ORIGINAL RESEARCH

Parental and Child Outlook on the Impact of ECC on Oral Health-related Quality of Life: A Prospective Interventional Study

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Abstract

Aim: To evaluate the perspectives of parents and children on the impact of early childhood caries (ECC) on the oral health-related quality of life (OHQoF).

Materials and methods: About 400 children aged 3–5 years were recruited for the study. About 200 children who were caries-free were the controls for the study. The remaining 200 consisted of children who were diagnosed with ECC and required dental rehabilitation under general anesthesia. Oral health-related quality of life was recorded at baseline and 6 months after intervention using the Michigan oral health-related quality of life scale. Data were analyzed and evaluated using Statistical Package for Social Sciences (SPSS) Version 25.0.

Results: Children with ECC were found to have a significantly lower oral health-related quality of life compared with caries-free children, and a statistically significant difference was seen between both groups. The main concern for both parents and children at baseline was pain at the first visit when the evaluation was done. After the intervention, a significant improvement in the oral health-related quality of life was seen.

Conclusion: Early childhood caries was found to have detrimental effects on the oral health-related quality of life. Full-mouth rehabilitation under general anesthesia was found to bring a significant improvement in the oral health-related quality of life. The perspectives of both parents and children were found to be similar.

Clinical significance: Early childhood caries has an impact on the lives of children and their parents. Oral health-related quality of life was low with children suffering from ECC. Full-mouth rehabilitation under general anesthesia can significantly improve the OHRQoL of children. Continuous monitoring of the children with regular follow-ups and parental education should be enforced to prevent the relapse of ECC.

Keywords: Early childhood caries, Full-mouth rehabilitation, General anesthesia, Oral health-related quality of life.

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Introduction

The presence of caries in children below 6 years of age has been termed as ECC. Though preventable, ECC is the most common disease affecting children worldwide, affecting their health, growth, and development. A more serious and progressive form of ECC is known as severe early childhood caries (SECC) which requires rehabilitative surgery under general anesthesia. Both ECC and SECC impact on quality of life, increase the risk of caries in permanent dentition, and foster oral health inequities that undermine general well-being.[1,2]

Early childhood caries is a multifactorial illness caused by acidogenic and aciduric bacteria on a sugar-rich diet on the tooth surface. Oral microbiota diversifies and develops with age after birth.[3] Early childhood caries is common in low-income and refugees children from Third-World nations. Early childhood caries is a severe oral health problem in malnourished populations in both developing and developed countries.[4–6] Children with ECC have trouble eating and drinking owing to pain,[2] experience low self-esteem, trouble sleeping, and poor school performance. These children miss school since they are often hospitalized.[5,6] This causes parents to miss work for doctor visits, hospitalization, and treatment.[7,8] Early childhood caries negatively affects the child and parent's quality of life.

Various instruments have been used to assess the OHRQoL of children suffering from ECC using different scales. Most studies,

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however, have been answered by parents as proxies for children as they often have difficulty in understanding the concepts of health.[9–11] However, studies have shown that children as young as 3 years can convey their OHRQoL validly. The Michigan OHRQoL scale is a unique validated scale which records the perception of both the parent and the child.[7,8]

Children suffering from ECC are young and in the precooperative stage of development, therefore, they lack the cooperation needed for dental treatment. These children may need physical restrictions, psychiatric stability, or general anesthesia.[12] Full-mouth rehabilitation for ECC under general anesthesia is popular. Children and parents have reported positive outcomes.[2,7,8] In the past 25 years, more children have had full-mouth ECC rehabilitation under general anesthesia.[9] Very few studies have assessed the post operative changes in OHRQoL from both children and parents.[7,8]

Hence, this study was undertaken to evaluate the effect of ECC on OHRQoL on children and parents and find the effect of full mouth rehabilitation on their OHRQoL.

Materials and Methods

This prospective interventional study was started after receiving ethical approval from the Institutional Human Ethical Committee (IHEC/SDC/FACULTY/21/PEDO/185). The study consisted of 400 patients aged 3–5 years who were divided into two groups. Group I consisted of 200 children diagnosed with SECC who required full-mouth rehabilitation under general anesthesia. Children with medical problems and those who did not require general anesthesia were excluded from this study. Group II consisted of 200 healthy caries-free children who participated for the baseline OHRQoL survey.

The purpose and objectives of the study were elucidated in detail to the parents of the patients who fulfilled the specified inclusion criteria and were invited to enroll their children in the study by providing written informed consent. After obtaining consent, baseline DMFT scores were entered, and baseline OHRQoL scores from both parent and child were recorded using Michigan OHRQoL were recorded. The questionnaire was administered in English and the languages that the parents and child were comfortable with (Hindi, Tamil, Telugu, and Malayalam). The patient was then sent for blood tests and anesthetic evaluation.

After anesthetic evaluation and the child was deemed fit for full-mouth rehabilitation under general anesthesia, the date for surgery was fixed. Full-mouth rehabilitation for all patients was done under general anesthesia at the Pediatric Operating Room in MaxFax building at Saveetha Dental College and Hospitals. Single-surface lesions or occlusal lesions that did not compromise cusp integrity were restored with intracoronal restorations using glass ionomer cement (GC Gold Label Type II Universal Restorative, GC Corp., Tokyo, Japan) or composite (Tetric N-Ceram, Ivoclar Vivadent, Schaan, Liechtenstein). Teeth with multisurface carious lesions were restored with stainless steel crowns (3M ESPE, St. Paul, Minnesota, USA). Teeth with caries involving the pulp were treated with pulp therapy and restored with full-coverage restorations: stainless steel crowns for posterior teeth (3M ESPE) and strip crowns for anterior teeth (3M ESPE). All dental materials were manipulated following the manufacturers' specifications. Teeth with necrotic pulps and nonrestorable teeth were extracted under local anesthesia.

All parents and children received instructions on oral hygiene maintenance and dietary counseling regarding caries-promoting food. Toothbrushing was demonstrated on a supersized model followed by hands-on practice by the children. Parents were also instructed on how to brush their children's teeth.

OHRQoL scores from both parent and child were recorded using Michigan OHRQoL were recorded before full-mouth rehabilitation under general anesthesia and at 6 months follow-up. Data were analyzed and evaluated using SPSS Version 25.0. The children's responses to the QOL questions were categorical (yes/no responses) and single-item analyses were conducted using nonparametric tests (McNemar test and Chi-square test). The parents'/guardians' responses were given on five-point rating scales and were analyzed using multivariate analysis of variance (MANOVA).

Results

The group I had an average age of 4.21 ± 0.81 years and consisted of 108 (54%) boys and 92 girls (46%). Group II had an average age of 4.34 ± 0.73 years, consisting of 102 (51%) boys and 98 (49%) girls. Group I had DMFT of 11.2 ± 5.6, and a statistically significant difference was seen between both groups. Table 1 represents the demographic characteristics of the participants.

Table 2 represents the item-wise comparison of oral health-related quality of life scores as perceived by the parents. According to the parents of the children affected with ECC, pain at the time of evaluation (3.95 ± 1.36) was the main concern followed by children complaining about their teeth (3.63 ± 1.84). A statistically significant difference was seen between the cases and controls, with controls showing a significantly higher quality of life.

Table 3 shows the comparative evaluation of children's oral health-related quality of life perceptions between the groups. About 78% of the children affected with ECC complained that they had tooth pain at the time of evaluation which was found to be the major concern followed by "hurting while chewing or eating" in 68% of the children. A statistically significant difference was seen between the cases and controls, with controls showing a significantly higher quality of life.

Table 4 represents the OHRQoL scores as perceived by parents before and after the intervention. The maximum improvement was seen in "pain at the time of evaluation" (from 3.95 ± 1.36 to 1.16 ± 0.33). A statistically significant improvement was after full-mouth rehabilitation under general anesthesia.

Table 5 depicts the response of children's oral health-related quality of life scores perceptions between preintervention and postintervention time intervals in group I. A statistically significant improvement was seen in the quality of life after full-mouth rehabilitation under general anesthesia. It was observed that children who had ECC had a much lower oral health-related quality of life in comparison to children who did not have caries, and the difference between the two groups was determined to be statistically significant. At the beginning of the study, when the evaluation was being done, the level of pain was the primary concern for both the parents and the children. Following the

Table 1: Demographic values of participants

	Cases n = 200	*Controls n = 200*	*p-value*
Age	4.21 ± 0.81	4.34 ± 0.73	0.612
Gender	M – 108 F – 92	M – 103 F – 97	0.785
DMFT	11.2 ± 5.6	0	<0.001

Table 2: Item-wise comparison of OHRQoL scores as perceived by parents

Sl. no.	*Item*	*Cases n = 200 Mean ± SD*	*Controls n = 200 Mean ± SD*	*p-value*
1.	Difficulty in chewing	2.97 ± 1.61	1.08 ± 0.35	<0.001
2.	Difficulty in biting	3.12 ± 1.45	1.10 ± 0.22	<0.001
3.	Sensitivity to hot and cold	2.98 ± 1.24	1.12 ± 0.29	<0.001
4.	Sensitivity to sweet food	2.84 ± 1.43	1.04 ± 0.18	<0.001
5.	Toothache or pain now	3.95 ± 1.36	1.05 ± 0.17	<0.001
6.	Toothache resulting in night awakening	3.41 ± 1.51	1.03 ± 0.24	<0.001
7.	Happy with his/her teeth†	3.22 ± 1.25	1.03 ± 0.21	<0.001
8.	Complains about teeth	3.63 ± 1.84	1.12 ± 0.22	<0.001
9.	Difficulty in playing due to toothache	2.84 ± 1.45	1.01 ± 0.19	<0.001
10.	Difficulty in school learning due to toothache	2.64 ± 1.38	1.01 ± 0.17	<0.001

†Responses were reversed to achieve unidirectional scores

Table 3: Item-wise comparative evaluation of children's OHRQoL perceptions between cases and controls

Sl. no.	*Item*	*Cases (%)*	*Controls (%)*	*p-value*
1.	Teeth hurting at time of evaluation	78	0	<0.001
2.	Hurt when eating hot/cold	56	0	<0.001
3.	Hurt when eating sweet	37	0	<0.001
4.	Hurt when waking up at night	44	0	<0.001
5.	Hurting tooth stops from playing	32	0	<0.001
6.	Hurt when chewing and biting	68	0	<0.001
7.	Like your teeth†	45	0	<0.001
8.	Happy with teeth and smile†	31	0	<0.001
9.	Kids make fun of your teeth	58	0	<0.001

†Responses were reversed to achieve unidirectional scores

Table 4: Item-wise comparison of OHRQoL scores as perceived by parents before and after intervention

Sl. no.	*Item*	*Before intervention Mean ± SD*	*After intervention Mean ± SD*	*p-value*
1.	Difficulty in chewing	2.97 ± 1.61	1.21 ± 0.29	<0.001
2.	Difficulty in biting	3.12 ± 1.45	1.17 ± 0.35	<0.001
3.	Sensitivity to hot and cold	2.98 ± 1.24	1.21 ± 0.27	<0.001
4.	Sensitivity to sweet food	2.84 ± 1.43	1.26 ± 0.41	<0.001
5.	Toothache or pain now	3.95 ± 1.36	1.16 ± 0.33	<0.001
6.	Toothache resulting in night awakening	3.14 ± 1.51	1.19 ± 0.28	<0.001
7.	Happy with his/her teeth†	3.22 ± 1.25	1.52 ± 0.41	<0.001
8.	Complains about teeth	3.63 ±1.84	1.34 ± 0.36	<0.001
9.	Difficulty in playing due to toothache	2.84 ± 1.45	1.39 ± 0.21	<0.001
10.	Difficulty in school learning due to toothache	2.64 ± 1.38	1.37 ± 0.24	<0.001

†Responses were reversed to achieve unidirectional scores

Table 5: Item-wise comparative evaluation of children's OHRQoL scores perceptions between preintervention and postintervention time intervals in the intervention group

Sl. no.	*Item*	*Before intervention (%)*	*After intervention (%)*	*p-value*
1.	Teeth hurting at time of evaluation	78	0	<0.001
2.	Hurt when eating hot/cold	56	0	<0.001
3.	Hurt when eating sweet	37	0	<0.001
4.	Hurt when waking up at night	44	0	<0.001
5.	Hurting tooth stops from playing	32	0	<0.001
6.	Hurt when chewing and biting	68	0	<0.001
7.	Like your teeth†	45	7	<0.001
8.	Happy with teeth and smile†	31	5	<0.001
9.	Kids make fun of your teeth	58	3	<0.001

†Responses were reversed to achieve unidirectional scores

implementation of full-mouth rehabilitation under general anesthesia, there was a considerable improvement in the quality-of-life factors associated with oral health.

Discussion

Oral health plays a vital role in the general health and well-being of every individual. Poor oral health may have a negative influence on the functional, social, and psychological well-being of young children, causing pain and discomfort which may influence quality of life.[13] Despite the fact that ECC can be preventable, it is the most prevalent disease in the world affecting children.[14]

Early childhood caries is contemplated as a major public health issue due to its clinical presentation and rapid progression which often bring crippling and detrimental effects on the growth of children. Severe carious teeth can result in pain which leads to discomfort that hinders normal food consumption and consequently causes malnutrition, which, in turn, can lead to retardation of physical growth and cognitive behavior. In addition, delay in seeking treatment results in infection and abscesses, which brings further discomfort for the child.[5,6] In addition, esthetic discomfort can cause relationship and self-esteem psychological problems.[15] The consequences of ECC often affect both the immediate and the long-term quality of life of the child. It also creates significant economic and social consequences for the family.[16,17]

Studies have shown that ECC has been associated with negative OHRQoL but limited studies have been done in India.[9–11] Most studies have used the early childhood oral health impact scale introduced by Pahel et al.[18] which is filled by parents who act as proxy for their children. The perspective of the child who is actually suffering from ECC has been rarely asked. Hence, this study was undertaken to investigate the impact on both parents and children before and after rehabilitation.

The acceptance of general anesthesia for full-mouth rehabilitation has been increasing among parents over the years.[5,6,16,17] High satisfaction levels have been reported by both parents and children. Though an elective procedure, the complete treatment in a single appointment which results in the complete removal of the infection. The popularity of full mouth rehabilitation under general anesthesia has been increasing as children suffering from ECC have multiple carious tooth, which would require multiple chair-side appointments and are uncooperative. High success rates for dental treatments performed under general anesthesia for children suffering from ECC have been reported.[19,20] The concept of quality of life has been defined by the World Health Organization (WHO) as "individuals" perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns. Oral health-related quality of life is an important part of general health and well-being and is now identified as a prime area of the Global Oral Health Program of the WHO.[21] The presence of good dental hygiene practices and oral health from birth through infancy and adolescence is also vital for the general health and well-being of an individual and is one of the building blocks for a disease-free life. The assessment of OHRQoL has become popular over the years as clinical indicators do not completely portray the attributes of oral health. The presence of oral diseases has been found to produce an adverse effect on the general and psychological health of both children and their parents.[5,6]

The perceptions of children below 6 years have been poorly reported in population-based oral health research areas due to issues of reliability and validity.[9–11] Over the years, research has shown that children as young as 36 months were able to respond and answer questions about their quality of life.[7,8]

In the present study, the responses of children from both groups were different at baseline. Children suffering from ECC were found to have a lower quality of life compared with children who did not have any dental caries. A significant improvement was seen after full-mouth rehabilitation. This can be attributed to the fact that children suffering from ECC often report with pain and discomfort, and the caries remains untreated until full-mouth rehabilitation is completed.[2] Previously published studies have shown that pain is the most common complaint with which children suffering from ECC report to the dental office.[2,5,7,8,16,19,20] Once the pain is relieved, the quality of life will automatically improve.

In the present study, at baseline, toothache at the time of evaluation was the major concern for parents, followed by child complaining about the tooth and the child not being happy with the smile. Difficulty in learning and playing at school due to tooth pain was the least common concern for parents. The results are similar to previously published articles.[22–24]

Parents usually bring their children to a dentist when pain occurs. This could be due to various reasons such as lack of

knowledge on the importance of oral health, missing school and work, cost of treatment, multiple visits, and the fear of treatment. Sanguida et al.[25] found that most parents did not take their children to dentist even though they knew caries was present as[26] they felt their child had no dental problem at that point of time. Parents are usually unaware of preventive dental services as they often visit a dentist when the disease has progressed, and aggressive treatment is required at that stage.27

About 78% of the children affected with ECC had pain at the time of evaluation, and 68% of the children had pain while eating. These complaints are often associated with ECC. Edelstein stated that 73% of the patients reporting to dental emergencies to US Pediatric Dentistry Training Programs had pain and 86% had difficulty in eating.[26] Once the child has pain, eating becomes difficult. This results in poor nutrition which in turn leads to malnourishment. Children with ECC are often anemic with low height and weight for age. After full-mouth rehabilitation, children, children receive new chewing surfaces in the form of crowns and restorations. As pain diminishes after treatment and new chewing surfaces are available, children are able to eat well which aids in their growth and development.[28,29] Studies have shown that after full mouth rehabilitation, children show improved body mass index.[30,31] In this study, none of the children had pain at postoperative follow-up at 6 months, and all patients could eat comfortably without any pain.

In total, 56% of the affected children stated that they had pain when they ate hot or cold food. This is in consensus with various studies. Children often report of experiencing pain for weeks which affects their daily activities. After full-mouth rehabilitation, none of the children had difficulty in having any hot or cold food. About 44% of the patients had pain while sleeping which would wake them up at night. This could be due to the unhealthy lifestyle of parents, intake of sugary food and drinks before sleep, and poor dental hygiene behaviors which lead to the occurrence of dental caries.[32] As oral health deteriorates, caries progresses, eventually resulting in pulpal involvement, thus causing pain and affecting sleep. Studies have reported that due to pain, children with ECC have disturbed sleep.[32–34]

About 58% of the children complained that children made fun of their teeth. Only 55% of the children with ECC were happy with their teeth, and 69% were happy with their smile. The primary maxillary anterior teeth are usually at high risk for caries and are the first teeth to be affected in ECC.[35] The unsightly appearance of maxillary teeth often affects the children and they often refuse to smile or laugh. Studies have shown that children have perceptions of beauty due to the strong influence of social media and television and would want their teeth to be restored to the original state with tooth-colored restorations.[36–38] In the present study, after the intervention, 93% liked their teeth and 95% are happy with their smile.

At the end of 6 months, a statistically significant improvement in the OHRQoL of children was seen. Since all patients underwent full-mouth rehabilitation under general anesthesia, the entire source of infection was removed in the same appointment. This is an advantage compared to chair-side management, where either a single tooth or a few teeth would be done in a single appointment based on the child's cooperative ability. The entire management would take multiple appointments over a longer period of time.[39]

The present study shows that children below 6 years of age were able to understand and convey answers regarding their OHRQoL. This is important as the child provides a subjective perspective regarding their need for dental care. From a parental perspective, the OHRQoL scale can be used as an instrument to teach and be vigilant about their child's dental needs. Children with ECC cannot refer themselves to a dentist when pain occurs, and it is the parental perception of their child's OHRQoL which will decide if treatment will be sought or not.[7] If a difference appears between the parental and child's report on OHRQoL, the dentist can share and discuss the disparity between the two to improve communication regarding oral health.

The present study had a few limitations. Patients were followed up for only 6 months. Previous studies have shown that usually full-mouth rehabilitation reduces the levels of caries-associated microorganisms for at least 6 months. Hence, there can be a chance of recurrence of caries if patients do not maintain oral hygiene. Hence, research with longer follow-ups should be conducted to understand the OHRQoL.

Conclusion

Early childhood caries was found to significantly decrease the OHRQoL of children from the perspectives of both parents and children. After full-mouth rehabilitation under general anesthesia, a significant improvement was seen. The perception of OHRQoL of parents significantly matched that of their child at both baseline and 6 months follow-up.

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