CORRELATION BETWEEN CHOLESTEROL AND D-DIMER IN TYPE 1 AND TYPE 2 DIABETES MELLITUS

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INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels ***(ADA, 2007).***

In type 1a there is evidence suggesting an autoimmune origin of beta-cell destruction, mostly due to predominately activated autoreactive T cells that destroy beta cells which results in a progressive and predictable loss in insulin secretion function**.** Activated helper T cells provoke beta-cells to produce several autoantibodies which act to destroy insulin producing beta-cells of the pancreas ***(Haller et al., '2005).*** This autoimmune entity also is associated with certain HLAs. Patients with type 1a are also more likely to have other autoimmune disorders, such as autoimmune thyroiditis, Addison's disease, and celiac disease ***(ADA, 2007).***

Type I b form of diabetes is characterized by low insulin and C peptide levels similar to those in type1a, although there is no evidence of an autoimmune etiology of the beta-cell destruction. They are prone to ketoacidosis and depend on insulin to prevent metabolic deterioration. This idiopathic diabetes reflects the still limited knowledge of the etiology of many forms of diabetes ***(ADA,2007).***

Type 2 diabetes mellitus (T2DM) historically was considered a disease of adults, with autoimmune type 1 diabetes mellitus accounting for almost all cases of pediatric diabetes. T2DM was recognized as a disease of the pediatric age group by the late 1970s. It has turned into a significant public health problem, with escalating numbers of new cases. T2DM is a heterogeneous condition in which the clinical manifestation of hyperglycemia is a reflection of the impaired balance between insulin sensitivity and insulin secretion ***(Ponder, 2009).***

D-dimer is a breakdown product produced by the normal process of clotting. It is normally present in small quantities in the blood; when increased it is suggestive of increased clotting activity in the body ***(Wells et al., 2003).***

Cholesterol levels were significantly related to D-dimer levels, determination of D-dimer might be a more sensitive parameter for detection of cholesterol related early hemostatic alterations ***(Gallis et al., 2000).***

Changes in D-dimer levels that may indicate diabetes disease progression to macrovascular complications. Using D-dimer in conjunction with other biomarkers to identify stages of disease progression, commencing from pre-diabetic and continuing to development of asymptomatic and clinical cardiovascular disease in diabetes mellitus, is worthy of consideration ***(Nwose et al., 2007).***

AIM OF THE WORK

To identify prevalence of dyslipidemia in type 1 and type 2 Diabetes and to assess the D-dimer level in both Diabetic patients.

DIABETES MELLITUS

Definition:

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels ***(ADA, 2007).***

Diabetes is defined by loss of β-cell function below a level that is adequate to maintain euglycemia ***(Palmer et al., 2004)***.

Diabetes mellitus is a syndrome of disturbed energy homeostasis caused by a relative or absolute deficiency in insulin or its action resulting in abnormal metabolism of carbohydrates, proteins and fats ***(Balkau and Eschwege, 2003)***.

Diabetes mellitus (DM) has metabolic, vascular and neuropathic components that are interrelated; this makes DM a major health problem with long-term microvascular and macrovascular complications. The development and progression of diabetic complications are strongly related to the degree of glycemic control ***(Ozmen and Boyuada, 2003)***.

Morbidity and mortality from metabolic derangement and from long-term complications that affect small and large vessels result in retinopathy, nephropathy, ischemic heart

disease and arterial obstruction with gangrene of extremities makes diabetes cover a wide range of heterogeneous diseases ***(Kuzuya et al., 2002)***.

Diabetes mellitus is not a simple disease, but it is a heterogeneous group of disorders in which there are distinct genetic patterns of inheritance as well as separate etiologic and pathophysiologic mechanisms all leading to impairment of glucose metabolism ***(Gabir et al., 2000)***.

Patients with any form of diabetes may require insulin treatment at some stage of their disease. Such use of insulin does not, of itself, classify the patient ***(ADA, 2007).***

The vast majority of cases of diabetes fall into two broad etiopathogenetic categories:

Type 1: Diabetes.

Type 2: Diabetes.

(ADA, 2007)

Table (1): Etiologic classification of diabetes mellitus

I. Type 1 diabetes (β-cell destruction, usually leading to absolute insulin deficiency)	
A. Immune-mediated	
B. Idiopathic	
II. Type 2 diabetes (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance)	
III. Other specific types of diabetes	
A. Genetic defects of B-cell function:	
1. Chromosome 12,HNF-1α (MODY3)	5. Chromosome 17, HNF-1β (MODY5)
2. Chromosome 7,glucokinase (MODY2)	6. Chromosome 2,neuro D1(MODY6)
3. Chromosome 20, HNF-4α (MODY1)	7. Mitochondrial DNA
4. Chromosome 13,insulin promoter factor 1(IPF-1; MODY4)	8. Others
B. Genetic defects in insulin action:	
1. Type A insulin resistance	4. Lipotrophic diabetes
2. Leprechaunism	5. Others
3. Rabson-Menenhall syndrome	
C. Diseases of the exocrine pancreas:	
1. Pancreatitis	5. Hemochromatosis.
2. Neoplasia	6. Fibrocalculous pancreatopathy
3. Trauma / pancreatectomy	7. Others
4. Cystic fibrosis	
D. Endocrinopathies:	
1. Acromegaly	5. Hyperthyroidism
2. Cushing's syndrome	6. Somatostatinoma
3. Glucagonoma	7. Aldosteronoma
4. Pheochromocytoma	8. Others
E. Drug or chemical induced:	
1. Pentamide,	6. Thiazide
2. Nicotinic acid,	7. Dilantin
3. Glucocorticoids,	8. β-adrenergic agonists
4. Thyroid hormone,	9. α-intreferon
5. Diazoxide,	10. Other
F. Infections:	
1. Congenital rubella,	
2. Cytomegalovirus	
3. Others	
G. Uncommon forms of immune-mediated diabetes:	
1. "Stiff-man" syndrome	
2. Anti-insulin receptor antibodie	
3. Others	
Other genetic syndromes sometimes associated with diabetes:	
1. Down's syndrome	6. Porphyria.
2. Klinefelter's syndrome	7. Friedreich's ataxia
3. Turner syndrome,	8. Prader-Willi syndrome
4. Wolfram's syndrome	9. Huntington's chorea
5. Laurence-Moon-Biedl syndrome	10. Myotonic dystrophy
IV. Gestational diabetes mellitus (GDM).	

HNF= hepatocyte nuclear factor; MODY= maturity-onset diabetes of the young.

(American Diabetes Association [ADA], 2007)

Table (2): Characteristic features of type1 compared with type 2 diabetes in young people

Characteristics	Type 1	Type 2
Age	Throughout childhood	Pubertal or later
Onset	Most often acute, rapid	Variable, from slow, mild to sever
Insulin dependence	Permanent, total, sever	Uncommon, but insulin required when oral hypoglycemic fail
Insulin secretion	Absent or very low	Variable
Insulin sensitivity	Normal	Decreased
Genetics	Polygenic	Polygenic
Race/ethnics	All groups, but wide variability of incidence	Certain ethnics groups are at particular risk
Frequency	Usually 90%	Most countries 10%
Autoimmunity	Yes	No
Ketosis	Common	Rare
Obesity	No	Strong
Acanthosis Nigerians	No	Yes

(Ramin and David, 2004)

Type 1 is further classified into the following subtypes:

1- Type 1a (Autoimmune form):

In type 1a there is evidence suggesting an autoimmune origin of beta-cell destruction, mostly due to predominately activated autoreactive T cells that destroy beta cells which results in a progressive and predictable loss in insulin secretion function**.** Activated helper T cells provoke beta-cells to produce several autoantibodies which act to destroy insulin producing beta-cells of the pancreas**.** This autoimmune entity also is associated with certain HLAs. Patients with type 1a are also