Association between Diabetes Mellitus Type-1 and Celiac Disease in Growth Retardation Iraqi Patients

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Abstract

This study was performed in the ministry of health- Specialized Center for Endocrinology and Diabetes in Baghdad. Measurement of some biochemical parameters in serum of 93 patients with growth retardation divided into two groups: group-1 (G1) control group without diabetes, and group-2 (G2) with diabetes. The results showed that celiac disease reduces weight and consequently body mass index. The Anti-tissue and Anti-Gliadin IgA increase significantly ($p<0.01$) in G2 compared with G1, were the Anti-tissue IgA titer reached 6.88 and 65.30 U/ml and Anti-Gliadin IgA titer reached 7.69 and 72.29 U/ml in G1 and G2 respectively. In addition, the results express positive linear relationship ($p < 0.01$) among glucose level with Anti-tissue and Anti-Gliadin IgA in G2, using the regression equation of Anti-tissue and Anti-Gliadin y=4.327+0.199 (S. glucose) and y=6.027+0.102 (S. glucose) respectively.

Keywords: *type-1 diabetes mellitus, celiac disease, anti-tissue IgA and anti-gliadin IgA.*

Introduction

Diabetes mellitus is one of the most common chronic endocrinology diseases [1]. In type-1 diabetes or insulin-dependent diabetes the pancreas produces little or no insulin [2], and the genetic factor contribute to type-1 diabetes appears usually during childhood or adolescence [3].

Celiac disease or gluten-sensitive enteropathy is an immune reaction in the intestine toward gluten, a protein found in wheat mainly [4], were in some persons this reaction leads to damage of small intestine lining and prevent it from absorbing some nutrients (malabsorption) causing diarrhea, stress, weight loss, and anemia [5].

The association between diabetes mellitus and celiac disease was first reported in 1960s [6]; and the average prevalence of celiac with diabetes mellitus was 4.5% [7]. Type-1 diabetes mellitus and celiac disease have same genetic background related with HLA DQ2 or HLA DQ8 and similar trigger for autoimmune processes [8 and 9]. Positive correlation in the duration was also observed between diabetes type-1 and celiac disease [10].

Anti-gliadin antibodies (IgA and IgG) are produce in response to gliadin (a prolamin in wheat). Gliadin is encoded by three different alleles which can elicit the body to produce different antibodies. Anti-gliadin IgA antibody found in 80% of patients with celiac disease [11]. IgA is useful in determining celiac

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disease because it's produced in the small intestine, where gluten causes irritation and inflammation in the sensitive people [12]. Antibodies to tissue transglutaminase (anti-tTG or anti-TG2) are found in several conditions like celiac disease, inflammatory bowel disease and type-1 diabetes [13]. In celiac disease, these antibodies involve in the destruction of the villus extracellular matrix and target the destruction of intestinal villus epithelial cells by killer cells. The deposits of anti-tTG in the epithelium of intestinal predict the celiac disease [14]. Anti-tissue antibodies (ATA) toward transglutaminases can be classified into 2 different schemes, transglutaminase isoform and immunoglobulin reactivity subclasses (IgA and IgG). The ATA IgA is more frequently found in celiac disease; however, one haplotype, DQ2.5 is found in most celiac disease, has genetic linkage to the IgA-less gene location.

Aim of this study to detect the association between celiac disease and type-1 diabetes mellitus in growth retardation patients.

Subjects, Materials and Methods

Subjects and Methods

Ninety-three patients with growth retardation were gathered randomize from the Specialized Center for Endocrinology and Diabetes in Baghdad, after attainment official approval and the verbal consent from participants report the age and gender; measure the body mass index (BMI) using the following equation: **BMI (Kg/m^2) = weight / (height)^2**. From each patient collect 5 ml of whole blood and after clot at 25 °C centrifuged at 10000 rpm for 5 minutes and stored at -20 °C until used.

Divide the 93 patients into two groups:

Group-1 (G1), number 50 represent control group: growth retardation patients without diabetes.

Group-2 (G2), number 43 growth retardation patients with diabetes**.**

Materials

· **Glucose measurement (mg/dl)**: glucose concentration was analyzed by an automatic biochemical analyzer.

· **Anti-tissue and Gliadin IgA (U/ml):** Anti-tissue and Gliadin IgA titer in serum was measurement by enzyme-linked immunosorbent assay method and used a commercially obtained ELISA kit (AESKULISA, Germany).

Statistical Analysis

Statistical package for social sciences program SPSS version 20 for window LEAD Technologies. Inc. USA (2011) were used for the estimation of result's differences between the studied groups consider the significance at P value < 0.05, using t-test for the assay of results and linear regression to find the association between diabetes type-1 and celiac disease.

Results and Discussion

The basic bibliography of this study in table (1) expressing highly significant differences ($p < 0.01$) in the body mass index between the studied groups, and this is may be due to restriction of some types of food according to the disease state of the patients or the involvement of dietary deficiencies or changes in absorption may play a role in it [15] and this is clear in G2 where the patients underweight. Even though our data showed that BMI analysis of G1 were within the normal range and this is compatible with other study by Pitocco et al [16].

Other results in this table were obviously demonstrate the effect of type-1 diabetes on Anti-tissue IgA and Anti-Gliadin IgA concentration, at which there are highly significant elevation ($p<0.01$)

in the serum level of glucose, Anti-tissue IgA and Anti-Gliadin IgA in G2 compared to G1, also these results were clarified more in figure 1 and 2.

Table (1): Basic bibliography of the study

Parameters	G1 Mean ± SE	G2 Mean ± SE	P-value
Age	16.14 ± 6.15	16.92 ± 7.21	> 0.05
BMI	20.09 ± 5.30	15.08 ± 2.14	< 0.01
S. glucose Mmol/L	5.59±0.769	13.78±2.94	< 0.01
Anti-tissue IgA U/ml	6.88±2.94	65.30±26.07	< 0.01
Anti-Gliadin IgA U/ml	7.69±2.62	72.29±25.63	< 0.01

Figure (1) and (2) represent the association among serum glucose with Anti-tissue IgA and Anti-gliadin IgA in G2; at which a positive linear relationship ($p < 0.01$) between serum glucose and Anti-tissue IgA (Fig. 1) assessed by the regression equation y=4.327+0.199 (serum glucose) this mean increasing level of glucose by 4.327 Mmol/L lead to increase the level of Anti-tissue IgA by 0.199 U/ml. These findings confirmed by barker et el that patients with type-1 diabetes carries 33% risk for the presence of transglutaminase autoantibodies also Anti-tissue IgA and Anti-Gliadin IgA titer [17].

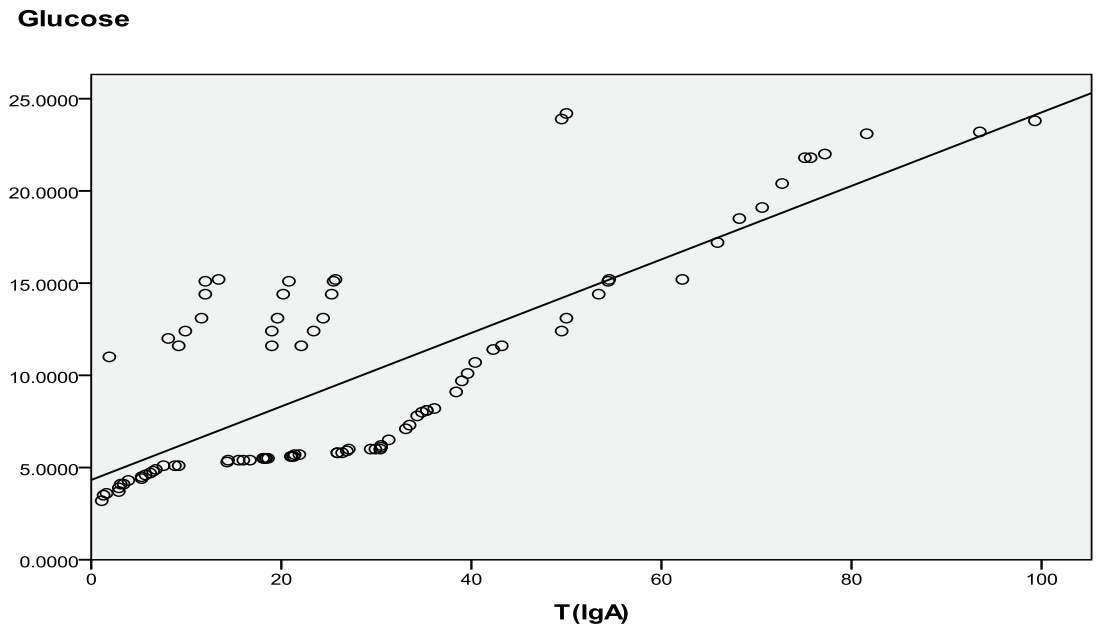

Figure (1): Association between serum glucose and Anti-tissue IgA in group 2

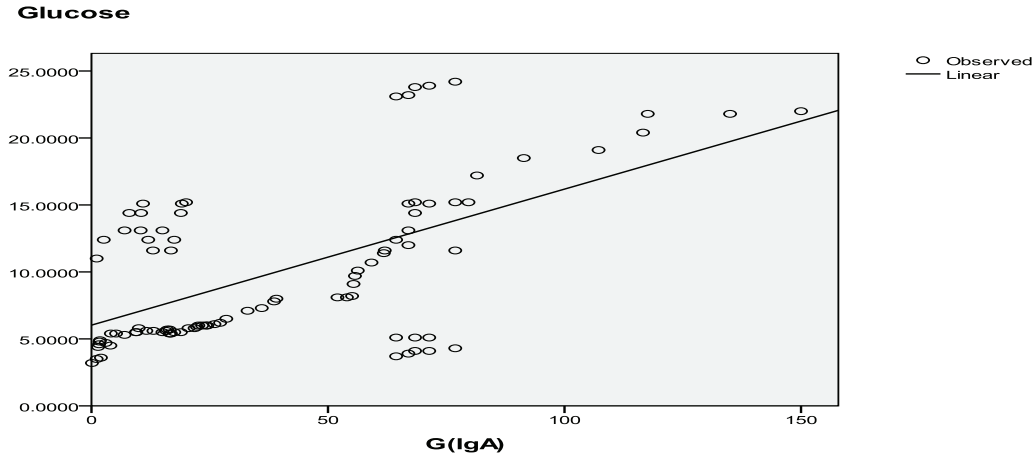

Figure (2): Association between serum glucose and Anti-gliadin IgA in group 2

Another positive linear relationship ($p \leq 0.01$) was found between serum glucose and Anti-Gliadin IgA in G2 (Fig. 2) which is explicit by regression equation y=6.027+0.102 (serum glucose).

The positive association between serum glucose and Anti-tissue IgA and Anti-Gliadin IgA is an indicator of the relationship between type-1 diabetes and celiac disease in growth retardation patients and this is consistent with other studies [5,7,8, 9 and 18]. The association between celiac and type-1 diabetes may be due to common genetic predisposition as suggested by increased occurrence of HLA-DR3, DQ2 encoded by the alleles DQA1*501 and DQB1*201, thus providing a common genetic basis for expression of both diseases [8,9 and 19].

Conclusions

There is a relationship between type-1 diabetes and celiac disease confirmed by the association between serum glucose and Anti-tissue IgA and Anti-Gliadin IgA which can be considered as biomarker or indicator for growth retardation.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: Non

Funding: Self-funding

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