Original Article

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Dentistry Section

Oral Health-Related Quality of Life Improvement in Children with Special Needs Following Comprehensive Dental Treatment under GA: A Saudi-Based Follow-up Study

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ABSTRACT

Introduction: Children with Special Healthcare Needs (CSHCN) are considered difficult to maintain oral hygiene and challenging for caregivers and dentists to attain co-operation in dental treatment under general anaesthesia. Family Impact Scale (FIS) and Parental-Caregiver Perceptions Questionnaire (P-CPQ) are useful tools to assess patient's oral health quality of life and caregivers perception.

Aim: To assess the impact of dental treatment under general anaesthesia on the quality of life and oral hygiene of CSHCNs, as perceived by caregivers.

Materials and Methods: This prospective follow-up survey study was carried out at Dammam Medical Complex, Saudi Arabia, from December 5th, 2019 to December 15th, 2021. The CSHCN of either gender, aged 12 years, and falling within the American Academy of Paediatric Dentistry (AAPD) definition of special-needs patients referred for invasive procedures under general anaesthesia (American Society of Anaesthesiologists {ASA}) class I or II), were included. The baseline and, after a one-year follow-up, information obtained from two surveys that were altered from Thompson's P-CPQ and FIS were decoded into the numeric ordinal scales Never ("0"), Once or Twice ("1"), Sometime ("2"), Always ("3"), and Daily ("4"). Analysis of the collected data was done by Statistical Package for Social Sciences (SPSS) version 20.0.

Results: A total of 84 participants were caregivers of CSHCN who underwent dental procedures under General Anaesthesia (GA), of whom 77 (91.7%) were mothers and 7 (8.3%) were fathers of the CSHCN. The mean age of children was 8.29±2.14 years (Range=3-12 years); 38 (45.2%) were males and 46 (54.8%) were females. The median FIS after treatment was zero, compared to the median before treatment which was 2, revealing a significant impact on being absent from work, a child requiring more care, the impact of presence, sleeping disturbances, feeling angry, feeling guilty, and a child disputing or blaming either parent ($p<0.001$). Following the pattern of one year post-treatment FIS, median was 0 (Never) for all items including halitosis, pain, food trapped in palate and teeth, swallow, breath, time, sleep, irritable, frustrating, nervous, shy, absent, laugh, and continue school ($p<0.001$).

Conclusion: The modified FIS and P-CPQ evaluations before and after dental treatment under GA revealed a significant improvement in the oral health quality of life for those CSHCN, as well as the impact on their caregivers. Regular check-ups would be useful for early and non invasive intervention without GA.

Keywords: Dental care, Disabled children, General anaesthesia, Questionnaire

INTRODUCTION

Special healthcare needs are defined by the American Association of Paediatric Dentistry (revised 2012) as any body-structural, age-related, mental, sensory, behavioural, cognitive, or emotional impairment or limiting state that necessitates medical treatment, health care provision, and/or specialised services or program support. The condition may be birth-anomaly, inherited, growing, or acquired as a result of disease, trauma, or environmental factors, and it may impose limitations on everyday self-care activities or significant constraints on a major life activity. Specialised knowledge, as well as enhanced awareness and attention, adaptation, and accommodating measures beyond what is considered regular, are required for health care for individuals with special needs [1].

To address these issues and efficiently cater treatment demands, paediatric dentists have devised and implemented a number of management approaches, including accessing anaesthetic services and/or providing oral health care in a hospital setting with or without general anaesthesia [2,3]. Some children with especially insecure medical issues may be able to receive dental care only in a hospital setting. All authorised advanced paediatric dental training programs include hospital dentistry as part of the curriculum. Paediatric dentists are qualified to identify the indications for such an approach and provide such care as a result of their training and expertise [4,5].

Previous studies have covered a wide variety of restorative procedures done on special-needs patients under general anaesthesia [6,7]. Several researches have demonstrated clinical outcomes of dental treatment under GA for healthy patients [8-11]; however, relatively few studies have reported comparable outcomes [12]. Studies have been published in Saudi Arabia [13-15], but they lack comprehensive coverage of family impact and children's oral hygiene problems using FIS and P-CPQ before and after treatment under GA.

Therefore, the present study aimed to evaluate the patient's quality of life and oral hygiene improvement using a questionnaire based on the perspectives of caregivers of the CSHCN who had received dental treatment under general anaesthesia. It was anticipated that the study would add a diversified experience in the literature for dental practitioners to identify hurdles in oral health quality under GA from the caregiver's view point.

MATERIALS AND METHODS

This prospective survey-based follow-up study was carried out at Dammam Medical Complex, Dammam, Saudi Arabia, during a period of two years from December 5th, 2019 to December 15th, 2021.

Ethical approval was obtained from the Institutional Review Board (IRB), (reference No. RAC-077). Data of 84 CSHCN was retrieved who had been referred from primary dental care centers, located in Eastern Province, Saudi Arabia, to Dammam Medical Complex, a tertiary center accredited advanced paediatric dental training program institution for the Saudi Board in Paediatric Dentistry.

Sample size calculation: Assuming effect size for the present study=0.3, the difference of effect sizes reported by Song JS et al., COHIP-14: p<0.001, effect size=1.0; FIS-12: p<0.001, effect size=0.7, the estimated sample size on 0.3 effect size, 5% level of significance (a), 80% power was calculated 71 patients of special-needs [16]. Following a survey based study, target participants increased by about 20-25%. Hence, the study ended up with 84 participants for evaluation of FIS and P-CPQ scales.

Inclusion criteria: Caregivers family members of CSHCN of either gender, under the age of 12, those with orthopaedic or physical deformity, psychomotor retardation, congenital brain impairment, intellectual or learning disabilities, speech disorders, emotional disturbances, full or partial blindness, deafness, epilepsy, acquired disabilities, syndromes, autism spectrum disorder, and class I or II of the American Society of Anaesthesiologists (ASA) were included after taking the informed consent.The World Health Organisation (WHO) criteria for Children of Special Healthcare Needs was followed [17].

Exclusion criteria: Those children with ASA class III or IV, and with compromised general health due to serious ailments or disabilities or/and those whose caregivers refused to participate in the study were excluded.

Study Procedure

The caregivers along with CSHCN attended the GA Pre-assessment due to pain during the dental examination or suspicion of pain for application of dental treatment, and then received invasive procedures such as extractions, amalgam and composite/glass ionomer restorations, stainless steel and strip crown restorations, pulp therapy, and the placement of fissure sealants, which were psychologically threatening to the patient and caused anxiety, uncooperative behaviour, and pain tolerance when treated under general anaesthesia, when non pharmacological behaviour guidance techniques were ineffective.

Following a clinical setting as a Pre-anaesthetic assessment, patients were reviewed, selected, and prepared, mentioning their lack of cooperative ability or their medical or disability conditions. Their treatment was carried under the care of a paediatric dentistry consultant and involved complete and comprehensive dental treatment under GA, following the American Academy of Paediatric Dentistry (AAPD) guidelines. Follow-up recall and examination of patients that had comprehensive dental treatment under GA was after one year. For behavioural and well-being purposes, it was decided at a prior date for each of these children to have their full dental rehabilitation under general anaesthesia [7]. Their names, contact information, and chart numbers were added to a waiting list as per the department policy.

Data were collected from the patients and caregivers to avoid bias, and because most of the patients, either due to their mental capabilities or disabilities, would not be able to provide an accurate expression of their oral health quality of life changes, two simple written questionnaires adapted from Thomson WM et al., P-CPQ and FIS were used [18]. The questionnaire was devised by following FIS and P-CPQ items [17,18] tailored for the present study into English and translated Arabic versions for the convenience of Arabic speaking Saudi population.

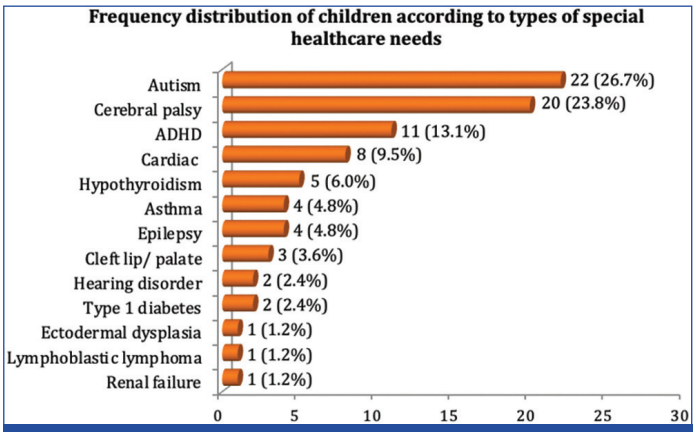
The parents/caregivers were provided with the questionnaires to obtain baseline data prior to treatment. For the sake of performing follow-up on a longitudinal basis after one year, the participants were provided also with the same questionnaires in order to determine, evaluate, and provide a straight-forward declaration of the post-treatment quality-of-life changes of the patients and their caregivers. Both FIS and P-CPQ were decoded into a numeric ordinal scale as Never '0', Once/Twice '1', Sometime '2', Always '3', and Daily '4', which revealed a lower number towards less likely and a higher number towards more likely occurrence of the particular event. To test the reliability and validity of the modified survey tools, a sample of 10 out of the first 30 filled questionnaires from FIS and P-CPQ was randomly selected for item analysis. Cronbach's alpha was found to be 0.925, indicating high item reliability and validity.

STATISTICAL ANALYSIS

Statistical Package for Social Sciences (SPSS)-20.0, an International Business Management (IBM) product from Chicago (USA), was used to analyse statistical data. Numeric data consisting of the FIS scale and the P-CPQ scale were presented as mean, standard deviation, and explored for test of normality by using the Kolmogorov-Smirnov test that revealed a non Gaussian distribution. Therefore, numeric data was presented in terms of median and inter-quartile range. A non parametric Wilcoxon sign-rank test for paired samples was applied for comparison of before and after treatment FIS and P-CPQ scale values. Statistical significance was considered if p-value was ≤0.05.

RESULTS

Among 84 CSHCNs, 38 (45.2%) were males and 46 (54.8%) were females. Of these 84 children, 77 (91.7%) had mothers as their primary caregivers, while 7 (8.3%) had fathers. The mean age of children was 8.29±2.14 years (ranging from 3 to 12 years). The most common disability was autism, found in 22 (26.2%) patients, followed by cerebral palsy in 20 (23.8%), ADHD in 11 (13.1%), cardiac problems in 8 (9.5%), hypothyroidism in 5 (6%), asthma in 4 (4.8%), epilepsy in 4 (4.8%), cleft lip/palate in 3 (3.6%), hearing disorder and diabetes mellitus in 2 (2.4%) participants each, while lymphoblastic lymphoma, ectodermal dysplasia and renal failure were in 1 (1.2%) patient each, as presented in [Table/Fig-1].



[Table/Fig-1]: Frequency distribution of children according to types of special healthcare needs.

The FIS following a higher average score 1.40±0.74 before treatment to a lower average score 0.37±0.54 revealed a highly significant decrease of the family impact after treatment i.e., (p<0.001). The similar pattern of overall parent-caregiver perception questionnaire (P-CPQ) was found before and after treatment respectively 1.74±0.84 and 0.48±0.60 (p<0.001) as illustrated in [Table/Fig-2].

Post treatment median FIS was zero, that corresponds the rating of "Never" to the items related to absent from work, child need more care, impact of presence, sleeping disturbance, feel angry, feel guilty, child disputed and child blame to either the parents (p<0.001) as compared to before treatment median FIS was 2 that reveals the rating of "Sometimes" to the items of absent from work, child need more care, impact of presence and sleeping disturbance of either parents presented in [Table/Fig-3].

Scores	Before (n=84)		After (n=84)		p-value
	Mean±S.D	Q2 (Q3-Q1)	Mean±S.D	Q2 (Q3-Q1)	
Family Impact Scale (FIS)	1.40±0.74	1.75 (1.1-2.3)	0.37±0.54	1.45 (0.82-1.9)	**0.001**
Parent-caregiver scale questionnaire (P-CPQ)	1.74±0.84	0.2 (0-0.9)	0.48±0.60	1 (0-0.6)	**0.001**

[Table/Fig-2]: Comparison of modified FIS and P-CPQ overall scores before and after treatment.
*Significant at p≤0.05.
Q2: Median, Q1: Lower quartile, Q3: Upper quartile
FIS: Never '0', Once/Twice '1', Sometime '2', Always '3', Daily '4'
PCPQ: Never '0', Once/Twice '1', Sometime '2', Always '3', Daily '4'

Family Impact Scale (FIS)	Before (n=84)		After (n=84)		p-value
	Mean±SD	Q2 (Q3-Q1)	Mean±SD	Q2 (Q3-Q1)	
Either of parents absent from work	1.62±0.92	2 (2-1)	0.26±0.49	0 (0-0)*	**0.001**
Child need more care	2.18±1.26	2 (3-1)	1.08±1.47	0 (2-0)*	**0.001**
Impact of presence	1.67±1.44	2 (3-0)	0.61±1.09	0 (1-0)*	**0.001**
Sleep disturbance	1.82±1.23	2 (3-1)	0.29±0.72	0 (0-0)*	**0.001**
Parent feel angry	1.30±1.25	1 (2-0)	0.20±0.64	0 (0-0)*	**0.001**
Parent feel guilty	1.33±1.19	1 (2-0)	0.18±0.60	0 (0-0)*	**0.001**
Child disputed with parent	0.71±1.16	0 (1-0)	0.15±0.67	0 (0-0)*	**0.001**
Child blame to parent	0.56±1.07	0 (1-0)	0.15±0.68	0 (0-0)*	**0.001**

[Table/Fig-3]: Average comparison of the modified Family Impact Scale (FIS) before and after treatment.
*Significant at p≤0.05 between before and after observed values by using Wilcoxon sign-rank test.
Q2: Median, Q1: Lower quartile, Q3: Upper quartile
FIS: Never '0', Once/ Twice '1', Sometime '2', Always '3', Daily '4'

Following the pattern of post-treatment FIS, the post-treatment median P-CPQ scale was also zero, which reveals the rating of "Never" for all items including halitosis, oral pain, food trapped in palate and teeth, difficulty in swallowing, breath, take more time to eat, difficulty in sleep, irritable/quick tempered, frustrating, nervous, shy, absent from school, avoid laugh, and concentrating at school as compared to the pre-treatment median value (p<0.001), presented in [Table/Fig-4].

Perceptions Questionnaire (PCPQ) scale	Before (n=84)		After (n=84)		p-value
	Mean±SD	Q2 (Q3-Q1)	Mean±SD	Q2 (Q3-Q1)	
Halitosis	2.62±1.45	3 (4-1)	0.40±1.00	0 (0-0)*	**0.001**
Oral pain	3.17±0.98	3 (4-3)	0.14±0.54	0 (0-0)*	**0.001**
Food trapped in palate	2.05±1.41	2 (3-1)	0.19±0.59	0 (0-0)*	**0.001**
Food trapped in teeth	2.17±1.37	2 (3-1)	0.26±0.62	0 (0-0)*	**0.001**
Difficulty in swallowing	1.86±1.45	2 (3-0)	0.58±1.20	0 (1-0)*	**0.001**
Mouth breath	1.45±1.50	1 (2-0)	0.94±1.54	0 (1.75-0)*	**0.001**
Take more time for eating	1.65±1.42	2 (3-0)	0.61±1.22	0 (1-0)*	**0.001**
Difficulty in sleep	1.89±1.23	2 (3-1)	0.38±0.88	0 (0-0)*	**0.001**
Irritable/Quick tempered	1.60±1.36	1 (2-0)	0.35±0.80	0 (0-0)*	**0.001**
Frustrated/ Depressed	1.56±1.52	1 (2-0)	0.69±1.33	0 (1-0)*	**0.001**
Nervous	1.32±1.31	1 (2-0)	0.39±1.14	0 (0-0)*	**0.001**
Shy/embarrassed	1.48±1.48	1 (2-0)	0.39±1.02	0 (0-0)*	**0.001**
Absent from school	1.29±1.24	1 (2-0)	0.58±1.21	0 (1-0)*	**0.001**
Avoid laughing in front of friends	1.02±1.53	0 (1.75-0)	0.67±1.51	0 (0-0)*	**0.001**
Difficulty in concentrating at school	1.02±1.46	0 (2-0)	0.64±1.39	0 (1-0)*	**0.001**

[Table/Fig-4]: Average comparison of the modified parent-caregiver scale questionnaire (P-CPQ) before and after treatment.
*Significant at p≤0.05 between before and after observed values by using Wilcoxon sign-rank test.
Q2: Median, Q1: Lower quartile, Q3: Upper quartile
PCPQ: Never '0', Once/ Twice '1', Sometime '2', Always '3', Daily '4'

DISCUSSION

The results of the present study demonstrated a significant decrease in the mean FIS following one year post-treatment (1.40 to 0.37); the median was 0 (Never) for all items revealing a significant effect. An almost identical pattern of significant decrease in the mean P-CPQ score (1.74 to 0.48), revealed a significant improvement in the oral health quality of life of CSHCN.

It remained a great challenge to achieve and sustain optimal oral health care for children with special needs in comparison to their peers who are free of any special needs [19]. Individuals with special needs have a higher pervasiveness of oral disease and the need for treatment [20]. Studies of oral health of individuals with special care needs had reported them to have a compromised oral hygiene, untreated dental disease and a multiple dental extraction [21]. Treatment plan according to the mental and/or physical disabilities in the present study was similar to a 10-year retrospective study by Mallineni SK and Yiu CK, where most of the dental treatment performed under general anaesthesia was of the restorative type [11].

A study by Farsi DJ et al., supports these results with significant improvement in the impact of oral health rehabilitation on the parent/ caregiver, consistent with the present study findings [22]. In a local study carried out in Jeddah, prior to Full Mouth Rehabilitation (FMR) under GA, the impact on OHRQoL was apparently negative, with overall scores ranging from 12 to 68 and a mean of 43.34±14.83, OHRQoL improved significantly across the board (p-value <0.05) [23]. In another local study, the mean pretreatment FIS score 10.64±5.41 reduced to 2.59±2.82 post-treatment, while P-CPQ scores before and after treatment were respectively 19.41±10.25 and 2.80±3.71, revealing a significant (p<0.001) effect of treatment under GA on oral health quality of life [24]. Instead of impact scale measurement, the post-treatment effect among the majority of patients was observed on eating (35.2%), teeth cleaning (22.0%), and relaxing activities (15.9%). In a study from Malaysia, caries in primary teeth was linked to oral consequences in children [25].

In the present study, parent-caregivers perception scores have changed to "Never" on aspects including halitosis, pain, food trapped in palate and teeth, swallow, breath, time, sleep, irritable, frustrating, nervous, shy, absent, laugh and continue school as compared to pre-treatment. These results are also in accordance with Mohammed MM et al., who concluded that oral rehabilitation has an immediate effect on the well-being and improvement in quality of life of children and their caregivers [26]. Song JS et al., used impact scores FIS and P-CPQ based on 14 items of child oral health impact profile to compare quality of life in relation to the severity pattern of systemic diseases, and found quite promising results before and after treatment [17]. The current study outperformed as compared to the study by Baghdadi ZD et al., in Riyadh, Saudi Arabia, limited to the P-CPQ and FIS survey instruments, which appeared to be connected to comprehensive dental care under GA and were also found to be responsive to praise and validate for assessing OHRQoL in kids with severe childhood caries [24]. Whereas, in the present study, a comparison of before and after treatment with regards behavioural changes and oral health quality of life of CSHCN.

Limitation(s)

The impact scores (FIS and P-CPQ) were not evaluated in relation to the type of dental treatment provided to the CSHCN. Parent-caregivers' demographic characteristics, such as education level, employment, family income, and number of children, were not elicited; instead, the FIS and P-CPQ complete evaluations before and after were primarily focused.

CONCLUSION(S)

The modified FIS and P-CPQ evaluations before and after comprehensive dental treatment under GA with follow-up after one year showed a great improvement in the oral health quality of life for those CSHCN, as well as the impact on their caregivers. Early recognition of dental treatment needs via regular check-ups of special needs patients would be an important tool for early and non invasive intervention, preventing the rise of comprehensive dental treatment under GA. The family lives of those patients and their caregivers were associated and directly affected by pretreatment, but treatment dramatically improved the quality of life for both patients and their caregivers.

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