

## Sweet Tooth Troubles

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Oral diseases are a major public health problem for countries and populations worldwide, although they often are not publicly recognised as such. Globally, these diseases affect almost 3.5 billion people, with three out of four people affected, living in middle-income countries.

Between 1990 and 2019, estimated case numbers of oral diseases grew by more than 1 billion – a 50 per cent increase, higher than the population increase of about 45 per cent during the same period. In particular, the case numbers in low-income countries more than doubled (114 per cent), and they increased by 70 per cent in lower-middle income countries and by 33 per cent and 23 per cent in upper-middle and high income countries, respectively, outpacing the demographic growth in those countries.

The most common oral diseases are dental caries (tooth decay), severe gum disease, tooth loss and oral cancers. More than one third of the world's population lives with untreated dental caries. The disease, also known as tooth decay or simply cavities, is the most widespread non-communicable disease (NCD) and a major public health problem for populations and governments worldwide. Untreated dental caries in permanent teeth is the most prevalent condition among all diseases, affecting more than 2 billion people worldwide. In deciduous teeth, untreated caries is the single most common chronic childhood disease, affecting 514 million children worldwide.

Caused by a combination of factors, including bacteria in the mouth, frequent snacking, sipping sugary drinks and not cleaning the teeth well, tooth decay has been an area of discussion and subsequent research across the scientific community for many years. In fact, a recent report has linked tooth decay and eventual tooth loss to dementia.

An expert panel of dentists in the US has developed the first-ever guideline on tooth decay after extensive review of approximately 300 published studies. While research has already confirmed that selectively removing decayed tissue is an effective approach to treating early tooth decay, this evidence-based guideline provides a range of treatment choices for patients with moderate to advanced tooth decay, such as conservative carious tissue removal (CTR), tooth-colored fillings, silver-colored fillings, capping etc. It also suggests specific materials for primary and permanent teeth depending on the

extent of the decay.

On the other hand, researchers in Thailand have put their focus on nano-hydroxyapatite that can be used as a component in toothpaste due to its compatibility with human tissues and capability to promote tooth enamel remineralisation. Typically, when decay-causing bacteria come into contact with sugars and starches from foods and drinks, they form an acid which can attack the tooth's enamel, causing it to lose minerals. Since nano-hydroxyapatite is a derivative of calcium phosphate that is naturally found in your teeth and bones, it appears to be a potential solution for tooth decay related problems.

3,3'-Diindolylmethane (DIM), also known as bisindole, is another molecule identified by scientists across Israel, China and Singapore, that can help fight tooth decay. It could be added to toothpastes and mouthwashes to greatly improve dental hygiene.

While products are being developed to improve the tooth decay scenario across the globe, this area of research remains underfunded. For instance, in the US, the National Institute of Health provided \$485 million to fund oral health research, representing 1.1 per cent of total research funding. In comparison, in Australia, total funding by the National Health and Medical Research Council for dental disorders between 2017 and 2021 was \$15 million, which is 0.23 per cent of total funding for the top 75 diseases with the highest burden of disease.

A similar case can be observed in India where not many research projects within the academia and industry are focused on oral health science. However, emergence of a few startups in this sector does offer some hope to more than 50 per cent of the Indian population that is suffering from dental health issues.

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