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ASSESSMENT OF ORAL HEALTH-RELATED QUALITY OF LIFE AFTER FULL MOUTH REHABILITATION UNDER GENERAL ANESTHESIA IN A GROUP OF EGYPTIAN CHILDREN BELOW 5 YEARS OLD (A BEFORE AND AFTER STUDY)

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ABSTRACT

Background: Dental caries remain a major global health issue in both developed and underdeveloped nations. Acute and chronic infections, as well as changes in eating and sleeping patterns, can result from pain and discomfort caused by severe caries, which can profoundly affect children's overall quality of life.

Aim: To evaluate the impact of full-mouth rehabilitation under general anesthesia (GA) on the oral health-related quality of life (OHRQoL) of Egyptian children younger than five years. **Methodology:** The study involved 18 Egyptian children, ages 2 to 5, who participated in an observational analysis. The children's oral health-related quality of life was assessed using the Early Childhood Oral Health Impact Scale Questionnaire (ECOHIS) before and after treatment under general anesthesia. Height and weight were recorded pre- and post-treatment. Body mass index (BMI), along with dental and clinical data were evaluated at baseline and during follow-up visits at three and six months after surgery.

Results: The study included 18 caregivers, with an average age of 32.28 ± 10.05 years, and children with a mean age of $3.45 \pm .82$ years. All children, regardless of age or sex, had a significant incidence of dental cavities. Prior to full-mouth rehabilitation (FMR) under GA, OHRQoL was negatively affected. After the procedure, significant improvements were observed across all evaluated aspects (P<0.05). Six months' follow-up scores showed a mean of 0.77 ± 0.68 , compared to the baseline mean of 2.20 ± 1.03 for the entire ECOHIS.

Conclusion: OHRQoL significantly improved in all areas assessed following FMR under GA, benefiting children and their families.

Trial Registration: The study was registered on clinicaltrial.gov with ID No: NCT05127655 on 19th November 2021.

KEYWORDS: Egypt, oral health, full-mouth rehabilitation, children, quality of life.

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INTRODUCTION

According to Rathee and Sapra, (2020), early childhood caries (ECC) is dental caries that impact the primary dentition of newborns, toddlers, and preschoolers. It starts shortly after tooth eruption and advances quickly, affecting smooth surfaces. More specifically, "early childhood caries" is defined as the presence of one or more decaying, missing, or filled primary tooth surfaces in a child 71 months (5 years and 11 months) or younger, according to Avila *et al.*, (2015).

According to Berkowitz, (2003), the prevalence of ECC among these children varies between 11 and 72 percent. In Egypt, the most recent national survey on oral health indicated that the incidence of early childhood caries (ECC) was 69.2% (Abbass *et al.*, 2019).

If left untreated, dental caries can cause pain, which can lead to infection and have a detrimental effect on social connections, speech, nutrition, and learning (American Academy of Pediatric Dentistry., 2016). These detrimental effects can prevent a minor from growing and developing normally. Decreased oral health-related quality of life (OHRQoL), which assesses how oral health or disease impacts a person's well-being or quality of life, has also been connected to untreated caries (Bani-Hani *et al.*, 2018).

If the child is uncooperative, has a medical condition that requires attention, or if the parents are unable to return for scheduled appointments, general anesthesia (GA) may be considered (Rane *et al.*, 2017). According to reports, 17% of children treated under GA for two years needed retreatment under GA, and over 50% of children treated under GA presented with caries, necessitating additional treatment at six months of recall (Berkowitz, 2003; Berkowitz *et al.*, 1997).

Since its introduction, quality of life (QoL) has expanded the range of conventional medical criteria evaluated for assessing QoL outcomes in healthcare settings, including symptoms and functional status. Oral health-related quality of life is measured by the effect of the oral and dental condition on activities such as eating, chewing, swallowing, speaking, playing, and learning. It also includes emotional aspects like happiness, embarrassment, interaction with others, and overall physical, mental, and emotional well-being (American Academy of Pediatric Dentistry., 2016; Rane *et al.*, 2017).

The dental health and physical, emotional, and social quality of life of children under GA improve immediately, according to a systematic analysis reported by (Jankauskiene and Narbutaite, 2010). It also benefits the family positively. To the best of our knowledge, however, very few published research focusing on the quality of life of Egyptian minors who undergo full-mouth rehabilitation under GA. As a result, this study was designed to evaluate the oral health-related quality of life (OHRQoL) of Egyptian children following full-mouth rehabilitation under GA.

MATERIALS AND METHODS

Study design

An active attempt was made to evaluate OHRQoL following full mouth rehabilitation under GA in a group of children aged two to five over six months in this prospective, observational study (before-andafter study).

Sample size determination

The research group's OHRQoL at baseline and after therapy differed by 10.7 + 8, according to a prior study by Yawary et al. Ten subjects were to be studied with a 95% power and a 5% significance level. The sample size was raised to 12 to account for the use of a nonparametric test. To account for losses during follow-up, this number was raised once more to a total sample size of 18. The sample size was determined via PS: Power and Sample Size Calculation Software Version 3.1.2. (Vanderbilt University, Nashville, Tennessee, USA).

Participants

In order to diagnose their primary complaint, patients who came to the general anesthetic unit of the Pediatric Dentistry and Dental Public Health Department at Cairo University in Egypt were screened. This study included patients who fulfilled the eligibility requirements. In order to identify them, eligible individuals were assigned specific codes. We took note of each child's name, sex, age, address, and phone number.

Inclusion criteria

The children were two to five years of age.

Children who were undergoing dental treatment under general anesthesia.

Children with untreated early childhood caries.

Exclusion criteria

Children with disabilities.

Parents chose not to grant permission for their children to participate in the study.

Parents who had no contact number to reach them for postoperative follow up.

Ethical Considerations and Informal Consent

Eligible individuals were assigned specific codes. Each child's name, gender, age, address, and phone number were documented. Informed consent was obtained in written form from parents/ caregivers after they were fully informed about their involvement in the study. participants were included in the study only after their parents or guardians provided signed informed consent. All the data were included in the study, but the participants' identities remained confidential.

Outcome measures

The primary outcome, oral health-related quality of life (OHRQoL) was assessed using the Early Childhood Oral Health Impact Scale Questionnaire (ECOHIS). Caries experience and body mass were evaluated as secondary outcomes. Body mass was determined using the body mass index (BMI), calculated as a person's weight in kilograms divided by their height in meters squared. Caries experience was assessed using the decayed, missing, and filled (dmf) index for primary dentition.

Setting and location

The research was carried out in the general anesthetic unit of Cairo University, Faculty of Dentistry, Pediatric Dentistry and Dental Public Health Department in Egypt, utilizing its specialized facilities to conduct the study. Through detailed interviews with their parents or caregivers, socioeconomic conditions as well as demographic information including caregiver age and sex, was gathered for each participant.

Each child's height and weight were measured before and after treatment using the same devices to standardize the results. The scale used was a (1 BY ONE Bluetooth Body Fat Scale) battery-powered, Tempered Glass, United States brand to measure weight, and a wall measuring tape was used to measure height.

The body mass index (BMI) was determined using the BMI percentile calculation tool, which compares the child's BMI to age and gender-specific percentiles according to CDC charts for children and teens (ages 2 to 19). Based on the CDC guidelines (2022), children were categorized into the following groups: underweight (BMI <5 percentile), healthy weight (BMI = 5th-84th percentile), overweight (BMI = 85-94 percentile), or obese (BMI >95).

After the child was induced anesthesia and prior to the dental procedure, a dental caries assessment was carried out. The examination took place in a dental chair, using a light source, a sterilized mouth mirror, and a probe, based on the modified World Health Organization guidelines (World Health Organization, 2013). During the child's general anesthetic session, parents/caregivers were interviewed face-to-face to complete the questionnaire (ECOHIS) about their child's oral condition and overall well-being in the last three months and were provided with oral hygiene guidance.

The ECOHIS developed by Pahel et al., (2007), is an instrument used to assess oral health-related quality of life (OHRQoL) in young children, based on responses from adult informants. It has shown excellent validity and reliability, translated and culturally adapted into both French (Li et al., 2008) and Turkish (Peker et al., 2011). Additionally, Farsi et al., (2017) and Jiang et al., (2019) have reported that it is sensitive and responsive to the effects of dental treatment under general anesthesia. This study utilized the A-ECOHIS, an Arabic version of the tool validated by Farsi et al., (2017). The ECOHIS comprised 13 closed-ended questions specifically designed for preschool-aged children (Pahel et al., 2007). The responses were scored on a 0 to 4 scale, where: never (score 0); hardly ever (score 1); occasionally (score 2); often (score 3); and very often (score 4). Additionally, a "don't know" response was available, which is crucial for research when participants share their opinions about the health or quality of life of another person (Jokovic et al., 2002).

Two additional questions were asked of caregivers to assess the child's global health-related quality of life (OHRQoL) score. The questions provided an overall view of how caregivers perceive their child's oral health and its impact. The first question asked caregivers to rate their child's overall oral health (teeth, lips, jaws, and mouth) using a five-point Likert scale, ranging from "excellent," "very good," "good," "fair," to "poor.". The second question inquiries about the effect of the child's oral health on their overall well-being, using a Likert scale from "not at all," "very little," "some," "a lot," to "very much", as outlined by Jokovic *et al.*, (2002),

At the baseline and during the six-month postoperative follow-up, the questionnaire was given to the parents/caregivers. Clinical and dental examinations were carried out, and the BMI was measured at baseline (preoperative), and again at the 3- and 6-month postoperative visits.

Each follow-up visit included clinical and dental evaluations, along with instructions on maintaining good oral health. Caregivers were reminded of the significance of oral hygiene, the proper use of fluoridated toothpaste based on age, limiting sugar foods, and minimizing snacking.

Statistical analysis:

Both ordinal and categorical data are displayed as percentages and frequencies. A chi-square test was used to assess categorical data, and then multiple z-tests with Bonferroni correction for independent comparisons and McNemar's test for repeated measures were used to compare the data pairwise. The means, medians, interquartile ranges, and standard deviations (SD) are used to display numerical data. The Shapiro-Wil test was used to check for normality in the data. A one-way ANOVA and Tukey's post hoc test were used to assess the normally distributed age data. The Kruskal-Wallis test was used to assess other nonparametric and ordinal numerical data. Dunn's post hoc test with Bonferroni correction for independent comparisons and a signed rank test for repeated measures were then used. Using Spearman's rank-order correlation coefficient, correlations were examined. All tests had a significance level of p < 0.05. Version 4.3.1 of the R statistical analysis program for Windows¹ was used to conduct the statistical study.

R Core Team (2023). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.Rproject.org/.

RESULTS

The follow-up response rate was (83.3%), with 15 participants having completed a 6-month follow-up visit (3 participants did not complete the follow-up).

Demographic data and baseline characteristics:

Sociodemographic data for caregivers:

The study population consisted of 18 parents/ caregivers (one caregiver per child), and the mean age of the parents/caregivers was (32.28±10.05) years. Summary statistics for sociodemographic data for parents/caregivers are presented in Figure (1).

Sociodemographic data for children:

The children's ages ranged from 2.5 to 4.5 years, with a mean age of 3.45 ± 0.82 years. Twelve of the children were males, and six were females.

Dental caries status:

Descriptive caries statistics:

Almost all the children (100%) had severe dental caries (equivalent to five or more dmf). The number of decayed missing teeth (dmf) ranged from eight to 12, with a mean value equal to 10.22±3.17.

Dental treatment:

Descriptive statistics:

Most of the evaluated teeth were sound, and no interventions were made. Most treated teeth received crowns made of zirconia or stainless steel and pulp therapy.

Figure (2) presents descriptive statistics for dental treatment.





Assessment of oral health-related quality of life

3.4.1. Early Childhood Oral Health Impact Scale (ECOHIS) scores

The total score was divided into six domain scores, along with individual scores for each of the 13 questions. The impact of oral rehabilitation on responses to the ECOHIS is shown in Table (1).



Fig. (1): A bar chart showing sociodemographic data for parents/caregivers.

TABLE (1) Overall and subscale scores of theECOHIS for the study sample at baselineand six months after surgery.

	Quality of	life score	
Domains	(Mear	<i>p</i> -value	
	Before	After	
Oral symptoms	2.67±1.18	0.73±0.88	<0.001*
Functional limitations	0.95±1.28	0.05±0.22	<0.001*
Emotional wellbeing	1.67±1.42	0.00±0.00	<0.001*
Social well-being	0.27±0.74	0.13±0.51	0.518ns
Parents distress	2.37±1.38	0.00±0.00	<0.001*
Family function	0.63±1.07	0.00±0.00	0.008*
Overall	1.26±1.43	0.09±0.38	<0.001*

*; significant (p<0.05) ns; nonsignificant (p>0.05)

Associations between overall ECOHIS scores and sociodemographic variables for parents/caregivers:

When the Spearman correlation coefficient was applied to assess the influence of sociodemographic variables, no significant relationship was found between the overall OHRQoL score and factors such as age, caregiver education level, employment status, housing situation, source of money, or income scale.

Associations between overall ECOHIS scores and sociodemographic variables for parents/ caregivers are presented in Table (2).

Relationships between overall ECOHIS scores and demographic variables and caries status in children:

When the effects of demographic variables were analyzed using the Spearman correlation coefficient,

TABLE (2) Relationships of overall ECOHIS scores with demographic variables for parents/caregivers.

Paramete	Value	<i>p</i> -value		
Sex (Mean±SD) (quality of life	Male	2.33±1.21	0.010	
score)	Female	1.54±1.44	0.210hs	
Age (Correlation of	coefficient)	0.163	0.155ns	
Polation (Moon+SD)	Father	2.33±1.21		
(quality of life gappa)	Mother	1.41±1.40	0.150ns	
(quanty of me score)	Legal guardian	3.00±1.41		
	No school	2.50±1.29		
Educational loval (Maan+SD)	Primary school	0.00±0.00		
	High school	2.40±1.26	0.075ns	
(quanty of me score)	College	1.25±1.49		
	University	1.17±1.17		
Employment (Meen+SD)	Employed	1.81±1.38		
	Unemployed	1.67±1.63	0.866ns	
(quanty of me score)	Self-employed	1.50 ± 1.51		
	Salary	0.67±1.20		
Source of income (Mean±SD)	Disability grant	NA	NA	
(quality of life score)	Pension grant	NA	INA	
	Child grant	NA		
	<1000	2.00±1.41		
Scale of income (Mean+SD)	>1000-1500	1.33±1.63		
(quality of life score)	>1500-2500	0.75±0.96	0.422ns	
	2500-3000	1.50±1.29		
	>3000	2.20±1.48		
	Own house	1.10±1.45		
	Rented house	2.00±1.34		
(quality of life appro)	Own shack	NA	0.099ns	
(quality of me score)	Rented shack	NA		
	Rented room	NA		

*; significant (p<0.05) ns; nonsignificant (p>0.05)

no significant correlation was found between age and the overall ECOHIS score. Additionally, no statistically significant correlation was detected between the dmf score and the overall ECOHIS score.

Table (3) displays the associations of overall ECOHIS scores with sociodemographic variables, as well as child caries status.

TABLE (3) Associations of overall -ECOHIS scores with sociodemographic variables and caries status in children

Parameter		Value	<i>p</i> -value	
Children sex	n sex Male		0.440	
(Mean±SD) (quality of life score) Female		2.17±1.19	0.112ns	
Children age (Correlation coefficient)		0.091	0.217ns	
dmf (Correlation co	efficient)	0.169	0.199ns	

*; significant (p<0.05) ns; nonsignificant (p>0.05) SD;

Global oral health rating scores

Based on preoperative Global Oral Health Rating (GOHR) scores, 10 out of 15 parents/caregivers rated their children's oral health as average, below average, or poor, while five rated it as above average. Additionally, 13 out of 15 caregivers reported their children's overall well-being as average or below average. The distributions of GOHR responses are presented in Table (4).

Anthropometric measurements:

At baseline, fewer than one-tenth of the children were underweight, over half were classified as overweight or obese, and one-third had a healthy weight. After full-mouth rehabilitation, approximately two-thirds of the children were of healthy weight, one-quarter were obese, and the remaining quarter were underweight. There was no statistically significant difference in BMI before, Three months after full mouth rehabilitation under GA, or six months (p=0.075). Figure 3 presents the BMI percentile CDCs for the study sample at baseline and six months post-surgery.

 TABLE (4) Distribution of the Global Oral Health Rating questions for the study sample at baseline and

 6-month postoperative visits

Orection	A	n	,	
Question	Answers	Preoperatively	Postoperatively	<i>p</i> -value
1- how would you rate the health of your	Excellence	0 (0.0%)	5 (33.3%)	0.001*
child's teeth, lips, jaws and mouth?	Above average	5 (33.3%)	8 (53.3%)	
	Average	3 (20.0%)	2 (13.3%)	
	Below average	5 (33.3%)	0 (0.0%)	
	Poor	2 (13.3%)	0 (0.0%)	
2- How much is your child's overall well-	Excellence	2 (13.3%)	6 (40.0%)	0.007*
bring affected by the condition of his/her teeth lins, jaws and mouth?	Above average	0 (0.0%)	7 (46.7%)	
ceelly np3, Jaws and mouth?	Average	7 (46.7%)	2 (13.3%)	
	Below average	6 (40.0%)	0 (0.0%)	
	Poor	0 (0.0%)	0 (0.0%)	

*; significant (p<0.05) ns; nonsignificant (p>0.05)



Fig. (3): A stacked bar chart showing the anthropometric measurements of the children at baseline and 3- and 6-month postoperative visits.

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Associations between sociodemographic data for parents/caregivers and BMI:

A statistically significant correlation was observed with the ages of parents or caregivers. No other associations reached Statistical significance (p>0.05). The relationship between sociodemographic data for parents/caregivers and BMI is outlined in Table (5).

Associations of BMI with sociodemographic variables of children and dental caries status:

None of the correlations were statistically significant (p>0.05), as shown in Table (6).

TABLE (5) Associations between sociodemographic data for parents/caregivers and BMI.

Parameter		Underweight	Healthy weight	Overweight	Obese	<i>p</i> -value	
	Male	0 (0.0%)	6 (22.2%)	0 (0.0%)	3 (27.3%)	0.522	
Sex [n (%)]	Female	ale 3 (100.0%) 21 (77.8%)		4 (100.0%)	8 (72.7%)	0.533ns	
Age of parent/care	egiver (Mean±SD)	15.00±17.32 ^B	34.81±7.78 ^A	27.75 ± 5.68^{AB}	28.82±3.82 ^A	<0.001*	
	Father	0 (0.0%)	6 (22.2%)	0 (0.0%)	3 (27.3%)		
Relation [n (%)]	Mother	3 (100.0%)	19 (70.4%)	3 (75.0%)	8 (72.7%)	0.537ns	
	Legal guardian	0 (0.0%)	2 (7.4%)	1 (25.0%)	0 (0.0%)		
	No school	2 (66.7%) ^A	4 (14.8%) ^{AB}	$0 (0.0\%)^{\text{B}}$	0 (0.0%) ^B		
	Primary school	$0 \ (0.0\%)^{\text{A}}$	$0 (0.0\%)^{A}$	1 (25.0%) ^B	2 (18.2%) ^{AB}		
Educational	High school	1 (33.3%) ^A	9 (33.3%) ^A	2 (50.0%) ^A	3 (27.3%) ^A	0.023*	
level [ff (%)]	College	$0 \ (0.0\%)^{\text{A}}$	10 (37.0%) ^A	1 (25.0%) ^A	1 (9.1%) ^A		
	University	$0 \ (0.0\%)^{\text{A}}$	4 (14.8%) ^A	$0 \ (0.0\%)^{\text{A}}$	5 (45.5%) ^A		
	Employed	1 (33.3%)	14 (51.9%)	2 (50.0%)	7 (63.6%)		
Employment [n	Unemployed	2 (66.7%)	6 (22.2%)	1 (25.0%)	0 (0.0%)	0.299ns	
(%)]	Self-employed	0 (0.0%)	7 (25.9%)	1 (25.0%)	4 (36.4%)		
	Salary	3 (100.0%)	27 (100.0%)	4 (100.0%)	11 (100.0%)		
Source of income	Disability grant	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	NT A	
[n (%)]	Pension grant	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	NA	
	Child grant	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
	<1000	$0 (0.0\%)^{A}$	7 (25.9%) ^A	$0 (0.0\%)^{A}$	2 (18.2%) ^A		
G 1 6'	>1000-1500	$0 (0.0\%)^{A}$	3 (11.1%) ^{AB}	3 (75.0%) ^B	3 (27.3%) ^B		
Scale of income $[m(0'_{1})]$	>1500-2500	$0 (0.0\%)^{A}$	2 (7.4%) ^A	$(7.4\%)^{A}$ $0 (0.0\%)^{A}$ 4		0.012*	
[n (%)]	2500-3000	2 (66.7%) ^A	4 (14.8%) ^{AB}	0 (0.0%) ^B	$0 (0.0\%)^{\text{B}}$		
	>3000	1 (33.3%) ^A	11 (40.7%) ^A	1 (25.0%) ^A	2 (18.2%) ^A		
Place of living [n (%)]	Own house	0 (0.0%)	8 (29.6%)	1 (25.0%)	6 (54.5%)		
	Rented house	3 (100.0%)	19 (70.4%)	3 (75.0%)	5 (45.5%)		
	Own shack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.259ns	
	Rented shack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
	Rented room	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		

Values with different superscript letters within the same horizontal row are significantly different, *; significant (p<0.05) ns; nonsignificant (p>0.05).

Parame	eter	Underweight	Healthy weight	Overweight	Obese	<i>p</i> -value
Sex [n (%)]	Male	0 (0.0%)	17 (63.0%)	3 (75.0%)	7 (63.6%)	0.169ns
	Female	3 (100.0%)	10 (37.0%)	1 (25.0%)	4 (36.4%)	
Age (Mear	n±SD)	2.84±0.24	3.62±0.91	3.17±0.55	3.53±0.73	0.380ns
dmf (Mear	n±SD)	12.33±2.89	10.22±3.18	10.50±3.87	9.73±3.61	0.632ns

TABLE (6) Associations of BMI with sociodemographic variables of children and dental caries status

*; significant (p<0.05) ns; nonsignificant (p>0.05)

DISCUSSION

The ECOHIS is the most widely used questionnaire for assessing preschoolers' OHRQoL. Numerous studies have validated the correctness and reliability of the data gathered using the ECOHIS. Similar to earlier research, the original two-factor model of the ECOHIS demonstrated a satisfactory fit to the data across various contexts, indicating a degree of instrument stability (Zaror *et al.*, 2018; Buldur and Güvendi, 2020; Randrianarivony *et al.*, 2020).

Our research shows a marked reduction in the overall ECOHIS score and a notable positive effect on parental emotions and distress following dental treatment under GA demonstrating the positive impact of these procedures on a child's quality of life. To the best of our knowledge, there is limited data from Egypt on the effects of full-mouth rehabilitation under GA on children OHRQoL.

The study population comprised children and their caregivers, with females being the majority. Notably, almost all female caregivers in this study were mothers. This finding is consistent with another study that reported that most mothers completed questionnaires (85.9%) (Fernandes *et al.*, 2015). This trend has been attributed to global social norms, as highlighted by the American Psychological Association which recognizes females as primary caregivers. The majority of caregivers were aged between 33 and 43, and a significant portion were from low-income backgrounds. This may be due to the sample being drawn from a government hospital offering free or low-cost treatment services.

Our investigation involved 18 children; where more than half were males. The predominance of males in this study could be attributed to their significantly higher susceptibility to ECC compared to females, particularly within the age range of 8 months to 7 years (Ramos-Gomez *et al.*, 2002). Similarly, another study by Faheem *et al.*, (2023) investigated 88 children: 46 males and 42 females.

In this study, the dmf score was classified based on The World Health Organization (WHO), (2013) guidelines as follows: 0 for caries-free, 1–2 for low, 3–4 for moderate, and \geq 5 for high experience. Nearly all the children fell into the high caries experience category (score of 5 or more); which may be largely attributed to insufficient parental awareness regarding the importance of maintaining good oral hygiene habits, frequent and consistent consumption of foods high in sucrose, and a carbohydrates-rich diet.

Most samples received pulp therapy and a crown (zirconia/stainless steel). The same findings were reported by Elkhadem and Nagi., (2019). The prefabricated crown significantly increases the treatment success rate, protects teeth during treatment, and prevents the development of secondary and new cavities from developing. The success rate with a preformed crown was significantly higher than without it according to Zhang *et al.*, (2023).

The Early Childhood Oral Health Impact Scale (ECOHIS) was employed in this study to evaluate the effect of dental health on the oral health quality of life of young children. This underscores the critical role of oral health in preschool-aged children and its influences on their families, daily routines, and overall quality of life.

Untreated ECC is widely recognized for causing unfavorable side effects like oral inflammation, which can cause intense chronic pain and overall health limitations. Consistent with Anderson *et al.*,(2004), our study also found that most children reported experiencing "pain in the teeth, mouth, and jaws". The most frequently reported daily life problem was difficulty eating (functional limitation domain) before full-mouth rehabilitation.

Pain experienced by children is typically associated with greater difficulty eating, which can be an indicator of the seriousness of their oral health condition, as noted by Gomes *et al.*, (2020). Irritability can be caused by the combination of tooth pain and difficulty eating. Consequently, these complaints of eating difficulty and pain are often interconnected, which explains their frequent experience. Our findings align with those of Yawary *et al.*, (2016) and Farsi *et al.*, (2021) in which dental pain was also identified as the most commonly reported issue among children. At the same time, difficulty drinking was the most frequently reported in the functional limitation domain.

The lowest scores were recorded in the social well-being domain, as most of the children were too young to attend school, and questions in this section focused on school attendance and interactions with peers. In the family impact section (FIS), the parental emotions domains most frequently identify "feeling upset" as a significant concern. Coincident with the findings of this study, Faheem *et al.*, (2023) observed that "pain", "eating difficulties", "sleeping disturbances", and "irritability" were the most commonly noted effects in the child impact section

(CIS). Within the FIS, the most frequently reported issues prior to oral rehabilitation included parents "experiencing guilt" and "economic impact" placed on the family.

The impact of oral rehabilitation on questionnaire responses addressing oral health-related quality of life (OHRQoL) was evident, as a significant decrease in the frequency of impacts was observed postoperatively across all scale items compared to the preoperative level.

A reduction in the mean summary score was observed, indicating that oral rehabilitation under general anesthesia effectively reduces or eliminates oral symptoms, daily challenges, and parental worries. This observation aligns with previous research by (Elkhadem and Nagi, 2019) which reported a statistically significant decline in postoperative issues, including tooth complaints pain-related absences from daycare or school, sensitivity to hot stimuli and sweets, difficulty with speech clarity, sleep disturbances, and behavioral concerns. Following full-mouth rehabilitation, a notable reduction in feelings of guilt regarding their children's well-being was observed in guardians. This outcome is consistent with the previous study, where improvements in dental health, such as pain relief and enhanced masticatory function, along with better social functioning, were reported after oral rehabilitation in preschool children (White et al., 2003).

In accordance with our findings, it has been indicated by numerous earlier studies that dental treatment under GA improved OHRQoL in all aspects. It was highlighted by Malden *et al.*, (2008) that significant improvement in OHRQoL, along with an increased burden on families, are experienced by young children with extensive dental caries who undergo dental care under GA. Similarly, it has been shown by other research that a child's OHRQoL improves following treatment under GA (Klaassen *et al.*, 2009). Furthermore, it has been systematically indicated through research that oral rehabilitation under GA leads to rapid improvements in children's oral health, as well as their physical, emotional, and social well-being. Benefits to the family have also been reported (Jankauskiene and Narbutaite, 2010).

No statistically significant associations were identified between OHRQoL and sociodemographic characteristics in the analysis. However, a systematic review by Kumar *et al.*, (2014) suggested that better OHRQoL is more likely among children whose parents have higher levels of education and greater family wealth. disparity may be attributed to the fact that lower education attainment can result in reduced income, which is often linked to material deprivation.

In the current study, all associations and correlations between sociodemographic data and QoL scores for children were not statistically significant. These findings disagreed with previous research, which confirmed that females had worse OHRQoL than males did (El-Meligy *et al.*, 2016). This is likely due to females' physiological vulnerability, which makes them more sensitive to discomfort and, as a result, results in more oralhealth-related influences.

Before treatment, the global rating score data revealed that most caregivers evaluated their children's oral health as average, below average, or poor and similarly rated their overall well-being as average or below average. After full-mouth rehabilitation, there was a significant improvement in global rating scores. Faheem *et al.*, (2019) reported similar findings, showing that parents' perceptions of their children's general and oral health improved following dental treatment under general anesthesia. Post-treatment, negative global rating scores decreased significantly, as the majority of oral symptoms were resolved and the daily life challenges were reduced, leading to better oral and overall health outcomes.

According to Fryar *et al.*, (2016), growth measures and regular growth patterns serve as gold

standard for evaluating a child's overall well-being and health status. These metrics are extensively used in pediatrics to evaluate a child's nutritional status, overall health, and developmental progress, The importance of accurate, serial anthropometric measurements in identifying potential medical, nutritional, or social issues is emphasized by the American Academy of Pediatrics and Child Health and Disability Prevention (CHDP) Program Health Assessment Guidelines (guideline #4). Any deviation or abnormalities in these measurements, particularly in children, are recommended to be investigated further to identify underlying causes.

At the baseline of our study, the sum of children who were obese and overweight represented more than half of the total sample size. This result is consistent with Osei Bonsu and Addo, (2022), who reported that childhood obesity in Egypt is related to childhood obesity. Following full-mouth rehabilitation under GA, most children achieved a healthy weight. Weight loss was observed in four overweight children and two obese children, who were subsequently classified within the healthy weight group in the study.

In the this study, the child's BMI was directly associated with factors such as the parents' age, maternal education level, and income scale. In line with these findings, Kotha *et al.*, (2022) reported a significant link between maternal education and children's BMI, whereas paternal education did not show a significant association. This could be due to mothers typically spending more time with their children and playing a greater role in overseeing their dietary habits. However, no statistically significant relationship was found between socioeconomic status and obesity.

Donnelly *et al.*, (2022) found that individuals with lower socioeconomic status, both parents and children, tend to have higher BMIs compared to those from higher socioeconomic backgrounds. This is likely due to poor dietary choices, as unhealthy food options are more accessible in marginalized areas. In contrast, Osei Bonsu and Addo, (2022) observed that children of wealthier parents are more likely to be overweight or obese. This is likely a result of exposure to calorie-dense diets and sedentary lifestyles, which are more common in wealthier households, increasing the risk of obesity.

The association between BMI and dental caries has long been debated. While reducing sugar intake may normalize BMI, the incidence of dental caries can continue to rise, indicating a complex relationship between the two. Sugar food is known to contribute to both weight gain and increased risk of caries. In this study, we did not detect statistically significant differences between caries status(dmf) and BMI, both at baseline and after treatment under GA. The results align with a systematic review, which noted a lack of consensus among studies regarding the connection between BMI and dental caries (Bashirian *et al.*, 2018).

We concluded that oral rehabilitation under general anesthesia significantly reduces oral discomfort, everyday challenges, and concerns among parents. In this group of participants, no association was found between BMI and dental caries at the six-month follow-up.

CONCLUSIONS:

The research findings indicate that all children had high caries experience due to difficulty performing and maintaining oral hygiene. No association was observed between dental caries and sociodemographic factors for either caregivers or children. At the baseline, pain, difficulty chewing firm food, and parent's distress were the most frequent impacts reported. These results suggest that oral rehabilitation performed under general anesthesia effectively reduces or eliminates oral discomfort, daily life challenges, and parental worries. Additionally, no correlation was found between BMI and dental caries in this group of participants, based on a six-month follow-up.

Limitation:

The caregivers acted as proxies, providing data or information on behalf of their children, which raises the concern that their responses may not fully capture the children's actual experiences and emotions. As a result, it is important to develop a child-reported assessment for inclusion in the OHRQoL questionnaire to ensure more accurate representations of the children's perspectives.

List of abbreviations:

BMI	Body mass index
CDC	Center for disease control and
	prevention
CIS	Child Impact Section
ECC	Early Childhood Caries
ECOHIS	Early Childhood Oral Health
	Impact Scale
FIS	Family Impact Section
FMR	Full mouth rehabilitation
GA	General anesthesia
GOHR	Global Oral Health Ratings
LA	local anesthesia
OHRQoL	oral health related quality of life
QoL	Quality of Life

Declarations

Ethics approval and consent to participate:

The Research Ethical Committee, Faculty of Dentistry, Cairo University, approved this study on 15 December 2021 (approval number: 15-12-21).

Consent for publication:

Not applicable

Availability of data and materials:

The corresponding author can provide the data used to support the findings of this study upon reasonable request.

Competing interests:

The authors declare that they have no conflicts of interest.

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Authors' contributions:

E.M. contributed to the research idea, and performed case selection, instructions, and patient follow-up. Also, prepared the master's table for the result, and drafted the first version of the manuscript.

Y.Y. ensured the questionnaire was completed, revised the data, and helped in writing the manuscript.

F.A. contributed to the research idea, diagnosed the cases, performed full mouth rehabilitation, interpreted the results, and edited and refined the data as well as the initial draft of the manuscript.

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