10.22592/ode2020n36a2
Research

Oral health-related quality of life in peruvian children with severe early childhood caries

Evelyn R. Munayco-Pantoja[1], 0000-0003-0417-262X
Héctor Pereyra-Zaldívar[2], 0000-0003-2449-4407
Marleny M. Cadillo-Ibarra[3], 0000-0003-4114-920X

[1]School of Dentistry. Universidad Nacional Mayor de San Marcos. Lima, Peru.
[2]School of Medicine. Universidad Nacional Mayor de San Marcos. Lima, Peru.
[3]Instituto Nacional de Salud del Niño. Lima, Perú.

Abstract
Objective: To evaluate parental perception of the quality of life related to the oral health of children with severe early childhood caries from a Peruvian health institute. **Method:** An observational, analytical, and cross-sectional study was carried out in 200 children aged 3 to 5, without caries and children with severe early childhood caries (S-ECC) selected randomly. A calibrated examiner applied the Peruvian version of the ECOHIS questionnaire (P-ECOHIS) and the defs index. The normal distribution was determined with the Kolmogorov-Smirnov test; the Mann-Whitney U statistical test was also applied.
Results: The total ECOHIS score is higher in children with S-ECC than in caries-free children, with a statistically significant difference ($p<0.05$).
Conclusion: Parental perception of oral health-related quality of life was negatively affected by severe early childhood caries in children at a Peruvian health institute.
Keywords: dental caries, quality of life, pediatric dentistry, child, preschool.

Date received: 6/4/2020, date accepted: 12/6/2020

Introduction and background

Oral health-related quality of life (OHRQL) is a multidimensional (functional, psychosocial, and economic) complex of interrelated domains(1) that represents the patients' subjective perspective on their symptoms and experiences(2). It is a socio-dental indicator, defined as the extent to which oral conditions influence normal social functioning and lead to significant changes in daily activities such as inability to work or attend school, etc.(3) These indicators are considered to complement clinical indicators significantly(4).
Severe early childhood caries (S-ECC) is defined as any sign of smooth-surface caries in a child younger than three years of age. From ages 3 through 5, it typically has one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a defs index ≥4 (age 3), ≥5 (age

4), or ≥6 (age 5)(5). The etiology is complex and multifactorial, as in early childhood caries (ECC)(6).
ECC prevalence is 21% to 41.2%(7-9) in different parts of the world. ECC prevalence in Peru has already been studied(10), but S-ECC prevalence in Peruvian children is unknown. It must be studied because children with S-ECC are at high risk of permanent tooth decay(11) and other clinical consequences, which can be prevented if detected in time.
The link between dental caries and parental perception of OHRQL has already been studied internationally(12-13), in Latin America(14-15), and Peru(16). It was found that dental caries reduces the quality of life. It impacts the child as it causes pain, infections, increased risk of hospitalization due to complications; it impacts parents because of high treatment costs, sleepless nights, lost work days, and distress(17). This connection strengthens as the disease becomes more severe (18), and few studies analyze this connection in children with S ECC(19).
In Peru, dental caries is the disease that most affects children's oral health. Its prevalence is 59.1% in deciduous teeth and 85.6% in mixed dentition(20). Children are at greater risk of tooth decay because Peruvian public health policies have not prioritized oral health(10). It is vital to work with them more comprehensively, combining the social and clinical components, evaluating the quality of life, and addressing the issue as a whole to improve the likelihood of preventing tooth decay effectively. This study evaluates the parental perception of oral health-related quality of life in children with severe early childhood caries at a Peruvian health institute.

Materials and methods

Study population

The study was observational, analytical, and cross-sectional. It was conducted at Instituto Nacional de Salud del Niño (National Institute of Children's Health - INSN), located in Lima, Peru. This institute specializes in health care for children and adolescents. It is the first pediatric institution of reference nationwide. Most users are from the capital (83.24%), including the urban population (75%). The children that seek the care services the most are under nine years of age, and only 49% are subsidized by free public insurance(21).
Calibration of examiners
The calibration was performed in two stages: the theoretical stage involved discussing the defs index criteria by analyzing 30 photographs taken by a pediatric dentistry specialist (gold standard). The clinical stage was conducted at a preschool by performing the clinical examination of 30 children, aged 3 to 5, randomly chosen by the gold standard. The children were evaluated twice at a seven-day interval. Good intra- and inter-examiner reliability were determined (Cohen's Kappa = 0.8 and 0.9). A pilot study was then conducted to assess the caregivers' understanding of the ECOHIS questionnaire; everything was clear. The children from the pilot study and the calibration process were not included in the main sample.

Sample selection

The sample size was determined by convenience and randomly (every third child from the attendees' list). It included 200 children (100 caries free and 100 with S-ECC), aged three to five, and treated at the pediatric dentistry department, accompanied by their caregiver, in October 2019. They were invited to participate in the study as per these inclusion criteria: the caregiver must be their father or mother, the child must not suffer from any systemic disease, and must have their dental clinical history in the institute.

Collection of non-clinical data

Structured interviews were conducted in the waiting room of the institute. The demographic data of the children and their caregivers were collected, as well as information on whether they had health insurance.

The instrument applied was the Peruvian version of the Pre-school Oral Health Impact Scale (P-ECOHIS) validated by López Ramos et al. (22) This scale assesses the impact or influence of oral health problems related to the quality of life on children aged three to five, taking parental perception as a reference(23). It includes 13 questions (items) divided into two main parts: the child impact section (first part) and the family impact section (second part). The child impact section (CIS) includes four subscales: child symptoms, child function, child psychology, and child self-image and social interaction. The family impact section (FIS) includes two subscales: parental distress and family function. The questionnaire includes a Likert scale of five responses ranging from "never" to "very often" (equivalent to a score of 0 to 4)(24). These responses record how often an event occurred during the child's life. Each subscale element was classified as having no impact (0 or 1) and impacting (2–4). "Never" and "hardly ever" were considered to have no impact on the OHRQL, and "occasionally," "often" and "very often" to have an impact(25). The sixth response ("I don't know") was not considered in the study.

The total score ranges from 0 to 52 calculated as the addition of the answers. A higher score reflects a worse parental perception about OHRQL, an adverse effect or influence.(23) Sections and scores are summarized in table 1. This stage lasted approximately ten minutes.

Collection of clinical data

Immediately after the interview, clinical data were collected. Patients were examined using an oral mirror, a WHO-recommended periodontal probe (Hu Friedy® PCP 11.5B), and artificial light. The defs index was used to distinguish caries-free children (defs = 0) from those with S-ECC (defs≥4, in children aged 3; defs≥5, in children aged 4, and defs≥6, in children aged 5). Cavitated carious lesions were considered caries, regardless of location. If the child had bacterial plaque or food debris, the caregiver was instructed to wash the child's teeth before the evaluation. This stage lasted approximately five minutes.

Statistical analysis

The collected data were organized in an Excel spreadsheet (Microsoft Excel 2010). R package version 3.6.1 was used (R Core Development Team, 2019). The caries-free and S ECC samples were analyzed using a descriptive statistical method and a frequency distribution of ECOHIS demographics, components, subscales, and items. The caregiver's age was cut-off at the median. Normal distribution was determined with the Kolmogorov–Smirnov test. As no normal distribution was found, a non parametric test was applied. The Mann Whitney U statistical test with a 95% confidence level determined the statistical difference between the two samples regarding the ECOHIS subscales and the total score.

Ethical considerations

This study was approved by the Institutional Research Ethics Committee of the Instituto Nacional de Salud del Niño (PI-08/19). Informed consent was obtained from all the caregivers included in the study.

Table 1: Summary of ECOHIS subscales and scores

CHILD IMPACT SECTION (CIS)	Subscales	Score (min - max)	CIS score
1. How often has your child had pain in the teeth, mouth or jaws?	Child symptoms	0 - 4	0 - 36
How often has your child.....because of dental problems or dental treatments?	Child function	0 - 16	
2. had difficulty drinking hot or cold beverages			
3. had difficulty eating some foods			
4. had difficulty pronouncing any words			
5. missed preschool, daycare or school			
6. had trouble sleeping	Child psychology	0 - 8	
7. been irritable or frustrated			
8. avoided smiling	Child self-image/social interaction	0 - 8	
9. avoided talking			
FAMILY IMPACT SECTION (FIS)	**Subscales**	**Score (min - max)**	**FIS score**
How often have you or another family member.....because of your child's dental problems or dental treatments?	Parent distress	0 - 8	0 - 16
10. been upset			
11. felt guilty			
12. taken time off from work.....	Family function	0 - 8	
13. How often have your child's dental problems or treatments affected the economy of your family or home?			
ECOHIS TOTAL SCORE			0 - 52

Results

The mean age of children and caregivers in the caries-free and S-ECC samples was 4.39 ± 0.85; 32.83 ± 6.82 and 4.1 ± 0.72; 31.4 ± 5.81, respectively. Most

participants with S-ECC were male (55%), and they were mostly accompanied by their mothers (89%). Of the children, 65% had health insurance. The mean defs values in children aged 3, 4, and 5 were 6.4 ± 2.79, 7.12 ± 3.48, and 9.05 ± 3.56. Table 2 shows the demographic data of caries-free children.

Table 3 shows how the child and family sections of caries-free children had a higher frequency of "never" and "hardly never" responses. These children obtained 98%, 99%, and 100%, in the child's section, as the "never" response in the items "difficulty pronouncing words," "has avoided smiling," "has avoided talking," "difficulty drinking" and "felt upset or frustrated." In the family section, they have low scores in the "never" response for items "has been upset or worried," "has felt guilty," and "has taken time off of work." Additionally, caries-free children scored 0 in the "often" response for all the child's section items.

Table 4 shows that the total ECOHIS score was higher in children with S-ECC compared to caries-free children. The family section had the highest values, with the items "has been upset or worried," "has felt guilty" and "has taken time off from work" being the most impacted. The items least impacted by S-ECC were "avoided smiling" and "avoided talking," with 7% and 6%respectively.

Table 5 shows the statistically significant difference ($p<0.05$) between the subscales' impact and the total ECOHIS score among caries-free children and children with S-ECC, except on the parent distress subscale.

Table 2: Sociodemographic characteristics of the study participants

Demographic characteristics		caries-free sample	sample with caries
Caregiver's gender	Female	96%	89%
	Male	4%	11%
Child's gender	Female	45%	45%
	Male	55%	55%
Caregiver's age	20 – 31	42%	52%
	32 - 43	58%	48%
Age	3	24%	21%
	4	63%	48%
	5	13%	31%
Health insurance	Present	58%	65%
	No injuries	42%	35%

Table 3: Distribution of ECOHIS responses according to subscales and items in Peruvian children without caries and with S-ECC (n=200)

	Never		Almost never		Occasionally		Often		Very often	
Section, items	**a**	**b**	**a**	**b**	**a**	**b**	**a**	**b**	**a**	**b**
Early Childhood										
Pain in teeth, mouth, or jaw	83	20	7	38	6	22	4	7	0	13
Difficulty drinking	98	58	1	20	1	10	0	6	0	6
Difficulty eating	85	31	6	22	6	26	3	11	0	10
Difficulty pronouncing words	100	77	0	12	0	8	0	2	0	1
Missed preschool, school	77	18	8	25	4	20	11	19	0	18
Trouble sleeping	94	49	2	31	1	11	3	6	0	3
Felt irritable or frustrated	98	34	2	20	0	26	0	14	0	6
Avoided smiling	99	73	1	20	0	0	0	5	0	2
Avoided talking	99	77	1	17	0	5	0	1	0	0
Family										
Become upset or worried	4	7	17	6	28	20	15	28	36	39
Felt guilty	4	6	16	12	29	20	15	25	36	37
Taken time off from work	6	3	22	14	25	19	20	30	27	34
Family economy affected	17	8	30	28	35	26	7	21	11	17

a= caries-free children, b= children with S-ECC (values in percentages)

Table 4: Distribution of ECOHIS scores according to child and family impact in Peruvian children without caries and with S-ECC (n=200)

	Mean ± SD		Minimum - maximum value obtained		Impact (%)	
	a	**b**	**a**	**b**	**a**	**b**
Child impact	1.42 ± 2.43	9.1 ± 6.58	0 - 11	0 - 29		
Pain in teeth, mouth, or jaw	0.31 ± 0.76	1.55 ± 1.26	0 - 3	0 - 4	10	42
Difficulty drinking	0.03 ± 0.22	0.82 ± 1.2	0 - 2	0 - 4	1	22
Difficulty eating	0.27 ± 0.71	1.47 ± 1.31	0 - 3	0 - 4	9	47
Difficulty pronouncing words	0	0.38 ± 0.81	0	0 - 4	0	11
Missed preschool, school	0.64 ± 1.34	1.94 ± 1.38	0 - 4	0 - 4	15	57
Trouble sleeping	0.13 ± 0.56	0.83 ± 1.04	0 - 3	0 - 4	4	20
Felt irritable or frustrated	0.02 ± 0.14	1.38 ± 1.25	0 - 1	0 - 4	0	46
Avoided smiling	0.01 ± 0.1	0.43 ± 0.89	0 - 1	0 - 4	0	7
Avoided talking	0.01 ± 0.1	0.3 ± 0.61	0 - 1	0 - 3	0	6
Family impact	9.3 ± 4.19	10.5 ± 3.39	0 - 16	2 - 16		
Become upset or worried	2.62 ± 1.25	2.86 ± 1.21	0 - 4	0 – 4	79	87
Felt guilty	2.63 ± 1.24	2.75 ± 1.24	0 - 4	0 – 4	70	82
Taken time off from work	2.4 ± 1.26	2.78 ± 1.15	0 - 4	0 – 4	72	83
Family economy affected	1.65 ± 1.78	2.11 ± 1.22	0 - 4	0 – 4	53	64
ECOHIS total score	10.72 ± 5.58	19.6 ± 8.56	0 - 27	5 - 45		

SD= standard deviation, a = caries-free children, b= children with S-ECC

Table 5: Description of medians and interquartile range of each subscale, and total ECOHIS score in Peruvian children without caries and with S-ECC (n=200)

Subscales	Without caries	With S-ECC	p value
Child symptoms	0 (0)	1 (1)	<0.001*
Child function	0 (1)	4 (5)	<0.001*
Child psychology	0 (0)	2 (3)	<0.001*
Self-image/social interaction	0 (0)	0 (1)	<0.001*
Parent distress	6 (4)	6 (4)	0.41
Family function	4 (4)	5 (2)	<0.01*
ECOHIS total score	11 (8.25)	18 (12)	<0.001*

Discussion

The main reason for caries prevention and treatment in primary dentition is to avoid pain and infection, as this has a considerable impact on children's psychosocial well-being and can affect their daily activities(26). Children's health affects all family members economically and emotionally, making dental caries a family and social problem. Moreover, Peru is one of the countries with the highest prevalence of untreated caries in the region(10), so this is a national public health problem.

Early childhood caries (ECC) has negatively impacted parental perception on the OHRQL of children and their parents/caregivers(27-30). In contrast, in the study published by Ramos Jorge et al.(31), 52.8% of parents/caregivers consider that caries does not impact the quality of life, where 60.6% of children have severe caries. In this study, caregivers reported that S ECC negatively impacted the parental perception of OHRQL (all ECOHIS items have high percentages except for "avoided smiling" and "avoided talking"). A similar result was found in Asia(19,6). It follows that the S-ECC has the most significant impact on children and families. Still, most of the research we consulted on caries in preschoolers focuses on ECC, which is one of the limitations of this study.

The mean ECOHIS score for children with S-ECC was 19.6 ± 8.56, which was higher compared to caries-free children, a result that matches what Lai et al. found(19) (14.3 ± 7.9). These values are close, although the compared populations belong to different continents. It should be noted that the ECC scores are lower (9.21; 3.1 ± 5.1; 2.95) according to Abanto et al. (32), Li MY et al.(33) and Martins-Junior et al.(30), respectively, compared to those obtained in this study. It is essential to determine the total ECOHIS score since the higher the score, the more affected the OHRQL. In this study, both ECOHIS

components are affected by S-ECC; the family component is affected the most, a similar result to that found by Lai et al., (19) as opposed to Scarpelli et al.(27), Gomes et al.(29), and Martins-Júnior et al.(30), where the child component is the most impacted by ECC.

The most notable feature of the child's component is the missed school days (57%), a topic studied by Ruff et al.(34), who showed that children with unmet dental needs might be absent longer because they have to go to the dentist for treatment. Also, pain makes it difficult for them to attend classes, which affects their school performance. Issues related to pain and difficulty eating have been reported more frequently(27,30), although over half the parents in this study responded that it did not impact parental perception on OHRQL. Even so, the pain caused by ECC could affect nutrition since several studies have found that, for each unit of increase in the frequency of dental pain, children are more likely to be underweight(35), which is linked to malnutrition(36).

Regarding the family component, the results are similar to those of Lai et al.(19); the parents' guilt is evident (82%), as previously studied by Carvalho et al.(37-38), and Gomes et al.(39) These researchers found that one third of parents feel guilty, leading to a decrease in the parental perception of OHRQL of families. This is associated with the perception that the child has tooth problems and that this could have been avoided. The parent distress subscale showed no difference in scores for children with S-ECC and caries-free children; the scores on this subscale are higher than those published by Li et al. in 2015(33).

Another important item in the family component is the time spent by parents accompanying their children to dental appointments (83%), studied by Ribeiro et al.(40) as missing work days. These researchers conclude that it is associated with dental pain, which affects family function. Regarding the economy (64%), Ribeiro et al.(41) state that parents had financial difficulties when they sought treatment too late, mainly due to the presence of pain and clinical complications.

All the negative effects on OHRQL for S-ECC compared to caries-free children found in this study should be taken into account to implement better public policies focusing on measures to prevent the appearance of caries. This would strengthen primary health care strategies in the first level of care and establish them as a priority within Peruvian public health measures. The current ones have not been effective, so far, in controlling the disease. It is recommended that future research on the subject include a larger sample so that the results can be extrapolated to the general population.

Conclusion

The parental perception of oral health-related quality of life in children was negatively affected by severe early childhood caries among children treated at a Peruvian health institute.

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Authorship contribution:
1.Conception and design of study
2.Acquisition of data
3.Data analysis
4.Discussion of results
5.Drafting of the manuscript
6.Approval of the final version of the manuscript.
ERMP has contributed in 1,2,3,4,5.
HPZ has contributed in 3,4.
MMCI has contributed in 2,6.

Editor’s opinion:
This article has been accepted by the Odontoestomatología’s editor Dra. Vanessa Pereira-Prado