

Screening for celiac disease using anti-tissue transglutaminase antibody assays in healthy students individuals

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Abstract

This study was aimed to determine the prevalence of seropositivity of celiac disease among apparently healthy individuals. Between December / 2014 to March / 2015, eighty four apparently healthy students (42 males and 42 females) of the Technical College/Kirkuk with mean age \pm standard deviation of 22.25 ± 2.85 years where participated in the study. All subjects were serologically screened for the presence of immunoglobulin A and G of anti-tissue transglutaminase antibodies (IgA-tTG and IgG-tTG) by using Enzyme-Linked Immunosorbent Assay (ELISA). In total, 84 students (42 males and 42 females). There was only five students (5.9%) who had a seropositive for celiac disease, including 4 females and 1 male, among them only one female showed positive results of both IgA and IgG anti-tissue transglutaminase antibodies (IgA-tTG and IgG-tTG), while the remaining students (3 females and 1 male) revealed negative results of IgA anti-tissue transglutaminase antibodies and positive results of IgG anti-tissue transglutaminase antibodies. The Computerized Microsoft Excel program was performed by using proportions and mean \pm standard deviation. In conclusions, positive celiac screening is existent at a high prevalence rate in our healthy individuals, in which the individuals' IgA deficiency are detected with the positivity of IgG anti-tissue transglutaminase antibodies. Females are more affected than males. A study widely is needed to estimate the real prevalence by substantiation of positive cases with histological examination.

Keywords: Celiac disease, anti-tissue transglutaminase antibody.

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الكشف عن مرض حساسية الحنطة باستخدام فحص أضداد نسيج الترانسكلوتامينز في الطلبة الأصحاء

بريهان حمدي حميد

قسم تقنيات التحليلات المرضية - الكلية التقنية - كركوك

الخلاصة

تهدف هذه الدراسة الى تحديد مدى انتشار الاصابة بمرض حساسية الحنطة بين الأفراد الأصحاء. شارك في هذه الدراسة ، أربعة وثمانون طالبا اصحاء (42 ذكور و 42 إناث) من الكلية التقنية / كركوك مع متوسط العمر \pm الانحراف المعياري من 22.25 ± 2.85 سنة بين كانون الأول / 2014 إلى آذار / 2015. خضعت جميع العينات المصلية لوجود الغلوبولين المناعي A و G ضد نسيج ترانسكلوتامينز (IgG-tTG و IgA-tTG) باستخدام تقنية الامتزاز المناعي المرتبط بالانظيم. من المجموع، 84 طالبا (42 ذكور و 42 إناث). لم يكن هناك سوى خمسة طلاب (5.9%) الذين كان في مصليهم اجسام مضادة لمرض حساسية الحنطة بما في ذلك 4 إناث و 1 ذكر، لم يكن بينهم سوى أنثى واحدة أظهرت نتيجة ايجابية من كلا IgG-tTG و IgA-tTG ، في حين أن بقية الطلبة (3 إناث و 1 ذكر) كشفت النتائج السلبية من IgA-tTG ونتائج الايجابية من IgG-tTG. تم تنفيذ برنامج مايكروسوفت اكسل بالحاسبة باستخدام النسب والمعدل \pm الانحراف المعياري. في الاستنتاجات وجد معدل انتشار عالي في الأفراد الأصحاء لدينا عند التحري عن الاستجابة الإيجابية لفحص حساسية الحنطة، وتم الكشف عن نقص IgA في الأفراد مع إيجابية IgG-tTG. الإناث أكثر تأثرا من الذكور. هناك حاجة إلى دراسة على نطاق أوسع لتقدير مدى انتشار حقيقي من إثبات حالات إيجابية مع الفحص النسيجي.

كلمات مفتاحية: مرض حساسية الحنطة ، الأضداد المناعية ضد نسيج ترانسكلوتامينز.

Introduction

Celiac Disease (CD) is an immune-mediated disorder initiated in genetically predispose individuals by ingestion of gluten, which progresses to destroy the small intestine [1]. It has been identified throughout the world, and its prevalence is approximately 1% in the general population, but there are emerging data to suggest that its prevalence might be increased in recent years [2].

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The disorder originates from the interaction of environmental and genetic agents [3]. The essential environmental elicit is gluten, which is a mixture of gliadin and related prolamines present in cereals such as wheat, rye and barley [4], while the genetic predisposition depends on some HLA-related class II genes, most celiac patients about 90-95% express HLA DQ2, while, the remaining 5-10 of the patients are positive for DQ8 [5]

The disease onsets at any age and with many possible presentations, and the identification of CD is challenging because it could be completely symptomless, or it can begin not only with gastrointestinal symptoms but also with a typical gastrointestinal and extra-intestinal symptoms (recurrent abdominal pain, constipation, anemia, osteoporosis, aphthous stomatitis, raised transaminases and associated autoimmune disorders) [6].

Tissue transglutaminase (tTG) and antiendomysial (EMAs) are a highly reliable serological assays for the diagnosis of celiac disease [6]. However, tTG have similar sensitivity and specificity to EMAs test but it represents an improvement over the antiendomysial antibody assay because it is inexpensive, rapid and easy to perform by using enzyme-linked immunosorbent assay (ELISA) technique [7]. This study was aimed to estimate the prevalence of seropositivity of celiac disease among apparently healthy student individuals.

Subjects and Methods

The study was carried out on healthy individuals during the period between December / 2014 to March / 2015. This study included eighty four apparently healthy students (42 males and 42 females) from Technical College/Kirkuk and their ages ranged between (19 – 25 years). All subjects were subjected to personal interview using specially designed questionnaire format gathered information concerning name, age, gender, knowledge about the CD, if each subject has a family history of CD or formerly diagnosed as celiac patient, clinical history of: vomiting, diarrhea, abdominal pain, anemia and other associated autoimmune diseases. Venous blood samples were also obtained from each subject included in this study. Sera were detached and frozen at (-20 C) until performing the tests. The immunoglobulin A and G of anti-tissue transglutaminase antibodies were determined by using enzyme-linked immunosorbent assay (ELISA) (AESKU. DIAGNOSTICS. MIKROFORUM RING 2.55234

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WENDELSHEIM.GERMANY) in conformity with the manufacturer's directive. Sera of all subjects were examined at a dilution (1:101); a 6-point calibrator curve (0, 3, 10, 30, 100, 300 U/ml) were used to calculate the antibody level and expressed as (U/ml). Values more than 18 U/ml were considered positive. The Computerized Microsoft excel program was performed by using proportions and mean \pm standard deviation [8].

Results

A total of 84 apparently healthy students, positive result of IgA-tTG was found in one individual 1 female (1.2%). While, IgG-tTG antibody test results showed that 5 individuals tested positive 1 male & 4 females (5.9%), one of these females also showed positive result of IgA-tTG. Based on the screening questionnaire, no individual was found to have features to suggest CD. One individual tested positive for IgG-tTG revealing family history of CD. The properties of individuals with the positive result of IgA-tTG and IgG-tTG or both are presented in the table (1).

Table (1): Data of the five patients who were found positive for IgA-tTG and IgG-tTG or both.

No	Sex	Age (years)	*IgA-tTG antibodies (U/ml)	*IgG-tTG antibodies (U/ml)	Symptoms	Family history
1	F	24	198	105	n	No
2	F	20	11	90	n	No
3	F	21	4.9	74	n	No
4	F	20	11.8	91	n	No
5	M	22	7.6	44	n	Yes

*Using quantitative evaluation ratio for tissue transglutaminase (tTG) IgA and IgG, the cutoff for the positive > 18 U/ml, equivocal 12-18 U/ml, and negative subjects < 12 U/ml. n: No complains; M: Male; F: Female.

Discussion

Celiac disease is a throughout life disorder caused by ingested cereal-derived gluten in predisposed individuals [3]. Since celiac disease is common but difficult to detect because of the heterogeneous clinical picture, a wide scale screening of the whole population with

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noninvasive serologic tests frequently has been suggested [9,10]. The immunoglobulin A (IgA) of anti-tissue transglutaminase antibody as the preferable serological assay recommended by many studies for CD screening to distinguish new celiac patients with mild and extra-intestinal symptoms, likewise epidemiological tracking [11, 12, 13]. The current study showed that the seropositive of IgA-tTG was 1.2% (1/84). Immunoglobulin G (IgG) tTG and IgA-tTG were used in combination as a screening test for celiac disease to assess an IgA deficiency. The present study revealed that the seropositive of IgG-tTG was 5.9% (5/84). This finding indicates that they may have IgA deficiency, and so it agrees with a study conducted IgG-tTG reliable serological assay for the diagnosis CD with selective IgA deficiency patients [14]. Immunoglobulin A deficiency is 10-15 times more common primary immunodeficiency disorder in CD patients. Almost 3% of celiac patients with IgA deficiency, which may produce false-negative IgA-tTG [15]. The prevalence of seropositivity of CD among apparently healthy students reported in the present study, 5.9% (5/84) is much higher than that recorded in other seroprevalence studies worldwide, evaluated by IgA-tTG assay, was recorded in children, adolescents and adults that were formerly healthy, like in studies completed in United Arab Emirates (1.17%) (14/1197) [16], Iran (2%) [17], Libya (0.82%) [11], north India (1.44) (1:96) [18] and Belgium (0.86%) [13]. Other studies using another serological test for screening celiac disease like in Saudi Arabia study [19], CD prevalence was 2.2% among healthy adolescents by seropositivity of the anti-endomysial antibody. The researchers reported in their study the prevalence of celiac disease may be among the highest rates worldwide; but, the Egyptian study [20] had revealed a prevalence of 0.5 % among healthy children (7 months–18 years) for anti-endomysial antibody and histology compatible with celiac disease, whereas an Turkish study (performed during 2011) for 20190 students was [21] found 489 (2.4%) patients with seropositivity of both IgA-tTG and IgA-EMA antibodies. Only ninety five children who were compatible with CD of 215 patients who agreed to intestinal biopsy, with an estimated biopsy confirm the prevalence of (0.47%) children. The gross prevalence of CD of this study is also higher compared to other studies of Europe; in Finland (2.4%), Germany (0.3%), Italy (0.7%) and the United Kingdom (1.5%) [22]. The CD prevalence varies greatly across different countries. This variability reflects

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differences in the diagnostic strategies used, heterogeneity of the studied population (e.g., serologic screening vs. symptom-based diagnosis, screening of general vs. high risk group populations), sensitivity of tests and whether confirmatory biopsies were performed or not [23, 24, 25]. The present study also showed that the prevalence of celiac disease was more frequent among females than males, this was compatible with most of the celiac disease epidemiological studies reported by Aljebreen AM, et al, 2013 study [19] and Abu-Zeid YA, et al, 2014 study [16] which concluded that celiac disease affected females more frequently than males. Possibly females are genetically more susceptible to environmental exposure factors that impact the immunological processes and resulting CD [26] because the genetic predisposition HLA DQ2/DQ8, are more recurrent in female compared to male CD patients [27]. In conclusion, the high prevalence rate of seropositivity of celiac disease among healthy student individuals and is found in female students more than males.

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