ANEMIA IN TYPE 1 DIABETES

Thesis
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By

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List of Abbreviations

α	*Alpha*
AAT	*Alpha-1 antitrypsin*
ACD	*Anemia of chronic disease*
EMA	*Endomysial antibodies*
AGE	*Advanced glycation end products*
AGA	*Antigliadin antibodies*
ARA-R1	*Anti-reticulin R*
ATG	*Antithyroglobulin antibodies*
GAD65A	*Glutamic acid decarboxylase antibodies*
ICA512A	*autoantibodies directed at a transmembrane tyrosine phosphate*
AIDS	*Aquired immune deficiency syndrome*
BCG	*Bacillus Calmette Guerin vaccine*
GLA	*Gamma linolenic acid*
β-thal	*Beta thalassemia*
BG	*Blood glucose*
CD	*Celiac disease*
CBC	*complete blood count*
CSII	*Continuous subcutaneous insulin infusion*
Vit. D	*Vitamine D*
D.M	*Diabetes mellitus*
DKA	*Diabetic ketoacidosis*
DSPS	*distal symmetrical polyneuropathies*
ELISA	*Enzyme-linked immunosorbent assay*
EPO	*erythropoietin*
F	*Female*
FEP	*Free erythrocyte protoporphyrin*
γ	*Gamma*

G.D.S	*Gestational diabetes mellitus*
GHb	*Glycosylated hemoglobin*
HC	*Haematocrite concentration*
HT	*Hashimoto thyroiditis.*
Hb	*Hemoglobin*
BM	*Basement membrane*
NO	*Nitric oxide*
IAAs	*insulin auto antibodies*
IDDM	*Insulin dependant diabetes mellitus*
IFN	*Interferon*
IF	*Intrinsic factor*
BG	*Blood glucose*
ICAs	*Islet cell auto antibodies*
M	*Male*
MCH	*mean corpuscular hemoglobin*
MCHC	*mean corpuscular hemoglobin concentration*
MCV	*mean corpuscular volume*
MRBG	*Mean random blood Glucose*
MAOIs	*monoamine oxidase inhibitors*
N	*Normal*
PCA	*Parietal cell antibodies*
WBCs	*White blood cells*
WHO	*World health organization*
RAIU	♂*Radioactive iodine uptake*
rAVV	*Recombinant Adeno-associated Virus vector*
RBCs	*Red blood cells*
RDW	*Red blood distribution width*
CHr	*Reticulocyte Hemoglobin content*
SMBG	*self-monitoring of blood glucose*
yrs	*Years*
SD	*Standard deviation*

SDS	*Standard deviation score*
TSH	*Thyroid stimulating hormone*
TIBC	*Total iron binding capacity*
TC	*Transcobalamin*
TfR	*Transferrin receptors*
TIDM	*Type 1 diabetes mellitus*
vit B12	*Vitamin B12*

INTRODUCTION

Diabetes mellites is a common chronic metabolic syndrome characterized by hyperglycemia as a cardinal biochemical feature, with type 1 DM is the most common endocrine–metabolic disorder of childhood and adolescence ***(Alemzadeh and Wyatt, 2004)*.**

Recently, it was recognized that anemia is a common complication of diabetes, particularly in patients with diabetic kidney disease. In a recent cross-sectional survey of patient with diabetes in a single clinic, it was found that nearly a quarter of all out patients had anemia ***(Thomas et al., 2004)***. Anemia develops earlier in patiens with renal impairment than other diabetic microvascular complications.

In addition, a normochromic normocytic anemia can also be observed in patiants without overt renal disease ***(Bosman et al., 2002)***.

It is now recognized that reduced hemoglobin (Hb) levels, even to a limited degree, identifies patients at increased risk of progressive renal disease in patients with diabetic nephropathy ***(Keane et al., 2003)***.

The rate of vision-threatening retinopathy is significantly increased in patient with type 1 diabetes and anemia.This is thought to be due to retinal hypoxia leading to the up-

regulation of growth factor such as vascular endothelial growth factor and other genes involved in neoangiogenesis, capillary permeability and apoptosis ***(Grimm et al., 2002)***.

Patients with type 1 diabetes and anemia have established macrovascular disease more than patients without anemia. So these patients have increase in the risk of ischemic heart disease, irrespective of renal impairment or albuminuria ***(McClellan et al., 2002)***.

The correction of anemia in patients with type 1 diabetes improve the common complaint in many patients (e.g cognitive function, sexual function and reduced tolerance for exercise and ability to work ***(Cody et al., 2001)***.

AIM OF THE WORK

The aim of this work were to study the prevalence of different types of anemia among a group of Egyptian type 1 diabetic children and adlescents and its relation to different diabetic complications.

DIABETES MELLITUS

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

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)***.

Morbidity and mortality from metabolic derangement and from long-term complications that affect small and large vessels result in retinopathy, nephropathy, ischaemic heart disease and arterial obstruction with gangrene of extremities makes diabetes cover a wide range of heterogenous diseases ***(Kuzuya et al., 2002)***. Diabetes mellitus is not a simple disease, but it is a heterogenous 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 ***(Gabr et al., 2000).***