Diabetes Mellitus: The Epidemic of the Century

Abstract: The epidemic nature of diabetes mellitus in different regions is reviewed. The Middle East and North Africa region has the highest prevalence of diabetes in adults (10.9%) whereas, the Western Pacific region has the highest number of adults diagnosed with diabetes and has countries with the highest prevalence of diabetes (37.5%). Different classes of diabetes mellitus, type 1, type 2, gestational diabetes and other types of diabetes mellitus are compared in terms of diagnostic criteria, etiology and genetics. The molecular genetics of diabetes received extensive attention in recent years by many prominent investigators and research groups in the biomedical field. A large array of mutations and single nucleotide polymorphisms in genes that play a role in the various steps and pathways involved in glucose metabolism and the development, control and function of pancreatic cells at various levels are reviewed. The major advances in the molecular understanding of diabetes in relation to the different types of diabetes in comparison to the previous understanding in this field are briefly reviewed here. Despite the accumulation of extensive data at the molecular and cellular levels, the mechanism of diabetes development and complications are still not fully understood. Definitely, more extensive research is needed in this field that will eventually reflect on the ultimate objective to improve diagnoses, therapy and minimize the chance of chronic complications development.

Keywords: Diabetes, Classification of diabetes, Type 1 diabetes, Type 2 diabetes, Gestational diabetes, Diagnosis, Etiology, Oral Manifestations, Management.

INTRODUCTION

- Diabetes mellitus is a metabolic disorder characterized by relative or absolute insufficiency of insulin and resultant disturbances of carbohydrate metabolism.
- The major function of insulin is to counter the concerted action of a number of hyperglycemia-generating hormones and to maintain low blood glucose levels.

Epidemiology

- Almost 20% of adult older than 65 year old have DM.
- A dental practice serving an adult population of 2,000 can expect to encounter 40-80 persons with diabetes, about half of whom will be unaware of their condition.

Etiologic Classification Of Dm

There are two types of Diabetes Mellitus:

- Type 1, insulin-dependent or juvenile-onset diabetes (IDDM)
- Type 2, non-insulin-dependent or adult-onset diabetes (NIDDM)
- Other specific types

Type 1 (IDDM)

- Autoimmune destruction of the insulin-producing beta cells of pancreas.
- 5-10% of DM cases.
- Commonly occurs in childhood and adolescence.
- Absolute insulin deficiency.
- High incidence of severe complications.
- Prone to autoimmune diseases (Grave’s, Addison, Hashimoto’s thyroiditis).
Type 2 (NIDDM)

- Result from impaired insulin function (insulin resistance).
- Constitutes 90-95% of DM cases.
- Specific causes of this form are unknown.
- Risk factors: age, obesity, alcohol, diet, family history and lack of physical activity, etc.

![Comparison Table]

Other Specific Types

- Genetic defects of beta-cell functions
- Decrease of exocrine pancreas
- Endocrinopathies
- Drug or chemical usage
- Infections

Gestational Diabetes Mellitus (Gdm)

- Defined as any degree of glucose intolerance with onset or first recognition during pregnancy.
- 4% of pregnancy.

![Factors Causing Diabetes]
COMPLICATIONS
People with DM have an increased incidence of both microvascular and macrovascular complications.

DIAGNOSIS
- A casual plasma glucose level of 200 mg/dL or greater with symptoms presented.
- Fasting plasma glucose level of 126 or greater. (Normal <100 mg/dL)
- Oral glucose tolerance test (OGTT) value in blood of 200 mg or greater.
ADA recommend >45 year old screened every 3 years.

MEDICAL MANAGEMENT
- Objective: Maintain blood glucose levels as close to normal as possible.
- Good glycemic control inhibits the onset and delay of type 1 DM, similar in type 2 DM.
- Exercise and diet control
- Insulin: rapid, short, intermediate, long acting.
- Oral antidiabetic agents
ORAL MANIFESTATIONS AND COMPLICATIONS

No specific oral lesions associated with diabetes. However, there are a number of problems by presence of hyperglycemia.

- **Periodontal disease**
  - Microangiopathy altering antigenic challenge.
  - Altered cell-mediated immune response and impaired of neutrophil chemotaxis.
  - Increased Ca+ and glucose lead to plaque formation.
  - Increased collagen breakdown.

- **Salivary glands**
  - Xerostomia is common, but reason is unclear.
  - Tenderness, pain and burning sensation of tongue.
  - May cause secondary enlargement of parotid glands with sialosis.

- **Dental caries**
  - Increase caries prevalence in adult with diabetes. (xerostomia, increase saliva glucose)
  - Hyperglycemia state shows a positive association with dental caries.

- **Increased risk of infection**
  - Reasons unknown, but macrophage metabolism altered with inhibition of phagocytosis.
  - Peripheral neuropathy and poor peripheral circulation
  - Immunological deficiency
  - High sugar medium
  - Decrease production of Antibodies
  - Candidal infection are more common and adding effects with xerostomia

- **Delayed healing of wounds**
  - Due to microangiopathy and utilisation of protein for energy, may retard the repair of tissues.
  - Increase prevalence of dry socket.

- **Miscellaneous conditions**
  - *Pulpitis*: degeneration of vascular.
  - *Neuropathies*: may affect cranial nerves. (facial)
  - *Drug side-effects*: lichenoid reaction may be associated with sulphonylureas (chlorpropamide)

DENTAL MANAGEMENT CONSIDERATIONS

To minimize the risk of an intraoperative emergency, clinicians need to consider some issues before initiating dental treatment.

- **Medical history**: Take history and assess glycemic control at initial appointment.
  - Glucose levels
  - Frequency of hypoglycemic episodes
  - Medication, dosage and times.
  - Consultation

- **Scheduling of visits**
  - Morning appointment
  - Do not coincide with peak activity.

- **Diet**
  - Ensure that the patient has eaten normally and taken medications as usual.

- **Blood glucose monitoring**
  - Measured before beginning. (<70 mg/dL)

- **Prophylactic antibiotics**
  - Established infection
  - Pre-operation contamination wound
  - Major surgery
During treatment
- The most complication of DM occur is hypoglycemia episode.
- Hyperglycemia

After treatment
- Infection control
- Dietary intake
- Medications: salicylates increase insulin secretion and sensitivity - avoid aspirin.

**CONCLUSION**

Diabetes mellitus is growing to epidemic proportions, leading to devastating complications if not treated well. There are many challenges in the successful treatment of diabetes mellitus because of personal and economic costs incurred in diabetes therapy. Its long-term consequences translate into enormous human suffering and economic costs. However, comprehensive diabetes care can delay the progression of complications, maximize the quality of life, and minimize healthcare expenditure.

Insulin is indicated for all types of diabetes mellitus. However, diet, exercise, and diabetes education remain the essential components of diabetes management.

**REFERENCES**

2. American Diabetes Association
4. Canadian Diabetes Association
10. Sareen Gropper. Jack Smith and James Groff, Advanced Nutrition and Human Metabolism, fifth ed. WADSWORTH