



## ارزیابی خطر پوسیدگی؛ ما امروز کجا ایستاده‌ایم

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### چکیده

پوسیدگی دندان شایع‌ترین و روبه رشدترین بیماری با همه‌گیری جهانی در سراسر جمعیت رو به افزایش کره زمین قرار است. ثابت شده است که پوسیدگی دندان تنها بیماری مهمی است که هم کودکان و هم بزرگسالان را تحت تأثیر قرار می‌دهد و روند تشخیصی با سناریوی پیش‌رونده با گسترش به بافت‌های سخت دندان صورت می‌گیرد. اگرچه پوسیدگی دندان با ایجاد عوارض جانبی قابل توجه فعالیت‌های روزمره افراد را تحت‌الشعاع قرار می‌دهد، اما همچنان به‌عنوان کمترین نگرانی بهداشتی برای جمعیت کشورهای در حال توسعه در سراسر جهان قلمداد می‌گردد.

هزینه‌های بالای درمانی، مراجعات متعدد، عدم دسترسی به خدمات و نیز ناآگاهی از این واقعیت که سلامت دندان نیز نقش مهمی در تعیین سلامت عمومی فرد دارد، باعث نادیده گرفته شده دندان پزشکی در نیازهای جمعیت مورد اشاره می‌گردد.

با این حال، این واقعیت وجود دارد که در میان سناریوی رایج درمان‌های دندان پزشکی استفاده از ابزارهای ارزیابی خطر پوسیدگی دندان تا حد زیادی غیرقابل اجتناب است.

بنابراین محققان در تلاش برای توسعه و طراحی این ابزارها و روش‌های ارزیابی خطر پوسیدگی هستند. هدف ایجاد ابزار مقرون به صرفه، با کاربرد آسان، تشخیص زودهنگام است. این ابزار همچنین جهت ابداع یک برنامه درمانی قطعی و معتبر برای ضایعات پوسیدگی پیش‌رونده و در نتیجه تعیین علت بروز ضایعات پوسیدگی دندان کمک‌کننده خواهد بود.

**واژه‌های کلیدی:** پوسیدگی دندان، عوامل خطر، ارزیابی خطر پوسیدگی، سلامت دندان.

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## Introduction

In today's global scenario, dental diseases are estimated to contribute to an enormous percentage of rapidly progressing pandemic among the general population.[1] Individual's dental health status is regulated by the active involvement of legions of causative elements which guides its impact on the general health and wellbeing of the individual.[2] Unattended dental scenarios will ultimately result in hampering the individual's routine activities thereby leading to an unprecedented affect on the person's psychological, physical and interactive social living. However out of the many defined factors lack of early detection instigates to have an impeded influence on the progressive nature of dental diseases.[3]

Caries prevention strategies has been cumulatively designed with the existent knowledge and undeniable risk factors. This provides with two well defined classification of caries risk assessment and caries prediction modality with well demarcated target lines assigned to both criteria.[4] Caries risk assessment strategies have been formulated in a definitive sequential modality whereby it intends to provide with an expected patient outcome and enhance their beam of awareness on various caries prevention strategies which can be implicated and practiced at a fundamental level within the society.[5] Caries risk assessment hence has been modulated in such acceptable terms and principles that it dental caries is considered to be a globally persistent disease which exists with definitive preventive protocols.[6] Hence Caries risk assessment can thereby enable children prevailing with a very high caries incidence to resort to better oral hygiene practices thereby formulating them to have caries free permanent dentition.[6]

Caries risk assessment implies the protective and indomitable risk factors which considerably contribute in progression of dental caries irrespective age, gender or any other existing factors. [7] Caries risk assessment marks its evidential presence in arriving at ideal clinical diagnosis. However, in Indian scenario, it current practical application in India is still considered as an enigma of doubt pertaining to the solidarity fact that all these risk assessment tools have been designed to suite a larger population which does not

take into consideration Indian modalities, practices and population predilections prevailing within the country.[8]

### Need Of The Hour- Motive Of Caries Risk Assessment In Indian Current Scenario

Dental caries is defined as well confined desolation of receptive dental hard tissues by acidic prehension from dietary carbohydrate consumption.[9] The pertaining and periodic intermediary dietary sucrose consumption considerably causes downfall of the ideal pH within the oral cavity thereby decelerating the evidential salivary flow rate.[9] This henceforth result in invariable demineralization leading to enormous cavitated lesions within the oral cavity. These visible directly linked factors are thus termed as risk factors who claims to establish an evident role in caries progression. Apart from these there exist another variant group of factors termed as confounding indicators which states that the prevailing socioeconomic conditions of the patients, patient's knowledge and awareness on the need of maintaining a good oral hygiene, patient's lifestyle and habits also contributes to the progression of existent dental caries lesions.[10] Caries risk assessment is

claimingly defined as the estimated prospects for an individual to advance proficiently into definitive carious lesions in successional times. Apart from probability assessment it also provides the clinician with a birds eye view on the expansion rate of persistent lesion with respects to its dimensional variabilities.[11] Caries risk assessment hence not only provides a definitive strategy for lesion identification and restoration but also should unanimously prove to depict a pathway which would precisely provide with caries prevention strategies.[12]

Mehta et al in his elaborated study assessing caries prevalence among Indian children have clearly establish the fact unbiased that one out of two children in every other locality within India is found to be inflicted with dental caries.[13] The National Oral health survey conducted by Central Government of India during 2002 - 2003 also established the importance of requirement of well planned and executed preventive strategies for dental caries prevention and progression.[14]

### Ideal requisites of caries risk assessment in indian scenario.[15,16,17]

- Ease of Use for clinicians thereby not requiring any technical training and other advanced modalities.
- Prior set identification of probable risk and defined confounding factors.
- Prioritized identification of risk indicators which enhances dental caries progression.
- Provide with adequate timely identifiable preventive strategies to the patient with no financial constraints.
- Multidimensional technological utilization of resources for deriving at the most acceptable prognosis of the caries lesion.
- Confirm with idealistic and cost effective treatment options available for the patients.
- Aids in designing a patient focused and oriented treatment protocols and strategies.
- Requirement of periodic monitoring and scheduled recall appointment for consistent evaluation and follow-up of the patient.

### Modality For Performing And Evaluating Caries Risk Assessment

Caries risk assessment tool should ideally include the considerable variables which channelizes its involvement as contributing factors to dental caries progression. These include social factors, habits, environmental factors and clinical findings pertaining to the individual.[18,19] These contributory factors have been isolated from numerous experimental and analytical studies conducted in varying population with an estimated long term and sequentially scheduled follow-ups.[20,21]

Several Caries risk assessment tools have been developed by numerous highly acclaimed universities and countries and have been introduced into dental fraternity. A vast majority of them tend to follow a similar convergence pattern with respect to risk factors but relies on their variability factor in terms of population confinement strategies which encompasses variations in dental caries prevalence, gender and age criterion.[22] The globally acclaimed Caries risk assessment tools currently in use include AAPD'S Caries Risk Assessment form, Cariogram model, CARE (Caries Risk Assessment and

Evaluation Test), CAMBRA (caries management by risk assessment) and Traffic Light Matrix system.[23,24]

### **Brief Summary On Types Of Caries Risk Assessment Available Globally**

#### **AAPD's Caries Risk Assessment Form**

American Academy of Pediatric Dentistry developed Caries Risk Assessment forms that can be utilized by the practicing dentists to evaluate and assess caries risk status of children.[25] The values obtained were systematically classified as low, moderate and high on the regular basis of prevalence of noted risk factors accordingly. Care pathways were introduced with the conceptual fact that these stored documents provide the clinician in formulating an ideal and most acceptable diagnosis with the required treatment modality.[26]

#### **Cariogram**

Cariogram was introduced by Professor Douglas Bratthall in 1997 in Sweden. Cariogram have thus been multilingually translated to numerous other languages as it gained rapid popularity in ease of practice and documentation.[27] It's an interactive PC-program which was developed for highly motivational educational intervention, prevention strategies and clinical applications including accurate diagnosis and devising the most beneficial treatment modalities.[27] The main aim of this Cariogram is to significantly depict the caries risk factors and the probable chances by which dental carious lesions can be avoided in succeeding times in future. Another significant strategy of Cariogram is its involvement in providing motivational pathways in adapting ideal oral hygiene practices for a caries free oral cavity.[27]

#### **Caries management by risk assessment (CAMBRA)**

CAMBRA was evidently based on the fact that ideal assessment of every reporting patient is confoundly based on uniqueness of the disease, individualized risk and protective which can thereby determine the present evidence of dental scenario as well provide us with an individualized predominance of dental caries occurrence.[28] This replica was thus

created to elaborately explain the caries imbalance model was created to represent the multifaceted dental caries progression as well as to preferably establish an undeniable interlink between the existent pathogenicity and reliable protective factors of dental caries.[28]

#### **Caries Assessment and Risk Evaluation (CARE) test**

CARE test was developed by Division of Diagnostic Sciences of the University of Southern California. It was formulated on the basis of extensive correlations between existent and detailed elaboration of oligosaccharides in patient's saliva.[29] The CARE test continue to reign as the only caries risk assessment method that has been evidently proven to enhance caries prevention strategies at the fundamental levels of primary care.[29]

#### **Traffic Light Matrix (TLM)**

Traffic Light Matrix is commonly used in Australia. It's built upon 19 point criterion including saliva, plaque, fluoride exposure and other modifying factor contributing to the

widespread occurrence of dental caries on basis of individualized concerns.[30] The resultant threshold values thus obtained are then transferred in traffic light color codes thereby predominantly emphasizing the risk levels ranging from red indicating high risk category, yellow indicating moderate risk category and green indicating low risk category of caries development.[30] The primary objective in establishment of this color embedded system was to alarm the clinician as well as the resultant patient about the probability of developing caries and thereby signifying the need of adapting healthy dental hygiene practices. [30]

#### **Cariometer App**

Cariometer app was developed on the basis of daily food intake comprising of the individual specific dietary constituents and definitive oral hygiene measures. An individualized registration is mandatory for the application as it decodes individual data accordingly.[31] This app is engrossed to provide routine and daily cariogenic risk status of the individual following which the clinician will be able to identify the risk probability and thereby proceed with adequate preventive and treatment strategies.[31]

#### **LACTIC ACID IMPRESSION**

This method of Lactic acid impression method is done by using clinpro 3M ESPE. This impression material consists of a powder, an activator to induce setting and a sugar solution. The sugar fermentation leads to lactic acid production finally resulting change in color of the assigned impression material thereby signifying the probable degree of severity of each individual with respect to caries status.[31,32]

#### **CARIES RISK ASSESSMENT FOR TREATMENT (CRAFT)-THE DEFINING CRA OF INDIA**

Caries Risk Assessment for Treatment (CRAFT) is a highly unique, exquisite and noninvasive risk assessment tool based on four point criterion.[34] The CRAFT tool utilizes four highly essential parameters which have been established to have inexplicable role in caries exposure of the dental hard tissues.[34] These four parameters inclusively include Diet, Decay status, Fluoride exposure and Other factors. The obtained values are then graded from 0-4 based on severity level of 0-No risk, 1-Very Low risk, 2-Low risk, 3- Moderate risk and 4-High risk respectively.[34,35] The greatest highlight of CRAFT is that it provides definitive treatment modalities including specific preventive measures depending on the available depicted score and is age dependent in all aspects. CRAFT basically has directed its focus on modifying impaired oral hygiene measures and thereby decreasing the caries incidence along with providing a highly unique and customized individual priorities along with definitive preventive strategies.[35]

#### **APPLICATION OF CARIES RISK ASSESSMENT IN INDIAN POPULATION**

The existence of numerous caries risk assessment tool remains as the boon to the advancing technologies which paves the path for early detection of carious lesions and in devising the adequate treatment plans.[35] However in a develop country like India with curtailing financial constraints and the need of ease of accessibility all the advanced caries risk assessment tools still remains farther in accessibility to vast majority of the population. Moreover even though significance of oral health

have been prevailing to gain confidence and popularity among common people, the need of more and advanced oral health programmes is at the utmost emergent requirement. CRAFT the caries risk

assessment and a modified CAMBRA which provides one of the most simplest and easiest form of data collection appears to be the most acceptable ones when considering with the aspects of Indian population.[36] Hence definitive and larger clinical trials in varied age group has to be carried out indistinctly as this app not only estimates the probable risk factors but also sequentially provides ideal treatment options pertaining to Indian scenario in the most affordable and sustainable manner.[37]

## Conclusion

Caries risk assessment is assumed to be one of the most significantly critical constituent contributing to dental caries management. Its inclusion in routine dental examination has been termed and signified to be highly essential as it determines and provides with well defined early detection of carious lesions as well as aids in incorporating the necessary preventive strategies for those with probability of high caries risk.[38] Though most of the existent caries risk assessment tools have been defined inclusively for western population the need for an ideal caries risk assessment tool pertaining to the needs of Indian population has also to be well designed and implicated with more defineable levels is the has become the primary necessity in today's prevailing dental scenario.[39,40]

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## Caries Risk Assessment: Where do we stand?-Narrative Review Lakshmi Thribhuvanani (M.D.)<sup>1</sup>, M. S. Saravanakumar (M.D.)<sup>2\*</sup>

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### Abstract:

Dental caries have risen as the most prevalent and rapidly progressing universal pandemic throughout the vast creed of growing population in the planet. Dental caries has been evidenced to be claimed as the only significant disease affecting both children and adults with an apprehended trend without a constrainable halt in the pregressive scenario of its expansion involving the dental hard tissues. Though dental caries continue to boon around causing substantial side effects thereby compromising the individuals routine activities, it still curtails as the least significant health concerns to population of developing nations across the world. The highly incurred treatment and therapeutic monetary confinements, multiple appointments, lack of accessibility and inadequate awareness on the fact that dental health also plays a significant role in determining the individual's general health, all these factors contributes to the neglected dental needs in population serving to the predefined category. However this signifies the fact and need that with the prevailing dental scenario with highly specific dental needs, it has become mandatory in incorporating caries risk assessment tool to a great extent. Researchers are in the quest of developing and designing these caries risk assessment tools and modalities which would be cost effective, easy to use, provides with early detection as well as aids in devising a definitive and validated treatment plan for progressive caries lesions thereby ascertaining to cause a recession of dental carious lesions.

**Keywords:** Dental Caries, Risk factors, Caries risk assessment, Dental health.

Conflict of Interest: No

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