.70	0.55	2	-5.698	< 0.001	
12.	Affects family work	4.16	0.86	4	1.75	0.53	2	-5.794	< 0.001	

Md = Median; Higher scores depict poorer quality of life. The responses were given on a 5-point rating scale ranging from 1 = “disagree strongly” to 5 = “agree strongly.” The responses to the question “My child is happy with his/her teeth” were reversed to achieve unidirectional.

Table 4
Item wise Comparative Evaluation of Children's Quality of Life Perceptions between pre-intervention and post-intervention time intervals in intervention group.

SN	Item	Before intervention (n = 44)		After intervention (n = 44)		Statistical significance	
		No.	%	No.	%	χ ²	'p'
1.	Teeth hurting at time of evaluation	32	72.7	0	0	34.74	< 0.001
2.	Hurt when eat hot/cold	24	54.5	0	0	21.82	< 0.001
3.	Hurt when eat sweet	13	29.5	0	0	10.59	< 0.001
4.	Hurt when wake up at night	23	52.3	0	0	25.71	< 0.001
5.	Hurting tooth stops from playing	18	40.9	0	0	18.26	< 0.001
6.	Hurt when chew and bite	30	68.2	0	0	37.30	< 0.001
7.	Like your teeth (reversed-“no”)	38	86	3	6.8	60.00	< 0.001
8.	Happy with teeth and smile. (reversed-“no”)	32	71.5	3	6.8	60.00	< 0.001
9.	Kids make fun of your teeth	21	47.7	3	6.8	15.56	< 0.001

The responses to the questions “Do you like your teeth?” and “Are you happy with your teeth and smile?” were reversed to achieve unidirectional scores.

outcomes of specific clinical conditions.^{12,13} Tooth ache, painful sensation in the teeth, difficulty in chewing, unhappy with teeth and trouble sleeping are the most common difficulties reported by parents (Table 1), as found in earlier studies (Filstrup et al., 2003, Marcelo Bönecker et al., 2012, P.A. Martins-Júnior, 2013)^{7,14,15}

In present study 27% preschool and school going children showed problems while playing, 48% children reported pain on having hot and cold beverages, 41% of children reported that they had problem in sleeping because of pain (Table 2). Similar findings were reported by Low, Tan and Schwartz in 1999, they evaluated seventy seven children (age 35–66 months, mean = 44 months) with caries and found that 35% children had shown problem in sleeping. Acharya S and Tandon S in 2011 also found that in 44% participants sleep was affected due to caries.¹⁶

P.A. Martins-Júnior in 2013, evaluated 438 children and found that

23% children had problem in their behavior while playing.¹⁵ Filstrup et al., in 2003 reported that 58% children were affected by pain.⁷

In present study among all the factors the greatest impact of ECC as perceived by the parents was that it affected their routine family work (mean = 4.16) followed by “financial impact” (3.89) (Table 3).

Before intervention, most common complaint from children was that “they were not liking their teeth (86%)” followed by “toothache at the time of evaluation (72.7%)”. After intervention, except for 3 children (6.8%) for items “like your teeth”, “kids make fun of your teeth”, and “happy with teeth and smile” all other children showed improvement in all parameters. For these 3 children esthetic intervention was done for maxillary incisors which may not have been completely acceptable to children. All the scores improved significantly after intervention (Table 4).

In a study, Parsons, 1999 showed relationship between early

Table 5
Comparison of Change in Total QoL Scores following intervention (n = 44).

SN	Group	Min	Max	Mean	SD	Median
1.	Pre-intervention	22	58	41.00	8.11	41.5
2.	Post-intervention	12	24	17.45	3.79	17.5

$z = 5.778$; $p < 0.001$ (Wilcoxon signed rank test).

Mean Change \pm SD = -23.55 ± 9.65 (% Change = 57.4%.

childhood caries and oral health-related QoL and observed that parents realised an improvement of their child's overall well-being after dental rehabilitation.¹² Low and Tan 1999 in their study, found that dental treatment was shown to have a statistically significant impact in alleviating the complaint of pain, of reversing certain eating problems, and improving sleep habits ($P < 0.001$) whereas the difference relating to changes in behavior was found not to be statistically significant.¹⁷

In present study comparison of change was seen in total QoL scores following intervention. Prior to intervention, mean parental QoL scores were 40.97 ± 6.74 which declined to reach at 17.53 ± 3.87 following intervention, thus showing a mean decline of 23.43 ± 8.70 , i.e. a mean change of 57.2%. Statistically, this change was found to be highly significant ($p < 0.001$) which showed that there was a improvement in quality of life significantly after treatment (Table 5).

The results of study depicted that children themselves, even as young as 36 month of age, can correspond their oral health-related quality of life.

We can say that, the parent/guardian scale is an acceptable criteria for communication as per study of Filstrup et al., in 2003. Preschoolers can not refer themselves for dental treatment, despite experiencing toothache. Ultimately, it may lead to the parental perceptions of their child oral health related quality of life that may decide whether dental care will be sought for children. In addition to this the use of a representative is also important in the situation when the patient is either unable or unwilling to participate in the study to assess oral health related quality of life parameters.

5. Conclusions

Early childhood caries has a profound adverse effect on the oral health related to quality of life of children. At one month follow up after complete oral rehabilitation, the quality of life improved significantly as assessed by children's self reports as well as parental perceptions of their child's OHRQoL.

Declaration of competing interest

Authors have no conflict of interest.

References

- Schütte Ursula, Guido Heydecke. Oral health related quality of life. *Ref. Work Encycl. Publ. Health.* 2008;10:1052–1055. https://doi.org/10.1007/978-1-4020-5614-7_2455.
- Locker D. *Concepts of Oral Health, Disease and the Quality of Life.* vol. 30. Chapell Hill Dental Ecology University of North Carolina; 1997:11–23 7.
- Sischo L, Broder HL. Oral health-related quality of life, what, why, how, and future implications. *J Dent Res.* 2011;90(11):1264–1270. <https://doi.org/10.1177/0022034511399918>.
- Postma TC, Ayo-Yusuf OA, van Wyk PJ. Socio-demographic correlates of early childhood caries prevalence and severity in a developing country - South Africa. *Int Dent J.* 2008;58:91–97.
- Policy on early childhood caries (ECC), classifications, consequences, and preventive strategies. *Am. Acad. Pediatr. Dentistr.* 2016;39(6):17–18.
- McGrath C, Broder H, Wilson-GendersonM. Assessing the impact of oral health on the life quality of children: implications for research and practice. *Community Dent Oral Epidemiol.* 2004;32:81–85.
- Filstrup SL, Briskie D, da Fonseca M, Lawrence L, Wandera A, Inglehart MR. Early childhood caries and quality of life: child and parent perspectives. *Pediatr Dent.* 2003;25:431–440 (PubMed).
- Piaget's, *Theory of Cognitive Development.* 1952; 1952.
- Prakash Mathur Vijay, Kaur Dhillion Jatinder, Ajay Logani, Ramesh Agarwal. Development and validation of oral health-related early childhood quality of life tool for North Indian preschool children. 2014;25(5):559–566.
- Li MY, Zhi QH, Zhou Y, Qiu RM, Lin HC. Impact of early childhood caries on oral health-related quality of life of preschool children. *Eur J Paediatr Dent.* 2015;16(1):65–72.
- Brazil. *Ministry of Health Secretariat of Health Care Project SB Brazil. Oral Health Status of the Population from 2002 to 2003. Main Results.* Brasilia: Ministry of Health; 2004.
- Parsons SK, Barlow SE, Levy SL, Supran SE, Kaplan SH. Health-related quality of life in pediatric bone marrow transplant survivors: according to whom? *Int J Canc.* 1999;12:46–51.
- Le Coq EM, Boeke AJ, Bezemer PD, Colland VT, van Eijk JJ. Which source should we use to measure quality of life in children with asthma: the children themselves or their parents? *Qual Life Res.* 2000;9:625–636.
- Bönecker Marcelo, Jenny Abanto, Tello Gustavo, Butini Oliveira Luciana. Impact of dental caries on preschool children's quality of life: an update. *Braz Oral Res.* 2012;26(1) <https://doi.org/10.1590/S1806-83242012000700015>.
- Martins-Júnior PA, Vieira-Andrade RG, Corrêa-Faria P, Oliveira-Ferreira F, Marques LS, Ramos-Jorge ML. Impact of early childhood caries on the oral health-related quality of life of preschool children and their parents. *Caries Res.* 2013;47:211–218. <https://doi.org/10.1159/000345534>.
- SonuAcharya, ShobhaTandon. The effect of early childhood caries on the quality of life of children and their parents. *Contemp Clin Dent.* 2011;2(2):98–101. <https://doi.org/10.4103/0976-237X.83069>.
- Low W, Tan S, Schwartz S. The effect of severe caries on quality of life in young children. *Pediatr Dent.* 1999;21:325–326.