

ECC Status, CRAFT Categorization and OHRQoL Assessment in 3–6-year-old Children: A Cross-sectional Study

Chitra R Iyer¹, Ashwin M Jawdekar²

ABSTRACT

Introduction: Early Childhood Caries (ECC) can affect the health and quality of life of the children. Assessing a patient's risk of developing caries is an important aspect of caries management; however, can assessing the caries risk predict the impact of ECC on the OHRQoL? Few Indian studies have reported association between caries status, risk, and the impact on OHRQoL.

Aim: To assess the association between dental caries status, risk assessment, and OHRQoL in 3–6-year-old children.

Methodology: A total of 50 healthy children were recruited in a cross-sectional study. Parents filled the ECOHIS questionnaire. Caries status, risk, and OHRQoL were measured as dmft-pufa, CRAFT (Caries Risk Assessment for Treatment- an indigenous tool) and ECOHIS scores, respectively.

Results: Moderate correlation was seen between dmft and ECOHIS scores ($r = 0.496, p < 0.01$), and pufa and ECOHIS scores ($r = 0.408, p < 0.05$). More number of subjects with higher scores of ECOHIS were in the high-risk category of CRAFT ($p < 0.05$).

Conclusion: Caries status, risk and OHRQoL were associated in 3–6-year-old children. Thus, caries risk assessment may predict poor OHRQoL.

Keywords: Caries risk assessment, Dental caries, Impact of dental caries, Oral health related quality of life.

International Journal of Clinical Pediatric Dentistry (2021): 10.5005/jp-journals-10005-2219

INTRODUCTION

Despite the advancement in dental caries prediction, and the disease being preventable, Early Childhood Caries (ECC) continues to remain a global health burden, demanding more effective preventive strategies.¹ ECC is reported to be the most common chronic childhood disease with approximately 1.8 billion new cases arising per year globally.² ECC is defined as the presence of ≥ 1 decayed, missing (due to caries), or filled tooth surface in primary teeth in a child 71 months of age or younger.³ Effects of dental caries are not only pertaining to the tissues involved but are far-fetched. The impacts reported range from inability to eat, inadequate nutrition, difficulty sleeping, school absences, inability to concentrate in school, reduced self-esteem, poor social relationships to impaired speech development; thereby affecting the overall growth and cognitive development of the child.⁴ The impacts extend to the family as well resulting in, sleepless nights, lost workdays for caregivers adding to the financial burden on the family. Untreated dental caries thus can exert significant negative impacts on the quality of life (QoL).⁵

Steady accumulation of evidence pertaining to dental caries has led to unambiguous conclusions that caries management must be "risk-based." Caries Risk Assessment (CRA) is "prediction of future caries based on the diagnosis of current disease by evaluation of risk and protective factors for making evidence-based clinical decisions."⁶ Risk assessment is a valuable tool for the prevention and management of dental caries. There are a number of risk assessment tools available but none validated for the Indian population.

CRAFT—"Caries Risk Assessment For Treatment":⁷

CRAFT is an indigenously developed tool for ascertaining the caries-risk in children by interviewing the parents. It is a simple, economic, chair-side tool with the focus on four major parameters namely diet, fluoride exposure, decay, and other factors. Each of the aforementioned parameters has a set of questions with Yes/No

¹Department of Pediatric and Preventive Dentistry, Y.M.T. Dental college and Hospital, Navi Mumbai, Maharashtra, India.

²Department of Pediatric and Preventive Dentistry, Bharati Vidyapeeth Dental College and Hospital, Navi Mumbai, Maharashtra, India

Corresponding Author: Chitra R Iyer, Department of Pediatric and Preventive Dentistry, Y.M.T. Dental college and Hospital, Navi Mumbai, Maharashtra., India, +91 9930286648, e-mail: drchitraiyer@gmail.com

How to cite this article: Iyer CR, Jawdekar AM. ECC Status, CRAFT Categorization and OHRQoL Assessment in 3–6-year-old Children: A Cross-sectional Study. *Int J Clin Pediatr Dent* 2021;xx(xx):1–6.

Source of support: Nil

Conflict of interest: None

response. Depending upon the data fed in by the parents, caries risk can be determined over a range (very low, low, moderate, and high), where a green star is indicative of "safety" and red for "risk." Gleaned from the risk, suitable recommendations implicating on age-appropriate home-based measures are provided.

Traditional treatment approaches have been based largely on the "normative needs," though the treatment-seeking behavior of patient is based on "perceived needs." Though 50% of the early childhood population suffers from caries, triggers like pain and lack of sleep are the major reasons to seek treatment.⁸ Dental needs are simply calculated by converting clinical normative data into amounts of needs. Appropriately assessed population needs reflect upon the effectiveness of the dental care. Therefore, rather than based almost entirely on normative needs, a broader perspective of "health" and "need" is recommended when assessing needs to obtain the best treatment outcomes.⁹ Also, the improvement of the QoL through better functioning and psychosocial well-being should be the greatest goal of dental care.¹⁰ This visionary led to the development of Oral Health Related Quality of Life (OHRQoL) indicators.

The concept of OHRQoL implies the impact that oral problems have on the performance of activities of daily living, well-being, and QoL.¹¹ Assessment of OHRQoL in different populations will aid in superior understanding of the oral health problems and design public health programs and strategies directed at prevention and treatment.¹² Studies on QoL in infants and preschoolers have been based on questionnaires answered by their caregivers.

The questionnaire Early Childhood Oral Health Impact Scale (ECOHIS) was developed and validated in USA to measure the impact of oral health of children under 5 years old from a family standpoint. Validation of ECOHIS for the Indian population in regional languages like Hindi^{13,14} and Malayalam¹⁵ have been reported. Despite its importance, OHRQoL, has never been systematically used for the needs assessment. The need for an integrated "SOCIODENTAL" approach where the "needs meet the services" highlights the importance of including the QoL measures in comprehensive assessment. This paper aims to integrate the risk and impact on QoL with an objective to assess the association between dental caries status, risk assessment, and OHRQoL in 3–6-year-old children.

MATERIALS AND METHODS

A cross-sectional study was conducted to examine children aged 3–6 years reporting to the Department of Paediatric and Preventive Dentistry. Ethical clearance was obtained from the institutional review board. Consent was obtained from the parents of children participating in the study. Being a preliminary study, 50 healthy child-parent pairs were administered the ECOHIS questionnaire to assess the OHRQoL. The questionnaire (ECOHIS) measures the impact of oral health of children from a family standpoint. It is a 13-point questionnaire with six domains: nine questions about parents' perception of the impact of oral health on the children and four questions regarding the impact on the

family. Each question is provided with three quantifiable options: Never, Occasionally, Often thus having a maximum score of 6 and minimum of 0 (Fig. 1). The caries status was assessed using dmft and pufa indices. All the children were examined by a single calibrated examiner with caries threshold set at ICDAS (International Caries Detection and Assessment System) score II. The caries risk was assessed using the digital tool APP4CARIES and graded as Low, Moderate, and High (Fig. 2 and 3). The parents/guardians of all the fifty children were asked to complete the CRAFT assessment in entirety.

Variables

Both CRAFT and ECOHIS scores were recorded as categorical variables. dmft and pufa were measured as continuous, quantitative variables.

Statistical Analysis

Data obtained was compiled on a MS Office Excel Sheet (v 2010) and was subject to statistical analysis using Statistical Package for Social Sciences (SPSS v 21.0, IBM). Comparison of frequencies of categories of variables like dmft, pufa, and ECOHIS score with CRAFT score has been done using Chi-square test and ordinal association by Kendall Tau-b. For all the statistical tests, $p < 0.05$ was considered to be statistically significant, keeping α error at 5% and β error at 20%, thus giving a power to the study as 80%.

RESULTS

Of the 50 children, 17 were boys with the mean age of the participants was 4.61 years. The mean dmft score was 10.21 and pufa score was 4.61. The mean ECOHIS score was 4.42 (Table 1).

About 46%²³ of the participants reported High CRAFT scores, 40%²⁰ had Moderate, and 14 %⁷ had Low CRAFT scores.

CHILD SYMPTOMS DOMAIN	Never	Occasionally	Often
<ul style="list-style-type: none"> How often as your child had pain in teeth, mouth or jaw 			
CHILD FUNCTION DOMAIN How often has your child... <ul style="list-style-type: none"> Had difficulty in breathing hot/cold breathing Had difficult eating food Had difficulty in pronouncing words Missed pre-school/ day-care/ school 			
CHILD PSYCHOLOGICAL DOMAIN <ul style="list-style-type: none"> Had trouble sleeping Been irritated/ frustrated 			
CHILD SELF- IMAGES/ SOCIAL INTERACTION DOMAIN <ul style="list-style-type: none"> Avoided smiling/ laughing due to bad breath/ pain/ discoloured/ broken teeth Avoided talking 			
PARENT DISTRESS DOMAIN <ul style="list-style-type: none"> How often have you been upset of dental problems/ treatments How often have you been guilty of dental problems treatments? 			
FAMILY FUNCTIONS DOMAIN How often have you / your family taken time off work <ul style="list-style-type: none"> How often has your child had dental problems/ treatments had a financial impact on the family 			

Fig. 1: ECOHIS Questionnaire

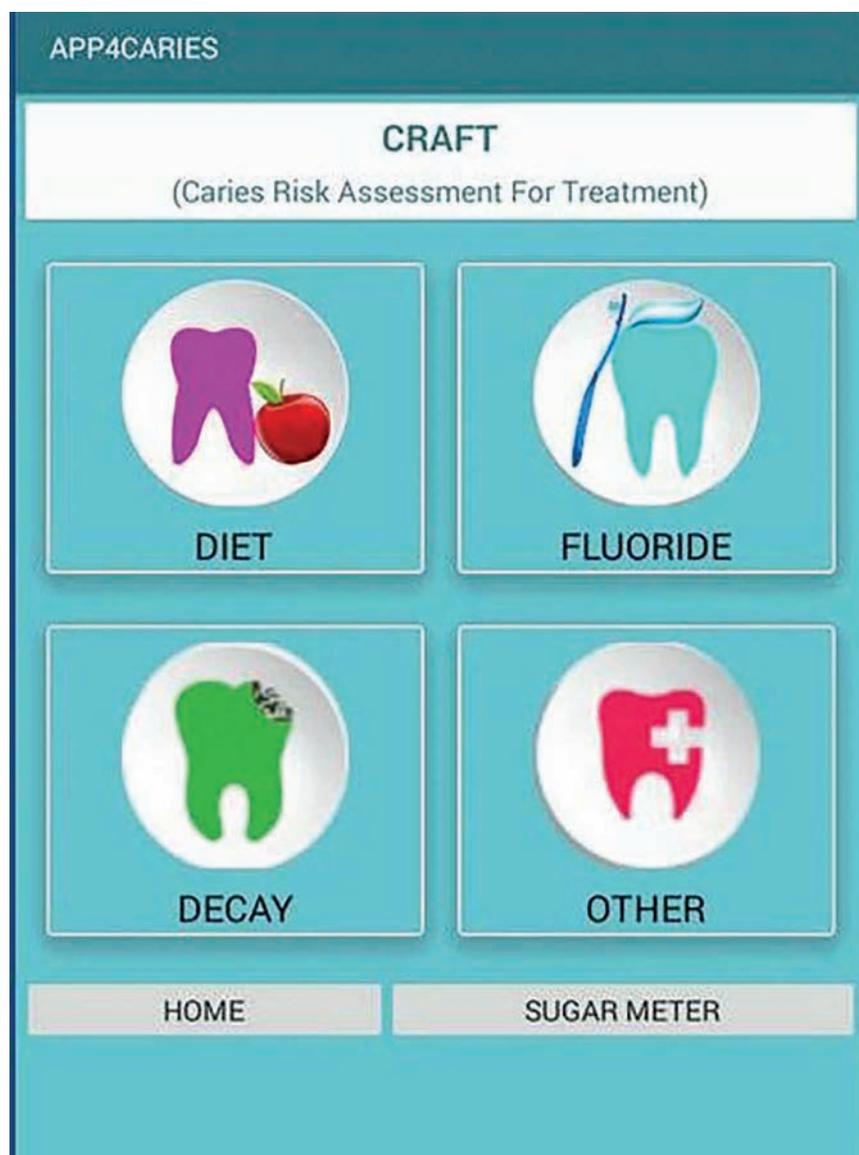


Fig. 2: CRAFT digital tool APP4CARIES (screenshot)

Table 1: Characteristics and baseline scores of the study population

Parameters	N	Min	Max	Mean	SD
Age	50	3	6	4.61	0.96
dmft	50	5	16	10.21	3.07
pufa	50	1	8	4.61	1.98
ECOHIS	50	0	6	4.42	1.60

About 34%¹⁷ of the participants reported maximum ECOHIS score of 6 whereas 4%² had the lowest ECOHIS score of 1.

There was no statistically significant association between CRAFT and dmft ($p = 0.067$) and CRAFT and pufa scores ($p = 0.237$) (Fig. 4 and 5).

There was a moderate correlation between dmft and ECOHIS score ($r = 0.496$, $p < 0.01$) (Fig. 6) and pufa and ECOHIS score ($r = 0.408$, $p < 0.05$) (Fig. 7). Statistically significant difference was seen for the frequencies of categories of ECOHIS score with various grades of CRAFT ($p < 0.01$) with higher number of participants with higher ECOHIS scores being in High risk category of CRAFT (Fig. 8).

DISCUSSION

The study conducted in the Department of Pediatric and Preventive Dentistry included children between 3 and 6 years belonging to Navi Mumbai region. By this age all the primary teeth are erupted and dietary habits are established to a great extent. Understanding and predicting dental caries has been a long-standing challenge for both the clinicians and researchers.¹⁶ The multifactorial etiology of the disease necessitates the combination and evaluation of multiple factors.¹⁷ Assessing the clinical status, estimating the caries risk and identifying the needs and the impact on the QoL of the child, provides a panoramic image of the case for successful treatment and preventive strategies.

The present sample exhibited a high prevalence and severity of dental caries. Caries threshold was set to ICDAS II (first visual change in enamel) so as to prevent subjective variation in the assessment of dental caries. The dmft index only provides information on caries and treatment experiences only (extraction and restoration of decayed teeth), but fails to provide information on clinical consequences of untreated dental caries, severity of

APP4CARIES

Your risk is High



Diet



Fluoride



Decay



Other

CLICK HERE FOR RECOMMENDATIONS

CRAFT
SUGAR METER

APP4CARIES

RECOMMENDATIONS

- * Reduce sugar intake to less than 2 exposures per day and preferably at meals.
- * Stop bottle-feeding.
- * Consider non-syrupy medicines (consult doctor).
- * Use age-appropriate fluoride toothpaste and mouthrinse and receive 6 monthly fluoride applications (consult your dentist).
- * Take treatment for any untreated cavities (consult your dentist) for yourself and your child.
- * Consult your physician/ specialist for recurrent illnesses.
- * Strengthen the child's teeth with remineralizing agents (consult your dentist for the same).
- * Use hydrating agents or sugar-free chewing gums.(consult your dentist).
- * Have the alignment of teeth corrected (consult your dentist)

CRAFT
SUGAR METER

Fig. 3: CRA score and recommendations

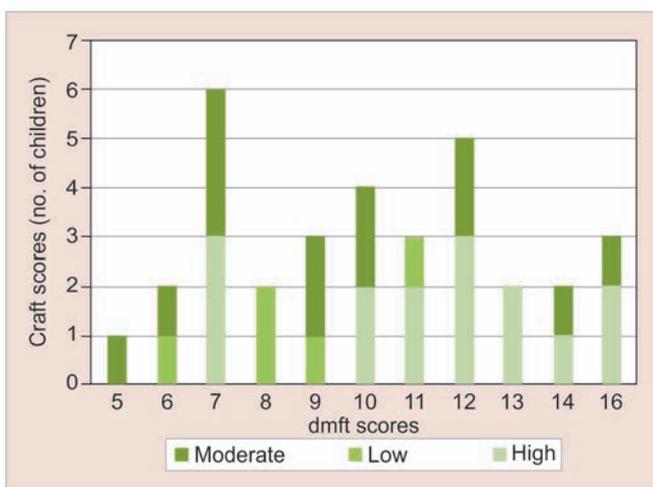


Fig. 4: Association between dmft and CRAFT scores

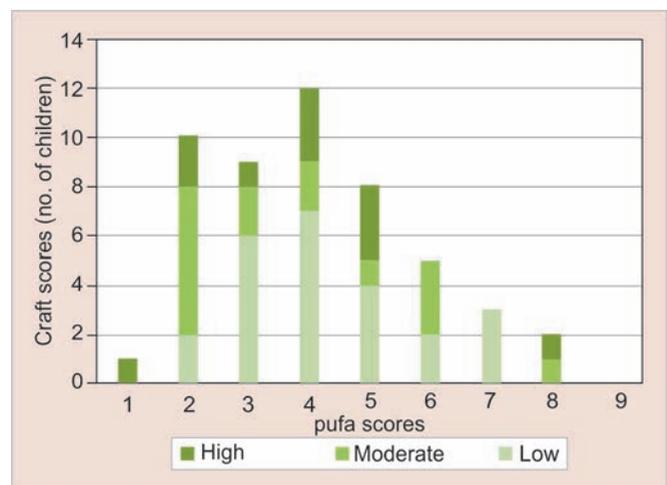


Fig. 5: Association between pufa and CRAFT scores

the infection and leads to overestimation of an individual's caries experience.¹⁸ The pufa index attempts to complement the dmft index and records the consequences of a carious lesion.¹⁹

Assessing a patient's risk of developing caries is a vital component of caries management. The present study made use of the CRAFT tool. A comprehensive caries assessment should

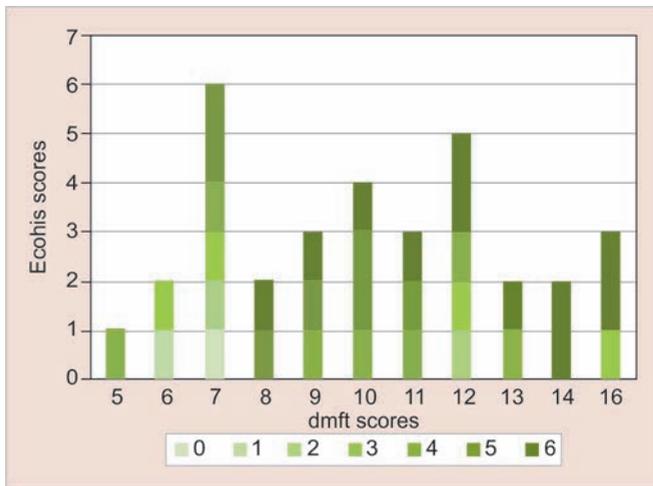


Fig. 6: Association between dmft and ECOHIS score



Fig. 7: Association between pufa and ECOHIS score

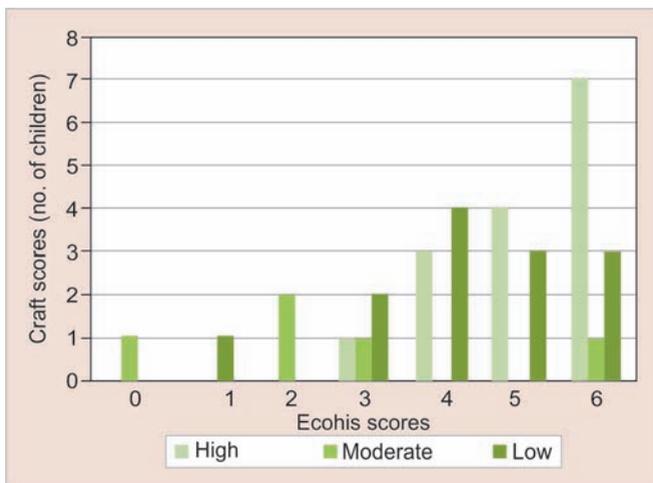


Fig. 8: Association between caries risk assessment and ECOHIS score

consider factors such as past and current caries experience, diet, fluoride exposure, presence of cariogenic bacteria, salivary status, general medical history, behavioral and physical factors, and medical and demographic characteristics that may affect caries development.²⁰ CRAFT’s four domain approach involves majority of these etiologic factors along with being a simple, economic, noninvasive, and chair-side tool. The present study reported that the association between caries risk and caries status was not significant. This could be attributed to the lack of inclusion of salivary parameters and microbiological indicators. However, a study conducted by Thakur et al. reported a high correlation between CRAFT and Alban scores (Spearman’s Rho = 0.874; $p < 0.001$), discounting the need for microbial testing.⁷

Quality of life used to be considered a vague, insubstantial concept. The new sociodental approach combines the standard and OHRQoL measures so that the dental services correspond to the health needs and focus lays on improving the QoL.¹⁰ The ECOHIS has been shown to be a sensitive, valid, and reliable tool when applied to children.²¹ The relationship between the ECOHIS scores and dental caries was in the expected direction, that is, severe the caries status, higher the ECOHIS scores. This is in accordance to studies conducted by Banihani et al.⁴ and Li et al.²¹ There is overwhelming amount of evidence that dental caries has a significantly negative impact on the QoL.⁵ This study aimed at identifying association between risk assessment and impact on QoL. Statistical analysis reported significant association between risk assessment and ECOHIS score, wherein children with “High” risk exhibited higher ECOHIS scores.

“Caries management must be risk based”²² and target at improving the QoL.²³ If risk assessment can predict the OHRQoL it can be a valuable tool in motivating the parents and children to participate in preventive programs. The association between CRAFT and ECOHIS scores confirms that risk assessment can predict the impact on QoL. Children with a sociodental need can thus be prioritized for treatment depending upon both their risk and impact on QoL.

Limitations

This being a preliminary study, we used a nonprobabilistic sample. The study findings have limited generalizability to similar settings and populations. Multicentric studies on a large sample are needed to further substantiate this claim.

CONCLUSION

In this study a moderate association was seen between caries status and its impact on OHRQoL. Also, a significant association was seen between caries risk assessed using CRAFT and its impact on OHRQoL of 3–6-year-old children. The sociodental approach combining OHRQoL and caries risk assessment with the standard clinical measures comes closer to the current concepts of health, where the overall well-being of an individual is the ultimate goal.

REFERENCES

1. Xiao J, Alkhers N, Kopycka-Kedzierawski DT, et al. Prenatal oral health care and early childhood caries prevention: a systematic review and meta-analysis. *Caries Res* 2019;53(4):411–421. DOI: 10.1159/000495187
2. Dye BA. The global burden of oral disease: research and public health significance. *J Dent Res* 2017;96(4):361–363. DOI: 10.1177/0022034517693567

3. Drury TF, Horowitz AM, Ismail AI, et al. Diagnosing and reporting early childhood caries for research purposes. A report of a workshop sponsored by the National Institute of Dental and Craniofacial Research, the Health Resources and Services Administration, and the Health Care Financing Administration. *J Public Health Dent* 1999;59(3):192–197. DOI: 10.1111/j.1752-7325.1999.tb03268.x
4. BaniHani A, Deery C, Toumba J, et al. The impact of dental caries and its treatment by conventional or biological approaches on the oral health-related quality of life of children and carers. *Int J Paediatr Dent* 2018;28(2):266–276. DOI: 10.1111/ipd.12350
5. Sajadi FS, Pishbin L, Azhari SH, et al. Impact of oral and dental health on children's and parents' quality of life based on Early Childhood Oral Health Impact Scale (ECHOIS) Index. *Int J Dent Sci Res* 2015;3(2):28–31. DOI: 10.12691/ijdsr-3-2-2
6. Young DA, Featherstone JD. Caries management by risk assessment. *Community Dent Oral Epidemiol* 2013;41(1):e53–e63. DOI: 10.1111/cdoe.12031
7. Thakur JH, Subhadra HN, Jawdekar A. Evaluation of CRAFT as a tool for caries risk assessment in 3-to 6-year-old children and its validation against Alban's test: a pilot study. *Int J Clin Pediatr Dent* 2019;12(6):538–542. DOI: 10.5005/jp-journals-10005-1698
8. Davies MJ, Spencer AJ, Slade GD. Trends in dental caries experience of school children in Australia-1977 to 1993. *Aust Dent J* 1997;42(6):389–394. DOI: 10.1111/j.1834-7819.1997.tb06083.x
9. Gherunpong S, Sheiham A, Tsakos G. A sociodental approach to assessing children's oral health needs: integrating an oral health-related quality of life (OHRQoL) measure into oral health service planning. *Bull World Health Organ* 2006;84(1):36–42. DOI: 10.2471/blt.05.022517
10. Gherunpong S, Tsakos G, Sheiham A. A sociodental approach to assessing dental needs of children: concept and models. *Int J Paediatr Dent* 2006;16(2):81–88. DOI: 10.1111/j.1365-263X.2006.00701.x
11. Slade GD, Reisine ST. The child oral health impact profile: current status and future directions. *Community Dent Oral Epidemiol* 2007;35(Suppl 1):50–53. DOI: 10.1111/j.1600-0528.2007.00405.x
12. Sheiham A, Tsakos G. Oral health needs assessments. *Community Dent Oral Epidemiol* 2007;35(Suppl 1):50–53. DOI: 10.1111/j.1600-0528.2007.00405.x
13. Ghanghas M, Manjunath BC, Kumar A, et al. Validation of the Hindi version of the early childhood oral health impact scale among 3–5-year-old preschool children in Rohtak city, Haryana. *J Indian Soc Pedod Prev Dent* 2019;37(4):333–338. DOI: 10.4103/JISPPD.JISPPD_128_18
14. Mathur VP, Dhillon JK, Logani A, et al. Development and validation of oral health-related early childhood quality of life tool for North Indian preschool children. *Indian J Dent Res* 2014;25(5):559–566. DOI: 10.4103/0970-9290.147078
15. Bhat SG, Sivaram R. Psychometric properties of the Malayalam version of ECHOIS. *J Indian Soc Pedod Prev Dent* 2015;33(3):234–238. DOI: 10.4103/0970-4388.160398
16. Twetman S, Fontana M. Patient caries risk assessment. In *Detection, assessment, diagnosis and monitoring of caries 2009* (Vol. 21, pp. 91–101).
17. Abanto J, Celiberti P, Braga MM, et al. Effectiveness of a preventive program based on caries risk assessment and recall intervals on the incidence and regression of initial caries lesions in children. *Int J Paediatr Dent* 2015;25(4):291–299. DOI: 10.1111/ipd.12144
18. Singhal DK, Singla N. Severity and clinical consequences of untreated dental caries using PUFA index among schoolchildren in Udupi Taluk, India. *J Orofac Sci* 2018;10(1):19–23. DOI: 10.4103/jofs.jofs_62_17
19. Monse B, Heinrich-Weltzien R, Benzien H, et al. PUFA—an index of clinical consequences of untreated dental caries. *Community Dent Oral Epidemiol* 2010;38(1):77–82. DOI: 10.1111/j.1600-0528.2009.00514.x
20. Fontana M, Zero DT. Assessing patients' caries risk. *J Am Dent Assoc* 2006;137(9):1231–1239. DOI: 10.14219/jada.archive.2006.0380
21. Li MY, Zhi QH, Zhou Y, et al. Impact of early childhood caries on oral health-related quality of life of preschool children. *Eur J Paediatr Dent* 2015;16(1):65–72. PMID: 25793957.
22. Featherstone JD. The caries balance: the basis for caries management by risk assessment. *Oral Health Prev Dent* 2004;2(Suppl 1):259–264. PMID: 15646583.
23. Petersen PE. Global policy for improvement of oral health in the 21st century—implications to oral health research of World Health Assembly 2007, World Health Organization. *Community Dent Oral Epidemiol* 2009;37(1):1–8. DOI: 10.1111/j.1600-0528.2008.00448.x