The Early Childhood Oral Health Impact Scale (ECOHIS): Assessment Tool in Oral Health Related Quality of Life

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Abstract

Oral health related quality of life (OHRQoL) defines as the physical and psychological satisfaction with oral health status and the condition of the teeth. The objective of this study was to quantify the impacts of oral health related quality of life among Malaysia preschool children and their caregivers by using Early Childhood Oral Health Impact Scale (ECOHIS). A cross-sectional survey was conducted among preschool children under 5 years old and below from IIUM dental clinic and preschools around Kuantan within 10 months from January until October 2016. This research was approved by the IIUM Research Ethic Committee (IREC). Inter-examiner reliability was tested with Kappa statistic (0.81). A clinical oral examination was performed and decayed-missing-filled teeth (dmft) was documented. Parents or caregivers answered and completed the ECOHIS questionnaire. Data were analyzed by structural equation modelling (SEM) using SPSS and Amos® package version 23.0 with significance level was set at $\propto <$ 0.05. 130 samples were analyzed. The mean of children's age and dmft were 4.22 and 3.98. Cronbach's alpha for ECOHIS was 0.900, respectively child and family sections were 0.880 and 0.843. Patient's age, ECOHIS and dmft were significantly associated ($p<0.05$). Age has statistically significant direct and indirect relationship with child psychological factor, family factor towards dmft.

Oral Health has an impact on quality of life in Malaysian preschool children and their caregivers. Full SEM proved ECOHIS as a tool for assessing the impact of oral disorder on quality of life of Malaysian preschool children in Kuantan.

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Introduction

Early childhood caries (ECC) is defined as the presence of one or more decayed (uncavitated or cavitated lesions), missing (due to caries), or filled surfaces in any primary tooth in any primary tooth in a preschool-age child between birth and 71 month of age.[1] ECC is believed to have significant impacts on children and their families. Hence, dental caries and treatment can affect negatively the oral health related quality of life (OHRQoL) of preschool aged children and their caregivers.[2] Hence, there are few OHRQoL tools have been developed to assess the impact of oral conditions on daily activities of children one of it is the ECOHIS (Early Childhood Oral Health Impact Scale). The Early Childhood Oral Health Impact Scale (ECOHIS) is a tool to capture the complex dimensions of preschool children's oral health.[2]

Since life quality has direct role in children's learning, activities and socialization, it is necessary to assess the oral health impact on child's and family's quality of life. On the account, the main objective of this research is to quantify the impacts of oral health related quality of life among Malaysian preschool. Meanwhile, the specific objectives of this research are as follow:

1. To assess the significant direct effect for relationship of age and sex towards dmft.
2. To assess the significant direct effect for

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relationship of age and gender towards ECOHIS.
3. To assess the significant effect for relationship between ECOHIS and dmft.
4. To assess the significant indirect effect for the relationship of age and gender towards dmft mediated by ECOHIS.

Methodology

This study is a cross-sectional descriptive and analytical study. Random sample of 130 preschool children aged five years and below enrolled in the Bandar Kuantan and Pediatric Department of IIUM dental clinic. The inclusion criteria consisted of at least one of the parents or caregivers with developmentally healthy children 5-year-old and below. The exclusion criteria consisted of special need children.

Face to face interview with one of the parents or caregiver of the children and deliver the ECOHIS questionnaires. Pilot study with 10 children and parents were conducted to test the feasibility of the methodology; these were not included in the final sample. The ECOHIS questionnaires comprised of 13 items divided into two main parts: child impact section and family impact section. The child impact section comprised of four domains: child symptom (1 item), child function (3 items), child psychology (3 items) and child self-image/social interaction (2 items). The family impacts section contained two domains: parental distress (2 items) and family function (2 items). The questionnaires have 6 response options: 0 = don't know, 1 = never, 2 = hardly ever, 3 = occasionally, 4=often, 5 = very often. The different score ranges for each domains were as follows: child symptoms, range 0-5; child function, range 0-15; child psychology, range 0-15; child self-image/social interaction, range 0-10; parental distress, range 0-10 and family function, range 0-10. Items scores are simply summing up to calculate total score. Then, the overall score ranged between 0 and 65 (0-45 for the child section and 0-20 for the family section). In our research, 'don't know' responses we followed the method of data scoring proposed in the original version, where 'don't know' responses were recorded as missing. For those with up to two missing responses on the child section or one missing response on the family section, we imputed the score for the missing items as the average of the remaining of the items for that section.[2] Parents with more than two missing responses in the child items and one family item were excluded from the analysis.

During the pilot test, calibration was done among the student researchers with the supervisor and intraclass correlation coefficient was checked. Intra-observer reliability test for student A and student B were 0.82 and 0.80 respectively. The intraclass correlation coefficients between supervisor and students for the dental charting were 0.82 for student A and 0.81 for student B. Then, both students calibrated with each other in the same way; the interclass correlation coefficient was 0.81. Table 1 shows internal consistency reliability was assessed on the full sample (n = 130) using Cronbach's alpha. The analysis revealed satisfactory internal consistency, with coefficient of 0.900 for total ECOHIS score which indicate very high, 0.880 in child impact section and 0.843 in family impact section which both interpreted high. For all measures coefficient alpha was above 0.7 which suggested that the measures were reliable.

Mediators	Items	Cronbach's alpha value
ECOHIS	13 items	0.900
Psychological factor	CSD - pain CFD1 - drink CFD2 - eat CFD3- pronouncing	0.790
Sociological factor	CPD1 - skipped class CPD2 - sleep CPD3- frustrated	0.813
Child Self-image factor	CSID1 - smile CSID2 - talking	0.881
Family factor	PDD1 - upset PDD2 - guilty FFD1 - time off FFD2 - financial	0.843

Table 1. Reliability statistics

Data was analyzed and organized using software Statistical Package for Social Science (SPSS Graduate Pack 23.0; SPSS Inc, Chicago, IL) version 23.0. SPSS 23.0 was used for the descriptive statistics and the correlation matrix. Analysis for the distribution of age and sex will presented using frequencies (n) and percentages (%).

Structural equation modelling (AMOS 23.0) was used to analyze the relationships among demographic factors, oral health impact

scale and Decay-Missing-Filled Teeth (DMFT) index. While multiple regressions is usually used for analyzing the relationships between observed variable and latent variable. Structural equation modelling is used for examining the relationships among latent variables. Since the purpose of this study is examining the associations among the five latent variables (symptoms, functions, psychological, sociological and family domain), structural equation modelling is an appropriate method in this study.

Ethical approval for the study was granted by IIUM Research Ethics Committee (IREC) on 22nd January 2016 (IREC 559). Permission for the selected preschool's inclusion in the study was obtained from head teachers and written positive consent was requested from parents and caregivers for the oral examination.

Results

The result was obtained from total 130 Malaysian preschool children in Kuantan participating in this study that fulfilled the inclusion and exclusion criteria. Analysis for the distribution of age and gender were presented using frequencies (n) and percentage (%). Finding in table 2 showed that the preschool children equally distributed between male and female which is 65 children for each gender. The most participating preschool children in this study is 5 years old that consist of 58 children (44.6%). The mean age of preschool children that participate in this study is 4.22. Figure 1 shows the dmft of the preschool children in Kuantan that participate in this study. Regarding the clinical status, 34.6% (n=45) had dmft = 0. The mean dmft score was 3.98. The higher scorer of dmft is 16.

Generally, this research is to study the direct and indirect relationship between demographic factors and dmft score mediated by ECOHIS items. Each 13 ECOHIS item has been categorized in four group which consist of child psychological factors (4 items), child sociological factors (3 items), child self-image factors (2 items) and family factors (4 items). Hence, figure 2 illustrate direct path in our model.

Profiles	n=130	%
Gender		
Male	65	50.0
Female	65	50.0
Age (years)		
1	1	0.8
2	6	4.6
3	15	11.5
4	50	38.5
5	58	44.6

Table 2. Demographic profile of the Malaysian preschool children in Kuantan

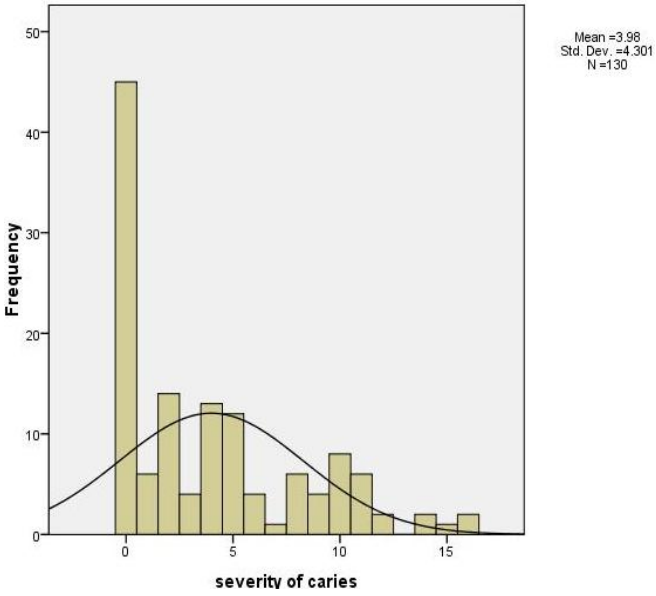

Figure 2. Theoretically proposed framework

Based on the conceptual framework (Figure 3), child self-image (CSID1 and CSID2), child sociological (CPD1 and CPD2) did not give significant relationship value and thus, was eliminated from the model framework (Figure 4).

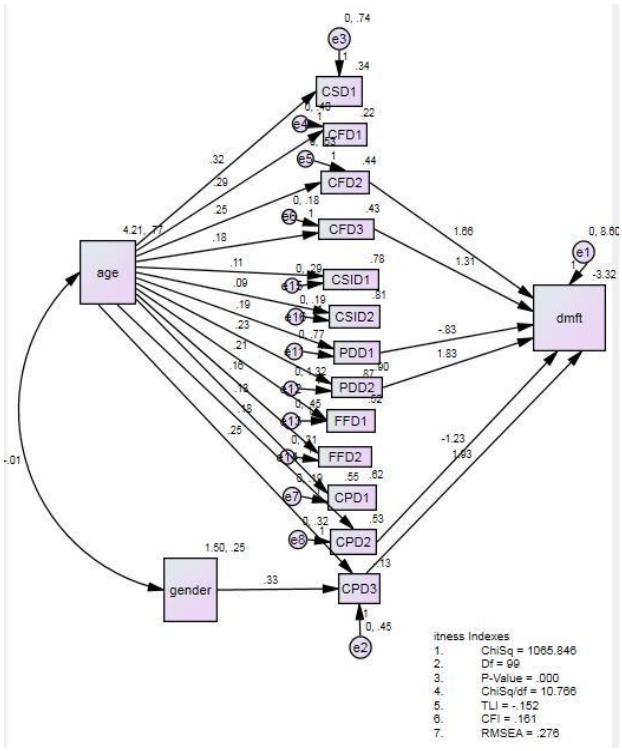

Figure 3. A draft model of independent variables (patient's background), mediators (ECOHIS) and dependent variables (dmft).

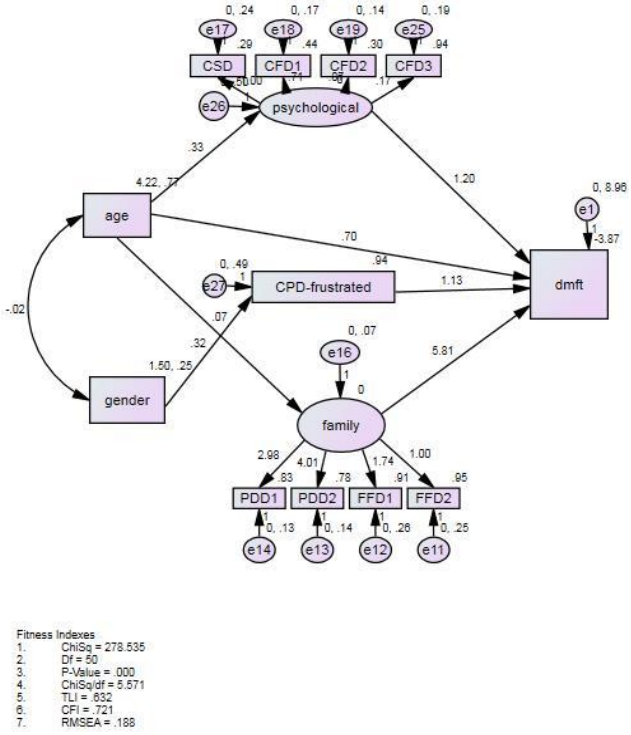

Figure 4. Full pathway structural equation model with significance relationship between age and gender, ECOHIS and dmft score.

The indirect and total effects were examined to interpret the effects on dependent variable (dmft) from other variables through indirect and all presumed ways, respectively. In this context the mediational approach has been used to explore the potential of one variable to mediate another. On figure 3, one interpretation that has been made in this report is that CSD, CFD1, CFD2, CFD3, PDD1, PDD2, FFD1, FFD2 and CPD3 which are significant relationship in both approaches to modelling is an indication of dmft.

From simple linear regression analysis result showed that:

1. Model H1: There was significant direct effect between age and dmft.
2. Model H2: There was no significant direct effect between gender and dmft
3. Model H3: There was significant direct effect between age and ECOHIS (child psychological and family factor).
4. Model H4: There was significant direct effect between gender and ECOHIS (CPD3).
5. Model H5: There was significant direct effect between ECOHIS and dmft.

From multivariate regression analysis result showed that:

Model H6: There was significant indirect effect for relationship of age and gender towards dmft mediated by the ECOHIS (child psychological, CPD3, and family factor).

Framework fitness indexes

Given the discrepancy between the parallel analysis and other factor retention methods, the CFI and RMSEA fit indices were examined as well. Results of the SEM yielded a CFI of < 0.3 and an RMSEA of > 0.10, whereas the SEM generated a CFI of 0.721 and an RMSEA of 0.188. Thus, the SEM solution provided better fit with the data and fell within the appropriate cut-offs for these indices (Raykov, 1998; Yu, 2002).

Based on the table 3, summary for p value of model hypothesis were shown.

	Model hypothesis (H)			P value
H^1	Age	dmft		0.039
H^2	Gender	dmft		0.291
H^3	Age	Child Psychological		0.000
	Age	Family Factor		0.028
H^4	Gender	CPD3 (sociological)		0.009
H^5	Child Psychological	dmft		0.004
	Family Factor	dmft		0.000
	CPD3 (sociological)	dmft		0.002
H^6	Age	Child Psychological	dmft	0.000
	Age	Family Factor	dmft	0.000
	Gender	CPD3	dmft	0.000

Table 3. Regression analysis

Discussion

Oral health related quality of life (OHRQoL) measure is the best measure to investigate the oral healthcare and proven valuable in assessing oral health needs, especially among adult populations. In recent years, OHRQoL measures have been designed for child population which one of them is early childhood oral health impact scale (ECOHIS). Most questionnaires have been drafted in native languages and adapted for use in other countries such as in Malaysia,[3] Brazil,[4] Turkey,[5] Farsi,[6] and French.[7] The ECOHIS consists of child and family impact sections with a total of 13 items.

Numerous studies have been published regarding impact of oral and dental health on quality of life in children and their families such as in Trinidad,[8] Iran,[9] Brazil,[10] Tanzania and Uganda.[11] However, only one study was found regarding ECOHIS in Malaysian populations. Thus, this study was carried out to determine the demographics of preschool children under 5 years old around Kuantan in relation towards ECOHIS and decayed-missing-filling teeth (dmft).

Children under age 5 years old may experiences many oral health problems such as dental pains, early childhood caries (ECC) and dental trauma. According to Nemati *et al* (2016), poor oral health makes difficult and trouble in pronouncing words or speaking, eating, sleeping and has negative effect on facial appearance.[23] Hence, it may make the children to be absent from school. Moreover, they are unable to express their feeling, pain or discomfort regarding oral health conditions. ECOHIS questionnaires are completely dependent on parents' understanding of their children's health and disease. Later, it may affect the respond in ECOHIS questionnaires that answered by parents.

From the results obtained, mostly children between age 4 years old (n=50) and 5 years old (n=58) were participate in this study. MD. Yunus (2013) stated that Ministry of Education Malaysia have guidelines for curriculum for children 4 to 6 years old, and have no specific curriculum guidelines for children under age of 4 years old.[12] In Malaysia, by age 4 until 6 years old, the children will enter the preschool either in public sector or private sector. According to National Oral Health Survey of School Children 2007, 74.5% children of 6 years old experience caries of deciduous dentition and the mean dmft score is 3.9. In Malaysia, the prevalence of dental caries in children below the age of 5 years is 76.2% (Ministry of Health Malaysia, 2005) which is far from the WHO oral health goal of 50% caries free in this age group. Ministry of Health 2003 in guidelines on oral healthcare for preschool children, having caries 5 or more teeth is high in rural area (65.2%) if compare with urban area (43.7%).[13] As the result in this study, the mean dmft score is 3.98 and higher dmft score is 16. About 46 children in this study having dmft score of zero. In consequence, it exhibit the children's oral and dental health status is poor as the WHO oral health goal of 50% caries free is still far to be achieved.

The analysis revealed satisfactory internal consistency, with coefficient of 0.900 for total ECOHIS score which indicate very high, 0.880 in child impact section and 0.843 in family impact section which both interpreted high. This indicate that it is a valid instrument when used by Malaysian caregivers of children 5 years old and below to describe the oral health impact experienced by their children.

According to Prakash *et al* (2012), caries prevalence increased significantly with age as by increasing the age, number of erupted deciduous teeth is increased and exposed to oral

environment and cariogenic challenge.[14] Besides that, as children grow older there is change in the dietary habits and hygiene practices. Thus, it concurrent with the result stated that there was significant direct effect for relationship of age toward dmft.

Based on gender, it is equally divided among male and female which is 50% for each gender. There was no direct relationship between genders toward dmft. This is because, gender not play big role in determine the dmft score as there was no differences in nutrition, hormonal changes, oral hygiene and parental care in preschool children.[15]

This study also exhibit age has statistically direct and indirect significant relationship mediated by the impact of oral health and dental health on children's quality of life especially in psychological and functional impact towards dmft. It consistent with the other studies in which the quality of life exhibited a significant relationship with age.[7,15] By increasing the age, the impact of oral health on the quality of life also increased. Previous studies stated that most parents or caregivers of children with severe caries complained that their children had reduce in quality of life because of toothache, had problems eating certain foods, were absent from school, ashamed to smile, and stopped playing with other children because of their teeth.[16]

This study also shows a significant relationship between family impacts with dmft. This was supported by other studies that experienced in impact of oral and dental health on quality of life in preschool children and their families.[9,10] However, according to Clementino *et al* (2015), dental caries have no relationship toward the oral health related quality of life of both children and their families.[17]

Parents' guilty increase when their children experience oral health problems that require treatment such as dental caries or dental trauma.[18] Parents are responsible for their children health care and poor oral health may cause feeling of guilt. Commonly dental pain may cause parental guilt as the present of pain in their children is to be a sign of poor oral health status. Other studies also show that family factor may affect by the oral and dental health of preschool children.[3,9,19,20]

This study has a few limitations. Mostly children 4 to 5 years old were participate in this study although the scale was developed for children 5 years old and below. This may due to 1 to 3 years old children is difficult to reach in Malaysia as majority of them stay at home while only a minority attend day care centers. Besides, not all parents give positive feedback and good commitment in answering the ECOHIS questionnaires. In this case, it will be excluded from data. Similarly, not all preschool in Kuantan give approval to conduct this research for their children. However, it does not seem have big disruptions in study outcomes.

Conclusion

The results of this study indicated that the oral and dental health has a significant impact on quality of life in Malaysian preschool children and their caregivers. In addition, the results indicated that the age has direct and indirect significant relationship with dmft and ECOHIS. However, gender did not exhibit direct significant relationship towards dmft but it does show indirect significant relationship toward dmft through children sociological factor (CPD3). Full SEM proved ECOHIS as a tool for assessing the impact of oral disorder on quality of life of Malaysian preschool children in Kuantan.

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Declaration of Interest

The authors report no conflict of interest.

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