

Changes in children's oral-health-related quality of life following dental treatment under general anesthesia in the United Arab Emirates

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Research article

Keywords: Early Childhood Caries, Dental Treatment, Dental General Anaesthesia, Oral Health-Related Quality of Life, Early Childhood Oral Health Impact Scale

Posted Date: November 4th, 2019

DOI: <https://doi.org/10.21203/rs.2.16746/v1>

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Abstract

Background Early Childhood Caries (ECC) is the most common childhood disease in preschool children which often require dental treatment under Dental General Anaesthesia (DGA). **Aim:** To assess the effect of DGA on United Arab Emirates (UAE) children and their families' Oral Health Related Quality of Life (OHRQoL).

Design: A cross sectional study, using a DGA pre-and post-survey to evaluate changes in OHRQoL. A total of 173 parents completed Early Childhood Oral Health Impact Scale (ECOHIS) before and after their children (mean age 4.6 years) underwent DGA by a pediatric dentist in Al-Ain, UAE from 1st March 2017 to 28th February 2018. The ECOHIS and its effect size (ES) served to evaluate children's OHRQoL, the Wilcoxon signed-rank and the Kruskal-Wallis tests were used for statistical analyses.

Results: The mean dmft of the children prior to the treatment was 13.8+3.07. Children's pain and eating problems and parents feeling upset and guilty were the most frequently reported impacts at baseline. The ECOHIS scores decreased significantly ($p < 0.001$) after DGA, revealing a large ES for the child (2.19) and family (2.79) sections of the ECOHIS.

Conclusions: DGA treatment resulted in significant improvement in all child and family physical, psychological and social aspects of OHRQoL.

Introduction

Dental caries is reported to be among the most common bacterial diseases affecting humans. It is five to eight times more common than asthma [1]. Even though there was a reduction in caries throughout the last two decades especially in developed countries; its high prevalence in developing countries and certain fragments of the populace in developed countries (e.g., youngsters and teenagers, low socioeconomic status children) is still an issue [2]. Early childhood caries (ECC) is an aggressive type of caries affecting children under the age of six.³ The consequences of ECC such as pain, absence of rest, and, in uncommon cases, death in addition to missing school days and the heavy financial burden require more endeavors from the general population, dental profession, and governments to control the pandemic way of oral disease [2]. ECC initially affects the upper central incisors and can destroy them to the gingiva level within a year if not treated. It involves the primary teeth, and even influences the permanent teeth as they begin to erupt at the age of six [3]. Evidence demonstrates that ECC, especially in extreme cases, antagonistically influences the personal satisfaction in children; which may be a result of agony, contamination, abscesses, poor health, and gastrointestinal issues [4]. The most distressing manifestation of ECC, which is often ignored, is how both children and parents deal with the disease and how it affects their quality of life, including their study performance, their growth and development, and their self-esteem [4,5].

Despite the potential morbidity and even mortality of dental general anaesthesia (DGA), the waiting time and the cost of performing DGA, it is considered the most suitable method for performing a complete

dental rehabilitation in a single visit [6].

Acs *et al.* [7] investigated the parental satisfaction following DGA and concluded that improvement in the quality of life and overall health was achieved. The greatest being a reduction in pain followed by improvement in quality of eating and sleeping.

Studies on children's *Oral Health-Related Quality of Life* (OHRQoL) have started nearly 30 years ago when the Child Health Questionnaire (CHQ) was first published [9]. The translations and adaptations of CHQ and subsequently its development, evaluation and validation have started in 1998 in western countries [8].

An example of OHRQoL scales is the scale developed and validated by Gaynor and Thomson [10] which is completed by parents/guardians because young children are often not a reliable source of medical information [10].

The Early Childhood Oral Health Impact Scale (ECOHIS) was created in the United States of America (USA) by Pahel *et al.* [11] to assess the effects of oral diseases on the quality of life among young children (0 to 5 years of age). It was translated to Arabic in Kingdom of Saudi Arabia and its validity and reliability were assessed and found that this instrument can be used in Arabic-speaking caregivers of children aged 2 to 6 [12].

In the United Arab Emirates (UAE), ECC is the most common childhood disease. The prevalence of ECC in the Abu Dhabi Emirate was reported to be 94% in 5-year-old children [13]. In Ras Al-Khaimah Emirate, a recent study [14] reported the prevalence of ECC was 74.1%.

In most cases, treatment of ECC requires comprehensive dental treatment under general anaesthesia by a paediatric dentist. Therefore, it seems appropriate to study the effects of comprehensive dental treatment under GA on the UAE preschool children and their families' quality of life.

Materials And Methods

Design and participants.

This study is a cross sectional study, using a pre-and post-design to assess changes in OHRQoL following DGA comprehensive treatment. The sample consisted of all children aged 2-6 years scheduled for Dental General Anaesthesia (DGA) by a specialist paediatric dentist in a paediatric dental clinic in Al Ain City, Abu Dhabi Emirate who received referral from all regions of the UAE for pre-school children in need of DGA during one-year period from 1st March 2017 to 28th February 2018. Before DGA, information about the treatment were explained to parents/guardians and children. Oral and written information about the study were given to the parents/guardians of the children qualifying for the study who were

requested to sign an informed consent form. Ethical approval was obtained from the Research and Ethics Review Committee of MBRU (No. EC 1016-002).

The inclusion criteria were parents of UAE and non-UAE children (aged 2-6 years) referred to a paediatric specialist and children in need of treatment under day case GA. While exclusion criteria were children with special healthcare needs and/or medically compromised (ASA III and IV) [15]; parents who refuse to consent and children younger than two or older than six years.

The demographic data of the children and parents were collected using a special data collection form. Before treatment, child and parent demographic information including patient's age, gender, nationality, and chronic illness (present/not present) were collected from the dental records. Cumulative primary teeth caries data decayed missing filled teeth (*dmft*) according to WHO criteria (1997) [16] and presence of other pathological changes such as abscesses and fistulas were also collected. For non-cooperative children clinical data were collected under GA before treatment. Following the treatment under GA, in two-three months' time, the parents were interviewed through phone calls by the principal investigator and asked to answer the same questions of the survey filled prior to the dental GA. At this time, the parents and the principal investigator had no access to the questionnaire that was completed before the treatment. A previously validated ECOHIS [12,17] to assess changes in the OHRQoL of both child and family. It is composed of 13 items divided between two sections namely; "the Child Impact Section (CIS) and Family Impact Section (FIS). The CIS has four subscales: child symptoms, child function, child psychology and child self-image and social interaction". The FIS has two subscales: parental distress and family function. The questionnaire was scored using a simple five-point Likert scale with responses ranging from "never" to "very often" (equivalent to a score of 1 and 5, respectively) (1 = never; 2 = hardly ever; 3 = occasionally; 4 = often; 5 = very often; 0 = don't know). ECOHIS scores were calculated as a simple sum of the response codes for the CIS and FIS after recording "don't know" responses as "missing".

Data analysis

A total score ranging from zero to 65 was calculated as a simple sum of the responses. Higher scores representing a greater oral health impact and/or poorer OHRQoL. The different ranges of the subscale scores were as follows: child impact section: child symptoms – one item, range 1 to 5; child function – four items, range 1 to 20; child psychology – two items, range 1 to 10; and child self-image/social interaction – two items, range 1 to 10. Family impact section: parental distress – two items, range 1 to 10; family function – two items range 1 to 10. The English original version was used for English speaking parents [18]. For the Arabic speaking parents, the Arabic version of ECOHIS questionnaire which was previously validated in a Saudi Arabian sample of parents by Pani *et al* (2012) was used [17]. Data was entered into computer using IBM-SPSS for windows version 23.0 (SPSS® Inc., Chicago, IL).

Frequency tables' bars and lines graphs, measure of percentage, measure of tendency and dispersion were performed as descriptive statistics. Categorical variables were cross-tabulated to examine the independency between variables, for such variables the χ^2 test or Fisher's exact test as appropriate were used. Kolmogorov-Smirnov was used to test the normality of continuous variables. The Mann-Whitney test was used to compare the pre-overall score of ECOHIS between demographical variables. The Wilcoxon signed-rank test was used to test the changes in the score of ECOHIS between baseline and the follow-up score, followed by calculating the effect size of each component by dividing the mean of the corresponding component by its standard deviation [19]. When comparing the means of the score between more than two groups the Kruskal-Wallis test was used. Internal consistency was assessed by using Cronbach's alpha and factor analysis for the items of the questionnaire. A p-value of less than 0.05 was considered significant in all statistical analysis.

Results

During the time frame of data collection between March 1st, 2017 and 28th February 2018, a total of 244 parents of children (109 boys and 135 girls) completed the survey at the time of the DGA. A total of 173 parents, 140 mothers (80.9%) and 33 fathers (19.1%) completed the pre- and post-operative ECOHIS questionnaires representing parents of 80 boys and 93 girls. This resulted in a 71% response rate. The mean age of the children who participated in the survey was 4.6 (± 1.86 years) and the range was 2.5–5.9 years. The mean *dmft* of the children prior to the treatment was 13.8 (± 3.07). The demographic characteristics of participants are presented in Table 1.

The distribution of the preoperative scores of ECOHIS domains by demographic characteristics of participants is summarized in Table 2. A total of 80 male and 93 female children were included in the study with almost equal numbers of children who were 2-4 years or 4-6 years old. The overall scores of the CIS showed that older children (4-6 years) experienced more impacts in all domains than did the younger children (2-4). Males experienced more symptoms than females. On the other hand, FIS in general showed that lower educated parents had lower scores than higher educated parents. Parent distress domains from this section showed that lower educated parents expressed greater impacts.

Comparison between pre and post-operative average of the items of the ECOHIS questionnaires is presented in Table 3. All items demonstrated a significant difference between the pre and post-operative responses. Except for question 8, regarding avoiding smiling which demonstrated a significant increase in the score, all other items demonstrated a significant decrease (Figure 1).

Changes in ECOHIS scores within the domains from baseline to follow-up are summarized in Table 4. The table also demonstrates the effect sizes (ES) for all the domains. The highest effect size of 3.4 was noticed in the child symptoms domain.

The relationship between baseline *dmft* scores and CIS and FIS was studied. There was no statistically significant relationship between baseline *dmft* and the change in CIS ($p=0.081$) nor with change in FIS ($p=0.995$). However, there was a statistically significant relationship between baseline *dmft* and changes in self-image and social interaction domains of the CIS with a p-value of 0.023. Similarly, no significant relationship was found between baseline *dmft* with change in child symptoms, functions and psychology domains ($p=0.99$, 0.243, and 0.108 respectively). Parents' change in distress and family function domains were not significantly related to baseline *dmft* ($p=0.740$ and 0.669 respectively).

The procedures performed under GA are demonstrated in Figure 2. The mean *dmft* of the children prior to the treatment was 13.8 (± 3.07) ranged from 6 to 20. The most common treatment provided was cervical pulpotomy (45%) and preformed metal crowns (46.5%) for the posterior teeth. The decayed anterior teeth were restored either with celluloid crown composite restorations (15.3%) or zirconia crowns (22.3%). Prior to the final restoration, 12% of the decayed anterior teeth required pulpectomy compared to 1% that required pulpotomy. Extraction was the treatment option for 5.6% of the decayed anterior teeth and 5% of posterior teeth were extracted.

Discussion

The current study presents new information about OHRQoL among UAE children before and following comprehensive dental treatment under GA. OHRQoL improved significantly after DGA treatment. Dental treatment under GA is not covered by most medical insurance companies in the UAE, and there is a long list of paediatric dental patients waiting to undergo GA in public sector hospitals providing DGA free of charge for UAE citizens. Our patient sample came from a large medical referral center in Al Ain city that accepted referrals from all over the UAE. Most participants were from Abu Dhabi and Al Ain compared to other UAE cities; the location convenience, acceptance of many insurances and faster treatment provision could be reasons for this.

The response rate in our study was higher than in another similar study [20]. The primary caregivers involved in this study were the mothers. As mothers play the dominant role in raising the child and are involved in activities concerning the child's welfare, therefore they were more willing to participate in the study. As such, their input and understanding of the scale was important.

The ECOHIS chosen for our study for pre-school age children was validated for many languages including the Arabic language and was found to be valid for measuring OHRQoL in children [10]. Several other DGA studies [10 20,21] used the Parental-Caregivers Perceptions Questionnaire and Family Impact Scale (P-CPQ and FIS), a long version questionnaire (49 questions) designed for school-age children. A shorter OHRQoL questionnaire (13 questions) in the ECOHIS seems to have advantages in evaluating young children's quality of life, as found in a Dutch study [22], where both questionnaires were

used. Nevertheless, the ECOHIS had lately been found to have some limitations which could challenge its suitability for use with children affected by severe dental caries [23] when compared with the new short-form P-CPQ and FIS scales [24]. On the other hand, a UK study [18] that used ECOHIS showed its limited sensitivity to change due to the low levels of dental problems reported in their sample at baseline.

Comparisons of OHRQoL pre- and post-DGA between different studies should be evaluated with care due to the following reasons: first, the outcome may be influenced by the participants' general oral health when the dental condition leading to DGA may have an impact on the results, the potential for improvement varying with the degree of severity. Second, the improvement in oral health reported may be influenced by cultural differences; in some countries, more serious problems may overshadow oral health problems. Third, different methods and scales used to assess OHRQoL as well as the age of children in different studies may influence the results. The aforementioned factors were recently discussed in a systematic review [25].

Our positive effect of DGA in children with severe caries are in line with the conclusions made in the Jankauskiene *et al.* review [25] that DGA resulted in an improvement in quality of life for the child and for the family.

OHRQoL was introduced in 1978 [26] and is defined as "that part of a person's quality of life affected by the oral health". This concept emphasized the holistic model of oral and general health. There are two main methods used to measure OHRQoL either by asking patients questions regarding her/his functions (e.g., biting, chewing), pain experience, psychological (self-esteem), and social wellbeing, or in case of young children by asking parents/caregivers (proxy measurement). The latter approach was followed in the present study.

Child impact

By analyzing the distribution of child impact factors in our study, when asked regarding child pain symptoms, in the first survey before DGA, most of the parents suggested that their children occasionally complained of pain. The result of this study for this factor was different to that of the study conducted by Hashim *et al.* in Malaysian children [27]. The majority of the parents in the present study suggested that their children occasionally had difficulty in drinking hot or cold beverages due to dental problems while in Pahel *et al.* [11], Hashim *et al.* [27] and Farsi *et al.* [12] studies, parents suggested that their children never/hardly ever complained. For the issue of difficulty in eating, the majority of the parents in our study suggested that their children occasionally had difficulty in eating due to dental problems or treatments; which was different from parents reported by Hashim *et al.* [27] and Pahel *et al.* [11].

Many parents reported that their child hardly ever or never complained of difficulty in pronunciation, missed preschool/school or daycare, had been irritated or frustrated, avoided smiling or laughing or

avoided talking due to dental treatments or problems which were in accordance with other studies [11,12,27]. Explanation for a higher number of “occasionally or hardly ever” responses from parents of children with high *dmft* (*dmft*=13.8) score may be attributed to the fact that dental caries and infections are mostly chronic in nature and do not cause severe pain in many instances [28].

Family impact

In the present study, most of the parents suggested that they have occasionally or hardly ever been upset, guilty, or taken time off from work because of their child's dental problems or dental treatments which was analogous to that of the study conducted by Pahel *et al* [11].

Our results were somewhat different from Pahel *et al*. [11] and Hashim *et al*. [27] studies for the issue related to financial impact where in these two studies; most of the parents said they had never have financial impact due to their child's dental problems or treatments while in our study the parents' answer was “hardly ever”.

The parents reported greater impacts on boys than on girls which was similar to Jankauskienė study [29], while Klaassen *et al*. found no gender differences [21]. Psychological factors may have played a role but confirming and explaining this finding will require further research. The highly educated parents with either secondary or tertiary education level reported higher child impacts than did parents with a lower level of education. This is an interesting finding that raises questions about different health values among parents in relation to their educational level. In the general population, a higher level of parental education is associated with better OHRQoL in children [30] but this might be different among parents of children with high levels of dental disease.

Most parents in the current study reported that their children had dental problems requiring treatment. This was reflected in this study by the high mean UAE-ECOHIS scores at baseline in both CIS (20.47) and FIS (11.33). The baseline and follow up mean scores of a similar study conducted among Chinese children in 2011 [31] revealed lower mean ECOHIS scores compared to our study. Higher mean scores of ECOHIS were reported in other studies conducted among Australian children in 2016 and 2017 [32,33].

In our study, the mean scores significantly declined following dental treatment under GA, indicating an improvement in preschool children's OHRQoL. Therefore, the UAE-ECOHIS was sensitive to changes in OHRQoL because the mean scores between pre- and post-treatment were statistically different. Overall, the magnitude of change of the UAE-ECOHIS following treatment which was assessed by the effect size (ES) was considered large (ES>0.7). The ES of both CIS and FIS was (2.8) and (2.2) respectively. A larger ES of CIS and FIS might be because all our sample children had severe ECC. Hashim *et al*. in 2018 [27] reported ECC to be significantly related to OHRQoL of preschool children. The aforementioned study also found large effect size for CIS impact but medium ES of FIS impact [27]. A Saudi study in 2014 [2] showed that both CIS and FIS scales and all their subscales had large ES with the exception of social wellbeing, which showed moderate ES (ES=0.59).

The greatest relative changes were seen in the oral symptoms (ES= 3.4) and the parent distress (ES= 2.8). This indicated that treatment of ECC under GA had an even higher effect on preschool children's OHRQoL compared to that of the family. Dental diseases frequently cause oral pain which might lead to oral dysfunction, i.e. difficulty in eating or drinking, and disturbed sleeping. Therefore, the impacts on the child were felt by parents a lot more than other domains. These findings were consistent with findings from other similar studies [2,18,31].

Although the 'child self-image and social interaction' domain of CIS sub-scale showed large ES, it was the lowest compared to the rest domains and this is in agreement with another similar study [32]. Possible explanations might be that a child's oral health and appearance was not important for peer-group acceptance at such a young age and may demonstrate limited parents' knowledge about the social aspects of a child's OHRQoL [29,34]. Interestingly; in this domain; the parents' answers when questioned regarding their child avoiding smiling or laughing because of dental problems or dental treatments revealed a significant increase in the avoidance of smiling after treatment.

There were no statistically significant differences in UAE-ECOHIS change scores related to *dmft* except with child self-image and social interaction. A similar study found that ECOHIS change was statistically significantly higher in children with higher *dmft* scores compared with lower *dmft* [12]. On the other hand, other studies conducted in India and Iran found no difference in the ECOHIS change in score relative to *dmft* scores [34,35]. Possible explanations to this might be related to the nature of detection of carious lesions using the *dmft* scoring system. The *dmft* score does not consider the stages of progression of carious lesions, for example early lesion or deep severe carious lesion were charted as decayed teeth only. Therefore, the use of a more precise charting techniques such as the ICDAS II or the *Pulpal involvement, Ulceration due to trauma, Fistula and Abscess (PUFA/pufa)* index for the detection of carious lesions may provide better clinical information in the investigation of OHRQoL in children [36,37].

Our study presented new information about the types of dental treatment under GA among children in UAE of the most frequently provided treatment for our study population was cervical pulpotomy (45%) and preformed metal crowns (46.5%) for the posterior teeth. In addition, 22.3% of anterior teeth were restored with zirconia crowns which was a preferred treatment option for its esthetics and retention properties[38], compared to 15.3% restored with composite restoration. This was different than other studies where most common treatment were either extraction[39] or composite restorations [40]. Restorative treatments were one of most common treatments in our study which is in agreement with previous studies in many European countries[40,41], North America[43], the Middle East[44], Asia[45,46], and New Zealand [47]. This is in contrast with other centres that provide mostly exodontia services under GA among British and Australian children [39,48,49].

Limitations of the study: the present study was conducted in a centre that provided only same day DGA for ASA I and II patients, therefore medically compromised patients who are commonly treated with DGA were excluded. The reporting of pain could have been underestimated by parents because pain might not have been present at the time the questionnaires were completed. An attempt was made to conduct the

study in a referral specialized center that treated children from all the Emirates of the UAE. However, most of the participants were from the Abu Dhabi Emirate. As discussed before, the reasons may be attributed to the following: the higher caries levels in Abu Dhabi Emirate, the ease of access and the full insurance cover provided for the benefit of Abu Dhabi Emirati children. An attempt was made to have the same parent who completed the first survey to do the same for the second survey, in very few cases; the same parent was not available, and we had to settle for the other parent to do so. The first survey was conducted on paper and second survey was conducted by a telephone call. This might have affected the consistency between the answers. There is a need for studies to involve more children including those with special needs and medically compromised children in all of the UAE emirates and also studies for surveying the effect of DGA on OHRQoL of school age children, with the questionnaires being completed by children themselves and not their parents/guardians.

Conclusions

In the sample of UAE children studied, significant improvements were found in all child and family physical, psychological and social aspects of OHRQoL following DGA. The effect size of CIS and FIS factors following DGA were found to be large. There was an association between *dmft* and changes in child self-image and social interaction in our study population. Most of the treatment provided under DGA in our study population were cervical pulpotomies and preformed metal crowns.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Research and Ethics Review Committee of MBRU (No. EC 1016-002). Informed written consents were obtained from the parents or guardians of all participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request

Competing interests

The author (s) declare that they have no competing interests.

Funding

This study received no funding

Authors' contributions

KA, MK, MA and IH carried out the conception, design of the study and writing and editing of the manuscript. AE participated in Data collection. AH performed sample size and power calculation and statistical analysis of the results. All authors read and approved the final manuscript.

Acknowledgements

The authors would like to thank the children and parents for their participation in the study.

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Tables

Table 1: Demographic characteristics of study participants

Variables		Nr (%) *
Gender of the children	Female	93 (53.7)
	Male	80(46.2)
Mean age (\pm SD) 4.6 (\pm 1.86)	2-4 years	86(49.7)
	4-6 years	87(50.2)
Parents	Mother	140 (80.9)
	Father	33(19.1)
Educational level**	Low	23(13.3)
	High	150(86.7)
Employment status of the parents	Employed	105(60.6)
	Unemployed	68(39.3)
Parents age: Mean (\pm SD)	Mother 34.7 (\pm 7.6)	
	Father 38 (\pm 7.3)	
Number of siblings: Mean (\pm SD)	Mean 3.8 (\pm 1.7)	

* Percentages between parenthesis are rounded and included for comparison

** Low education level includes none or primary education while High includes secondary and tertiary education

Table 2: Distribution of the scores of ECOHIS domains by demographic characteristics of participants.

Domain	Gender Nr		Age (years)		Parental Education Nr	
	Male 80	Female 93	< 4 87	4-6 86	Low 23	High 150
Child impact section	20.58 ± 6.57	20.37 ± 7.78	19.4 ± 6.8	21.5 ± 7.47	20.43 ± 7.60	20.48 ± 7.19
Child symptoms	3.1 ± 1.1	2.9 ± 1.2	2.7 ± 1.06	3.2 ± 1.2	3.1 ± 1.25	2.98 ± 1.16
Child functions	9.37 ± 3.41	9.11 ± 3.71	8.7 ± 3.6	9.7 ± 3.47	9.13 ± 4.27	9.25 ± 3.46
Child psychology	4.91 ± 2.18	4.54 ± 2.30	4.6 ± 2.06	4.8 ± 2.4	4.95 ± 2.40	4.68 ± 2.22
Child self-image and social interaction	3.20± 1.89	3.79 ± 2.34	3.3 ± 1.98	3.6 ± 2.3	3.21 ± 2.23	3.56 ± 2.15
Family impact section	11.77 ± 3.84	10.95 ± 3.73	10.8 ± 3.45	11.8 ± 4.06	11.08 ± 3.8	11.37 ± 3.81
Parent distress	7.03± 2.79	6.50 ± 2.57	6.35 ± 2.6	7.15 ± 2.69	7.08 ± 2.71	6.7 ± 2.68
Family function	4.73± 2.15	4.45 ± 2.19	4.4 ± 2.05	4.7 ± 2.29	4 ± 2.33	4.67 ± 2.14

* Low educated include none or primary education while High educated include secondary and tertiary educated

Table 3: Comparison between pre and post-operative scores of the items of the ECOHIS questionnaires

Questions	Domain	Pre-DGA Score		Post-DGA Score		p-value
		mean ± SD	Category	mean ± SD	Category	
How often has your child had pain in the teeth, mouth or jaws?	child symptoms domain	3 ± 1.17	Occasionally	1.24 ± 0.65	Never	<0.001
How often has your child had difficulty drinking hot or cold beverages because of dental problems or dental treatments?	child function domain	2.58 ± 1.33	Occasionally	1.15 ± 0.63	Never	<0.001
How often has your child had difficulty eating some foods because of dental problems or dental treatments?	child function domain	2.95 ± 1.31	Occasionally	1.17 ± 0.58	Never	<0.001
How often has your child had difficulty pronouncing any words because of dental problems or dental treatments?	child function domain	1.93 ± 1.28	Hardly ever	1.26 ± 0.72	Never	<0.001
How often has your child missed school, daycare or school because of dental problems or dental treatments?	child function domain	1.77 ± 1.14	Hardly ever	1.09 ± 0.47	Never	<0.001
How often has your child had trouble sleeping because of dental problems or dental treatments?	child psychological domain	2.46 ± 1.31	Hardly ever	1.05 ± 0.33	Never	<0.001
How often has your child been unable or frustrated because of dental problems or dental treatments?	child psychological domain	2.25 ± 1.26	Hardly ever	1.08 ± 0.39	Never	<0.001
How often as your child avoided playing or laughing when around other children because of dental problems or dental treatments?	Child self-image/social interaction domain	1.08 ± 1.19	Never	1.12 ± 0.52	Never	<0.001
How often as your child avoided playing with other children because of dental problems or dental treatments?	child self-image/social interaction domain	1.79 ± 1.17	Hardly ever	1.08 ± 0.48	Never	<0.001
How often have you or another family member felt guilty because of child's dental problems or dental treatments?	Parent distress domain	1.73 ± 1.48	Hardly ever	1.168 ± 0.57	Never	<0.001
How often have you or another family member been upset because of child's dental problems or dental treatments?	Parent distress domain	3.34 ± 1.49	Occasionally	1.16 ± 0.55	Never	<0.001
How often have you or another family member taken time off from work because of your child's dental problems or dental treatments?	Family function domain	2.44 ± 1.41	Hardly ever	1.04 ± 0.37	Never	<0.001
How often has your child had	Family function	2.16	Hardly ever	1.42	Never	<0.001

al problems or dental treatments had a financial impact on your y?	domain	± 1.27	± 1.03		
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Table 4: The mean change in ECOHIS scores between pre and post surveys with effect sizes.

ECOHIS domain (no. of items)	Baseline		Follow-up		Changes in Score ± SD	Effect-size	p-value
	Mean ± SD	Range	Mean ± SD	Range			
Child impact section (9)	20.47 ±7.23	3-45	10.28 ± 2.59	9-23	10.185± 4.64	2.195	<0.001
Child symptoms (1)	3 ±1.17	1-5	1.24 ± .655	1-3	1.76 ± 0.515	3.417	<0.001
Child functions (4)	9.23 ± 3.57	1-20	4.69 ±1.44	4-12	4.54 ± 2.13	2.13	<0.001
Child psychology (2)	4.7 ± 2.24	0-10	2.13 ± 0.59	2-6	2.58± 1.65	1.56	<0.001
Child self-image and social interaction (2)	3.52 ± 2.16	0-10	2.208 ±.972	1-10	1.31± 1.188	1.104	<0.001
Family impact section (4)	11.33 ± 3.79	1-20	4.78 ± 1.45	3-10	6.555 ± 2.347	2.792	<0.001
Parent distress (2)	6.75 ± 2.68	1-10	2.32 ±1.094	2-8	4.422 ± 1.57	2.81	<0.001
Family function (2)	4.58 ± 2.17	0-10	2.45± 1.09	1-6	2.133 ±1.08	1.97	<0.001

Figures

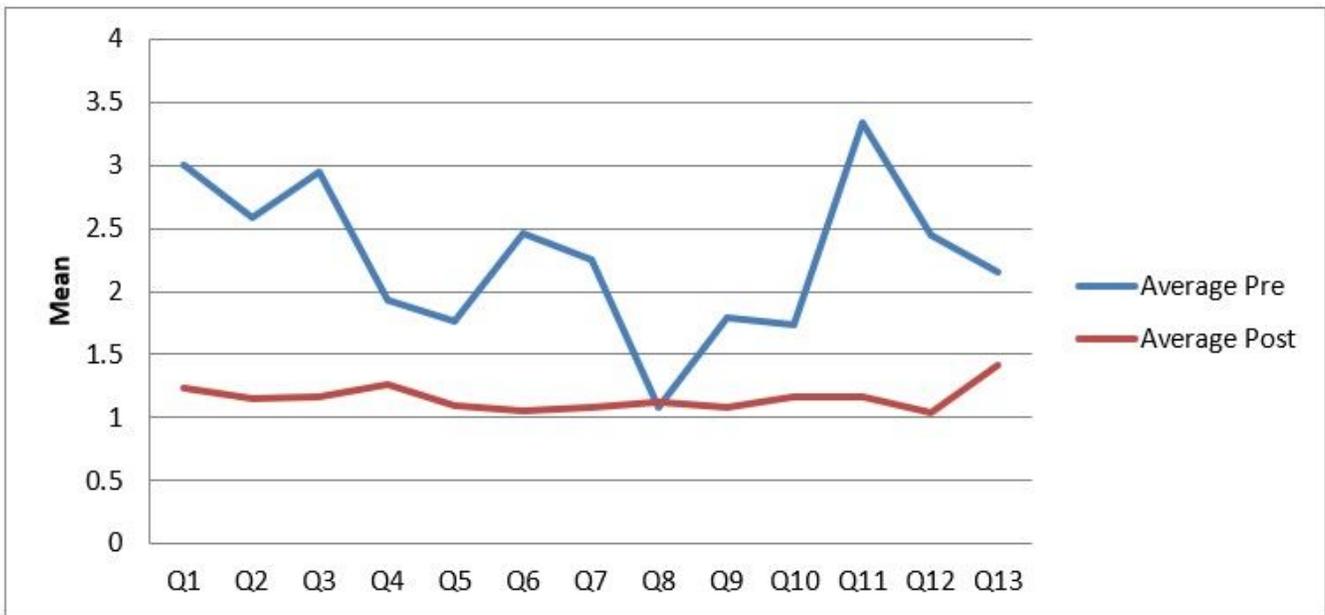


Figure 1

The distribution of the mean scores of pre and post-operative domains of the ECOHIS

Fig 2

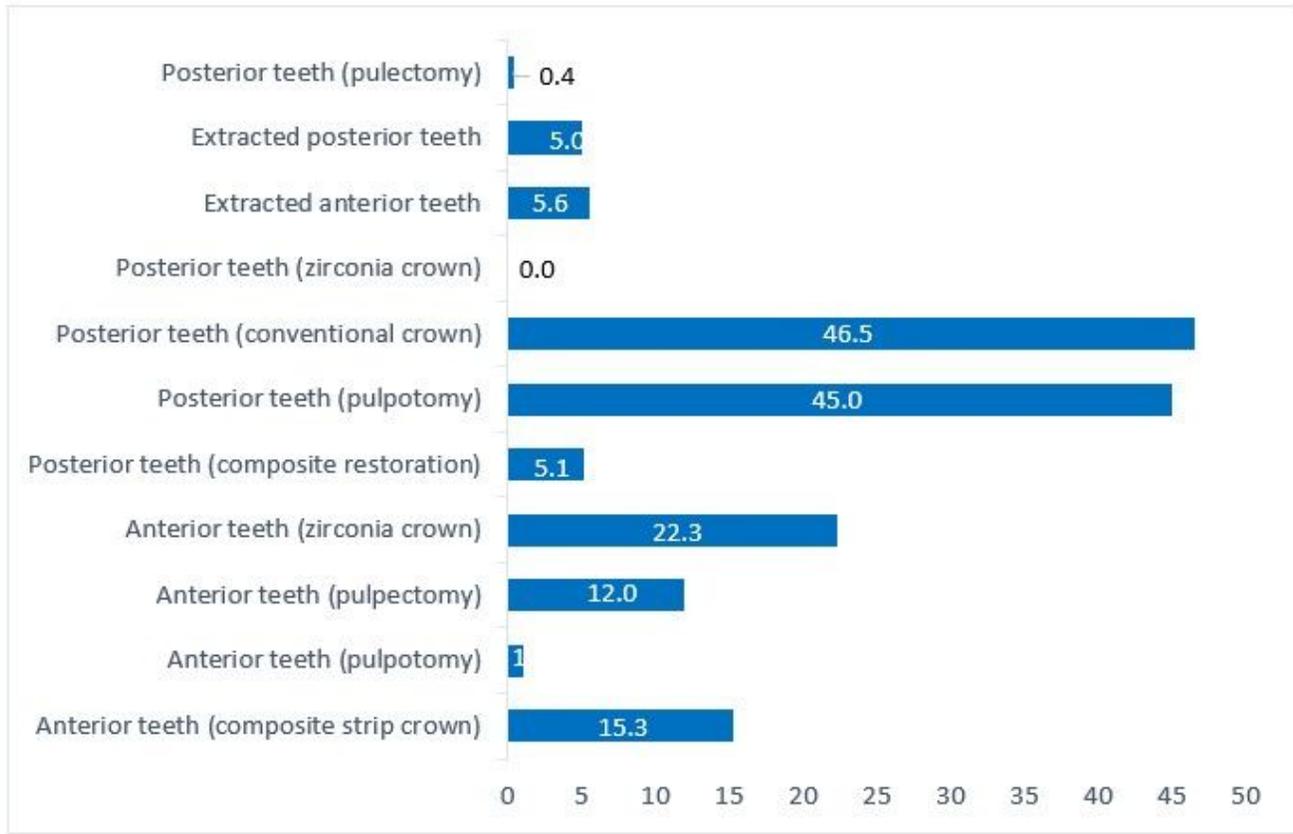


Figure 2

The percentage distribution of the treatment procedures provided under GA