

Ecological Approaches to Dental Caries Prevention

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ABSTRACT

Dental caries are the maximum frequent disorder among humans. The healthy oral bacteria plays a crucial role in preventing the formation of caries along with promoting the oral health. Based on this concept, various approach have been developed that can be used effectively as a caries anticipation measures. The main aim of this approaches is to control carries either enchaining the growth of health associated microbes or by disrupting the cariogenic virulence factors without affecting bacterial viability. For early detection of caries as opposed to ready till the hollow space paperwork and healing remedy is required, numerous gadgets like digital imaging fiber-optic trans illumination, diagnodent the electronic caries monitor, quantitative light-instigated fluorescence, etc.

Keywords: Biofilm biology, Dental caries, Prevention, Digital imaging fibre

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LITERATURE REVIEW

Various factors responsible for occurrence of caries include bacteria, fermentable carbohydrates and a susceptible tooth surface or a host. The acids produced by the microbial colonization of the tooth surface causes demineralization of the tooth structure. Saliva helps in the process of remineralisation by buffering the acids produced in the oral cavity. Though dental caries is preventable through its identification. Implementing the preventive measures at an early age will avoid the progression of the lesion. The main aim of this review is to discuss the etiological factor for caries formation, epidemiology its diagnosis and anticipation methods [3].

Etiology

Dental caries is multifactorial in origin. One primary etiologic agent for its formation is Mutans Streptococci (MS). The other includes agent, host and environmental factor. Streptococcus mutans adheres to the dental pellicle and fragments the carbohydrates to produce lactic acid. This acidic environment created causes the drop in the Ph subsequently leading to the demineralization of enamel and dentin. The amount of consumption quality and the frequency of carbohydrate intake influence the incidence and prevalence of caries.

Anticipation of any diseases preferably focuses on etiological factors that are involved for its formation. Oral hygiene measures have limited influence for caries anticipation. Furthermore, the dietary modification with reduced intake of sucrose is quite difficult to attain in

INTRODUCTION

One of the most common infections in human is dental caries. Although continuous efforts have been made to minimise its effect, it remains boundless, particularly among the lower socioeconomic groups. Traditionally, caries management was carried out using surgical model which required removal of the caries followed by preparation and restoration of cavity. This model resulted in creating bigger cavities because of restorative treatment thus needing retreatment procedures and sub sequential loss of tooth structure. So the surgical model was replaced now by medical model that emphasize of application of strategies of anticipation and conservation of tooth structure. The origin of tooth decay, as well as current detection and treatment options, are explained in brief in this overview.

It is one of the most widespread diseases among conditioned populations, with a prevalence of 40% in children under the age of seven and 85% in seventeen-year-old young men. In any case, there is some evidence that the occurrence of caries in children aged five to seventeen years has decreased by about 36 percent recently and nearly half of children may be considered caries-free in the extremely lasting dentition [1,2].

current society. Now a day, the emphasis is being placed on the analysis of caries risk as well as its prediction rather than its detection. Also, the supporting and moderating activities of resident small living things help in maintaining oral cavity homeostasis. A small quantity of healthful plaque has been proven to save you erosive teeth ulcers and sensitivity. Aimless or shotgun concealment of pretty much the entire oral biota, without information the standard outcomes on plaque nature, isn't probably going to have long-term accomplishment in controlling the illness [4].

All things considered, both preventative and repairing stock should primarily target cariogenic small organic organisms without affecting the resident microflora. Alternatively, they may need to obstruct harmful components (e.g., glucan union or corrosive assembly) rather than bacterial function. Environmental imbalance in cariogenic biofilms can be reduced by measures that improve colonisation of health-promoting microbial populations. The benefit of such a technique is that the negative effects of low pH circumstances caused by the use of fermentative organic entities may be reduced by the use of smelling salts made from diverse small living organisms. Following a natural method to caries anticipation can definitely maintain the beneficial effects that the host receives from the inhabitant oral microbiome, while reducing cariogenic destructive nature components that may be responsible for plaque biofilm microbiome. The manage and avoidance of any sickness have to ideally attention on the aetiological additives included. For dental caries, this could be the intermittent sickness of the oral plaque biofilm *via* the approach of technique for mechanical oral cleanliness, together with nutritional extrude to lower publicity to fermentable crabs. Shockingly, character oral cleanliness measures have best a controlled impact in caries counteraction. It has moreover been forewarned that tooth brushing has been amazing in halting caries particularly as it carries fluoride into the oral empty space at normal spans, rather than any interesting exhibition in upsetting carcinogenic plaque biofilms. Moreover, breaking point of sucrose utilization all alone isn't probably going to totally save you dental caries if normal utilization of various starches persevered. Hence, even as limiting the a etiological components adding to the infection is basic, additional preventive measures similar with character chance prominence can likewise also in any case be needed in bunches of fragments of the populace [5-7].

DISCUSSION

Caries epidemiology

Dental caries was a pandemic for an extended period of time which affected children as well as adult. Widespread utilization of fluoride caries preventive programme have possibly reduced the prevalence of caries late 20th century in developed countries. It was reported that the untreated caries still remains the most common disease worldwide. It was recognized that fluoride is economical

as well as highly effective for anticipation of dental caries but its use alone is not sufficient [8].

Many preventive strategies had been encouraged that integrate fluoride with different protecting marketers. Fluoride antimicrobial strategies integrate fluoride with marketers to inspire the boom of health-related microorganisms thereby ensuing in long-time period caries control. These mixtures decorate the ability capacity of fluoride in enhancing the biofilms and stopping caries. The fluoride-chlorohexidine mixture reduces the bacterial load and reduces the intensity of Stephan curve pH drop. Other biofilm modifying oral products include fluoride-arginine as a combination [9].

Detection and anticipation of dental caries

More emphasis is located at the speculation of dental caries and the exam of the danger of caries than at the direct popularity of pits that want quick filling. While previously, the cavities were filled at their most reliable acknowledgment, by and by the finishes paperwork for helpful treatment have restricted; rather than healing treatment, plaque control measures are used to propel demineralization and reversal of the dental caries measure [10].

Caries diagnosis: Traditionally, visible colour and texture change, tactile sensation with a dental explorer as well as the radiographs were used to detect and diagnose dental caries. Although, radiographs are ineffective for detecting early tooth caries and it's far hard to tune the improvement of dental caries and compare its reversal the use of those methods.

Diagno dent is another device that detect the early demineralization and measures bacterial products in caries lesions using laser fluorescence technology. Fluorescence intensity is represented by a numerical ranging from 0 to 99.

DIFOTI (Digital Imaging Fiber-Optic Transillumination) is a technique that uses fiber-optic light to create a picture that can be used to detect early areas of demineralization, fissures or fractures, as well as to quantify the caries process [11].

Caries risk assessment: Caries prevalence in community has shifted gradually from being pandemic to now being endemic in specific risk group. Evidence for genetic differences have also been arised where not everyone in a particular group of population seeks benefit to the same extent from the conventional caries preventive programmer.

The rapidly progressing disease of childhood has now changed its pattern to being a more slowly progressive disease. Previous data have revealed that the lesion of caries are also localized increasing to the specific site on tooth. Oral hygiene measures including the use of fluorides, fluorides intake, past caries experiences. Mutans level, deep pits and fissure, caries index, salivary flow, all help in assessing the individual risk of dental caries progression [12].

Anticipation methods

Oral hygiene: Brushing teeth is an effective way to remove dental plaque. Proper tooth brushing methods should be demonstrated and taught at the dental office. The need of using fluoride toothpaste should be emphasised.

Fluoride application: Fluoride levels of 1,000 ppm or greater are used in the glue of children over the age of six years. Under the supervision of their parents, children under the age of eight should brush their teeth. Guardians should be instructed to use only a smear layer of fluoride tooth glue on children under the age of 2.5 and a pea-sized amount on children aged 2 to 6. Children should be taught to spit out excess toothpaste both during and after brushing. It is the addition of a Fluoride compound to a public water supply in a controlled manner in order to increase fluoride particle fixation to a level that effectively prevents caries. The optimal fluoride concentration in drinking water, according to WHO guidelines, is between 0.7 ppm and 1.4 ppm, depending on the environment. Fluoride reduces tooth cavities by half, according to numerous studies conducted all over the world. Water fluoridation, fluoride sticks, fluoride mouthwash, dietary fluoride supplements and professionally applied fluoride mixtures such gels and stains are all examples of fluoride application techniques [13].

Pit and fissure sealants: In long-lasting molars with both sound occlusal surfaces and non-cavitated occlusal carious injuries in children, it is recommended to employ sealants rather than neither sealants nor F stains. For deciduous teeth, first long-lasting molars and second long-lasting molars and premolars, the optimal ages for sealant application are 4-5 years, 7-9 years and 11-15 years, respectively. But anyway, sealant is contraindicated if the patient refuses to be restrained, if there is an open occlusal carious lesion, if caries exist on multiple surfaces of the same tooth, if there is a significant occlusal rebuilding and if pits and gaps are very much blended and self-purifying.

Xylitol: It is a normally happening sugar replacement which may decrease levels of caries-shaping mutans streptococci in the plaque and salivation. Xylitol can be managed as a syrup or topically through wipes for little youngsters. It very well may be controlled in gum, capsules or nibble food sources, in more seasoned kids [14].

Vaccine: Because dental caries is such a strong microbiological infection, researchers have tried to build an immune response to it. Proteins in the form of recombinant or tailored peptides or protein-carbohydrates structures similar to those found on DNA, have probably been effective against MS and a safer treatment may be explored by blocking the receptors that colonies. MS or glucosyl transferase inactivation. However, none of these vaccines have recently been accessible in situations where changing the apparent quantity of antibodies in oral fluids while being aware is

challenging; the research is consistent with therapeutic applications at this time.

Role of the essential guardian in youngsters: Because dental caries is such a powerful illness, the basic guardians of children can transmit caries-producing germs to a child, resulting in MS colony of the infant's oral opening. There is definitely a link between MS levels in guardian and their adolescent years. Throughout this line, attempting to lower MS levels in parents, which involves practicing good oral hygiene and undergoing dental treatments, is critical in preventing dental caries in young children.

CONCLUSION

Despite recent advances in the detection and treatment of dental decay, it is still an infection that is generally considered to be irresistible. Even with all of the information on late tooth decay, most healthcare practices still focus on treating the illness with beneficial treatment as soon as it is detected, rather than preventing it. Future educational and clinical research initiatives should continue to promote early placement and caries anticipation. Similar research and review has been performed regarding dental caries by the prestigious institution-Datta Meghe institute of medical sciences Sawangi (Meghe), Wardha, Maharashtra, India.

REFERENCES

1. Patil S, Ranka R, Chaudhary M, et al. Prevalence of dental caries and gingivitis among pregnant and nonpregnant women. J Datta Meghe Inst Med Sci Univ 2018; 13:44-47.
2. Bhansali P, Baliga S, Thosar N, et al. Comparison of the chemical composition and the structural characteristics of normal enamel from the teeth affected with early childhood caries in pre-term and full-term born children: An *in-vitro* study. J Datta Meghe Inst Med Sci Univ 2020; 15:358-363.
3. Costa SM, Martins CC, Bonfim MD, et al. A systematic review of socioeconomic indicators and dental caries in adults. Intern J Env Res Publ Health 2012; 9:3540-3574.
4. Colak H, Dulgergil CT, Dalli M, et al. Early childhood caries update: A review of causes, diagnoses and treatments. J Nat Sci Biol Med 2013; 4:29.
5. Lussi A, Hibst R, Paulus R. Diagnodent: An optical method for caries detection. J Den Res 2004; 83:80-83.
6. Schneiderman A, Elbaum M, Shultz T, et al. Assessment of dental caries with Digital Imaging Fiber-Optic Transillumination (DIFOTITM): *in vitro* study. Caries Res 1997; 31:103-110.
7. Angmar-Mansson B, Ten Bosch JJ. Quantitative Light-induced Fluorescence (QLF): A method for assessment of incipient caries lesions. Dentomaxillofacial Radiol 2001; 30:298-307.
8. Ashley PF, Blinkhorn AS, Davies RM. Occlusal caries diagnosis: An *in vitro* histological validation of the

- Electronic Caries Monitor (ECM) and other methods. *J Dentistry* 1998; 26:83-88.
9. Featherstone JD. Prevention and reversal of dental caries: Role of low level fluoride. *Comm Dent Oral Epidemiol* 1999; 27:31-40.
 10. Beauchamp J, Caufield PW, Crall JJ, et al. Evidence-based clinical recommendations for the use of pit-and-fissure sealants: A report of the American dental association council on scientific affairs. *J Am Dent Assoc* 2008; 139:257-268.
 11. Trahan L. Xylitol: A review of its action on mutans streptococci and dental plaque-its clinical significance. *Int Dent J* 1995; 45:77-92.
 12. Smith DJ. Prospects in caries vaccine development. *J Dent Res* 2012; 91:225-226.
 13. Shanmugam KT, Masthan KM, Balachander N, et al. Dental caries vaccine-a possible option? *J Clin Diagn Res* 2013; 7:1250.
 14. Douglass JM, Li Y, Tinanoff N. Association of mutans streptococci between caregivers and their children. *Pediatr Dent* 2008; 30:375-387.