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# Human leukocyte antigen-DQA1*0501 allele and its association with pathogenesis of type 1 diabetes mellitus among Iraqi children

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ABSTRACT

*Background:* Type 1 diabetes mellitus (T1DM) is an autoimmune disease, arising through a complex interaction of both genetic and immunologic factors. There is an association between human leukocyte antigen (HLA) complex and T1DM in various populations. The allele of *HLA-DQA1* gene polymorphism associated with T1DM is *HLA-DQA1*0501*. The blood glycated hemoglobin (HbA1c) level provides the average blood glucose levels during two to three months, which is the predicted half-life of red blood cells (RBCs).

*Objective:* To investigate the molecular basis of the association of HLA- *DQA1*0501* allele with HbA1c levels in children with T1DM, in the Kerbala province of Iraq.

*Materials and methods:* This is a case-control study conducted on 125 T1DM patients, including 66 males (52.8%) and 59 females (47.2%), with the mean age of 10.92 ± 3.78 years and 100 healthy controls, including 57 males (57%) and 43 females (43%), with the mean age of 8.4 ± 3.53 years, randomly recruited from the Kerbala province of Iraq. Genotyping of *HLA* was performed on genomic DNA, using polymerase chain reaction sequence-specific primers (PCR-SSP).

*Results:* The frequency of HLA-*DQA1*0501* allele in T1DM patients was 71.2%, and in apparently healthy control was 29%. The association between HbA1c level and HLA-*DQA1*0501* allele was significant (*P* value ≤.01).

*Conclusion:* The HLA-*DQA1*0501* allele was highly associated with the risk of T1DM pathogenesis. A high significant correlation between the blood HbA1c level and *HLA- DQA1*0501* allele was found.

## 1. Introduction

Diabetes mellitus (DM) is a heterogeneous epidemic disease in Asia, characterized by a rapid increasing rate over a short period, onset at a relatively young age, and low BMI, and varies according to different ethnic and cultural subgroups, degree of urbanization, and socio-economic conditions in different Asian populations. Abdominal or central adiposity particularly is detrimental to type 2 diabetes and other metabolic diseases, which is highly prevalent in Asian populations. The high rates of gestational diabetes, childhood obesity, and over-nutrition in later life, may contribute substantially to the increasing trend of diabetes epidemic in Asia (Sayin et al., 2015; Al-Tu'ma et al., 2011a).

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease, characterized by increased blood glucose levels (hyperglycemia), which are due to the insulin deficiency that occurs as the consequence of loss of the pancreatic islet β-cells (Atkinson et al., 2014; Zaccardi et al., 2016). T1DM is one of the most common endocrine and metabolic conditions, occurring in children and adolescents. Polydipsia, polyphagia, and polyuria are the obvious symptoms of this disease; the loss of β-cells is the consequence T1DM-related autoimmunity. This type has a strong genetic component (Jacob et al., 2016; Bloem and Roep, 2017).

Single nucleotide polymorphisms (SNPs) are DNA sequence variations that occur when a single nucleotide (A, T, C, or G) in the genome sequence is altered. For a variation to be considered a SNP, it must

*Abbreviations:* T1DM, type 1 diabetes mellitus; DM, Diabetes mellitus; MHC, Major histocompatability; bp, base pair; HLA, Human lecukocyt antigen; PCR, Polymerase chain reaction; min, minute; Sec, Second; SNP, Single nucleotide polymorphism; TSH, Thyroid stimulating hormon; T3, Triiodothyronine; T4, Tetraiodothyronine; p value, *P*-value, probability value; χ2, Chi-square test

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