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Assessment of Quality of Life in Children with Early Childhood Caries using Early Childhood Oral Health Impact Scale and PUFA Index: A Cross-Sectional Study

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ABSTRACT

Background: Early Childhood Caries is considered as one of the foremost oral diseases affecting young children. Early Childhood Caries badly affects the kids' as well as their parent quality of life. The present study aims to assess the quality of life in children with Early Childhood Caries aged 6 months –6 year using the Early Childhood Oral Health Impact Scale. The study aims to compare the quality of life between children with pufa scores of > 0 and a pufa score = 0.

Material and method: A total of 476 children aged 6 months to 6 year with Early Childhood Caries and their parent/caregiver were included in the present study. Oral examinations of the children were achieved by the principal examiner using the defs and pufa index, which was followed by a personal interview of the 13 items in the Early Childhood Oral Health Impact scale among the 476 parents/caregivers.

Result: The results showed that, overall, Early Childhood Caries have a negative impact on children's quality of life, as assessed by the parent/caregiver. The overall Early Childhood Oral Health Impact scale score ranged from 0–32 (mean ± SD, 13.10 ± 5.68). Children with a pufa score > 0 (mean ±SD, 16.14±6.27, $p < 0.001$) have suggestively inferior quality of life than children with pufa score = 0 (mean ± SD, 9.07 ±4.94, $p < 0.001$). Early Childhood Caries had a negative impact on the quality of life of children aged 6 month–6 year.

Keywords: Oral Health Impact Scale, quality of life, dental caries.

INTRODUCTION

The term Early Childhood Caries covers all carious lesions occurring in the deciduous dentition of children from birth to 6 year of age approx. [1,2]. Pain and infection are the primary effects of Early Childhood Caries, which can cause different ingestion and sleeping habits interfering with the growth of the child. This results in adverse effects on body mass and stature and, ultimately, failure to bloom [3–5]. Dental discomfort as a result of untreated Early Childhood Caries have reported to have an adverse impact on the Quality of Life to a degree similar to that of systemic diseases affecting the child's anthropometric and nutritional status, socialization, lowered self-esteem, and reduced learning abilities [6]. The concept of Oral Health Related Quality of Life relates to the impact that oral health or disease has on individuals daily functioning, well-being, or quality of life [7]. recently, the psycho-social values of oral conditions have received little attention. The Early Childhood Oral Health Impact Scale was established for assessing Oral Health Related Quality of Life in

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preschool children. This device is comprised of four descriptive realms included in the child impact section (child symptoms realms, child function realms, child psychological realms, and child self-image/social interaction realms) and two realms for the family impact section (parent distress domain and family function domain) [8]. The pufa/PUFA index was developed by Monse et al. [9] to assess the pulpo-periapical extension of untreated caries. The uppercase PUFA are used for permanent dentition and the lowercase pufa are used for primary teeth. The PUFA/pufa index scores the incidence of a visible pulp (P/p), ulceration of the oral mucosa due to root fragments (U/u), a fistula (F/f), or an abscess (A/a). Limited attempts have been made to assess the impact of untreated caries on preschool children's quality of life with the use of pufa index. This paper presents an assessment of the impact of Early Childhood Caries on Quality of Life of children using the Early Childhood Oral Health Impact Scale and the impact of pulpo-periapical extension of caries on the Quality of Life of pre-school children using the pufa index, which is an area that appears to be less discovered.

MATERIALS AND METHODS

The present study is a cross-sectional study that evaluated caregiver's perception of their child's Oral Health Related Quality of Life in children aged 6 months–6 year with Early Childhood Caries. The study also assessed the impact of pulpo-periapical extension of caries on Oral Health Related Quality of Life.

The participants of this study were a handness sample of primary caregivers of children who were diagnosed with Early Childhood Caries, in the outpatient clinic of the Department of Pedodontics and Preventive Dentistry, at a dental college in Bihar, India. Sample size was intended based on the mean and standard deviation values of the previous study [8] using G power (Version 3.1),

Type I error of 5%, and at 90% of power (1-β err prob). This gave an estimation of 218 children to be recruited. After increasing the sample size by 5% to compensate for attrition, the sample of 476 children was chosen.

The study was commenced in two stages containing of intra-oral examination, which involved assessment of the caries grade and pulpo-periapical diseases using the defs and pufa index [9]. This was followed by a parental oral feedback form survey. Standardization of oral examination was carried out by three examiners on 40 children of similar age, prior to the study. The calibration was analyzed using the Intraclass Correlation Coefficient (ICC). The calculated intra examiner agreement for the pufa index was 95% and for defs was 67%.

After that the intra oral examination was done in a Department of Pedodontics and Preventive Dentistry, following the WHO standards for oral examination by the 3 calibrated and trained dentists under a dental chair light using a mouth mirror and an explorer. The defs index was used to score the carious tooth surfaces. It has 3 components: "d" for decayed, "e" for extracted, and 'f" for filled surfaces. For posterior teeth, 5 surfaces were examined and recorded: facial/buccal, mesial, distal, lingual, and occlusal. For anterior teeth, 4 surfaces were examined and recorded: facial, lingual/palatal, mesial, and distal. For primary teeth, the maximum score for defs is 88 for 20 teeth.

The lowercase pufa index for decidious teeth was recorded to assess the severity of pulpal diseases resulting from untreated caries. The recording of pufa index was done independently from the defs index.

The codes and criteria for pufa index are as follows [9]:

p/P: Pulpal involvement is recorded when the opening of the pulp chamber is evident or when the coronal edifices have been wrecked by the carious process and only roots and root fragments are left. No probing was performed to diagnose pulpal involvement.

u/U: Ulceration due to trauma from sharp pieces of a tooth is noted when sharp edges of a dislocated tooth with pulpal connection or root fragments have caused traumatic ulceration of the surrounding soft tissues, e.g., tongue or buccal mucosa.

f/F: Fistula is scored when a pus-containing inflammation related to a tooth with pulpal involvement is present.

a/A: Abscess is scored when a pus-containing inflammation related to a tooth with pulpal involvement is present.

For an individual being, the score for pufa ranges from 0 to 20 for primary dentition. The sample was divided into 2 subgroups based on the pufa score. Group 1 children had a pufa score = 0 and Group 2 children had a pufa score > 0.

All caregivers of 476 children were imperilled to an oral interview using a planned instrument known as the Early Childhood Oral Health Impact Scale [8]. The items were read out along with the responses to the caregivers and they were instructed to answer the response that best describes their children's experience or their own.

The Early Childhood Oral Health Impact Scale comprises of 13 items, which includes the following responses: "Never", "Hardly ever", "Occasionally", "Often" and "Very often" plus a "Don't know" option recoded as "missing". The scale is scored using a simple Likert frequency type scale, ranging from 0–4 [10].

The item score achieved were added to create a total scale score in a range of 0–52. Higher scores were specified as presenting more problems and/or greater impact on quality of life [8].

Statistical Analysis

Both questionnaire and oral examination forms were manually checked for completion of data. Following the completion of the parental survey and dental examination, the participants were divided into 2 groups based on their pufa scores: Group 1 (pufa score = 0) and Group 2 (pufa score > 0). The analysis was carried out using the SPSS software. Statistical differences between the 2 groups were assessed using the independent t test. Correlation between the Early Childhood Oral Health Impact Scale score and the pufa and defs score was analysed using Spearman's correlation test. For all the tests, the level of statistical significance was set at 5%.

RESULTS

A total of 476 children (53.8% males and 46.2% females) and caregiver pairs agreed to participate in the present study, as shown in Table 1. The mean age of the participants was 54.01 _ 13.45 months (mean _ SD). Among these participants, 340 children had a pufa score of > 0 (71.4%) while the remaining (n = 136, 28.6%) had no pulpo-periapical extension of caries.

Table 1: Demographic details of the whole sample.

Variables	Frequency (N)	Percentage (%)
Age 6month-3 year	102	21.4%
Age 4year- 6year	374	78.6%
Male	256	53.8%
Female	220	46.2%
pufa score > 0	340	71.4%
pufa score = 0	136	28.6%

Distribution of Responses

Table 2 shows the distribution of responses for the whole sample, wherein the most prevalent items in the child impact section were "pain" and "difficulty while eating and drinking" "Smiling" and "talking" were influenced the least in these children. Similarly, impacts related to oral health of the children were also observed in parental domains, which results in psychological and financial constraints.

Table 2: Distribution of Early Childhood Oral Health Impact Scale responses for the whole sample

Impacts	Never N (%)	Hardly Ever, Occasionally, Often, and Very Often N (%)	Do Not Know N (%)
Pain	128 (26.9)	348 (73.1)	0 (0)
Drinking	226 (47.5)	250 (52.5)	0 (0)
Pronouncing	446 (93.7)	30 (6.2)	0 (0)
Eating	194(40.8)	282 (59.3)	0 (0)
Absence	330 (69.3)	146 (30.8)	0 (0)
Sleeping	292 (61.3)	184 (38.7)	0 (0)
Frustrated	360 (75.6)	116 (24.3)	0 (0)

For children in Group 1 (pufa score = 0), it was observed that no parent reported any impact on the child by avoiding smiling and talking with other children in the child impact section. However, items related to the family impact section, such as feeling

guilty and being upset was reported more frequently.

The distribution of responses for Early Childhood Oral Health Impact Scale responses for children with a pufa score > 0 showed that the four domains (symptoms, function, psychological, self-image/social interaction domain) in the child impact section were influenced more than the children with nil pufa scores. Similarly, domains related to parental distress and functions were also greatly influenced in this group.

Overall Early Childhood Oral Health Impact Scale Score

The overall mean Early Childhood Oral Health Impact Scale score observed was 13.10±5.68 with an observed range of 0–32. The parent distress domain showed the highest mean value while the least mean Early Childhood Oral Health Impact Scale score was observed for the child self-image/social interaction domain, as presented in Table 3. Overall, for the two sections, the family impact section showed a higher mean Early Childhood Oral Health Impact Scale Score in comparison to the child impact section. Considering the floor effect for the total Early Childhood Oral Health Impact Scale Score as shown in Table 3, it was observed that the no impact [floor effect, i.e., the proportion with score of "0" (% score 0)] were reported by only 2.1% parents out of the 476 parents. The highest floor effect was seen in the child self-image/social interaction domain and the lowest floor effect was seen in the parental distress domain.

Table 3: Descriptive statistic pertaining to Early Childhood Oral Health Impact Scale Score

Impacts	Number of Items	Possible Range	Observed Range	Floor Effect	Mean (SD)
Child symptoms	1	0–4	0–4	26.9%	1.66 (1.19)
Child impact section	9	0–36	0–24	17.9%	6.66 (4.97)
Child function	4	0–16	0–10	24.8%	3.37 (2.65)
Child psychological	2	0–8	0–8	58.0%	1.45 (2.00)
Self-image and social interaction	2	0–8	0–8	95.0%	0.19 (0.95)

Correlations between Early Childhood Oral Health Impact Scale Score Scores and Pufa/Defs Scores

Table 4 depicts stronger correlation between the pufa scores and the Early Childhood Oral Health Impact Scale Score in comparison to the correlation of defs scores with the Early Childhood Oral Health Impact Scale scores.

Table 4: Correlation between Early Childhood Oral Health Impact Scale Score with pufa and defs scores.

Variables	n	Correlation(rho)	p-Value
Early Childhood Oral Health Impact Scale Score and pufa Index Score	476	0.431	< 0.001
Early Childhood Oral Health Impact Scale Score	476	0. 288	< 0.001

DISCUSSION

Children are well-thought-out as an integral part for dental public health research and practice [11].However, over the past several decades, Oral Health Related Quality of Life assessment tools have been developed mostly for adults and the elder population with a limited number of valuation tools available for children [8].

The Early Childhood Oral Health Impact Scale is a legalized proxy measure for assessing the oral health related quality of life in preschool children developed by Paheletal. [8] in the United States. The paper here presents the results of the study, which evaluated the Quality of Life in preschool children with Early Childhood Caries. The original version of the legalized instrument, known as the Early Childhood Oral Health Impact Scale developed to assess the Oral Health Related Quality of Life in preschool children [8], was used in the present study. As stressed by Davies [12], in developing countries, children with Early Childhood Caries suffer the same deficiencies as people living in poor economic circumstances in developed countries. Hence, there exists a great need for studies to evaluate Oral Health Related Quality of Life in India, which was addressed through this study.

In the present study a direct interview with the primary caregivers was done, which is similar to the mode of administration used by Scarpelliet al. [13]

for validating a Brazilian Early Childhood Oral Health Impact Scale (B-ECOHIS) version, which is contrary to the original Early Childhood Oral Health Impact Scale [8] version where they have used the self-completed mode of supervision. The mode of supervision used in the present study is supported by studies, which have indicated that a face-to-face interview provides a more favourable picture of Quality of Life assessment when compared to the self-administered mode and is more relevant in developing economies with low literacy rates [14–16]. To compare the Quality of Life among the children with Early Childhood Caries, we have used the pufa index, which was developed by Monseet al. [9]. The above indexes were used to quantify the prevalence and severity of pulpo-periapical diseases resulting from untreated dental caries [9]. Which represent the data based on the pufa index with the ultimate goal of providing health planners with relevant information, which is complementary to the dmft. However, providing decision makers only with dmft scores leaves them unaware of the high levels of untreated caries, their severity, and linked health and Quality of Life consequences [9]. Following analysis of the distribution of responses in our study, it was observed that, in the child impact section, the most prevalent impacts were related to children's symptoms and functions while impacts related to self-image/social interaction were the least prevalent. This finding is consistent with previous studies [8,10,17]. Nevertheless, in disparity to the findings in previous studies, our mean scores were high in the family impact section for the whole scale. This data, nevertheless, was consistent with the study conducted by Locker et al. [18], which indicated that oral conditions affect parent and family activities as well.

Prior to the initiation of the study, it was decided to recode "Do Not Know" responses as missing, as suggested by Jokovicet al. [19]. Since the present study did not have any "Do Not Know" response, this was not taken into account. The lacks of "Do Not Know" responses in this study can be attributed to the fact that majority of the respondents were mothers of children who reported only after the onset of symptoms related to caries. Results pertaining to correlations between the Early Childhood Oral Health Impact Scale score and the pufa/defs scores showed greater association between pufa scores and Early Childhood Oral Health Impact Scale scores. This finding suggests that pulpal symptoms have a stronger link with the underlying construct of the Oral Health Related Quality of Life. One of the hypotheses of our study was that children with a pufa score of more than zero will have a poorer Oral Health Related Quality of Life than the children with a pufa score of zero. It could be observed that children with a pufa score of more than zero had a higher negative impact on both the sections of the scale when compared to the children with a pufa score of zero. Pahelet al. [8] reported that children with elevated dmft scores had relatively poorer Quality of Life. In the present study, the severity of Early Childhood Caries was assessed using the pufa index, in order to evaluate the consequences of pulpo-periapical extension of caries on the Quality of Life of children. The dmft index emphasizes only on caries, restored and extracted tooth as a consequence of dental caries. However, it fails to present details on the clinical consequences of untreated dental caries, such as pulpal involvement and dental abscess, which may negatively influence the Oral Health Related Quality of Life than the presence of carious lesions alone [9]. In the present study, the majority of the caregivers reported the negative impact of oral health problems on their children's Quality of Life, which leads to nonexistence of the floor effect (2.1%) for the whole scale. The floor effect, i.e., the proportion with a score of "0" was reported by 17.9% and 5.9% parents on the child and family sections. This signifies that only a small fraction of parents reported "no impacts" on the child and family impact sections, respectively. However, a substantial floor effect was observed on the child self-image and social interaction (95.0%), child psychological domain (58.0%), and child symptom domain (26.9%) for the child impact section where, in the family impact section, evident floor effects were seen in the family function domain (23.5) The floor effect for the Early Childhood Oral Health Impact Scale value appears to be in accordance with the disease characteristics of the sample wherein the entire study sample taken was affected by Early Childhood Caries. This is in accordance with studies conducted by Gopal et al.[20] who found 27.3% of prevalence of early childhood caries among pre-schoolers of Andhra Pradesh. In the present study, ECC prevalence was lower among younger children and increased with age. The data for the present study was obtained from a convenience sample and,

therefore, our result provides evidence for its performance in this population only. Hence, it cannot be extrapolated to the general population. Further research needs to be conducted in different locations and different patient populations to verify and confirm the extent of the findings reported in this paper. Furthermore, including children without Early Childhood Caries would have facilitated a further comparison.

CONCLUSIONS

Within the limitations present, it can be concluded that, with the use of the pufa index, the present study offered additional information on the significant negative influence of pulpal involvement and abscess on the Oral Health Related Quality of Life in children and their families than the presence of caries alone. In addition, the pufa index can act as a medium for health planners for showing parents the real picture for the causes of pain and infection due to caries. It can help pediatric dentists to create awareness among the caregivers about the possible negative impacts of Early Childhood Caries in children's quality of life and help them to prevent caries.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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