ORAL HYGIENE INDEX FOR CHILDREN (OHI-C)

INDEX

INTRODUCTION

Oral health is an important aspect of general health [1]. The teeth and mouth are an integral part of the body, supporting and enabling essential human functions. [2] Despite being largely preventable, oral diseases are highly prevalent conditions, affecting more than 3·5 billion people around the world.[2] Poor oral hygiene is one of the primary causes of commonly prevalent dental diseases such as dental caries and gingivitis. Children, due to their limited manual dexterity and skills commonly find it challenging to maintain adequate oral hygiene thereby making them more susceptible to these oral diseases. Consequences of dental diseases in children may include pain, discomfort, embarrassment, challenged cognitive development, reduced self-esteem, and impairments of daily life activities.[3] Severe caries in young children are associated with underweight, poor growth, irritability, higher risk of hospitalization, disturbed sleeping, and diminished learning ability.[4] Oral hygiene represents measures taken to keep the mouth clean and healthy by maintaining plaque- and calculus-free tooth surfaces.[5] Improper oral health care and altered dietary patterns interrupt the microbial homeostasis within the oral cavity, promoting biofilm formation which is responsible for oral diseases such as dental caries and gingivitis. In children, dietary intake of sugars and carbonated soft drinks combined with poor oral hygiene are important factors that promote an environment conducive to bacterial activity and biofilm (plaque) formation.

A number of examination systems for assessing the oral hygiene of individuals have been introduced by various authors [6,7,8,9,10,11,12,13] yet oral hygiene index remains the most popular index used for studying oral hygiene in children.[14,15,16,17,18] . The original Oral Hygiene Index (OHI) is considered as "a sensitive, simple method for assessing group or individual oral hygiene quantitatively."[12]

Oral Hygiene Index (OHI) proposed by John C. Greene and Jack R. Vermiliion included all completely erupted permanent teeth.[11] While a modification of OHI, the Simplified

form of **Oral Hygiene Index (OHI-S)** clearly reflects upon the advantages of examining specific permanent index teeth, thereby reducing the discrepancy in the process of decision making at examiner's end as well as the time required for the inspection. But no such exclusive indices for the assessment of oral hygiene of children with primary or mixed dentition have been proposed till now in the literature.

The development of a simple quantitative assessment tool with definitive criteria and maximum inter and intra examiner reproducibility for examining the oral hygiene status of children is necessary.

This index can be used for studying the epidemiology of oral hygiene in children and conductance of oral hygiene surveys in school. It will also aid in the evaluation of the efficiency of toothbrushing and different oral hygiene products in market. Interpretations obtained from this index can prove to be useful in the assessment of the effects of oral health education and awareness programmes thus assisting in motivation of patients as well as parents.

With this need in mind, we introduce a novel method for quantifying oral hygiene status of children with primary and mixed dentition which is a modification in OHI-S index. Detailed criteria for "Oral Hygiene Index for Children (OHI-C) " has been proposed. This index is easy to perform and less time consuming. Also, the interpretations are formulated for easy comprehension by both the child and parent.

METHODOLOGY

To make this index simple and less time consuming, instead of examining all the erupted teeth, only index teeth are examined.

The six index teeth are,

16/55- Maxillary right permanent first molar or Maxillary right primary second molar

11/51- Maxillary right permanent central incisor or Maxillary right primary central incisor

26/65- Maxillary left permanent first molar or Maxillary left primary second molar

36/75- Mandibular left permanent first molar or Mandibular left primary second molar or

31/71- Mandibular left permanent central incisor or Mandibular left primary central incisor

46/85- Mandibular right permanent first molar or Mandibular right primary second molar

Note- The permanent teeth are functional for a lifetime and thus are fundamentally more important when compared to the primary teeth. Further, the permanent molars are positioned more distally in the arch, which often limits the accessibility during routine oral hygiene measures making them more prone to decay. Hence, the permanent index teeth when erupted more than 1/3rd are given preference over the primary index teeth for recording.

Rules:

1. This index is applicable for examining the oral hygiene of children with primary and mixed dentition.
2. In case of mixed dentition, permanent index tooth (if erupted more than 1/3rd) is given preference over the primary index tooth.
3. For each index tooth, assessment of both buccal/labial and lingual surfaces of clinical crown is done following which the surface with a higher score is taken into consideration.
4. If index tooth is missing/ not more than 1/3rd of clinical crown present, then the adjacent tooth (primary/ permanent) of the same type in that quadrant is examined.

   e.g.- If maxillary right (primary/permanent) central incisor is missing, then maxillary lateral incisor is taken into consideration.

5. If the adjacent tooth of the same type fails to qualify for the index criteria or is missing, score for that index tooth is not recorded.

   e.g.- If both maxillary right central and lateral incisors (primary/ permanent) do not have more than 1/3rd of clinical crown present or the teeth are missing, then the value is mentioned as N. A. (Not Applicable).

Instruments used:

Mouth mirror, Short shank spoon excavator

EXAMINATION METHODS AND SCORING SYSTEM

Oral examination should start from first quadrant proceeding to second, third and fourth quadrant in clockwise manner. For the assessment of plaque it was found that running an explorer along the surfaces of the teeth both supra and subgingivally gave better results than the use of disclosing solution and is, therefore, the method of choice.[19] Since most of the surveys take place in a community setting where desired level of child cooperation is difficult to achieve , we recommend the use of a short shank spoon excavator instead of an explorer to eliminate anxiety and soft tissue trauma.

Score	Criteria
0	No materia alba, no plaque, no stains, no calculus
1	Materia alba or plaque around free gingival margin and adjacent area of the tooth
2	Materia alba or plaque not more than one third of clinical crown surface, or presence of extrinsic stains covering not more than one third of clinical crown surface
3	Materia alba or plaque or extrinsic stains covering half of the clinical crown
4	Materia alba or plaque or extrinsic stains covering more than half of the clinical crown or presence of calculus regardless of the surface area covered

CALCULATION OF THE INDEX

Recording format for OHI-C index:

Tooth No	16 / 55	11 / 51	26 / 65	36 / 75	31 / 71	46 / 85
Score						

For individual tooth, score may vary from 0 to 4 and the total score may range from 0 to 24.

Calculation of OHI-C Index = $\frac{Total\ score}{No\ of\ teeth\ examined}$

Interpretation:

Very Good	< 0.5
Good	0.5-1
Average	1.1-2
Bad	2.1-3
Very Bad	> 3

:

Case No.-101

Name- Ashok K Age- 4 yr Sex - Male

Tooth No	16 /(55)	11 /(51)	26 /(65)	36 /(75)	31/(71)	46 /(85)
Score	1	0	0	1	0	0

◯ : Circle denotes index tooth recorded

Total score: 1 + 0 + 0 + 1 + 0 + 0 = 2

OHI-C score : 2/6= 0.33

Interpretation: Child has **very good** oral hygiene

Sample form for recording OHI-C Index

ADVANTAGES

- OHI-C index is simple and easy to perform.
- The index is exclusively designed for primary and mixed dentition and can prove to be an effective aid for assessment of oral hygiene in children.
- Explorer is replaced with a short shank spoon excavator.
- Interpretations drawn from assessment are easy to understand for child and parents and can be used to motivate them.
- High Sensitivity- as this index categorizes the final interpretations into five categories with short intervals, any improvement in the oral hygiene or otherwise will immediately reflect in the final interpretation thereby aiding in patient motivation.

LIMITATIONS

Although this index includes both the qualitative and quantitative assessment of oral hygiene level, it does not reflect upon the clinical condition of dental hard and soft tissues. Hence, a clinical correlation between oral hygiene and dental diseases using this index, needs to be established in further studies.

REFERENCES

1. Subramaniam P, Surendran R. Oral health related quality of life and its association with dental caries of preschool children in urban and rural areas of India. J Clin Pediatr Dent. 2020;44(3):154–60.

2. Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, Listl S, Celeste RK, Guarnizo-Herreño CC, Kearns C, Benzian H. Oral diseases: a global public health challenge. The Lancet. 2019 Jul 20;394(10194):249-60.

3. Jurgensen N, Petersen P. Oral health and the impact of socio-behavioural factors in a cross sectional survey of 12-year old school children in Laos. *BMC Oral Health.* 2009;9:29.

4. Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. *Br Dent J.* 2006;201:625–6.

5. Miller-Keane encyclopedia and dictionary of medicine, nursing, and allied health, 7th ed. St. Louis: Saunders, 2003.

6. Arno A, Waerhaug J, Lovdal A, Schei O. Incidence of gingivitis as related to sex, occupation, tobacco consumption, toothbrushing, and age. Oral Surg, Oral Med, Oral Path. 1958 Jun 1;11(6):587-95.

7. Brucker, Marcu. G ingiv itis and Vincent's infection in children. J. Den. Children 23:116 2nd Quart. 1956.

8. Dahl, L. O., and Davis, B. B. Oral hyqiene habits of young children. J. Perlodont. 25:209 July 1954.

9. Massler, M., and others. G in g iv itis in young adult males: lack of effectiveness o f permissive program of toothbrushing. J. Periodont. 28:111 A p r il 1957.

10. Ramfjord, S. P. Indices for prevalence and incidence of periodontal disease. J. Periodont. 30:51 Jan. 1959.

11. Greene JC, Vermillion JR. The oral hygiene index: a method for classifying oral hygiene status. The Journal of the American Dental Association. 1960 Aug 1;61(2):172-9.

12. Greene JG, Vermillion JR. The simplified oral hygiene index. The Journal of the American Dental Association. 1964 Jan 1;68(1):7-13.

13. O'Leary TJ, Drake RB, Naylor JE. The plaque control record. J Periodontol.1972;43(1):38.

14. Prabhu S, Krishnamoorthy SH, Sathyaprasad S, Chandra HS, Divyia J, Mohan A. Gingival, oral hygiene and periodontal status of the teeth restored with stainless steel

crown: A prospective study. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2018 Jul 1;36(3):273.

15. Oyedele TA, Folayan MO, Chukwumah NM, Onyejaka NK. Social predictors of oral hygiene status in school children from suburban Nigeria. Brazilian oral research. 2019 Jul 1;33.

16. Shaghaghian S, Bahmani M, Amin M. Impact of oral hygiene on oral health-related quality of life of preschool children. International journal of dental hygiene. 2015 Aug;13(3):192-8.

17. Prashanth ST, Bhatnagar S, Das UM, Gopu H. Oral health knowledge, practice, oral hygiene status, and dental caries prevalence among visually impaired children in Bangalore. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2011 Apr 1;29(2):102.

18. Ravishankar PL, Jayapalan CS, Gondhalekar RV, Krishna BJ, Shaloob KM, Ummer PF. Prevalence of dental caries and oral hygiene status among school going children: an epidemiological study. The journal of contemporary dental practice. 2013 Jul 1;14(4):743.

19. Silness J, Löe H. Periodontal disease in pregnancy II. Correlation between oral hygiene and periodontal condition. Acta odontologica scandinavica. 1964 Jan 1;22(1):121-35.