

## Diabetes and Dental Hygiene

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### Abstract

Diabetes Mellitus (DM), a collection of illnesses characterised by unusually high blood sugar (glucose) levels, is caused when the body is unable to make any or enough insulin or is unable to efficiently use insulin to synthesis glucose required for cellular energy. Type 1, type 2, and gestational diabetes are the most prevalent forms of the disease. Unsettlingly, according to some studies, type 2 diabetes is likely to be the largest epidemic in human history due to the disease's worldwide burden and rising prevalence.

**Keywords:** Diabetes mellitus; Insulin; Cellular energy; Gestational diabetes

### Introduction

Studies show a link between Alzheimer's disease and poorly managed blood sugar [1]. Due to the close connection between the two conditions, some have dubbed Alzheimer's disease "diabetes of the brain" or type 3 diabetes, which refers to a chronic insulin resistance + insulin shortage state that is mostly restricted to the brain.

Recent studies in metabolic research suggest the advent of type 4 diabetes, an underdiagnosed form of the disease associated with slim, elderly people who have insulin resistance [2]. Type 3c diabetes, which is underdiagnosed, develops when the pancreas ceases to produce enough insulin for the body as a result of pancreatic illness.

Monogenic diabetes syndrome, diabetes linked to cystic fibrosis, and drug- or chemical-induced diabetes are less frequent types of the disease. Prediabetes, decreased glucose tolerance, and impaired fasting glucose are further types of dysglycemia that might emerge [3].

Although increased blood glucose levels are a common problem for all varieties of diabetes, each type's aetiology, population it affects, symptoms it causes, and clinical management strategies vary [4]. The oral implications of diabetes, which we will cover later, are another feature in common with other kinds of diabetes.

### Diabetic disease prevalence

Diabetes is a widespread condition whose prevalence is rising globally, with bigger increases in middle- and low-income nations. From 108 million in 1980 to 476 million in 2017, the number of people with diabetes increased, making up 8.5% of adults aged 18 and over [5].

One in five Americans with diabetes is still undiagnosed, according to the CDC, which estimates that approximately 35 million American adults have the disease [6]. Younger than 70-year-olds accounted for 43 percent of deaths attributed to high blood sugar levels, and diabetes is thought to have been the direct cause of 1.5 million deaths worldwide in 2019. Premature death from diabetes increased by more than 5% between 2000 and 2016, and it is the primary cause of adult blindness, kidney failure, and lower limb replacements [7]. By 2030, diabetes is anticipated to rank as the sixth most common cause of death worldwide.

### Problems caused by diabetes

If unchecked, high blood sugar levels persist in the body and can induce diabetes problems due to no enzymatic binding of free sugars to proteins and cells, which reduces the efficiency with which they function.

Micro vascular and macro vascular disorders are two categories for diabetic complications. Small blood vessels are harmed by micro vascular disorders, whereas big arteries are harmed by macro vascular diseases [8]. Diabetic problems typically fall into one of five groups under these two broad divisions: neuropathy, cardiovascular disease, impaired wound healing, retinopathy, and nephropathy.

### Discussion

#### Diabetes's oral consequences

Since the 1960s, the literature has provided extensive documentation of the biochemical link between DM and periodontal disorders [9]. The bidirectional association between diabetes and periodontal disease was firmly established in the 1990s following 90 published epidemiological studies and extensive research, and periodontitis started to be known as the sixth consequence of diabetes [10].

In addition to periodontal disease, diabetes patients also have a higher prevalence of caries [11]. Reduced salivary flow caused by hyperglycemia encourages the growth of acid uric bacteria such as *Streptococcus* mutants, which results in the formation of carious lesions. In actuality, caries risk is higher in individuals with longer disease duration.

Since one in five patients with type 2 diabetes go undiagnosed and the oral complications of diabetes can have devastating long-term effects on the hard and soft tissue structures in the mouth, it is crucial to screen for diabetes in the dental setting as the medical community embraces the possibility that periodontal therapy will lead to therapeutically meaningful reductions in markers of systemic inflammation [12]. In order to enable the dental team to participate in the collaborative care necessary for disease management, the Association of Diabetes Care and Education Specialists advises people with DM to receive a dental check-up and monitor their dental health [13].

The clinician must make sure that enough time is set out for oral health education when delivering dental care to diabetic patients. A

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**Received:** 25-May-2022, Manuscript No: JOHH-22-67728, **Editor assigned:** 27-May-2022, PreQC No: JOHH-22-67728(PQ), **Reviewed:** 10-Jun-2022, QC No: JOHH-22-67728, **Revised:** 15-Jun-2022, Manuscript No: JOHH-22-67728(R), **Published:** 22-Jun-2022, DOI: 10.4172/2332-0702.1000322

**Citation:** Ezzat S (2022) Diabetes and Dental Hygiene. J Oral Hyg Health 10: 322.

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discussion of other oral side effects of the disease, such as dry mouth from medication, as well as the significance of meticulous home care to control biofilm levels in the oral cavity should also be included in this educational session [14]. Biofilm has been linked to the beginning and progression of both periodontal and caries disease.

In order to address dental issues brought on by diabetes, it is crucial to provide patients with at-home treatment methods that give preventative advantages, promote oral health, and assist avoid cavities.

### Renewal of the enamel

Three substances stand out among those that are advantageous to diabetic patients: xylitol, sodium fluoride, and nano-hydroxyapatite.

By inhibiting the expression of inflammatory cytokines brought on by LPS, xylitol, which is known to have cariostatic properties, may have a positive clinical impact on periodontitis [15]. Additionally, xylitol aids in balancing the pH in the mouth, fostering an environment that is more hospitable to commensal microorganisms. The major component of enamel is hydroxyapatite, which is mostly made of calcium and phosphate [16].

The major component of enamel is hydroxyapatite, which is mostly made of calcium and phosphate [17]. Because it may fill even the smallest surface lesions in the tooth material, nano-hydroxyapatite has more significant demineralizing effects on first enamel lesions than traditional fluoride. By smoothing the tooth surface, this action not only delays the onset of dental hypersensitivity but also makes it more difficult for pathogenic germs to colonise the tooth surface [18].

Fluoride contributes to the hardening of enamel and the transformation of hydroxyapatite into fluorapatite, which offers higher protection for the tooth surface because it is less soluble in an acidic environment than its counterpart [19].

Remin Pro is a novel tooth cream made from nano-hydroxyapatite, sodium fluoride, and xylitol. It is intended to assist in reducing the acidity of plaque biofilm-induced acids. Remin Pro has 1,450 ppm more fluoride than conventional pastes and lotions for the mouth [20]. Remin Pro has a superb flavour and can be used in conjunction with orthodontic treatments, professional teeth whitening procedures, and conservative dental procedures. It is the perfect medication for diabetic patients' protective dental care since it interacts with the oral environment in the mouth to change biofilm and add hydroxyapatite to the existing teeth, assisting in remineralisation.

Use Remin Pro differently from conventional toothpastes. Patients can use a finger, toothbrush, or cotton swab to apply a pea-sized amount to their teeth and then spread it about their mouth with their tongue [21]. The patient should wait at least 30 minutes after use before eating or drinking, and ideally they should retain the Remin Pro and saliva in their mouths for three minutes before expectorating.

### Conclusion

Dental professionals will need to be diligent in their knowledge of the various forms of diabetes as well as systemic and oral consequences

as the numbers of diabetic patients seeking dental care keep rising. Additionally, they must be able to offer optimal treatment options that advance oral health.

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