CHAPTER 9

PERIODONTAL DISEASE AND DIABETES

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Abstract: Diabetes is considered to be a genetically and environmentally based chronic metabolic and vascular syndrome caused by a partial or total insulin deficiency with alteration in the metabolism of lipids, carbohydrates and proteins culminating with different manifestations in different organisms. In humans hyperglycemia is the main consequence of defects in the secretion and/or action of insulin, and its deregulation can produce secondary lesions in various organs, especially kidneys, eyes, nerves, blood vessels and immune systems.

Periodontal disease is an entity of localized infection that involves tooth-supporting tissues. The first clinical manifestation of periodontal disease is the appearance of periodontal pockets, which offer a favorable niche for bacterial colonization. The etiology of periodontal disease is multifactorial, being caused by interactions between multiple micro-organisms (necessary but not sufficient primary etiologic factors), a host with some degree of susceptibility and environmental factors. According to current scientific evidence, there is a symbiotic relationship between diabetes and periodontitis, such that diabetes is associated with an increased incidence and progression of periodontitis, and periodontal infection is associated with poor glycaemic control in diabetes due to poor immune systems. Hence, for a good periodontal control it is necessary to treat both periodontal disease and glycaemic control.
INTRODUCTION

Diabetes mellitus (DM) is considered to be a genetically/environmentally-based chronic metabolic syndrome caused by partial or total insulin deficiency associated with decreased regulation of glucose leading to hyperglycemia, glycosuria, polydipsia, polyphagia, polyuria and an altered intermediate metabolism of lipids and proteins, among others. Because its severity can vary over time, hyperglycemia is considered a severity marker of the underlying metabolic state rather than being the nature of the process itself. Hyperglycemia in diabetes is the consequence of defects in the secretion and/or action of insulin. Chronic hyperglycemia and concomitant metabolic deregulation can produce secondary lesions in various organs, especially kidneys, eyes, nerves, blood vessels and immune systems.

Classification of DM

Although hyperglycemia is manifested in all forms of diabetes, its pathogenesis varies widely. Classifications of DM were previously based on the age at disease onset or on the treatment modality but now reflect the pathogenesis of each variant. The high prevalence of diabetes cases can be classified into two general types:

A. Type 1 DM (T1DM): This is characterized by total insulin deficiency due to destruction of pancreatic β cells and represents around 10% of all diabetes cases. It is also known as insulin-dependent diabetes or initiation diabetes. There are two subgroups of this class of diabetes:
   i. Immune DM: In which there is severe deficit of insulin secretion due to a cell-mediated autoimmune process that destroys pancreatic β cells. The high genetic predisposition has been linked to DQA and DQB genes and influenced by DRB genes, although environmental factors can play a role that remains poorly understood. The patients are not usually obese, although obesity is not incompatible with the diagnosis. The peak incidence is at puberty, i.e., around 10-12 yrs in girls and two years later in boys.
   ii. Idiopathic DM: Only a small proportion of patients with T1DM (mostly from Africa and Asia) falls into this category. They present with episodes of ketoacidosis and varied degrees of insulin deficit. This form of DM is usually neither hereditary nor is there evidence on the role of immunological autoimmunity associated with human leukocyte antigen (HLA).

B. Type 2 DM (T2DM): This represents around 80-90% of diabetes cases. It results from a combination of peripheral resistance to insulin action and an inadequate secretory response of pancreatic β cells.

As shown (Table 1), other diabetes cases have a variety of monogenetic and secondary origins. Although the two main types of diabetes correspond to completely different pathogenic mechanisms, the long-term complications in kidneys, eyes, nerves and blood vessels are of similar nature and are the main causes of the morbidity and mortality.

The American Diabetes Association also recognizes an intermediate group of patients who do not meet diabetes criteria but have elevated glucose levels, designated “pre-diabetics” due to their high risk of developing the disease. Pre-diabetes is not a clinical entity but rather denotes a risk of future diabetes and cardiovascular disease.