

Assessment of Dental Caries Using Caries Assessment Spectrum and Treatment Index in Children of Age 5-10 Years

V. Kalaivani, R. Ramiya, N. Khaaviya

Department of Public Health and Dentistry, Indira Gandhi Institute of Dental Sciences, Puducherry, Tamil Nadu, India

Abstract

Introduction: Dental caries is the most prevalent disease of oral health in school-aged children around the world. Although different caries detection/diagnosis criteria are available, none of them includes the total spectrum of dental caries (which ranges from a sound tooth to tooth loss due to caries) other than caries assessment spectrum and treatment (CAST) Index. CAST index covers the total dental caries spectrum from no carious lesion through caries protection (sealant) and caries cure (restoration) to carious lesions in enamel and dentin, and the advanced stages of carious lesion progression in pulp and tooth surrounding tissue. **Methodology:** A cross-sectional study was conducted among children of age 5–10 years to detect the prevalence of dental caries using CAST index in Panchayat Union Primary School in Sundharipalayam and Koot-road (east), Villupuram. A total of 100 samples were selected based on inclusion criteria. **Results:** Only 33% had sound dentition, 0% had sealant and restoration, presence of caries in enamel and/or dentine ranged from 9% to 33%. Pulpal involvement was observed in 13% and abscess/fistula was present in 7% of participants in at least one tooth. 5% had lost at least one tooth due to caries. **Conclusion:** CAST index has been found useful in epidemiological surveys, especially in recording early carious lesions. Developers of the CAST index should throw more light on the treatment needs part of the index as well as how each code of this index can be utilized in controlling dental caries in a community.

Keywords: Caries assessment, caries, caries assessment spectrum and treatment

INTRODUCTION

Dental caries is a complex disease affecting the teeth, which is mainly caused by imbalance between demineralization and remineralization process around the tooth surface. Dental caries is the most prevalent disease of the oral health in school-aged children around the world. Dental caries leads to tooth pain, discomfort, eating impairment, loss of tooth, and delayed language development in children. Furthermore, dental caries affects children's functions and body growth and impose a financial burden on their families. In addition, children with dental caries are exposing to fear and anxiety which can result in both severity and incomplete treatment of the condition. It is a major cause of tooth loss and pain worldwide.^[1]

According to the World Health Organization (WHO) reports, dental caries affect 60%–90% of schoolchildren in both developing and developed countries. Caries incidence is witnessing a decline in developed countries due to proper availability of fluoride products, better oral health services, and awareness regarding etiology of caries. At the same time, the incidence of caries is increasing in developing countries.^[2,3]

Caries detection is fundamental in understanding the oral health status of a population and is the basis for caries diagnosis for individual patients. Although different caries detection/diagnosis criteria are available, none of them includes the total spectrum of dental caries (which ranges from a sound tooth to tooth lost due to caries) other than caries assessment spectrum and treatment (CAST) index.^[4,5] The CAST codes and descriptions were submitted to experienced epidemiologists from across the world for obtaining face and content validity. Its construct validity and reproducibility under field conditions were tested in child and adult populations and showed a high level of agreement between examiners. Compared to what is usually reported in the literature, CAST provides more relevant information

Address for correspondence: Dr. V. Kalaivani,
Department of Public Health and Dentistry, Indira Gandhi Institute of Dental
Sciences, Puducherry, Tamil Nadu, India.
E-mail: kalai11venki@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Kalaivani V, Ramiya R, Khaaviya N. Assessment of dental caries using caries assessment spectrum and treatment index in children of age 5-10 years. *Int J Community Dent* 2021;9:168-70.

Received: 30-12-21; **Accepted:** 30-01-22; **Web Published:** 26-03-22

Access this article online

Quick Response Code:



Website:
www.ijcommdent.com

DOI:
10.4103/ijcd.ijcd_38_21

on caries prevalence, experience, and severity. CAST is straightforward and easy to use.^[2]

CAST index covers the total dental caries spectrum from non carious lesion through caries protection (sealant) and caries cure (restoration) to carious lesions in enamel and dentin, and the advanced stages of carious lesion progression in pulp and tooth surrounding tissue.^[3]

Aim

The aim of this survey is to assess and improve dental caries using CAST index in children of age 5–10 years.

METHODOLOGY

Type of study

A cross-sectional study was conducted among children of age 5–10 years to detect the prevalence of dental caries using CAST index in Panchayat Union Primary School in Sundharipalayam and Koot-road (east), Villupuram.

Informed consent was obtained from the parents or guardians of the child.

Sample size

A total of 100 samples were selected based on inclusion criteria.

Inclusion criteria

Children of age 5–10 years (both boys and girls).

Exclusion criteria

- Children with congenital and systemic illness
- Children who are not interested.

Clinical examination

CAST index will be performed under available light and is recorded with mouth mirror and community periodontal index probe.

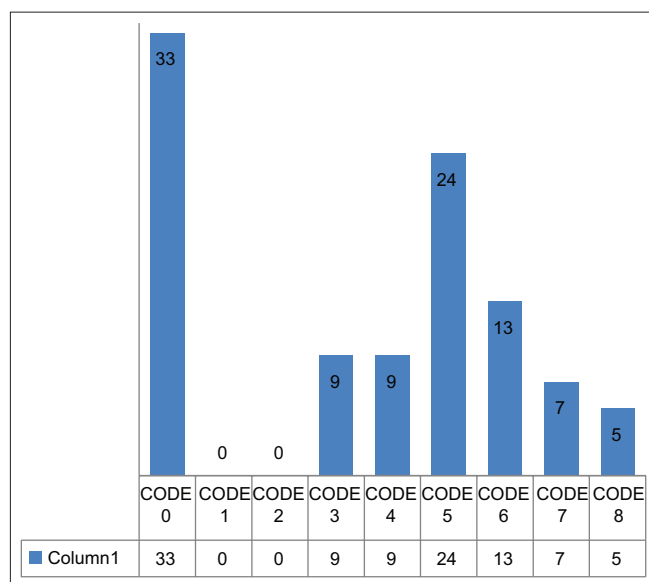


Figure 1: Prevalence of caries assessment spectrum and treatment index codes (highest score per mouth)

RESULTS

This cross-sectional study was done on 100 children in the age group of 5–10 years, out of 100, 50 were female, 50 were male. Analyses of codes of the CAST index were done as per the criteria given in the Table 1.^[5] The first level of analysis is to find out the presence of CAST codes in at least one tooth in a participant.

Only 33% had sound dentition, 0% had sealant and restoration, presence of caries in enamel and/or dentine ranged from 9% to 33%. Pulpal involvement was observed in 13% and abscess/fistula was present in 7% of participants in at least one tooth. Five percent had lost at least one tooth due to caries.

On the basis of the epidemiological concept of health and disease, the developers of the CAST index described findings as healthy dentition is denoted by codes 0, 1, and 2, this was observed in our study in 33% (33) individuals.

Nonhealthy dentition can be divided into:

1. A reversible pre morbidity stage (code 3)-this stage was the most severe condition in 9% (9) of the children
2. Dentition with morbidity (codes 4 and 5)-this stage was the most severe condition in 33% (9 and 24) of the children and with serious morbidity (codes 6 and 7), this stage was the most severe condition in at least 20% (13 and 7) of the children; and lastly
3. Dentition with mortality (code 8)-this stage was the most severe condition in at least 5% (5) of the children [Figure 1]. Figure 2 shows severity of the disease based on the maximum caries assessment spectrum and treatment score per subject.

DISCUSSION

Search for an ideal caries index is still in pursuit by many researchers worldwide. Decayed, missing, and filled (DMF) index is considered as reference index and is adopted and modified by the WHO for its oral health survey manuals.^[6,7,8]

From the public health viewpoint, major disadvantage of using the DMF index is that it records only cavitated lesions and ignore

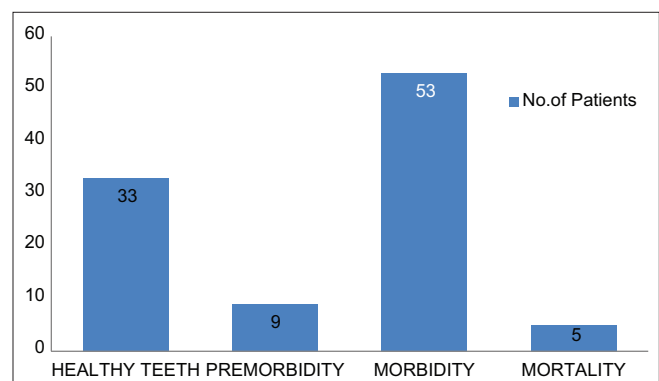


Figure 2: Severity of the disease based on the maximum caries assessment spectrum and treatment score per subject

Table 1: Codes of the CAST index

Codes	Area involved
0	Sound tooth
1	Sealed - Pits and fissures have been at least partially sealed with a sealant material
2	Restored - A cavity has been restored with an (in) direct restorative material currently without a dentine carious lesion and no fistula/abscess present
3	Distinct visual changes in enamel - A clear carious-related discoloration (white or brown color) is visible, including localized enamel breakdown without clinical visual signs of dentin involvement
4	Internal caries related discoloration in dentin - The lesion appears as shadows of discolored dentine visible through enamel which may or may not exhibit a visible localized breakdown
5	Distinct cavitation into Dentine - No (expected) pulpal involvement is present
6	Involvement of pulp chamber - Distinct cavitation reaching the pulp chamber or only root fragments are present
7	Abscess/fistula - A pus-containing swelling or a pus-releasing sinus tract related to a tooth with pulpal involvement due to dental caries is present
8	The tooth has been removed because of dental caries
9	Does not match with any of the other categories
A	Absent

incipient carious lesions. These lesions can be reversed by the application of various preventive measures such as fluorides if detected at earlier stages.^[9,10,11,12] Hence, an index should be able to record these lesions to apply primary preventive measures in a population.^[4] One such attempt is the CAST index,^[5] the major advantage of this index is that it records wide spectrum of lesions develops due to caries ranging from sound tooth to extraction of the tooth due to caries.

The current study is an attempt to record caries experience of children (5–10 years) in an urban Indian population using this index system.

Treatment needs can also be derived from this index such as healthy dentition requires maintenance through twice-daily cleaning of teeth with a toothbrush and fluoride-containing toothpaste.^[13,14] In a premorbidity dentition situation, management relies on the same regime as for healthy dentition, and some teeth may require extra surface protection with a sealant and/or fluoride treatment.^[15,16] Dentition with morbidity requires intra-or extra-coronal restoration or an ultraconservative treatment. Dentition with serious morbidity requires extraction or pulpotomy and dentition with mortality may require a space maintainer. It goes without saying that children with diseased dentition need to maintain their teeth, using a toothbrush and fluoride-containing toothpaste. And that parents should consider their diet, i.e., codes 4-7.^[6]

CONCLUSION

CAST index has been found useful in epidemiological surveys, especially in recording early carious lesions. Developers of the CAST index should throw more light on

the treatment needs part of the index as well as how each code of this index can be utilized in controlling dental caries in a community. Furthermore, while recording the index, it was felt that the presence of root fragments should not be combined with the involvement of the pulp chamber only (code-6) as they are two separate conditions with different treatment protocols.

Financial support and sponsorship

Self-funded.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Petersen PE. The World Oral Health Report 2003: Continuous improvement of oral health in the 21st century – The approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003;31 Suppl 1:3-23.
- Leal SC, Ribeiro APD, Frencken JE. Caries Assessment Spectrum and Treatment (CAST): A novel epidemiological instrument. *Caries Res* 2017;51:500-6.
- Frencken JE, de Souza AL, van der Sanden WJ, Bronkhorst EM, Leal SC. The Caries Assessment and Treatment (CAST) instrument. *Community Dent Oral Epidemiol* 2013;41:e71-7.
- Mehta A. Comprehensive review of caries assessment systems developed over the last decade. *RSBO South Braz Dent J* 2012;9:316-21.
- Frencken JE, de Amorim RG, Faber J, Leal SC. The Caries Assessment Spectrum and Treatment (CAST) index: Rational and development. *Int Dent J* 2011;61:117-23.
- Escoffié-Ramirez M, Ávila-Burgos L, Baena-Santillan ES, Aguilar-Ayala F, Lara-Carrillo E, Minaya-Sánchez M, *et al.* Factors associated with dental pain in Mexican school children aged 6 to 12 years. *Biomed Res Int* 2017;2017:7431301.
- Veiga N, Pereira C, Amaral O. Prevalence and determinants of dental caries in Portuguese children. *Procedia Soc Behav Sci* 2015;171:995-1002.
- Zhang S, Chau AM, Lo EC, Chu CH. Dental caries and erosion status of 12-year-old Hong Kong children. *BMC Public Health* 2014;14:7.
- Nomura Y, Maung K, Kay Khine EM, Sint KM, Lin MP, Win Myint MK, *et al.* Prevalence of dental caries in 5- and 6-year-old Myanmar children. *Int J Dent* 2019;2019:5948379.
- Kumar S, Kumar A, Badiyani B, Kumar A, Basak D, Ismail MB. Oral health impact, dental caries experience, and associated factors in 12-15-year-old school children in India. *Int J Adolesc Med Health* 2017;29. [doi:j/ijamh. 2017.29.issue-2/ijamh-2015-0041/ijamh-2015-0041.xml].
- Wulaerhan J, Abudureyimu A, Bao XL, Zhao J. Risk determinants associated with early childhood caries in Uygur children: A preschool-based cross-sectional study. *BMC Oral Health* 2014;14:136.
- Jürgensen N, Petersen PE. 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.
- Dawkins E, Michimi A, Ellis-Griffith G, Peterson T, Carter D, English G. Dental caries among children visiting a mobile dental clinic in South Central Kentucky: A pooled cross-sectional study. *BMC Oral Health* 2013;13:19.
- van der Tas JT, Kragt L, Elfrink ME, Bertens LC, Jaddoe VW, Moll HA, *et al.* Social inequalities and dental caries in six-year-old children from the Netherlands. *J Dent* 2017;62:18-24.
- Paglia L, Gallus S, de Giorgio S, Cianetti S, Lupatelli E, Lombardo G, *et al.* Reliability and validity of the Italian versions of the Children's Fear Survey Schedule – Dental subscale and the modified child dental anxiety scale. *Eur J Paediatr Dent* 2017;18:305-12.
- Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. *Bull World Health Organ* 2005;83:661-9.