*Original Research Article*

# Validation of Early Childhood Dental Anxiety Impact Scale among 3-5 Year Old Preschool Children in Chennai City

**R. Hemalatha[1], S. Nirmala[2], Viswaja[3], Gopi Chander[4]**

*[1]Research Scholar, Department of Pediatric and Preventive Dentistry, [2]Professor & Head, Department of Biochemistry, [3]Professor & Head, Department of Pathology, SRM Dental College, [4]Professor, Department of Prosthodontics, Ramapuram, Chennai*

## Abstract

**Background**: The early childhood dental anxiety impact scale (EC-DAIS) has been developed for assessing dental anxiety related quality of life ( DAR-QoL ) in pre-school children, which is then validated in the English language to confirm with their geographic locations.

**Aim:** The present study was undertaken to assess the validity of the English version among 3-5 year old pre-school children of Chennai city.

**Methodology**: The English version of EC-DAIS was developed. It was tested for validity and reliability among 469 parents and children after obtaining informed consent and assent.

**Statistical Analysis** : Construct validity was assessed by correlating EC-DAIS with FBRS-Frankl's Behavior Rating Scale. Internal consistency or reliability was determined by Cronbach's alpha. Test-retest reliability by ICC assessment was done and outcomes were measured.

**Results**: Construct validity was r=0.298.Reliability using Cronbach's alpha was 0.873. Test-retest reliability by Intra Class Correlation assessment was 0.91.

**Conclusion**: The English version of EC-DAIS is a valid instrument for assessing Dental Anxiety Related-Quality of Life (DAR-QoL) in pre-school children.

***Keywords****: Early childhood dental anxiety impact scale, dental anxiety related quality of life, pre-school children.*

## Introduction

Dental anxiety may have a negative impact on the functional, emotional and psychological well being of young children, leading to total voidance of dental care, which may have an indirect influence on the quality of life-QoL.[1] Qol is an individual's perception of life with regards to position in life, culture, value systems, goals, expectations and concern.[2-4] Assessment of DAR-QoL is important in young children as it can affect their growth, development, socializing capacity, self esteem and learning abilities.

**Corresponding Author :**

**R. Hemalatha**

Department of Pediatric and Preventive Dentistry

SRM Dental College, Ramapuram, Chennai-600089

Dental anxiety has been measured traditionally using various scales in the past but it does not document the full impact with regards to quality of life. This led to the origin of the concept of EC-DAIS with regards to DAR-QoL to provide a complete picture of dental anxiety status in children.

EC-DAIS was developed to assess the impact of dental anxiety on QoL among pre schoolers-3-5 year old children. There were questions under the knowledge domain for parents in English language which was, checked by experts. The validity and reliability was also checked. Pilot testing was done on a group of representative samples before commencing the survey. The responses were rated using Likert scales ranging from 1-5.

## Methodology

### Study Design

A cross sectional descriptive survey was conducted among parents of 3-5 year old children. Official permission to conduct the study was obtained from school authorities. After explaining the purpose and details of the study informed consent and assent was obtained from parents and children.

### Sample size calculation

Sample size calculated was calculated using G – Power software by taking values from a previous key article. It was based on confidence interval of 95% , 5 % margin of error and 90 % response rate. Final sample size was determined to be 469 taking into consideration a 20% loss of samples during the study.

### Eligibility Criteria

### Inclusion criteria:

Children who fall under the ASA category 1

Children present on the day of assessment

Children who were willing to participate.

Children with no past experience

Children who fall under Frankel Behavior rating of 2 or 3

### Exclusion criteria:

Children with special health care needs

Children with underlying systemic conditions

### Recruitment of Trial Participants

A total of 503 children belonging to the pre-school age group who reported to the dental office were screened for eligibility. From this,469 children met the inclusion criteria. The study procedure was explained, consent and assent forms obtained.

### Data collection:

Data collection was done through the administration of the newly developed structured questionnaire for dental anxiety status. The collected data was entered into MS Excel and analyzed using SPSS version 20. (IBM Armonk, New York, USA) package. All possible efforts were made to address the potential source of bias.

## Statistical Analysis

Reliability was assessed in two ways- Internal consistency and Test- Retest reliability. Internal consistency reliability was tested by assessing the mean item correlation of items within EC-DAIS using Cronbach's alpha co-efficient. Test-retest reliability was assessed by determining the level of agreement between initial and repeat assessments of EC-DAIS after one month by calculating intra-class correlation co-efficient –ICC in a one way random effect parallel model.

Convergent validity was assessed based on Spearman's rank order correlations between EC-DAIS scores and parental responses on the presence of dental anxiety among children and also EC-DAIS

scores with FBRS. Interpretation of correlation co-efficient was as follows:

- Ø r </=0.49-weak,
- Ø r </=0.50-moderate,
- Ø r </=0.74- strong relationship.

Construct validity was determined by correlating EC-DAIS scores with FBRS. The prior assumption was that FBRS scores have a moderate-high correlation with EC-DAIS scores.

Discriminant validity was evaluated by comparing EC-DAIS scores in children

with and without dental anxiety using Mann Whitney U test.

## Results

**Characteristics of children and parents from study population**

All participants completed the trial and no attrition was seen. **Our study** showed the characteristics of children and parents from study population which includes age, gender, mother's occupation, socio-economic and dental anxiety status. It indicates the sample population along with the percentages. The variables assessed in this category comprised of children in the pediatric age groups of 3,4 and 5. Amongst them participants of four year age group showed the highest percentage (43.7% ) In the gender category males were predominant (57.8 %) in comparison with females . In mother's education category two domains were assessed in terms of high school and above high school, of which the above high school category showed ( 85.7% )In mother's occupation category two domains were assessed in terms of employment, amongst which unemployed category showed (73.8 %)In the socioeconomic category five domains were assessed in terms of status , amongst which upper class Grade A showed the highest of ( 67.4 % ) In the dental anxiety category in terms of status mean FBRS score was (32 %) **Table 1**

**Distribution of EC-DAIS based on Likert responses**

**Table 2** in our study showed the distribution of EC-DAIS based on Likert responses which includes associated dental pain, difficulty in drinking, eating, communication, disturbances in sleep cycle, frustrated emotions, avoiding eye contact, smiling, laughing, talking, missed school, family feeling guilty and financial constraints.

**Score domain of EC-DAIS response**

**Table 3** showed the score domain of EC-DAIS. The items assessed were categorised into two domains namely child and parent totalling up to 13 characters along with mean and standard deviation of 1.79+/-4.018

## Reliability Analysis

**Table 4** showed the Reliability analysis for the child and parent domains. The number of items assessed were 13 with 9 in the child domain and 4 in the parent domain. Internal consistency was scored based on Cronbach's alpha and Test- Retest reliability was scored based on Inter class correlation.

**Discriminant Validity**

**Table 5** showed the Discriminant Validity for the dental anxiety status under present, absent and total categories. It tests if unrelated concepts are truly unrelated.

**Table 1: Characteristics of children and parents from study population**

| Variable | N% |
|---|---|
| Age (years) | |
| 3 | 121 (25.8) |
| 4 | 205 (43.7) |
| 5 | 143 (30.5) |
| Gender | |
| Male | 271 (57.8) |
| Female | 198 (42.2) |
| Mother's education | |
| High school | 63 (13.4) |
| Above high school | 402 (85.7) |
| Mother's occupation | |
| Employed | 119 (25.3) |
| Unemployed | 346 (73.8 ) |
| Socio economic status | |
| Upper class | 35 (7.5) |
| Upper class- Grade A | 316 (67.4) |
| Upper class - Grade B | 97 (20.7) |
| Lower class- Grade A | 19 (4.1) |
| Lower class –Grade B | 2 (0.4) |
| Dental anxiety | |
| Present | 150 (32) |
| Absent | 319 (68) |
| Mean FBRS score | 1.085+/ -2.269 |

**Table 2: Distribution of EC-DAIS based on Likert responses**

| | Likert- 1 | L2 | L3 | L4 | L5 | L6 |
|---|---|---|---|---|---|---|
| Associated dental pain | 382 (81.4) | 39 (8.3) | 39 (8.3) | 5 (1.1) | - | 4 (0.9) |
| Difficulty in drinking | 430 (91.7) | 21 (4.5) | 11 (2.3) | 4 (0.9) | - | 3 (0.6) |
| Difficulty in eating | 427 (91.0) | 17 (3.6) | 17 (3.6) | 4 (0.9) | 1.(0.2) | 3 (0.6) |
| Difficulty in communication | 436 (93.0) | 17 (3.6) | 8 (1.7) | 2 (1.4) | - | 6 (1.3) |
| Disturbances in sleep cycle | 440 (93.8) | 9 (1.9) | 16 (3.4) | 1 (0.2) | - | 3 (0.6) |
| Frustrated emotions | 424 (90.4) | 18 (3.8) | 18 (3.8) | 4 (0.9) | 1.(0.2) | 4 (0.9) |
| Avoids eye contact | 446 (95.1) | 6 (1.3) | 9 (1.9) | 2(0.4) | - | 6(1.3) |
| Avoids smiling | 449(95.7) | 10(2.1) | 4(0.9) | - | - | 6 (1.3) |
| Avoids laughing | 441(94) | 12(2.6) | 11(2.3) | 1(0.2) | - | 4(0.9) |
| Avoids talking | 388(82.7) | 30(6.4) | 43(9.2) | 5 (1.1) | 1(0.2) | 2(0.4) |
| Missed school | 411(87.6) | 21 (4.5) | 19 (4.1) | 2 (0.4) | 4(0.9) | 12 (2.6) |
| Family feeling guilty | 419(89.3) | 24 (5.1) | 21 (4.5) | 1(0.2) | 1(0.2) | 3 (0.6) |
| Financial constraints | 430(91.7) | 22 (4.7) | 9(1.9) | 3 (0.6) | 2 (0.4) | 3 (0.6) |

**Table 3: Score of domain of EC-DAIS**

| Impacts | Number of items | Possible range | Minimum | Maximum | Mean +/-SD |
|---|---|---|---|---|---|
| CIS | 9 | 0-36 | 0 | 21 | 1.05 +/- 2.714 |
| Child symptom | 1 | 0-4 | 0 | 3 | 0.28 +/- 0.658 |
| Function | 4 | 0-16 | 0 | 9 | 0.42 +/- 1.254 |
| Psychology | 2 | 0-8 | 0 | 6 | 0.24 +/- 0.829 |
| Child's self image and social interaction | 2 | 0-8 | 0 | 4 | 0.10 +/- 0.504 |
| FIS | 4 | 0-16 | 0 | 11 | 0.74 +/- 1.782 |
| Parental distress | 2 | 0-4 | 0 | 7 | 0.46 +/- 1.096 |
| Family contribution | 2 | 0-4 | 0 | 5 | 0.28+/- 0.845 |
| Total | 13 | 0-52 | 0 | 27 | 1.79+/- 4.018 |

**Table 4: Reliability analysis**

| EC-DAIS- No of questions | Internal Consistency Cronbach's alpha | Test retest reliability-ICC |
|---|---|---|
| Child-9 | 0.850 | 0.90 |
| Parent-4 | 0.777 | 0.60 |
| Total 13 | 0.873 | 0.91 |

**Table 5: Discriminant Validity**

| Dental anxiety status | EC_DAIS score in parent domain | EC- DAIS score in child domain | EC- DAIS score |
|---|---|---|---|
| Present | 1.14+/-2.329 | 1.91+/- 3.666 | 3.05 +/- 5.474 |
| Absent | 0.55 +/- 1.422 | 0.65 +/- 2.009 | 1.19 +/- 2.009 |
| Total | 0.74 +/- 1.782 | 1.05 +/- 2.714 | 1.79 +/- 4.018 |

## Discussion

The present study evaluated the properties of the English version of EC-DAIS like knowledge, trust, behaviour, patterns and trends. It determines the validity and reliability using discriminant validity, internal consistency and test re-test reliability which is an essential component for cultural adaptation of any measure of quality of life. They record events occurring as a single snapshot. Studies assessing validation of quality of life scales enrol potential participation of children from schools, hospitals or community settings. Regarding validation from Jabarifer et al, Li et al and Lee et al enrolled participants from the community basis. Hospital based settings generally represent the picture from the tip of the iceberg.[1-3]

In the present study, EC-DAIS was constructed in the English language. Word modifications were done for a majority of questions and all items were retained from the original version and none of the items were deleted. [4-9] A series of words were replaced by a single synonym, focussing on the aspect to retain the concept. The modifications were based on linguistic and ethnic considerations. The modifications focussed to improve content validity and thereby to reduce false negative responses

Oliveira and Nadanovsky replaced "pain in the mouth "by tooth ache while validating the Brazilian version of OHIP.[4] Wong et al [5] replaced "self – conscious by "worried" in the Chinese version of OHIP.

The reliability analysis of EC-DAIS quality of life score sheet showed 0.850 in the child category, 0.777 in the parent category and 0.873 in the total category, which was well above the standards recommended for strong internal consistency (0.7-0.9) by Cronbach's alpha. [10-13]. It also indicates the link between the number of items and the homogeneity of the constructs and in turn the homogeneity of the population.

The inter- class correlation in the child category was 0.90, in the parent category was 0.60 and the total was 0.91, which is again within the recommended standards. Limitations inherent and pertaining to cross-sectional studies like not being able to assess the causal relationships were present in this study.

## Conclusion

The English version of EC-DAIS is a reliable and valid tool for assessing the DARQOL- Dental Anxiety Related Quality of Life among children in Chennai city. The use of this scale could help clinicians, researchers and policy makers to interpret the dental anxiety related issues. It can help the family members to plan their children's dental treatment challenges accordingly. It can help to compare and evaluate the anxiety status among children. Further studies need to be planned and conducted in future to compare and evaluate the characteristics of dental anxiety.

**Ethical Clearance**: This study was a short project.

Hence IEC could not be obtained, ethical issues were appropriately addressed as follows

4. Anonymity of subjects was ensured.

5. No pressure was exerted on the subjects to participate in the study and participation was completely voluntary.

6. Confidentiality of data was ensured. It was saved in password protected systems which had access only to investigators.

**Declaration of Interests** : The authors declare no conflicts of interest.

**Funding**: No funding was acquired for this study.

## References

1. Jabarifar SE, Golkari A, IJadi MH, Jafarzadeh M, Khadem P. Validation of a Farsi version of the early childhood oral health impact scale (F-ECOHIS). BMC Oral Health. 2010 Dec; 10(1):1-7.
2. Lee GH, McGrath C, Yiu CK, King NM. Translation and validation of a Chinese language version of Early Childhood Oral Health Impact Scale (ECOHIS).Int J Paediatr Dent 2009; 19: 399-405.
3. Li S, Veronneau J, Allison PJ. Validation of a French language version of the early childhood oral health impact scale (ECOHIS). Health and quality of life outcomes. 2008 Dec;6(1):1-7.
4. de Oliveira BH, Nadanovsky P. Psychometric properties of the Brazilian version of the Oral Health Impact Profile–short form. Community dentistry and oral epidemiology. 2005 Aug;33(4):307-14..
5. Wong MC, Lo EC, McMillan AS. Validation of a Chinese version of the oral health impact profile (OHIP). Community dentistry and oral epidemiology. 2002 Dec;30(6):423-30.5.
6. Esa R, Jamaludin M, Yusof ZY. Impact of maternal and child dental anxiety on oral health-related quality of life of 5–6-year-old preschool children. Health and quality of life outcomes. 2020 Dec;18(1):1-1.
7. Tipán Asimbaya LM, López Ramos RP, Borges Yáñez SA, Cabrera Arias MA. Cross-Cultural Adaptation and Validation of Early Childhood Oral Health Impact Scale in ecuadorian preschool children
8. Bhat SG, Sivaram R. Psychometric properties of the Malayalam version of ECOHIS. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2015 Jul 1;33(3):234..
9. Scarpelli AC, Oliveira BH, Tesch FC, Leão AT, Pordeus IA, Paiva SM. Psychometric properties of the Brazilian version of the early childhood oral health impact scale (B-ECOHIS). BMC oral health. 2011 Dec;11(1):1-1.
10. Martins-Júnior PA, Ramos-Jorge J, Paiva SM, Marques LS, Ramos-Jorge ML. Validations of the Brazilian version of the early childhood oral health impact scale (ECOHIS). Cadernos de saude publica. 2012;28:367-74.
11. Peker K, Uysal Ö, Bermek G. Cross-cultural adaptation and preliminary validation of the Turkish version of the Early Childhood Oral Health Impact Scale among 5-6-year-old children. Health and Quality of life Outcomes. 2011 Dec;9(1):1-1.
12. Barbosa TS, Gavião MB. Oral health-related quality of life in children: Part III. Is there agreement between parents in rating their children's oral health-related quality of life? A systematic review. International journal of dental hygiene. 2008 May;6(2):108-13.
13. Wong HM, McGrath CP, King NM, Lo EC. Oral health-related quality of life in Hong Kong preschool children. Caries research. 2011;45(4):370-6.